U. S. DEPARTMENT OF COMMERCE
W. AVERELL HARRIMAN, SECRETARY
COAST AND GEODETIC SURVEY
LEO OTIS COLBERT, *Director*

JUNE 14, 1947 SERIAL NO. 694

UNITED STATES COAST PILOT

Atlantic Coast Section C

Sandy Hook to Cape Henry

FIFTH (1947) EDITION

VK
981
.N33
5th ed.
(1947)

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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

John A. McCormick

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. 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 C, covering the coast and intracoastal waterways from Sandy Hook to Cape Henry, including Delaware and Chesapeake Bays and their tributaries to the head of navigation. It is corrected to June 14, 1947 (including Notice to Mariners No. 24).

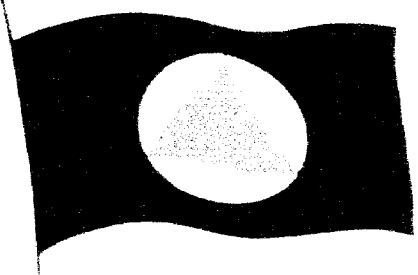
The information in this Coast Pilot is based upon the work of the United States Coast and Geodetic Survey and includes the results of a special field examination made in 1946–47. The United States Weather Bureau, the United States Engineers, the United States Coast Guard and other authorities were additional sources of information.

Supplements to the Coast Pilots, 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. The supplement 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 that may come to their attention.

LEO OTIS COLBERT, *Director.*

JUNE 14, 1947.



SERVICE FLAG
U. S. COAST AND GEODETIC SURVEY

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U.S. Coast and Geodetic Survey Charts
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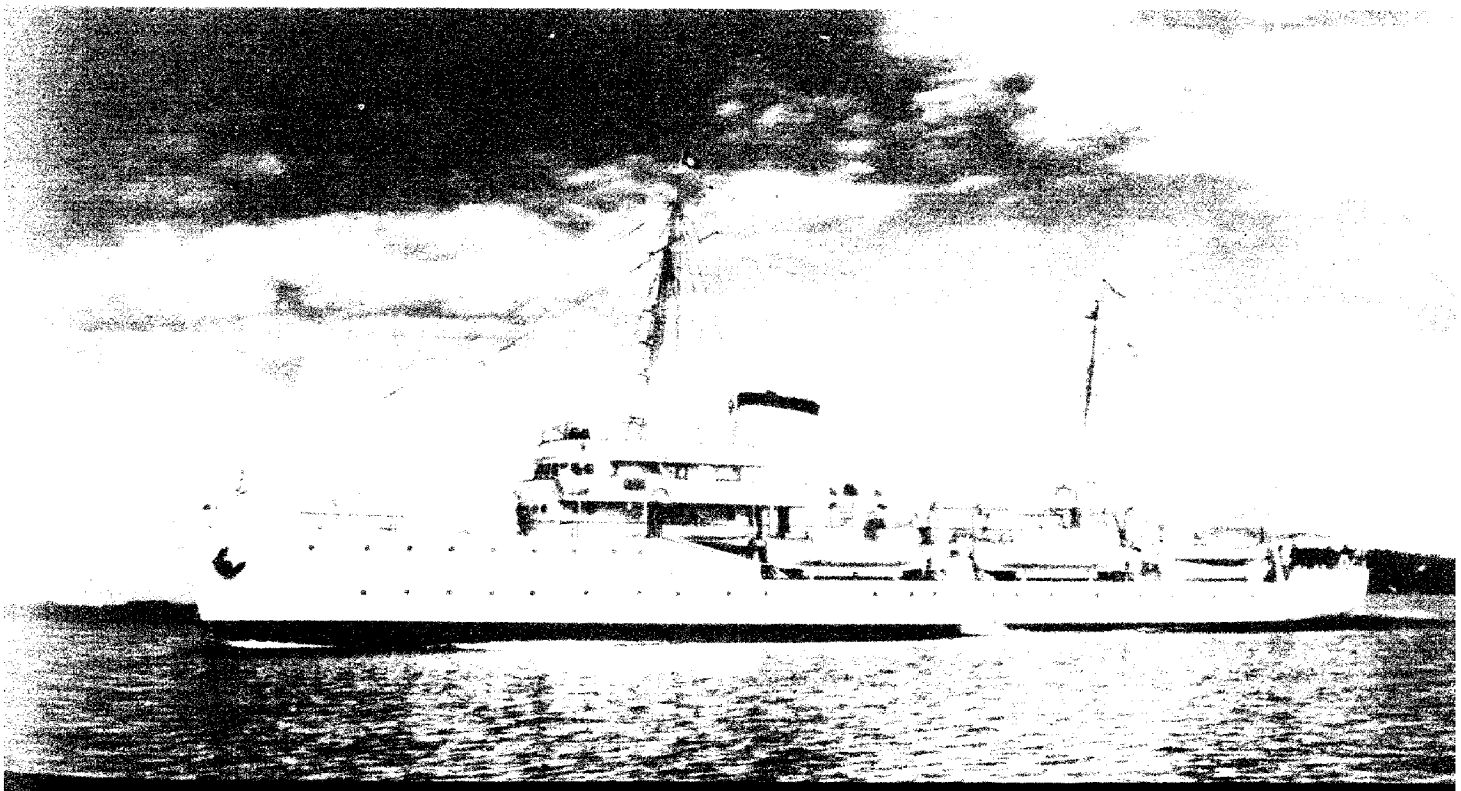
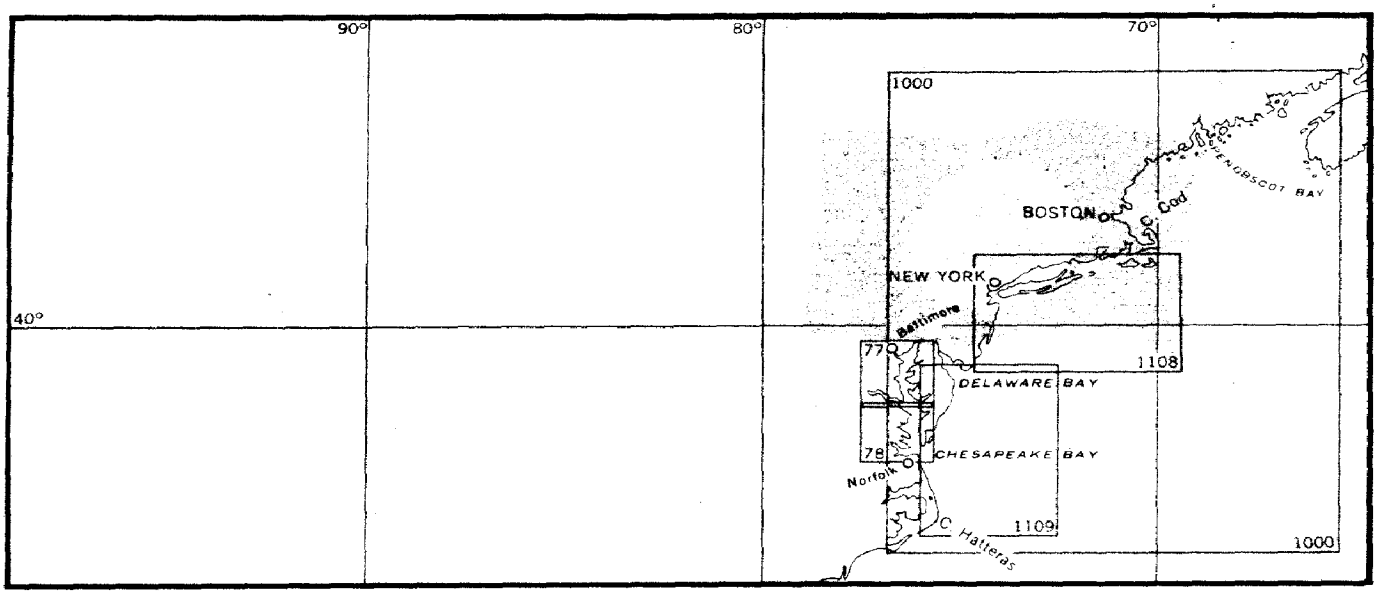


Coast and Geodetic Survey Ship *EXPLORER*; length 198 feet, draft 15 feet, displacement 1850 tons.

SAILING AND GENERAL CHARTS - ATLANTIC COAST



NUMERICAL LIST OF NAUTICAL CHARTS

June 14, 1947

No.	Price	Scale
77	$0.75	1:197,250
78	.75	1:200,000
234	.25	1:10,000
280	.75	1:15,000
286	.75	1:15,000
294	.75	1:40,000
295	.75	1:40,000
296	.50	1:40,000
369	.75	1:40,000
375	.50	1:20,000
379	.25	1:20,000
400	.75	1:20,000
452	.75	1:20,000
481	.75	1:20,000
492	.75	1:20,000
494	.75	1:40,000
495	.75	1:40,000
504	.75	1:40,000
529	.75	1:40,000
530	.50	1:40,000
531	$0.75	1:20,000
534	.75	1:40,000
535	.75	1:40,000
536	.75	1:20,000
539	.75	1:40,000
543	.50	1:20,000
545	.75	1:15,000
548	.75	1:40,000
549	.75	1:40,000
550	.75	1:40,000
551	.75	1:40,000
553	.75	1:40,000
556	.25	1:20,000
557	.75	1:40,000
558	.75	1:40,000
559	.75	1:40,000
560	.75	1:40,000
566	.75	1:25,000
567	.75	1:20,000
570	.50	1:20,000
572	$0.75	1:40,000
795	.75	1:10,000
825	.25	1:40,000
826	.25	1:40,000
827	.25	1:40,000
1000	.75	1:1,200,000
1108	.75	1:400,000
1109	.75	1:416,944
1215	.75	1:80,000
1216	.75	1:80,000
1217	.75	1:80,000
1218	.75	1:80,000
1219	.75	1:80,000
1220	.75	1:80,000
1221	.75	1:80,000
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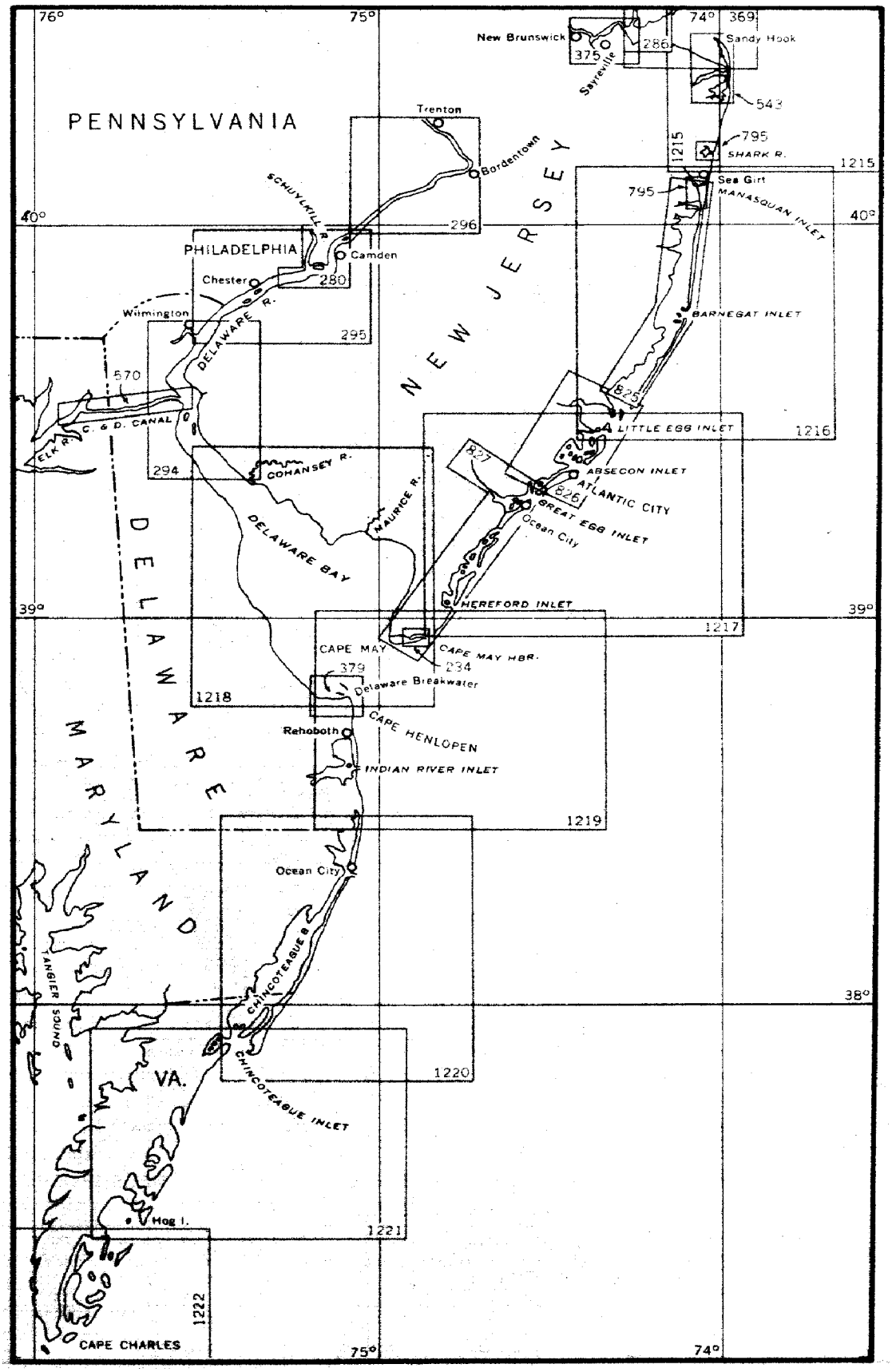
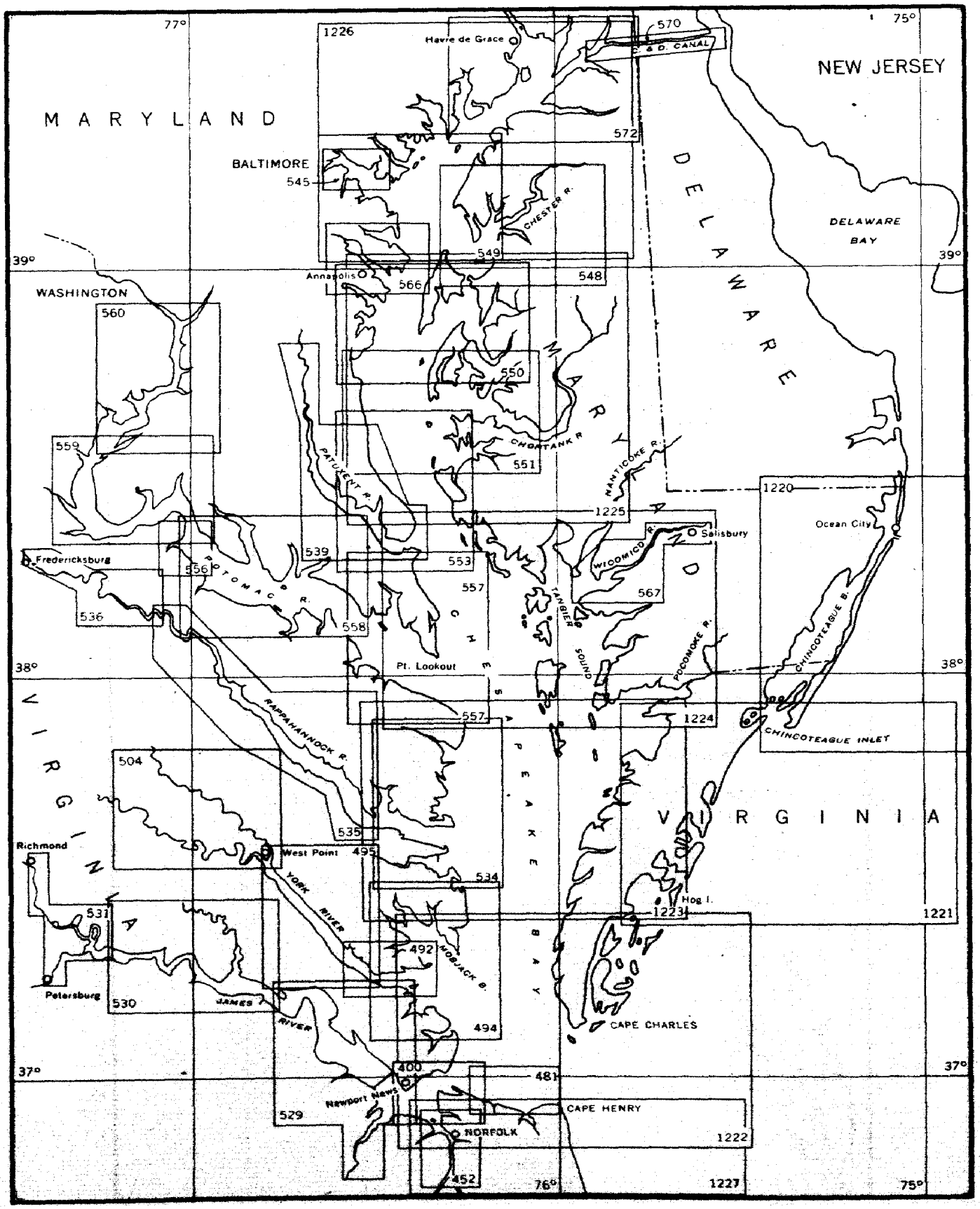
1223	.75	1:80,000
1224	.75	1:80,000
1225	.75	1:80,000
1226	.75	1:80,000
1227	.75	1:80,000

SANDY HOOK, N. J. TO CAPE CHARLES, VA., INCLUDING DELAWARE BAY



COAST AND HARBOR CHARTS - ATLANTIC COAST

CHESAPEAKE BAY AND TRIBUTARIES



CHAPTER 1

General Navigational Information

U. S. Coast and Geodetic Survey

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 tables 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 United States Coast and Geodetic Survey. 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

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can best be seen, three shapes not less than 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 work, you should keep clear of me."

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

ONA having the same meaning as the two letter hoist "HD."

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.

Charts

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, an explanation of the more important symbols and abbrevia-

tions, an index or notation of adjoining charts, controlling depths, caution notes, etc. 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 a survey with lead and line, 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 upon 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 Puerto Rico the plane of reference for soundings is the mean of all low waters; for the Pacific coast of the United States and Alaska, with the one exception noted below, and for the Hawaiian and Philippine Islands, it is the mean of the lower low waters. For the Atlantic coast of the Canal Zone, Panama, the plane of reference for soundings is mean low water, and for the Pacific coast of the same it is mean low water springs. 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 for entering 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, bearings to near objects should be used in preference to objects farther off, although the latter may be more prominent, as a small error in 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 Special Publication No. 96 of the United States Coast and Geodetic Survey, entitled *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 six feet of a compass an error of from two to four degrees will result. Closer proximity increases this greatly. Other equipment, such as emergency lights and portable telephones, will have similar effect. So as not to affect magnetic compasses, such electric equipment should not be stowed within ten 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.

Tides and Currents

Tide Tables for the Atlantic Ocean and for the Pacific Ocean are published in advance annually by the United States Coast and Geodetic Survey. The Atlantic Ocean Tide Tables supply complete tidal data for the east coast of North and South America, the west and north coasts of Africa, and all of Europe. The Pacific Ocean Tide Tables give data for the Pacific and Indian Oceans; see Appendix.

They contain tables of full daily predictions of the times and heights of high and low waters for certain reference stations along the coasts, with full explanations for the use of this table. 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 enables the height of tide at any time to be computed.

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 above mean high water due to similar causes.

Caution.—In using the Tide Tables, slack water should not be confounded 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- and low-water stand. The relation of the times of high and 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 figures 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 United States 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 Appendix.

Tidal Current Charts are published by the United States Coast and Geodetic Survey for various localities; see Appendix. These current charts are good for any year and show the direction and velocity of the tidal current for each hour of the current. 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.

Destructive and Other Waves

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.

Seiche and surge are short-period vertical and horizontal oscillations of water which are particularly dangerous to ships in certain areas.

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, and of many 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. 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.

At Honolulu, which is reasonably well protected from the direct onslaught of the waves, there was on April 1, 1946, an initial rise of about ½ foot in 6 minutes followed by a fall of 2¼ feet in the next 7½ minutes. In the three succeeding 7½ minute periods there was first 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 tide gages which have recorded heights of seismic sea waves have usually been located in comparatively sheltered areas. The wave of April 1, 1946 was reported to have reached levels 40 feet or more above sea level in some parts of the Hawaiian Islands. Except for the possible grounding of floating equipment, the rise following the first fall is 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 and extremely long, hence will pass a ship unnoticed. They become dangerous on either nearby or distant shores where depths and shape of coastline conspire to augment them. When a seismic sea wave moves into shallow waters, its speed is diminished, its height is increased and its front becomes more steep.

Submarine earthquakes produce waves that proceed at the velocity of sound waves. On reaching the surface, these oscillations may be felt on board a ship as a shock that violently rocks the vessel. The shock may be so severe that the sailors believe their ship has struck a reef. A ship receiving such a shock is not necessarily directly over the location of the seismic disturbance as some such reports have been received from ships at considerable distances from epicenters located by seismological methods.

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. An experimental seismic sea wave warning system in the Pacific is now being prepared and may soon be in operation.

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 waterfront. 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 U. S. 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 ten to twelve feet in a matter of fifteen to twenty 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 twenty separate waves from 0650 until 0920. These waves started with great magnitude from ten to fifteen 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 underway. 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 one and five-eighths towing hawsers were parted but were replaced immediately. Approximately thirty 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. Higher waves can form with greater depth and the combination can be destructive to low-lying 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. The destructive rise at Galveston on September 8, 1900, was of this type, raising the water level about 10 feet above mean high water.

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.

An intensive study of wave and surge at the Naval Operating Base, Terminal Island, California, was completed in 1945. It indicated that in this particular area oscillations, with periods of from one to three minutes and with amplitudes as small as 0.2 foot, induced ship motion capable of appreciable damage. Very little, if any, damage occurred to ships and piers during times of abnormally high waves which had periods of about fifteen seconds. Since the investigations, a breakwater has been built to minimize the seiche and surge oscillations at Terminal Island.

Swell.—When a severe storm has raised a heavy sea, large wind waves emerge from the storm area. 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. This swell may be all but hidden by short irregular wind waves until it enters shallow water where it is often responsible for determining the character of the surf.

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 shore.

The most striking transformation takes place, however, during the last few minutes, from the time when the wave "feels bottom" until it breaks on the beaches. Where

the swell approaches a shore line at an angle it tends to turn parallel to the shore. It bends into bays and around outlying points. As the wave is about to break, the crest rises sharply from the water surface, and the accumulated energy is thrown into the breaking wave. Transformations occur everywhere, and therefore the character of the surf varies considerably on adjacent beaches although caused by a uniform swell offshore.

Army Engineers

The improvement of the rivers and harbors of the United States and miscellaneous civil works are under the charge of the **Corps of Engineers, United States Army.**

The miscellaneous civil works under the Corps of Engineers 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, the granting of permits for structures or operations in navigable waters, etc.

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 United States 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 United States Engineers.

The **Port Series,** publications of the Corps of Engineers and the United States Maritime Commission, 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, water and rail connections, and character and commerce of the hinterland.

The information in all these reports is generally prepared along similar lines; the general subjects covered include the following:

Port and harbor conditions.	Port and harbor facilities.
Port customs and regulations.	Communications.
Port services and charges.	The freight-rate situation.
Fuel and supplies.	Commerce reports.

The publication, **Port and Terminal Charges at United States Ports,** Miscellaneous Series, No. 1, prepared by the Corps of Engineers and sold by the Superintendent of Documents, gives detailed information regarding all port services and charges (including dockage, wharfage, storage, handling charges, etc.) at practically all ports of the United States. This publication includes 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 (quaran-

tine and hospital services), the Customs Service and the Immigration Service; it also includes a list of Federal documents which vessels are required to have.

Protection of Navigable Waters.—There are given below 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 the 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.

Hydrographic Office

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.

The Publications of the Hydrographic Office issued for the use of the 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 a number of 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 Appendix.

Weather Bureau

The **Weather Bureau** has charge of weather forecasting, including the issuance and display of weather forecasts, and storm, hurricane, cold-wave, frost, forest fire, and flood warnings. It collects and transmits marine meteorological information for the benefit of commerce and navigation, records and reports rainfall and temperature conditions, etc. Meteorological tables issued by this Bureau for various ports are in the Appendix.

Storm Signals

Storm Signals are displayed by the United States Weather Bureau at numerous places on the coast of the United States and 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.

Coast Guard

The **Coast Guard** has among its duties the following:

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.

Enforcement of navigation laws.

Enforcement of neutrality laws and regulations.

Enforcement of rules and regulations in relation to anchorage grounds.

Enforcement of the Oil Pollution Act.

Inspection of all vessels to insure safety to passengers and crews.

Aid to distressed mariners and saving of life and property from shipwreck.

Issuance of marine licenses and certificates.

Investigation of circumstances connected with shipwreck or collision at sea.

Destruction of derelicts.

Construction, operation, maintenance and inspection of aids to navigation.

Publication of Light Lists and Radiobeacon Charts.

Light Lists.—All aids to navigation, such as lights, radiobeacons, fog signals, buoys, and day marks, 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, visibility, etc., of lights, as well as descriptions of light structure and day marks, buoys, fog signals, etc. Such detailed information is not given in this Coast Pilot; see Appendix.

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; the mariner 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, due to 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. In the case of 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 (a) the vessel is at the limit of the geographic range and (b) the light is of considerable luminous power. If, under the same circumstances, the light cannot be made to dip, it is evident that (a) the vessel is well within the geographic range and may, in fact, be very close to the light, and (b) 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, light characteristics, etc.—the mariner is referred to the preface of the Light Lists.

Buoys are liable to be carried away, shifted, capsized, etc., lighted buoys may be extinguished, or whistling 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 force 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 running near the land in a fog. Audible signals are useful, but the navigator's principal reliance should be on the lead or the echo-sounding apparatus, and in bearings of radio or submarine signals, 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 a few localities echo boards have been erected to facilitate this operation. Two general types are in use. The first type is specially constructed so that the echo will be heard at a specified distance off. The second type is a flat surface which will reflect any sound striking it. Refer to 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 radiobeacons are given in the *Light List* and *H. O. Publication No. 205, Radio Navigational Aids.*

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.

Search and Rescue

Search and rescue operations of surface vessels and 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 water line as possible. The largest metallic object available should be used.

Instructions to Mariners in Case of Shipwreck

General Information.—Coast Guard (lifesaving) stations and houses of refuge are located on the Atlantic and Pacific seaboards of the United States, the Gulf of Mexico, and the Lake coasts.

The stations are manned throughout the year by crews of experienced surfmen.

All lifesaving stations, except inactive stations, are fully supplied with boats, wreck guns, beach apparatus, and restoratives.

The lifesaving stations are provided with the International Code of Signals, and other means of visual signaling, and vessels can, by opening communication, be reported; or obtain the latitude or longitude of the station, where determined; or information as to the weather probabilities in most cases; or where facilities for the transmission of messages by telephone or telegraph are available, request for a tug or Coast Guard cutter will be received and promptly forwarded.

All services are performed by the lifesaving crews without other compensation than their pay from the Government.

Destitute seafarers are provided with food and lodging at the nearest station by the Government as long as necessarily detained by the circumstances of shipwreck.

The station crews patrol the beach from 2 to 4 miles each side of their stations between sunset and sunrise, and if the weather is foggy the patrol is continued through the day. A continuous lookout is also maintained at every station night and day.

Each patrolman carries warning signals. Upon discovering a vessel standing into danger he ignites one of these, which emits a brilliant red flame of about 2 minutes' duration, to warn her off, or, should the vessel be ashore, to let her crew know that they are discovered and assistance is at hand.

If the vessel is not discovered by the patrol immediately after striking, rockets, flare-up lights, or other recognized signals of distress should be used. If the weather be foggy, some recognized sound signal should be made to attract attention, as the patrolman may be some distance away at the other end of his beat.

Masters are particularly cautioned, if they should be driven ashore anywhere in the neighborhood of the stations, to remain on board until assistance arrives and under no circumstances should they attempt to land through the surf in their own boats until the last hope of assistance from shore has vanished. Often when comparatively smooth at sea a dangerous surf is running which is not perceptible 400 yards offshore, and the surf when viewed from a vessel never appears as dangerous as it is.

Many lives have been lost unnecessarily by the crews of stranded vessels being thus deceived and attempting to land in the ship's boats.

The difficulties of rescue by operations from the shore are greatly increased in cases where the anchors are let go after entering the breakers, as is frequently done, and the chances of saving life correspondingly lessened.

Rescue with the lifeboat or surfboat.—The patrolman after discovering your vessel ashore and burning a warning signal, hastens to his station or the telephone for assistance. If the use of a boat is practicable, either the large lifeboat is launched from its ways in the station and proceeds to the wreck by water, or the lighter surfboat is hauled overland to a point opposite the wreck and launched, as circumstances may require.

Upon the boat reaching your vessel the directions and orders of the officer in charge (who always commands and steers the boat) should be implicitly obeyed. Any headlong rushing and crowding should be prevented, and the captain of the vessel should remain on board, to preserve order, until every other person has left.

Women, children, helpless persons, and passengers should be passed into the boat first.

Goods and baggage will positively not be taken into the boat until all are landed. If any be passed in against the remonstrance of the officer in charge, he is fully authorized to throw same overboard.

Rescue with the breeches buoy or life car.—Should it be inexpedient to use either the lifeboat or surfboat, recourse will be had to the wreck gun and beach apparatus for the rescue by the breeches buoy or the life car.

A shot with a small line attached will be fired across your vessel. Get hold of the line as soon as possible and haul on board until you get a tailblock with a whip or endless line rove through it. The tailblock should be hauled on board as quickly as possible to prevent the whip drifting off with the set or fouling with wreckage, etc. Therefore if you have been driven into the rigging, where but one or two men can work to advantage, cut the shot line, and run it through some available block, such as the throat or peak-halyards block, or any block which will afford a clear lead, or even between the ratlines, that as many as possible may assist in hauling.

Attached to the tailblock will be a tally board with the following directions in English on one side and French on the other:

"Make the tail of the block fast to the lower mast, well up. If the masts are gone, then to the best place you can find. *Cast off shot line, see that the rope in the block runs free,* and show signal to the shore."

As soon as your signal is seen, a 3-inch hawser will be bent onto the whip and hauled off to your ship by the lifesaving crew.

If circumstances permit, you can assist the lifesaving crew by manning that part of the whip to which the hawser is bent and hauling with them.

When the end of the hawser is got on board, a tally board will be found attached, bearing the following directions in English on one side and French on the other:

"Make this hawser fast about 2 feet above the tailblock, see all clear and that the rope in the block runs free and show signal to the shore."

Take particular care that there are no turns of the whip line around the hawser. To prevent this, take the end of the hawser up between the parts of the whip before making it fast.

When the hawser is made fast, the whip cast off from the hawser, and your signal seen by the lifesaving crew, they will haul the hawser taut and by means of the whip will haul off to your vessel a breeches buoy suspended from a traveler block, or a life car, from rings running on the hawser.

If the breeches buoy be sent, let one man immediately get into it, thrusting his legs through the breeches. If the life car, remove the hatch, place as many persons therein as it will hold (four to six) and secure the hatch on the outside by the hatch bar and hook, signal as before, and the buoy or car will be hauled ashore. This will be repeated until all are landed. On the last trip of the life car the hatch must be secured by the inside hatch bar.

In many instances two men can be landed in the breeches buoy at the same time by each putting a leg through a leg of the breeches and holding onto the lifts of the buoy.

Children when brought ashore by the buoy should be in the arms of older persons or securely lashed to the buoy. Women and children should be landed first.

In signalling as directed in the foregoing instruction, if in the daytime, let one man separate himself from the rest and swing his hat, a handkerchief, or his hand; if at night, the showing of a light and

concealing it once or twice will be understood; and like signals will be made from the shore. (See also Wreck Signals, below.)

Circumstances may arise, owing to the strength of the current or set or the danger of the wreck breaking up immediately, when it would be impossible to send off the hawser. In such a case a breeches buoy or life car will be hauled off instead by the whip or sent off to you by the shot line, and you will be hauled ashore through the surf.

If your vessel is stranded during the night and discovered by the patrolman—which you will know by his burning a brilliant red light—keep a sharp lookout for signs of the arrival of the lifesaving crew abreast of your vessel.

Some time may intervene between the burning of the light and their arrival, as the patrolman may have to return to his station, perhaps 3 or 4 miles distant, and the lifesaving crew draw the apparatus or surfboat through the sand or over bad roads to where your vessel is stranded.

Lights on the beach will indicate their arrival, and the sound of cannon firing from the shore may be taken as evidence that a line has been fired across your vessel. Therefore upon hearing the cannon make strict search aloft, fore, and aft, for the shot line, for it is almost certain to be there. Though the movement of the lifesaving crew may not be perceptible to you, owing to the darkness, your vessel will be a good mark for the men experienced in the use of the wreck gun, and the first shot seldom fails.

Important.—Remain by the wreck until assistance arrives from the shore, or as long as possible. If driven aloft, the inshore mast is the safest.

If not discovered immediately by the patrol, burn rockets, flare-up, or other lights, or if the weather be foggy, fire guns or make other sound signals.

Make the shot line fast on the deck or to the rigging to prevent its being washed into the sea and possibly fouling the gear.

Take particular care that there are no turns of the whip line around the hawser before making the hawser fast.

Send the women, children, helpless persons, and passengers ashore first.

Make yourself thoroughly familiar with these instructions, and remember that on your coolness and strict attention to them will greatly depend the chances of success in bringing you and your people safely to land.

Wreck signals.—The following signals have been adopted by the Coast Guard and will be used and recognized by the officers and employees as occasion may require:

Upon the discovery of a wreck by night, the lifesaving force will burn a red pyrotechnic light or a red rocket to signify, "You are seen; assistance will be given as soon as possible."

A red flag waved on shore by day, or a red light, red rocket, or red roman candle displayed by night, will signify, "Haul away."

A white flag waved on shore by day, or a white light slowly swung back and forth, or a white rocket, or white roman candle fired by night, will signify, "Slack away."

Two flags, a white and red, waved at the same time on shore by day, or two lights, a white and a red, slowly swung at the same time, or a blue pyrotechnic light burned by night, will signify, "Do not attempt to land in your own boats; it is impossible."

A man on shore beckoning by day, or two torches burning near together by night, will signify, "This is the best place to land."

Any of these signals may be answered from the vessel as follows: In the daytime, by waving a flag, a handkerchief, a hat, or even the hand; at night, by firing a rocket, a blue light, or a gun, or by showing a light over the ship's gunwale for a short time, and then concealing it.

Distress Signals Used by Submarines and Aircraft

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 counter attacks 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 U. S. 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.

Report of Accident

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.

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.

Customs Service

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.

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, super-

vising the medical examination of immigrants and enforcing interstate quarantine laws.

American merchant seamen are entitled to medical relief obtainable through the United States Public Health Service at its established relief stations.

An American 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. 205, *Radio Navigational Aids*.

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 United States Public Health Service. National quarantine regulations will be found at the stations of the service and at American consulates, and will be furnished to vessels upon application, either by officers of the service or by the bureau in Washington, D. C.

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, 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 offices 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 Federal Communications Commission require certain vessels to have additional service documents, a complete list of which may be obtained from the Federal Communications Commission, Washington, 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

The **major weather bulletins** issued 4 times daily by U. S. Naval radio stations NAA/NSS, Washington, D. C., NPG., San Francisco, Calif., NBA, Balboa, C. Z., NPM, Honolulu, T. H., and the Civil Aeronautics Administration radio station WEK, New Orleans, La., include observations from ships at sea; weather reports from selected land stations; forecasts, storm advisories and weather analyses for specific ocean areas. The information contained in these bulletins is suitable for preparing weather maps at sea.

The areas covered by the forecasts and storm advisories are as follows:

NAA/NSS, Washington, D. C.: Forecasts—North Atlantic north of 30° N. latitude and west of 30° W. longitude. Warnings—North Atlantic, Gulf of Mexico and Caribbean Sea.

NPG, San Francisco, Calif.: Equator to 60° N. latitude and eastward of 150° W. longitude.

NBA, Balboa, C. Z.: North Atlantic, south of 25° N. latitude and west of 60° W. longitude. North Pacific south of 20° N. and east of 115° W.

NPM, Honolulu, T. H.: North Pacific, south of 45° N. and from 140° W. to 165° E. longitude.

WEK, New Orleans, La.: North Atlantic, Gulf of Mexico and Caribbean Sea within the area between 35° N. and 10° N. latitude and west of 35° W. longitude.

Local weather bulletins containing forecasts, storm warnings when issued, and the weather summaries for specified areas are broadcast on schedule every day by certain Government and commercial radio stations.

Storm warnings, whenever they are issued by the United States Weather Bureau, are the subject of special broadcast by various Government and commercial radio stations of the mobile service.

Emergency broadcasts by U. S. Naval Radio Stations.—Storm warnings and notices concerning the safety of navigation at sea of an urgent nature are broadcast by United States Naval Radio Stations (those whose call letters begin with N) in accordance with the urgency, as follows:

(A) Notices of an urgent nature, such as tidal waves, hurricanes, typhoons, cyclones, etc., so imminent as to warrant immediate broadcasting:

(1) One transmission immediately on receipt.

(2) One transmission at the end of the first ensuing silent period.

(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) above 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:

(A) Urgent messages as defined in (A) above:

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.

(B) Less urgent messages as defined in (B) above:

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 U. S. 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 two-hourly intervals thereafter for a period of six hours unless the information is canceled or superseded.

Transmission Procedure:

(A) Radiotelegraph transmission will follow the same procedure as outlined above for naval radio stations.

(B) 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 United States Weather Bureau is made through certain radio stations of the United States Coast Guard. 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 vessel 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, yacht clubs, etc.

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

North of the United States, radiophone weather as well as navigational information, is 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 U. S. Navy and U. S. Coast Guard radiotelegraph and radiophone stations at Adak, Anchorage, Ketchikan and Kodiak. For times and schedules of broadcasts, see *Radio Navigational Aids, H. O. 205.*

Circulars giving complete details relative to the broadcasting of weather information are published by the U. S. Weather Bureau.

These circulars, together with a card descriptive of storm warnings, may be obtained upon application to the Chief, U. S. Weather Bureau, Washington 25, D. C. Similar information is also given in *Radio Weather Aids to Navigation, H. O. 206.* 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 3 times thereafter at 2-hour intervals, whenever they are issued by the United States 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 3 broadcasts, the later information is used and broadcast 3 times unless superseded again.

Reports from Ships

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

Weather reports (United States).—Weather reports should not be sent regularly except from ships with which specific arrangements have been made by the United States 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, U. S. Government.

If a copy of the international meteorological code is not on shipboard, the code will be found in *Radio Weather Aids to Navigation, H. O. 206*, 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 United States 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 signal** 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 29th 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 29th second, as explained above. The dash on the beginning of the hour (shown as 59 minutes 60 seconds above) 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.

Repetitions: In the event of a failure or an error occurring in any of the time signals another time signal will be transmitted one hour later on the same frequency.

Standard Frequency Broadcast Service of National Bureau of Standards.—This service comprises the broadcasting of standard frequencies and standard time intervals from the Bureau's radio station WWV, near Washington, D. C.

The service is continuous at all times, day and night, from 10-kw. radio transmitters except on 2500 kc. per second where 1 kw. is used.

Four radio carrier frequencies are used; three are on the air at all times, to insure reliable coverage of the United States and other parts of the world. The radio frequencies are:

2.5 megacycles, broadcast from 2300 to 1300 G. C. T.
5 megacycles, broadcast continuously day and night.
10 megacycles, broadcast continuously day and night.
15 megacycles, broadcast continuously day and night.

Two standard audio frequencies, 440 cycles per second and 4,000 cycles per second, are broadcast on the radio carrier frequencies. Both are broadcast continuously on 10 and 15 megacycles. Both are on the 5 megacycles in the daytime, but only the 440 is on the 5 megacycles from 2300 to 1100 G. C. T. Only the 440 is on the 2.5 megacycles.

The 440 cycles per second is the standard musical pitch, A above middle C; the 4,000 cycles per second is a useful standard audio frequency for laboratory measurements.

In addition there is on all carrier frequencies 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 provides a useful standard time interval, for purposes of physical measurements, and may be used as an accurate time signal. On the 59th second of every minute the pulse is omitted.

The audio frequencies are interrupted precisely on the hour and each 5 minutes thereafter; after an interval of precisely 1 minute they are resumed. This 1-minute interval is provided in order to give the station announcement and afford an interval for the checking of radio-frequency measurements free from the presence of the audio frequencies. The announcement is the station call letters (WWV) in telegraphic code (dots and dashes), except at the hour and half hour when a detailed announcement is given by voice.

The beginnings of the periods when the audio frequencies are off are so synchronized with the basic time service of the U. S. Naval Observatory that they mark accurately the hour and the successive 5-minute periods.

Of the radio frequencies on the air at a given time, 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 fair reception throughout the world.

Information on how to receive and utilize the service is given in the Bureau's Letter Circular, *Methods of Using Standard Frequencies Broadcast by Radio*, obtainable on request. The Bureau welcomes reports of difficulties, methods of use, or special applications of the service. Correspondence should be addressed to National Bureau of Standards, Washington 25, D. C.

Navigational Warnings

Radiotelegraphic navigational warnings affecting the waters of the United States and possessions are compiled by the United States Hydrographic Office, Navy Department; the United States Coast Guard; and the North Atlantic International Ice Patrol (U. S. Coast Guard vessel). These warnings contain information of importance to the safety of navigation, such as the position of ice, derelicts; also defects and changes in aids to navigation, mine fields, etc., which are later published in the Notice to Mariners. Navigational warnings are also available via radiotelephone.

Radiotelephone.—Transmission by voice of radio 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 radiophone 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 of the United States Navy and local sources.

Complete details relative to radio telephonic or telegraphic navigational warnings are given in *Radio Navigational Aids H. O. 205.*

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 kilocycles 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. (112 m.) 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 commercial radio stations of its mobile service. The advice is given in language intelligible to the layman. For further details see *Radio Navigational Aids H. O. 205.*

Loran and Radar

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

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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 to 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.

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 experimenting with printing Loran lines of positions on various sailing and inshore navigational charts.

Radar (Radio Detection and Ranging) is among the most important of recent developments affecting the techniques of navigation. It promises to fill a long standing need of the merchant marine for 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, and the mariner's dream has only partly come true. Radar is merely a supplement and a highly valuable adjunct to existing equipment and navigational methods. Therefore, the mariner cannot forsake other piloting 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 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" (see inside back cover) in the same manner used for determining the distance at which a light can be expected to be seen at sea.[1] 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, buoys, etc., 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

A résumé of United States Government publications of navigational value is included in the Appendix for the ready reference of the mariner.

CHAPTER 2

Local General Information

Description

THIS volume describes the coasts and navigable rivers of the States of New Jersey, Pennsylvania, Delaware, Maryland, Virginia, and the District of Columbia, from Sandy Hook to Cape Henry.

This section of the Atlantic Coast includes the entrances to three large bays and the coastline between them, namely, New York Bay; Coast of New Jersey; Delaware Bay; Coast of Delaware, Maryland, and Virginia; and Chesapeake Bay. The general character of the outer coast is low and sandy backed by woods. The capes on the south sides of the entrances are higher than those on the north. The southern entrance capes are firm land for a short distance south, then the coast becomes a barrier beach of low islands separated by small inlets many of which cannot be distinguished from offshore. The shores of the capes and islands are being cut away on the south and built up on the north except at those places where stabilizing structures have been constructed. This is one of the reasons why the larger settlements will be found on the south sides of the entrances or inlets.

The coast of New Jersey is distinguished by the large number of summer resorts, with big hotels and occasional prominent standpipes and elevated watertanks. The coast southward of Delaware Bay has three smaller summer resorts within a 30-mile stretch on the Delaware and Maryland coast, but otherwise, it has few landmarks except lighthouses and Coast Guard stations.

It is probable that any vessel approaching from seaward in clear weather will be apprised of its approach to the land by the number of vessels, engaged in the coastal trade, standing up and down this coast.

The principal dangers which menace navigation are the outlying sand shoals, the doubtful direction and velocity of the currents after heavy gales, and fogs. The shoals are described under the appropriate area in the text.

Gales from northeast to southeast cause heavy breakers on the beach and outlying shoals along this coast; the sea breaks in 4 to 5 fathoms of water, and shoals of this depth or less are usually marked by breakers during easterly gales. The bars at the entrances of the inlets are then impassable, and even in comparatively smooth water with a slight swell, they are defined by breakers. The heaviest surf on the beach is on the rising tide near high water of spring tides and right after a heavy easterly gale; the least surf is encountered on the falling tide near low water. Between Sandy Hook and Cape May, the farthest offshore breakers are off Brigantine Inlet and Ludlam Beach Light, and on Five Fathom Bank; at the two former places they are about 4.5 miles from the shore. Only in very severe gales does the sea break along the whole ridge of Five

Fathom Bank. A very heavy surf makes on the beaches after a southeasterly gale followed by a sudden shift of wind to northwest.

The depths along the coast are irregular, with many outlying sand shoals. Soundings are of little assistance to the navigator for determining his position.

The entrances to the three large bays have broad deep channels. All of the other entrances are narrow inlets, subject to frequent changes in depth. Inside the entrances is generally little natural change in the shore, shoals, and other features, except in the more open parts of Delaware and Chesapeake Bays.

The banks of Delaware Bay and River are generally low with few conspicuous landmarks except in the industrial centers along the river. Many of the shallow tributary streams have been improved by dredging.

The shores of Chesapeake Bay and its tributaries are generally low and wooded. However, elevations of a few hundred feet are found near the head of the bay, and on the western side of the upper part of the bay is a general bluff formation. Cottages dot the shores but are usually inconspicuous.

The only rocky areas within the limits of this Coast Pilot are a few scattered spots in Delaware River, in Chesapeake Bay above the Patapsco River, and near the heads of the larger tributaries on the western side of Chesapeake Bay.

Anchorages and inlets.—The only anchorage between New York Harbor and Chesapeake Bay entrance available for vessels of all classes bound along the coast is Delaware Breakwater. Cape May Harbor may be used by moderate size vessels, see Chapter 4. Hampton Roads is the most important anchorage in the southern part of Chesapeake Bay, though vessels entering the bay for shelter often anchor in Lynnhaven Roads during southerly weather. The principal anchorages in Delaware Bay and River are described on page 103, and those in Chesapeake Bay on page 166.

Small local craft often seek shelter inside the other inlets, but they cannot be entered in safety during heavy weather, and the unimproved inlets are often difficult for strangers even in good weather.

The entrances to inlets on the coasts of New Jersey, Delaware, Maryland, and Virginia, are more or less obstructed by shifting sand bars. Some of the entrances have been improved by dredging and by jetties which extend from both sides of the entrance. At the improved inlets more dependence can be placed on the channel depths given in this pilot and shown on the chart than those not under improvement. In cases where the given depths approximate the vessel's draft inquiry should be made of local pilots what draft is being taken in and out over the bar at that time.

On many of the bars the buoys are moved from time to time to indicate the channel; but they are liable to be dragged out of position and cannot always be replaced immediately, so that a stranger must use the greatest caution. In general, if possible, a stranger should enter an inlet on a rising tide.

The tidal currents have considerable velocity in all of the entrances, and their direction is affected by the force and direction of the wind; sailing vessels entering harbors and sounds require a fair working breeze during the ebb.

Aids to navigation.—Aids to navigation are numerous and places along the coast where a vessel is not in sight of one or more lights are very few. Lightships are placed off New York Entrance, Barnegat Inlet, Five Fathom Bank, Delaware Entrance, Winter Quarter Shoal, and Chesapeake Entrance. The lightships south of New York Entrance and the principal coast lights are described in the text of this volume. The buoyage accords with the system adopted in United States waters. For a complete

description of all lighted aids, buoys, and daybeacons see the *Light List, Atlantic and Gulf Coasts of the United States.*

All lightships and some light stations are equipped with radiobeacons, particularly in the vicinity of the entrances to the main ports.

All medium-frequency radio direction-finder stations have been discontinued along the coasts of the United States. A system of high frequency radio direction-finder stations has been established for use of vessels in distress and in conjunction with the search and rescue system.

Wrecks.—Many vessels have been wrecked along this coast as the result of collision, foundering, torpedoing, fire, and other causes. Prior to 1941 most of the offshore wrecks had been located and wire-dragged to determine the least depth over their highest projecting part. Since 1945 work on the location and dragging of the vessels lost during the war has been resumed and is expected to be continued until completed. Dangerous wrecks for the most part are marked by buoys of various colors and shapes and often showing a quick flashing or an interrupted quick flashing light.

Rules of the Road.—*Pilot Rules for certain inland waters of the Atlantic and Pacific Coasts and of the Coast of the Gulf of Mexico,* apply to the inland waters of the Atlantic Coast of the United States as defined by the "General Rule" except at the entrances to Delaware and Chesapeake Bays, where specific boundary lines for the high seas have been described and are given in the descriptions of those places.

General Rule.—At all buoyed entrances from seaward to bays, sounds, rivers, or other estuaries, for which specific lines have not been described, Inland Rules shall apply inshore of a line approximately parallel with the general trend of the shore drawn through the outermost buoy or other aid to navigation of any system of aids.

Coastwise traffic.—This section of the coast has considerable traffic in all types of vessels. The routes generally followed depend upon the draft of the vessel and are given in Chapter 3. Two-way courses have not been laid down in this area so it behooves every navigator to maintain alert lookouts at all times to prevent collisions.

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 that *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.

Fish weirs are numerous along the outside coast and in Chesapeake Bay and tributaries. 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 War, and the supervision of the fishing structures is controlled by the Chief of Engineers, United States Army. The areas within which fish weirs are permitted are shown on the 1200 series charts and where no 1200 chart covers the area, they are shown on the next larger scale chart. The exact location of the weirs within the designated areas are not shown on the charts.

Along the outer coasts the limits of the areas are not marked. In Chesapeake Bay and tributaries, black and white horizontal-banded buoys mark the turns of the limits of the areas. Strangers should proceed with caution when crossing areas of possible fish weirs, and should avoid crossing such areas at night, whenever possible.

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

The lights shall be displayed between sunset and sunrise. They shall 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 shall be displayed. The outer light shall be white and the inner light shall be red. The size, capacity, and manner of maintenance of the lights shall be such as may be specified in the War Department permit authorizing the erection of the structure or applicance.

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.

Bridge regulations.—The regulations governing the opening of drawbridges will be found in the text as follows: New Jersey, north of Manasquan-Bayhead Canal and Intracoastal Waterway in Chapter 4; Delaware and Schuylkill Rivers in Chapter 5; Chesapeake and Delaware Canal in Chapter 6; Chesapeake Bay and tributaries are given below. Where regulations prescribe closed periods for particular bridges see the text describing that bridge.

All navigable waters discharging into the Atlantic Ocean south of and including Chesapeake Bay and the Gulf of Mexico, except the Mississippi River, its tributaries and outlets: Bridges.

(*a*) Corporations or persons owning or controlling a drawbridge shall provide the same with the necessary tenders and the proper mechanical appliances for the safe, prompt, and efficient opening of the draw for the passage of vessels.

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

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

(2) When the draw of the bridge cannot be opened immediately or when the bridge is open and is to be closed immediately, the drawtender shall reply by four or more short, distinct blasts of a whistle or horn, by four or more calls through a megaphone, or by four or more loud and distinct strokes of a bell (danger signal).

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

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

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

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

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

(*f*) Where bridges are less than 500 feet apart, the signals to govern the movements of the approaching vessel shall be given from the bridge nearest the vessel. If the bridge can be opened immediately, the

bridgetender shall await the reply signals from the other bridges and then give the signal circumstances require. If the nearest bridge cannot be opened immediately, the prescribed signal shall be given the approaching vessel at once to be followed as soon as possible by the signal from that bridge that the draws are about to open.

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

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

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

Coastal Currents, Sandy Hook to Cape Henry

Tidal currents.—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 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 flood and ebb strengths.

Off shore 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 in 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 *Atlantic Coast Current Tables* should be consulted.

Southward drift.—Between the coast and the Gulf Stream is a resultant southward drift having a velocity, generally less than ¼ knot, which decreases as the distance from the coast increases.

Gulf Stream.—The inner edge of the Gulf Stream is 85 miles from Cape Henry and 150 miles from Sandy Hook. For further data concerning this unique and important current see the *Atlantic Coast Current Tables*.

Wind currents.—Except near the entrances to the larger bays where tidal currents are important, the currents of most interest to the navigator of the coastal waters between Sandy Hook and Cape Henry are caused by winds. Wind currents are very complicated. Their velocities and directions depend upon a number of factors such as the velocity, direction and duration of the wind, the proximity of the coast and the direction of the coastline. Generally in the Northern Hemisphere the wind-driven current sets somewhat to the right of the wind but in coastal waters there are many exceptions to this general rule, the current often setting to the left of the wind, due to the tendency of the current to follow the direction of the coastline or to other local conditions.

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The velocity of the wind current relative to that of the wind also varies with the locality.

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 velocities likely to occur during storms at a number of offshore locations are given as follows: Ambrose Channel Lightship, 2 knots; Scotland Lightship, 2½ knots; Barnegat Lightship, 1 knot; Five-Fathom Bank north lighted whistle buoy 2FB, 1½ knots; Five-Fathom Bank Lightship, 1½ knots; Overfalls Lightship, 3½ knots; Fenwick Shoal lighted whistle buoy 2, 2 knots; Winter Quarter Shoal Lightship, 2½ knots; Tail of the Horseshoe lighted whistle buoy TH, 3 knots; and Chesapeake Lightship, 1½ knots.

General.—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 Coast and Geodetic Survey Special Publication No. 230, *Coastal Currents along the Atlantic Coast of the United States*. This publication is sold only by the Superintendent of Documents, Washington, D. C., price 75 cents.

Weather

See Appendix for the meteorological tables for 12 land stations arranged alphabetically, and for 3 ocean areas.

The climate of the middle eastern seaboard region is the result of the reaction of the general circulation upon the physiographic features in the area. A brief description of the most conspicuous surface features along the coast will be useful in understanding the weather.

The seacoast section of New Jersey, extending from Sandy Hook to Cape May, is characterized by long stretches of sandy beaches and tide-water marshes. Most of the State south of a line connecting Jersey City and Trenton is low, flat, and some of it swampy, with few elevations higher than 100 feet above mean sea level.

The coastal plain region of Maryland and Delaware lies between the ocean on the east and a line, known as the fall line, running from Wilmington, Delaware, through Baltimore to Washington. The Eastern Shore of Chesapeake Bay, as well as most of Delaware, consists of flat, low, and almost featureless plains, while the Western Shore is a gently rolling upland. West of the fall line the streams are mostly turbulent while to the east they are quiet, with their courses largely dominated by the tides.

Tidewater Virginia comprises the flat and near-sea-level sections east of a line from Quantico through Richmond to Emporia, Virginia. Its chief characteristics are numerous peninsulas, wide estuaries, and many swamps.

To the westward of the coastal regions lie the Appalachian Mountains and other

lower mountain ranges. These physical features, though at some distance from the seacoast, have a pronounced effect upon the general circulation and the resulting weather.

General circulation.—The circulation over the eastern seaboard is dominated largely by the position and intensity of the Bermuda HIGH. During the winter months a ridge of high pressure exists over the southeastern portion of the United States and the Bermuda HIGH is far out to sea. Major frontal systems developing over the interior of the country and the Gulf of Mexico sweep unhampered over the seaboard States in a general easterly or northeasterly direction. Since the contrast between continental and maritime polar air and maritime tropical air is great at this time, winter storms are generally intense, and changing air masses result in variable winter weather.

In spring the Bermuda HIGH, still far south, begins to exert its effect on the southeastern portion of the country. Normally the central seaboard region remains outside the rim of the high itself which obstructs but little the passage of the spring cyclonic storms.

In summer the entire eastern seaboard comes under the influence of the Bermuda HIGH which has now moved considerably northward. The intensity of the high pressure circulation is moderate but persistent, blocking the eastward movement of the continental pressure systems. A weak stationary front forms along the Appalachian Range and the synoptic situation on the coast may remain significantly unchanged for weeks at a time. The weather during this season, controlled by the infrequently interrupted warm, moist southerly air flow from the Gulf, is characterized by frequent instability, showers and thunderstorms, and uniformly high temperatures and humidity.

During the fall months the Bermuda HIGH retreats southward and eastward leaving the Atlantic Coast in a weak high pressure zone. The weakening of the pressure system indicates the gradual transition to the winter synoptic pattern accompanied by increased frontal activity and the more frequent passage of cyclones and anticyclones.

Pressure.—The mean sea level pressure on the coast ranges from 30.02 inches at New York to 30.07 inches at Norfolk. The highest mean pressure on the average occurs during the winter months and the lowest during late spring and early summer.

Extreme high pressures ranging from 30.96 to 31.02 inches were observed during January and February; lowest extreme high pressures (30.38 to 30.56 inches) in June, July, and August. Extreme low pressures, 28.35 to 28.67 inches were recorded in March, and highest extreme lows in the late spring and summer months. Thus it may be readily seen that winter and spring pressures are subject to wide variations accounted for by the moving cyclones and anticyclones, while summer pressures, dominated by the persistent Bermuda HIGH, though not as high on the average as winter, are less variable.

Winds.—Prevailing winds are from a northerly quadrant from October through March, from southerly to southeasterly from May through August, and about evenly divided from southerly to northerly in April and September. The shift in direction from summer to winter shows clearly the change in the general circulation.

The mean velocity of the wind averages from 6.1 knots at Washington to 13.0 knots at Atlantic City. Winds over the ocean are slightly stronger during the winter months than at most land stations, and the yearly average is thus slightly greater. Highest mean velocities occur in February and March, and lowest during July and August.

Temperature and humidity.—Mean annual temperatures along the coast range from 52.3° F. at New York to 59.8° F. at Norfolk. January is the coldest month and July the hottest at most stations. The lowest mean monthly temperature is 30.5° F. at Trenton in January; the highest 78.5° F. at Richmond and Norfolk in July. Normally temperature decreases with increasing latitude. This is true in general for the middle eastern seaboard, but the isotherms are by no means oriented in a rigid east-west direction. Over the water area January mean air temperatures are 8° to 10° warmer than at coastal stations, and the minimum occurs in February. July mean air temperatures are 2° to 3° cooler, with the maximum in August. The least difference between air temperatures over the land and water occur in August due to the fact that air over land surfaces warms and cools readily and very much; over water areas, it warms and cools slowly and relatively little. Also land surfaces absorb heat to slight depths and give it up freely, while water absorbs heat to great depths and retains the heat longer. Coastal stations tend toward a continental temperature regime, but the proximity of the Atlantic Ocean modifies this to some extent.

The temperature of the sea surface itself is lower than the air temperature from April through August and higher during the remainder of the year. Sea-surface isotherms follow the warm Gulf current, while air temperatures are more dependent upon the air masses and the moving pressure pattern.

The diurnal variation in air temperature at coastal stations is about 12° to 20° throughout the year, and is likely to be much less over the water. Small craft operating close to shore and vessels in harbor activities will be concerned with this effect.

Very little data on extremes in temperature are available for the ocean areas. Temperatures at the coastal stations rarely exceed 100° F. The highest mean daily maximum temperature is 88.3° F. recorded at Richmond in July. Freezing temperatures are usual from December through March at most stations, and below zero temperatures have been recorded from December through February.

Relative humidity is high throughout the year averaging from about 63 to 75 percent. Highest humidities occur from July through September when air temperatures are also high. During these months the climate is depressing and enervating. Lowest average humidities occur during the spring.

Cloudiness and precipitation.—Mean cloudiness over the area is moderately high throughout the year averaging from 40 to 70 percent. As might be expected the least cloudiness occurs while the eastern seaboard is dominated by the persistent Bermuda HIGH circulation in summer and early fall, and greatest cloudiness accompanies the frequent winter storms. Of the possible hours of sunshine most stations experience 50 to 65 percent sunny. Since the air is comparatively moist most of the time, only a small drop in temperature may cause condensation and cloud formation.

Precipitation over the eastern seaboard is moderately heavy averaging from 35 to 45 inches per year. Monthly departures from the average may be large in any individual year, but over a long period of record (50 to 75 years) a fairly uniform pattern appears. Since the region under consideration is not extensive, differences in station records may be explained by the exposure to the general circulation which may vary considerably in individual years.

Precipitation is heaviest, averaging 4 to 6 inches per month, during the months of July and August, and most of the rainfall at this time is the showery type resulting from instability conditions in the air mass itself. Least precipitation occurs in October and November when 2 or 3 inches are average.

The intensity of storms and showers, magnified by the effect of convection and orography, is usually greater over land than over water. Heaviest precipitation occurs over land and near coastal waters in the afternoon; over open water, during the night. The mountain and hill country to the west of the coastal area briefly described in earlier paragraphs is frequently the source of heavy cumulus and cumulonimbus cloud formations. These clouds drift eastward in the afternoon frequently giving rain along the coast, or they drift to sea where the precipitation may be released at night.

Maximum thunderstorm activity occurs during the summer months. The average number of thunderstorms in July at most of the stations is from 7 to 10 per month.

Snow along this coast may be expected from November through March. Maximum amounts averaging from 2.5 inches per month at Norfolk to 9.7 inches per month at New York are recorded in January and February. Most of the snow falls during intense winter storms but does not usually remain on the ground long. Over the water area falling snow is little more than a restriction to visibility.

Fog and visibility.—Visibility is generally good throughout the year. The percentage frequency of days with visibility less than a mile on the coast is 3 to 10 percent annually. The principal restrictions are fog and precipitation over water, and smoke, haze, fog, and precipitation over land.

The occurrence of fog over the eastern seaboard is very irregular. Station data, indicating 10 to 22 days of heavy fog per year, is somewhat misleading because coastal exposures may be very different from place to place. In general, fog decreases from north to south. Along the coast the worst fog conditions occur during the winter months. Over the water the greatest frequency occurs during the spring and early summer months. Sea fogs frequently drift onshore on hot summer days where they burn off at the surface and lift. Over the water the process is reversed and clearing takes place from the top of the fog cloud.

Ice conditions.—During the winter months ice may be found in the coastal waters in the northern part of the area; however, these waters will be generally navigable to all ocean-going vessels throughout the year. Small craft may experience difficulty under unusual ice conditions.

Hurricanes.—The middle Atlantic Coast is subject to tropical hurricanes from June through October. Considerable damage to shore property from high tides and to surface vessels off the coast has resulted from time to time. One example was the $2,000,000 loss from the July 30 to August 4, 1944 hurricane affecting principally the Wilmington, Delaware area. Careful attention should be paid to storm warnings at all times.

Navigation Within the Hurricane Area

The storm area of a hurricane varies from 100 miles to 500 or more miles in width, with a comparatively calm center some 10 or 20 miles in diameter. This center is an area of lowest atmospheric pressure around which the wind blows in a more or less circular course, spirally, in a direction contrary to the hands of a watch. In some respects the center or *eye* is the most dangerous part of the hurricane and is therefore a region especially to be avoided; for although the air movement within it, if any, is usually light and fitful, the seas in this area, in most cases, are very heavy and confused, rendered so by the shifting violent winds surrounding it.

The storm field advances in a straight or curved track, sometimes with considerable

speed, at other times at a very slow rate. The highest rates of progression usually occur when the storm moves northward or northeastward over the United States, or in middle or higher latitudes over the ocean. The average speed is about 12 or 15 miles an hour. Tracks of hurricanes are shown on the pilot charts of the *North Atlantic Ocean* and *Central American Waters*, published monthly by the United States Hydrographic Office.

Signs of approach.—One of the earliest indications of the approach of a tropical storm is in the appearance of the sky and the general clearness of the atmosphere. These storms are invariably 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 an unusually high barometer. Later it may be followed by a restless oscillating or pumping of the mercury caused by the disturbed condition of the atmosphere. Then the sky becomes overcast and remains so, at first with a delicate cirrus haze which shows no disposition to clear away at sunset, but which later becomes more and more dense until the dark mass of the true hurricane cloud appears on 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 forms one of the most 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 it falls in torrents. The rain area extends farther in advance of the storm than in the rear.

A long swell from the direction of the storm frequently sets in before any other indication becomes marked.

When the sky first becomes overcast with the characteristic veil of cirrus the storm center will most probably lie in the direction of the greatest density of the cloud.

When the hurricane cloud appears over the horizon it will be densest at the storm center.

By this time the barometer will usually be showing unmistakable evidence of a fall, and one may confidently look for a storm and begin observations to determine the location of its center and the direction in which it is moving.

Practical rules.—When there are indications of a hurricane, vessels should remain in port or seek one if possible, carefully observing and recording the changes in barometer and wind and taking every precaution to avert damage by striking light spars, strengthening moorings, and, if a steamer, preparing steam to assist the moorings. In the ports of the Southern States hurricanes are generally accompanied by very high tides, and vessels may be endangered by over-riding the wharf where moored if the position is at all exposed.

Vessels in the Straits of Florida may not have the sea room to maneuver so as to avoid the storm track and should use every endeavor to make a harbor or stand out of the straits to obtain sea room. Vessels unable to reach port and having sea room to maneuver should observe the following rules:

When there are indications of the near approach of a hurricane, sailing vessels should heave-to on the starboard tack and steamers remain stationary and carefully observe and record the changes in wind and barometer so as to find the bearing of the

center and ascertain by the shift of wind in which semicircle the vessel is situated. The safety of the vessel often depends on heaving-to in time.

Distance from center.—The distance from the center of a hurricane can only be estimated from a consideration of the height of the barometer and the rapidity of its fall, and the velocity of the wind and rapidity of its change in direction. If the barometer falls slowly and the wind increases gradually it may be reasonably supposed that the center is distant; with a rapidly falling barometer and increasing winds the center may be supposed to be approaching dangerously near.

Bearings of center.—Facing the wind, the storm center will be 8 to 12 points to the right; when the storm is distant it will be from 10 to 12 points, and when the barometer has fallen five- or six-tenths it will be about 8 points.

A line drawn through the center of a hurricane in the direction in which it is moving is called the axis or line of progression, and facing in the direction of its path the semicircle on either side of the axis is called, respectively, the right-hand or dangerous semicircle and the left-hand or navigable semicircle.

Handling the ship within the storm area.—Plot the approximate position of the center on the chart. The relationship between the position of the ship and the position and prospective track of the center will indicate the proper course to pursue: To enable the vessel to keep out of or escape from the dangerous semicircle and to avoid the center of the storm; to enable the vessel to ride out the storm in safety 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 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 observations, allowance must be made for the course and distance she has traveled in the interim.

Two bearings of the center with an interval between of from two to three hours will, in general, be sufficient to determine the course of the storm, provided an accurate 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.

Rules for maneuvering.—The rules for maneuvering in the northern hemisphere, so far 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 center.—Steam and sailing vessels: Bring the wind two points on the starboard quarter, note the course and hold it, and run for the left semicircle, and when in that semicircle maneuver as above.

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

Local Services

Pilotage is compulsory for certain inward and outward bound vessels in Delaware Bay and River and Chesapeake Bay. Pilots cruise off the entrances of both bays and are always available. Further information concerning pilotage in Delaware Bay is given in Chapter 5 and in Chesapeake Bay in Chapter 8.

Local boatmen competent to act as pilots can usually be found near the entrances to the principal inlets and to the tributaries of Delaware and Chesapeake Bays; the charge for piloting in this case is by special agreement with the pilot.

Towboats are stationed at Wilmington, Philadelphia, Norfolk, Newport News, Richmond, West Point, Washington, and Baltimore. Arrangements for towboats should be made by radio or telegraph.

Salvage equipment, consisting of tugs, lighters, pumps, derricks, diving apparatus and the like, is available at New York, Philadelphia, Baltimore, and Norfolk. The more extensive equipment is available at New York and Norfolk.

Supplies.—Coal, fuel oil, gasoline, fresh water, and supplies of all kinds are obtainable at Wilmington, Philadelphia, Norfolk, Newport News, Richmond, and Baltimore. Coal in limited quantities can also be obtained at other cities and many of the larger towns. Gasoline, provisions, and water are obtainable at practically all of the towns and villages.

Repairs.—Philadelphia, Camden, Chester, Wilmington, Norfolk, Newport News, and Baltimore are the principal places at which extensive repairs to the hulls and machinery of vessels can be made. Small vessels and motorboats can be hauled out, and minor repairs to machinery can be made at many other places, as mentioned under the descriptions of the different ports.

Legal holidays.—The following are the legal holidays in the District of Columbia and the States of New Jersey, Pennsylvania, Delaware, Maryland, and Virginia:

January 1, New Year's Day.—All.
January 19, Lee-Jackson Day.—Virginia.
January 20, Inauguration Day.—District of Columbia.
February 12, Lincoln's Birthday.—Delaware, New Jersey, Pennsylvania.
February 22, Washington's Birthday.—All.
March 25, Maryland Day.—Maryland.
Good Friday.—All except District of Columbia and Virginia.
April 13, Thomas Jefferson's Birthday.—Virginia.
May 30, Decoration or Memorial Day.—All except Virginia.
June 3, Confederate Memorial Day.—Virginia.
June 14, Flag Day.—Pennsylvania.
July 4, Independence Day.—All.
Labor Day.—All.
September 12, Defenders' Day.—Maryland.
October 12, Columbus Day.—All except District of Columbia.
Election Day.—All except District of Columbia.
November 11, Armistice Day.—All.
Thanksgiving Day.—All.
December 25, Christmas Day.—All.

Miscellaneous.—For information of any particular kind about a definite locality refer to the locality in the text.

For general information of a local character, including the addresses of the offices maintained by different bureaus of the Government, meteorological tables and the like, refer to the Appendix.

Inland Waterways

The following data concerning the Intracoastal Waterway from Boston to the Rio Grande, the Routes across Florida, the New York Canal System, the Lakes to Gulf Waterway, and the other river channels tributary to the Mississippi are included for ready reference.

The Intracoastal Waterway affords a protected route, with the exception of various sections, for vessels between Boston, Massachusetts, 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 Cape Cod 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 MHW.

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 49 feet horizontal and 89½ 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.

Key West to Apalachicola.—This waterway is along the outside coast.

Apalachicola to Corpus Christi.—This waterway consists of dredged channels and land cuts. The project depth is 12 feet over a width of 125 to 150 feet.

Corpus Christi to the Rio Grande.—In 1947, this section of the waterway was being dredged through the Laguna Madre. The project depth is 12 feet over a width of 125 feet.

Lake Okeechobee and Cross-Florida Waterway.—The passage across Florida from the Intracoastal Waterway on the east coast to San Carlos Bay on the Gulf of Mexico is by way of the St. Lucie River, St. Lucie Canal, Lake Okeechobee, and the Caloosahatchee River. The project depth is 6 feet over a width of 80 to 90 feet. The minimum clearances are 50 feet horizontal and 80 feet vertical.

Cross-Florida Barge Canal.—The proposed canal extends up the St. Johns River, past Palatka, thence up the valley of the Oklawaha River; across the divide, and down the valley of the Withlacoochee River to the Gulf of Mexico at a point about 83 miles north of Tampa, Florida. The project provides for a lock canal with a depth of 12 feet over a width of 150 feet; each of the five locks will be 75 feet wide, 600 feet long and 13 feet deep over the sills. This canal has been authorized by Congress but construction had not been started in June 1946.

New York State Canal System.—The New York canals, built by the State of New York, afford free waterway communication between Lakes Erie and Ontario on the west and the Hudson River and Lake Champlain on the east. The system comprises the following lines or branches: Erie Canal, from Troy Lock in Hudson River to Tonawanda on Niagara River; Champlain Canal, from Waterford on Hudson River to Whitehall on Lake Champlain; Oswego Canal, from Three Rivers Point at head of Oswego

River to Oswego on Lake Ontario; Cayuga and Seneca Canals, from Erie line at the confluence of Seneca and Clyde Rivers to Ithaca on Cayuga Lake and Montour Falls on Seneca Lake.

Troy to Lake Ontario.—The Erie Canal is followed to Three Rivers where the canalized Oswego River is entered and followed to Oswego on Lake Ontario. This section is being improved by the Federal Government to provide a channel 14 feet deep between the locks and a vertical clearance of 20 feet at maximum navigable stage at bridges and overhead structures. The 29 locks have usable dimensions of 43.5 feet wide, 300 feet long, and 12 feet over the sills. The locks are to be deepened to 13 feet.

Troy to Niagara River.—The Erie Canal is followed the entire distance. West of Three Rivers Point the depth is 12 feet in the canal and over the sills of the locks. The usable length of the locks is 300 feet and the width 43.5 feet. The least vertical clearance is 15 feet.

Troy to St. Lawrence River.—The Champlain Canal, Lake Champlain, and the Richelieu River, including the Chambly Canal, afford an all-water route from Troy to the St. Lawrence River. The size of vessels using this route is limited by the locks in the Chambly Canal, Canada, which have usable dimensions of 118 feet in length, 22 feet in width, and 6½ feet of water over the sills. The locks of the Champlain Canal have the same dimensions as those in the Erie Canal west of Three Rivers Point. The distance from Albany to Montreal via the route is 309 statute miles.

The Canadian Government requires cruising permits or let-passes from pleasure boats entering Canadian waterways, which may be obtained at their canal statistical offices at St. Johns and Prescot. American vessels when leaving Canada must report at the customs office.

Charts.—Charts of the Erie Canal, Champlain Canal, Lake Champlain, and Great Lakes are published by the United States Lake Survey Office, Detroit, Michigan, and sections of the New York State canals by the Superintendent of Public Works, Albany, New York. Charts of the Richelieu River and Chambly Canal are published by the Hydrographic and Map Service, Department of Mines and Resources, Ottawa, Canada.

Ice.—Navigation in the upper Hudson River and the New York State Canal System is usually obstructed by ice from the middle of December to the middle of April.

The **Lakes to Gulf Waterway** by way of the Illinois Waterway System and the Mississippi River affords passage of vessels from Chicago on Lake Michigan to the Gulf of Mexico, a distance of 1,630 statute miles.

The *Illinois Waterway System* permits a draft of 9 feet to be taken from Chicago to Grafton on the Mississippi River. The limit in vertical clearance is 17 feet at ordinary water level.

Charts of the Illinois Waterway System can be obtained from the United States Engineer Office, 520 Merchandise Mart, Chicago 54, Illinois.

The Mississippi River, Grafton to Cairo.—This section of the waterway follows the natural and improved channels of the Mississippi River. The project depth is 9 feet throughout, but this has not been attained between Grafton and St. Louis during very low waters. Between Grafton and the mouth of the Missouri River a channel depth of at least 6 feet can usually be depended upon, though during periods of very low water the controlling depths may be as little as 5 feet. Except for some delays during periods of very low water, navigation is relatively easy. The least vertical clearance of 44 feet, extreme high water, is at Merchants Bridge, St. Louis, Missouri.

Cairo to Baton Rouge.—The project depth of the channel is 9 feet. This dimension is greatly exceeded during medium and high stages, and at low stages except across under-

water sand bars where channel dredging is necessary. Year-round navigation is easy except during periods of exceptionally low water, when some difficulty is experienced with large tows. The controlling vertical clearance is 56 feet above the highest water on record at the fixed bridge at Vicksburg, Mississippi.

Baton Rouge to the Gulf of Mexico.—This section of the waterway is a ship channel navigated by large ocean-going vessels. Navigation is safe and easy at all seasons. The bridge 2 miles above New Orleans has a vertical clearance of 135 feet above ordinary high water.

Charts of the Mississippi River may be obtained from the office of the Mississippi River Commission, P. O. Box 80, Vicksburg, Mississippi.

Ice.—Navigation of the Illinois Waterway System is stopped by ice from about December 1 to March 1, and in the section of the Mississippi River between Grafton and Cairo usually between December 15 and February 15.

Other river channels tributary to the Mississippi River, *Upper Mississippi River.*—A 9-foot project depth has been adopted for the channel improvement of the Upper Mississippi River from Grafton to St. Paul and Minneapolis.

Information relative to improvements and navigation may be obtained from the District Engineer, U. S. Engineer Office at 1217 U. S. Post Office and Customhouse, St. Paul 1, Minnesota; 816 U. S. Courthouse and Customhouse, St. Louis 1, Missouri; Clock Tower Building, Rock Island, Illinois.

Missouri River.—A 9-foot project has been adopted for the Missouri River from its outlet into the Mississippi River 15 miles above St. Louis, to Sioux City.

Information relative to improvements and navigation may be obtained from the Division Engineer, U. S. Engineer Office, Farm Credit Building, Omaha 2, Nebraska.

Ohio River.—A 9-foot project has been adopted for the Ohio River from its outlet into the Mississippi River to Pittsburgh. Thence up the Monongahela River to Fairmont, West Virginia, and up the Allegheny River to above East Brady, Pennsylvania.

Information relative to improvements and navigation on the Ohio River and its tributaries may be obtained from the Division Engineer, U. S. Engineer Office, 243 North High Street, Columbus 16, Ohio.

Ice.—Navigation in the upper reaches of the Mississippi River, and in the Missouri and Ohio Rivers is obstructed by ice in the winter months.

CHAPTER 3

Routes and Sailing Directions

THIS chapter gives the courses used by vessels of various sizes and will be found dependable if used judiciously in connection with the latest charts. All bearings and directions are true.

These are slack-water courses and due allowance must be made for currents and wind.

Directions, New York to Chesapeake Bay Entrance

From Sandy Hook southward to Brigantine Shoal, a distance of about 70 miles, the coast is comparatively free from off-lying shoals, but southward of this point it is fronted with extensive areas of broken ground, depths of 10 fathoms and less being found at distances of nearly 20 miles offshore in places. A number of wrecks exist this distance offshore.

Owing to the numerous outlying shoals and wrecks this coast is dangerous for deep-draft vessels, and unless sure of the vessel's position soundings should be taken to give warning of too close an approach to shore. The 15-fathom curve extends from 9 to 30 miles offshore but in general is about 18 miles offshore. The curve is nearest to the shore at the northern part. In thick weather vessels should keep outside this depth curve.

The water shoals uniformly from 30 fathoms to 15 fathoms, but inshore of the latter depth the soundings are irregular, and shoals rise abruptly in many cases from about 10 fathoms.

Caution.—In case one of the lights or lightships is not made when in a depth of 15 fathoms, it is advisable to stand alongshore until one is sighted.

Wrecks.—Many vessels have been wrecked along this coast as the result of collision, foundering, torpedoing, fire, and other causes. Dangerous wrecks for the most part are marked by buoys of various colors and shapes and often showing a quick-flashing or an interrupted quick-flashing light.

Standing along the coast, vessels of the deepest draft usually pass outside of the lightships and out of sight of land, except between Cape May and New York. At night, if on this track, some of the lights or lightships will be sighted, so that the vessel's position can be readily determined. Radiobeacons will also assist in determining the vessel's position.

The large number of steamers and tows passing up and down this coast makes it necessary to keep a sharp lookout to prevent collisions.

The routes followed along this part of the coast vary greatly, according to the vessel's draft and the condition of wind and weather. Complete directions to meet all conditions cannot be given, but the following suggestions may be of some assistance to strangers.

Directions for Vessels of the Deepest Draft

Vessels of the deepest draft should in all cases keep outside of the lightships and should, wherever possible, avoid crossing areas of a less charted depth than about 9 fathoms. The courses given below lead in a least depth of about 9 fathoms except in approaching the entrances to Delaware and Chesapeake Bays. They lead across a least depth of 6½ fathoms in Delaware Bay entrance and in 7 fathoms in Chesapeake Bay entrance.

From Ambrose Channel Lightship bearing 005°, distant 1 mile, steer **185°** for 40.7 miles to Barnegat Lightship bearing 280°, distant 1.5 miles.

International Rules apply seaward of Ambrose Channel Lightship.

Then steer **206½°** for 66.3 miles to Five Fathom Bank Lightship bearing 300°, distant 2.2 miles.

Continuing southward along the coast from Five Fathom Bank Lightship, steer **199°** for 54.3 miles to Winter Quarter Shoal Lightship bearing 295°, distant 1.5 miles, and pass 3.3 miles off Fenwick Shoal lighted whistle buoy 2.

Continuing southward from the position off Winter Quarter Shoal Lightship, steer **213°** for 68 miles to Chesapeake Lightship, bearing 315°, distant 1.2 miles. Two wrecks are on this course.

Then steer **230°** for 10 miles to Chesapeake Bay Entrance lighted whistle buoy 2 CB, bearing 315°, distant 0.3 mile and round the buoy southward until it bears 045°. For courses entering the bay see Table 4 or 5.

Alternate courses.—Many large vessels entering Chesapeake Bay from the northward run from Winter Quarter Shoal Lightship following the courses laid down in Table 1. For entering Delaware Bay use Table 1.

To go southward to Diamond Shoal Lightship (Cape Hatteras) bearing 240°, distant 5 miles, from the position off Barnegat Lightship steer **193°** for 285 miles, or from the position off Winter Quarter Shoal Lightship steer **185½°** for 168 miles.

Directions for Vessels of 17 to 24 Feet Draft

The following Table of Courses (Table 1) represents approximately the mean of the courses followed by coasting vessels of 17 to 24 feet draft and the largest tows. They are varied but little on account of weather conditions except northward of Five Fathom Bank, where courses leading farther offshore are sometimes followed during easterly weather and closer inshore during westerly weather. These courses depend entirely on making the aids, and soundings are of little value to insure safety; in thick weather it is safer to keep farther offshore between Five Fathom Bank and Sandy Hook and exercise care to keep outside of Barnegat Lightship.

Table 1.—New York (Sandy Hook) to Chesapeake Bay Entrance

CHARTS 1215, 1216, 1217, 1219, 1109, 1220, 1221, 1222

Positions (Reverse directions in *italics*—read upward)	True courses	Distances
	Degrees	*Nautical miles*
1. Gedney Channel lighted whistle buoy, bearing 117°, distant 0.4 mile, Chart 1215.		
International Rules apply outside of the line between Ambrose Channel Lightship and Navesink Light, south tower.		
Pass Scotland Lightship distant 0.8 mile, Shrewsbury Rocks lighted bell buoy 1 distant 1.1 miles, and Sea Girt Light distant 5.8 miles.		
Direct	180	43. 3
Reverse	*000*	*43. 3*
2. Barnegat Lightship, bearing 280°, distant 1.5 miles. Chart 1216.		
Brigantine Shoal lighted whistle buoy 2 BS distant 4.5 miles and Five Fathom Bank North lighted whistle buoy 2 FB distant 4.9 miles.		
Direct	206½	66. 3
Reverse	*026½*	*66. 3*
3. Five Fathom Bank Lightship, bearing 300°, distant 2.2 miles. Chart 1219.		
To Delaware Bay Entrance		
3. Five Fathom Bank Lightship, bearing 300°, distant 2.2 miles. Chart 1219.		
Direct	274	23. 0
Reverse	*094*	*23. 0*
3A. Overfalls Lightship, bearing 045°, distant 0.2 mile.		
International Rules apply seaward of Overfalls Lightship.		
Continue by Table 3 to Delaware Bay and River.		
Delaware Bay Entrance to Chesapeake Bay Entrance		
3A. Overfalls Lightship, bearing 045°, distant 0.2 mile.		
Direct	144	27. 3
Reverse	*324*	*27. 3*
4. Fenwick Shoal lighted whistle buoy 2, bearing 260°, distant 3.9 miles. Charts 1109, 1220.		
Continuing Southward		
3. Five Fathom Bank Lightship, bearing 300°, distant 2.2 miles. Chart 1219.		
Direct	199	21. 5
Reverse	*019*	*21. 5*
4. Fenwick Shoal lighted whistle buoy 2, bearing 260°, distant 3.9 miles. Charts 1109 and 1220.		
Direct	199	32. 8
Reverse	*019*	*32. 8*
5. Winter Quarter Shoal Lightship, bearing 295°, distant 1.5 miles. Pass Hog Island lighted bell buoy 12, distant 3.5 miles, and Chesapeake Lightship, distant 3.0 miles. Charts 1221, 1222, 1109.		
Direct	216½	71. 5
Reverse	*036½*	*71. 5*
6. Cape Henry Approach lighted whistle buoy 2, bearing 306°, distant 0.6 mile. Pass close southward of Cape Henry Junction lighted whistle buoy. Chart 1222.		
Direct	259	8. 0
Reverse	*079*	*8. 0*
7. Cape Henry Light, bearing 257°, distant 2.3 miles. Continue on Table 4 to Baltimore or Table 5 to Norfolk.		

Directions for Vessels of Less Than 17 Feet Draft

Tows and other vessels of less than 17-foot draft usually pass inside of Five Fathom Bank and Fenwick Shoal at all times, and close outside of McCrie Shoal and Winter Quarter Shoal, except in westerly weather.

International Rules apply seaward of a line drawn between Cape Charles Light, Cape Henry Junction lighted whistle buoy, and Cape Henry Light.

In westerly or northwesterly weather vessels of this class bound northward run closer inshore in places. The generally used route for vessels with local knowledge is as follows:

From 2.5 miles eastward of Middle Ground Bank lighted bell buoy 2 A (Chesapeake Bay entrance) to 5 miles eastward of Hog Island Light; thence along shore at a distance of about 3 miles to Turners Lump lighted bell buoy.

Thence midway between Chincoteague Shoals and Blackfish Bank; thence to Six Fathom lighted buoy 4 A; thence to Great Gull Bank lighted whistle buoy; thence along shore to the vicinity of Overfalls Lightship passing close by Hen and Chickens Shoal lighted whistle buoy.

The courses from here to Barnegat Inlet are not much varied in any weather, but from Barnegat Inlet to Shrewsbury Rocks vessels follow close inshore, not more than 1 mile off, but always pass outside of Shrewsbury Rocks buoy, guarding against the wrecks in the general vicinity north and south of this buoy; and thence to Ambrose Channel outer end.

In easterly weather the route often used by vessels of this class is from Chesapeake Lightship to Winter Quarter Shoal lighted whistle buoy; thence to 1 mile westward of Fenwick Shoal lighted whistle buoy; thence to 1 mile eastward of McCrie Shoal lighted whistle buoy 2, of Ludlam Beach lighted bell buoy 2 LB and of Brigantine Shoal lighted whistle buoy 2 BS; thence to 2 miles westward of Barnegat Lightship; thence to 1 mile eastward of Shrewsbury Rocks lighted bell buoy; and thence to the vicinity of Scotland Lightship.

The following courses are suggested for strangers of 17 feet or less draft in good weather. They are designed to avoid dangers along the coast and to pass outside the authorized fish-trap areas which extend long distances offshore. They have been laid between lighted aids to insure safer running at night.

In bad weather, or with a deeper draft, follow the directions for vessels of 17- to 24-foot draft, Table 1 preceding.

Table 2.—New York (Sandy Hook) to Chesapeake Bay Entrance

CHARTS 1215, 1216, 1217, 1219, 1220, 1221, 1222

Positions (Reverse directions in *italics*—read upward)	True courses	Distances
	Degrees	*Nautical miles*
1. On Swash Channel Range with Scotland Lightship bearing 131½°, distant 1.2 miles. International Rules apply seaward of a line drawn between Ambrose Channel Lightship and Navesink Light (south tower). Guard against wreck about 0.4 mile westward of course and 1 mile before next position. Chart 1215.		
Direct	174	7.0
Reverse	*354*	*7.0*
2. Shrewsbury Rocks lighted bell buoy 1, bearing 270°, distant 0.2 mile. Guard against reported wrecks lying close to the course.		
Direct	193	14.7
Reverse	*013*	*14.7*

Table 2.—New York (Sandy Hook) to Chesapeake Bay Entrance—Con.

Positions (Reverse directions in *italics*—read upward)	True courses	Distances
	Degrees	*Nautical miles*
3. Manasquan Inlet North Breakwater Light, bearing 270°, distant 1.5 miles. Chart 1216.		
Direct	187	20.4
Reverse	*007*	*20.4*
4. Barnegat Daybeacon (Barnegat Lighthouse), bearing 270°, distant 2.6 miles. Guard against the reported wrecks near the course.		
Direct	200½	23.8
Reverse	*020½*	*23.8*
5. Brigantine Shoal lighted whistle buoy 2 BS, bearing 270°, distant 1.0 mile. Chart 1217.		
Direct	225	21.8
Reverse	*045*	*21.8*
6. Ludlam Beach lighted bell buoy 2 LB, bearing 270°, distant 1.0 mile. Pass about 0.5 mile westward of Avalon Shoal lighted gong buoy 1. Guard against the charted wrecks and obstructions about 0.8 mile west of the course and 4 miles beyond position 6. Pass westward of the lighted buoy marking the wreck 8.2 miles beyond position 6.		
Direct	215	21.4
Reverse	*035*	*21.4*
7. McCrie Shoal lighted whistle buoy 2, bearing 270°, distant 1.0 mile. Chart 1219.		
Direct	226½	11.7
Reverse	*046½*	*11.7*
8. Hen and Chickens Shoal lighted whistle buoy 1 HC, bearing 270°, distant 0.1 mile.		
Direct	174	15.6
Reverse	*354*	*15.6*
9. Fenwick Shoal lighted whistle buoy 1 FIS, bearing 090°, distant 0.5 mile. Chart 1220.		
Direct	190	10.6
Reverse	*010*	*10.6*
10. Great Gull Bank lighted whistle buoy 4, bearing 270°, distant 0.1 mile.		
Direct	192	19.8
Reverse	*012*	*19.8*
11. Winter Quarter Shoal lighted whistle buoy 6 WQS, bearing 270°, distant 0.1 mile.		
Direct	219	8.3
Reverse	*039*	*8.3*
12. Blackfish Bank lighted whistle buoy 8, bearing 270°, distant 0.2 mile. Chart 1221. Guard against wrecks on this course.		
Direct	210½	21.7
Reverse	*030½*	*21.7*
13. Parramore Banks lighted whistle buoy 10 P, bearing 270°, distant 0.2 mile.		
Direct	206	16.1
Reverse	*026*	*16.1*
14. Hog Island lighted bell buoy 12, bearing 270°, distant 0.2 mile. Chart 1222.		
Direct	206½	11.4
Reverse	*026½*	*11.4*
15. Cape Charles lighted whistle buoy 14, bearing 270°, distant 350 yards.		
Direct	210	11.3
Reverse	*030*	*11.3*
16. Cape Henry Approach lighted whistle buoy 2, bearing 306°, distant 0.6 mile.		
Direct	259	8.0
Reverse	*079*	*8.0*
17. Cape Henry Light, bearing 257°, distant 2.3 miles.		

Table 3.—Delaware Bay Entrance to Philadelphia

CHARTS 1218, 294, 295, 280, 296

Positions (Reverse directions in *italics*—read upward)	True courses	Distances
	Degrees	*Nautical miles*
1. **Overfalls Lightship,** bearing 045°, distant 0.4 mile, pass 300 yards eastward at Delaware Bay Main Channel lighted bell buoy 7, and be guided by the lighted buoys. Pass 0.9 mile west of Brandywine Shoal Light and 0.8 mile east of Fourteen Foot Bank Light. Miah Maull Shoal Light is directly ahead (*astern*) on this course, Chart 1218:		
Direct	337	18.9
Reverse	*157*	*18.9*
2. **Delaware Bay Main Channel lighted bell buoy 19,** bearing 240°, distant 200 yards, pass 0.6 mile southwestward of Miah Maull Shoal Light:		
Direct	325	7.1
Reverse	*145*	*7.1*
3. **Elbow of Cross Ledge Light,** bearing 075°, distant 400 yards:		
Direct	335½	3.5
Reverse	*155½*	*3.5*
4. **Delaware Bay Main Channel lighted bell buoy 32,** bearing 057°, distant 250 yards, south edge of red sector Mahon River Light bearing 237½°. Pass Ship John Shoal Light bearing 048°, distant 650 yards; change to Chart 294:		
Direct (Liston Range ahead)	318	18.0
Reverse (Liston Range astern)	*138*	*18.0*
5. **Junction of Liston and Baker Ranges.** Baker Range lighted bell buoy 2 B bearing 066°, distant 0.4 mile:		
Direct (Baker Range ahead)	355	1.6
Reverse (Baker Range astern)	*175*	*1.6*
6. **Junction of Baker and Reedy Island Ranges,** midway between buoys 1 R and 2 R:		
Direct (Reedy Island Range astern)	015	1.9
Reverse (Reedy Island Range ahead)	*195*	*1.9*
7. **Junction of Finns Point and Reedy Island Ranges,** buoy 1F bearing 230°, distant 300 yards:		
Direct (Reedy Island Range astern)	015	2.3
Reverse (positions 9 to 7 steering Finns Point Range astern)	*188*	*2.8*
8. **Junction of Reedy Island and New Castle Ranges,** midway between buoys 1N and 2N:		
Direct (New Castle Range ahead)	334	0.5
Reverse (position 9 to 7, steering Finns Point Range astern)	*188*	*2.8*
9. **Junction of Finns Point Range,** lighted bell buoy 3N bearing 270°:		
Direct (New Castle Range ahead)	334	3.8
Reverse (New Castle Range astern)	*154*	*3.8*
10. **Junction of New Castle and Bulkhead Bar Ranges,** lighted bell buoy 2B bearing 065°:		
Direct (Bulkhead Bar Range ahead)	008	0.6
Reverse (Bulkhead Bar Range astern)	*188*	*0.6*
11. **Junction of Bulkhead Bar and Deepwater Point Ranges,** Finns Point Jetty Light bearing 096°:		
Direct (Deepwater Point Range ahead)	042	3.8
Reverse (Deepwater Point Range astern)	*222*	*3.8*
12. **Junction of Deepwater Point and Cherry Island Ranges,** lighted bell buoy 1C bearing 300°:		
Pass about 400 yards eastward of Christina River South Jetty Light at the Christina River Entrance to Wilmington. There is a privately maintained fog signal (siren) on the dock at Deepwater Point. (Entering the Christina River steer the entrance lighted range, course 293° to the Wilmington Marine Terminal, and thence follow the chart.) There is marked local magnetic attraction in the vicinity of Wilmington—see note on chart;		
Direct (Cherry Island Range ahead)	017	4.1
Reverse (Cherry Island Range astern)	*197*	*4.1*
13. **Cherry Island Range buoy 9C** bearing 270°, distant 230 yards; Chart 295:		
Direct (Rounding to Bellevue Range)	027	0.5
Reverse (Rounding to Cherry Island Range)	*207*	*0.5*
14. **Cherry Island Front Range Light** bearing 000°, distant 0.3 mile:		
Direct (Bellevue Range astern)	035½	2.8
Reverse (Bellevue Range ahead)	*215½*	*2.8*

Table 3.—Delaware Bay Entrance to Philadelphia—Continued

Positions (Reverse directions in *italics*—read upward)	True courses	Distances
	Degrees	*Nautical miles*
15. Marcus Hook Range lighted bell buoy 2M bearing 125° distant 250 yards, rounding to Marcus Hook Range. (Light shown at Grubbs Landing, offshore from west bank, when this buoy is replaced by an unlighted buoy during ice runs):		
Direct (Marcus Hook Range astern)	058	4.3
Reverse (Marcus Hook Range ahead)	*238*	*4.3*
16. Junction of Marcus Hook and Chester Ranges, Chester Range lighted bell buoy 1C bearing 321°:		
Direct (Chester Range ahead)	051	1.9
Reverse (Chester Range astern)	*231*	*1.9*
17. Chester Range lighted buoy 6C bearing 145°, distant 200 yards:		
Direct	064	1.0
Reverse	*244*	*1.0*
18. Tinicum Island Range lighted buoy 2T bearing 180°, distant 200 yards:		
Direct (Tinicum Range ahead)	092	3.1
Reverse (Tinicum Range astern)	*272*	*3.1*
19. Tinicum Island Range lighted buoy 5T bearing 000°, distant 200 yards:		
Direct (Billingsport Range astern)	070	1.1
Reverse (Billingsport Range ahead)	*250*	*1.1*
20. Junction of Billingsport and Mifflin Bar Ranges. (Fort Mifflin Fog Signal, siren, at outer end of lower pier at Fort Mifflin). Entering the Schuylkill River steer the entrance lighted range, course 020½° and follow Chart 280. Schuylkill River Entrance Fog Signal, bell, on bulkhead at west side of river entrance:		
Direct (Mifflin Bar Range astern)	054	2.8
Reverse (Mifflin Bar Range ahead)	*234*	*2.8*
21. Junction of Mifflin Bar Range and Horseshoe West Range:		
Direct (latter range astern)	094	1.8
Reverse (latter range ahead)	*274*	*1.8*
22. Horseshoe Lower lighted buoy 35, bearing 000°, distant 150 yards. Round in mid-channel to Horseshoe East Range astern:		
Direct	various	0.6
Reverse	*various*	*0.6*
23. Horseshoe lighted buoy 37, bearing 260°, distant 450 yards:		
Direct (Horseshoe East Range astern)	028	1.1
Reverse (Horseshoe East Range ahead)	*208*	*1.1*
24. On Horseshoe East Range abreast Immigration Station, Gloucester, New Jersey, follow dredged channel on Chart 280 along Philadelphia and Camden water fronts:		
Direct	various	5.6
Reverse	*various*	*5.6*
25. Fisher Point Range abreast Allegheny Avenue, Philadelphia. From Philadelphia to Trenton the channel is marked by numerous buoys and lighted ranges. Chart 296 is the best guide. The distance from Position 25 to Trenton Municipal Marine Terminal is 26 miles.		

Table 4.—Chesapeake Bay Entrance to Baltimore

CHARTS 1222, 1223, 1224, 1225, 1226

1. Chesapeake Lightship bearing 000°, distant 0.2 mile. 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:		
Direct	259	12.6
Reverse	*079*	*12.6*
Or, **Chesapeake Bay Entrance lighted whistle buoy 2CB to position 2—steer 309°** for 6.9 miles. See General Remarks on page 168.		
2. Cape Henry Light bearing 257°, distant 2.3 miles. Pass 0.3 mile northeast of Tail of the Horseshoe lighted whistle buoy TH:		
Direct	321	14.1
Reverse	*141*	*14.1*
3. Middle Ground lighted whistle buoy 10 bearing 090°, distant 0.9 mile. Pass 0.4 mile east of York Spit Channel Entrance lighted whistle buoy 1A:		
Direct	353	4.0
Reverse	*173*	*4.0*

Table 4.—Chesapeake Bay Entrance to Baltimore—Continued

Positions (Reverse directions in *italics*—read upward)	True courses	Distances
	Degrees	*Nautical miles*
4. **Entrance York Spit Dredged Channel,** midway between lighted buoys 1 and 2:		
Direct	017	3.5
Reverse	*197*	*3.5*
5. **North end of York Spit Channel** abreast of York Spit Channel lighted bell buoy 9. Wreck 1.5 miles 108° from Wolf Trap Light:		
Direct	002	9.0
Reverse	*182*	*9.0*
6. **Wolf Trap Light** bearing 270°, distant 3 miles, Chart 1223:		
Direct	354	23.1
Reverse	*174*	*23.1*
7. **Tangier Island Shoal Lump lighted bell buoy 12TL** bearing 090°, distant 0.3 mile. A 23-foot spot lies 0.95 mile 015° from this buoy, and is a menace to deep-draft vessels passing close eastward of the buoy. The course passes between three sunken wrecks which have a least charted depth of 40 feet; change to Chart 1224:		
Direct	005	6.3
Reverse	*185*	*6.3*
8. **Smith Point Light** bearing 270°, distant 1 mile. Pass 1.5 miles eastward of Point No Point Light, and 1.1 miles eastward of Cove Point Light. The latter is a day service, vessel-reporting station connected by telephone to Baltimore; Chart 1225:		
Direct	343	42.5
Reverse	*163*	*42.5*
9. **Sharps Island lighted bell buoy 18A** bearing 090°, distant 0.1 mile. Pass 2.9 miles westward of Sharps Island Light:		
Direct	356	11.9
Reverse	*176*	*11.9*
10. **Poplar Island Shoal lighted bell buoy 20A** bearing 090°, distant 0.2 mile. Pass 1.8 miles westward of Bloody Point Bar Light.		
Direct	010	9.0
Reverse	*190*	*9.0*
11. **Thomas Point Shoal Light** bearing 270°, distant 0.9 mile:		
Direct	016	7.3
Reverse	*196*	*7.3*
12. **Sandy Point Light,** bearing 270°, distant 0.5 mile. Pass between Craighill Channel entrance lighted buoys, and pass 0.4 mile east of Baltimore Light; Chart 1226.		
Direct	343	3.3
Reverse	*163*	*3.3*
13. **Craighill Channel Range,** midway between lighted buoys 5C and 6C:		
Direct (Craighill Channel Range ahead)	000	3.5
Reverse (Craighill Channel Range astern)	*180*	*3.5*
14. **Junction Craighill and Cut-off Channel Ranges,** southwest of lighted buoy 2K:		
Direct (latter range ahead)	330	3.6
Reverse (latter range astern)	*150*	*3.6*
15. **Junction Cut-off and Brewerton Channel Ranges,** south of lighted buoy 14K:		
Direct (latter range ahead)	291	3.9
Reverse (latter range astern)	*111*	*3.9*
16. **Junction Brewerton and Fort McHenry Channel Ranges,** northeast of lighted buoy 1M.		
Direct (latter range ahead)	321	4.4
Reverse (latter range astern)	*141*	*4.4*
17. **Lazaretto Point Light,** bearing 000°, distant 0.3 mile. Thence be guided by the chart.		
An alternate route passes westward of York Spit Channel; 32 feet by this route. Positions A and C are the same as positions 3 and 6 in the main route.		
A. **Middle Ground lighted whistle buoy 10** bearing 090°, distant 0.9 mile. Pass 0.1 mile eastward of lighted whistle buoy 1A.		
Direct	347	4.0
Reverse	*167*	*4.0*
B. **York Spit Channel lighted buoy 1** bearing 090°, distant 0.3 mile.		
Direct	008	12.5
Reverse	*188*	*12.5*
C. **Wolf Trap Light** bearing 270°, distant 3 miles.		

Table 5.—Chesapeake Bay Entrance to Newport News and Norfolk

CHARTS 1222, 481, 400, 452

Positions (Reverse directions in *italics*—read upward)	True courses	Distances
	Degrees	*Nautical miles*
1. **Cape Henry Light** bearing 257°, distant 2.3 miles, Chart 1222. Pass through Thimble Shoal Dredged Channel. See page 179 for restricted use of this channel. Vessels with drafts within the restrictions should parallel this course just outside the lighted aids. Change to chart 481.		
Direct	288	14.5
Reverse	*108*	*14.5*
2. **Thimble Shoal Light** bearing 045°, distant 0.45 mile; Chart 400.		
Direct	259	1.1
Reverse	*079*	*1.1*
3. **Old Point Comfort Light** bearing 263°, distant 1.8 miles. Thimble Shoal Light astern.		
Direct	249	1.9
Reverse	*069*	*1.9*
4. **Old Point Comfort Light** bearing 000°, distant 0.5 mile. Anchorage A west of Old Point Comfort is for Quarantine. Caution: Course leads along Quarantine and Naval Anchorage limits.		
Direct	229½	1.9
Reverse	*049½*	*1.9*
5. **Elizabeth River lighted gong buoy 1** bearing 139°, distant 150 yards. Entrance to dredged channel leading to Norfolk. Anchorage can be made in Hampton Roads as desired.		
To Newport News		
5. **Elizabeth River lighted gong buoy 1** bearing 139°, distant 150 yards. Chart 400:		
Direct	229½	1.4
Reverse	*049½*	*1.4*
6. **Newport News North Channel lighted buoy 2** bearing 319°, distant 100 yards. Through Newport News dredged channel.		
Direct	264	2.7
Reverse	*084*	*2.7*
7. **Newport News North Channel lighted bell buoy 8** bearing 066°, distant 0.2 mile. Thence be guided by the chart.		
Direct	307	1.1
Reverse	*127*	*1.1*
8. **Newport News**, C. & O. Railway Pier bearing 070°, distant 250 yards. Fog bell on outer end of pier. For James River courses see Table 6.		
To Norfolk		
5. **Elizabeth River lighted gong buoy 1** bearing 139°, distant 150 yards. Through dredged channel; chart 400.		
Direct	184	3.4
Reverse	*004*	*3.4*
6A. **Elizabeth River lighted buoy 12** bearing 274°, distant 150 yards. Off Pier 2. Pass 200 yards eastward of Craney Island Light with fog bell. Lambert Point fog bell on outer end of pier. Change to chart 452.		
Direct	172½	2.8
Reverse	*352½*	*2.8*
7A. **Elizabeth River lighted buoy 23** bearing 111°, distant 380 yards. Off Lambert Point Piers, heading for Town Point.		
Direct	131	2.2
Reverse	*311*	*2.2*
8A. **Channel buoy S30** bearing 233°, distant 150 yards. Thence be guided by the chart to the Norfolk Piers or into Eastern Branch.		

Table 5.—Chesapeake Bay Entrance to Newport News and Norfolk—Con.

Positions (Reverse directions in *italics*—read upward)	True courses	Distances
To Portsmouth or Berkley	*Degrees*	*Nautical miles*
8A. Channel buoy S30 bearing 233°, distant 150 yards.		
Direct	155	0.5
Reverse	*335*	*0.5*
9A. Railway wharves, north end Portsmouth water front bearing 270°, distant 180 yards. Thence be guided by the chart to the Portsmouth or Berkley wharves. Vessels bound for the Dismal Swamp or Albermarle and Chesapeake Canals continue along the Southern Branch via directions given in the *U. S. Coast Pilot, Section D, Cape Henry to Key West.*		

Table 6.—James River, Newport News to Hopewell and Richmond

CHARTS 529, 530, 531

1. **Newport News,** railway pier bearing 070°, distant 125 yards. Fog bell on outer end of pier; Chart 529:		
Caution: Fish net stakes abound in the James River. The area limits are shown on the charts but are not rigidly adhered to by the local fishermen.		
Direct	322	2.8
Reverse	*142*	*2.8*
2. **Lift Span, James River Highway Bridge.**		
Direct	299	2.0
Reverse	*119*	*2.0*
3. **James River lighted bell buoy 6** bearing 000°, distant 250 yards. Pass 0.5 mile off White Shoal tower bearing 225°.		
Direct	307	3.4
Reverse	*127*	*3.4*
4. **Between James River lighted buoys 9 and 10.** Pass between lighted buoy 11 and buoy 12. (Burwell Bay channel not now maintained.):		
Direct	267	1.4
Reverse	*087*	*1.4*
5. **James River lighted bell buoy 14** bearing 330°, distant 450 yards. Continue on course to 0.4 mile above lighted bell buoy 24:		
Direct (Rocklanding Shoal Lighted Channel)	330	5.0
Reverse (Rocklanding Shoal Lighted Channel)	*150*	*5.0*
6. **James River lighted bell buoy 24** bearing 149°, distant 0.4 mile. Mulberry Point bearing 090°.		
Caution: Ships are bunched and moored either side of channel abreast the wharf north of above point:		
Direct	003	1.4
Reverse	*183*	*1.4*
7. **Deep Water Shoals Light** bearing 090°, distant 300 yards:		
Direct	016½	1.2
Reverse	*196½*	*1.2*
8. **Between James River lighted buoy 27 and buoy 28.** Follow aids in Tribell Shoal Channel:		
Direct	various	3.7
Reverse	*various*	*3.7*
9. **Between James River lighted buoy 39 and buoy 40.** Lighted bell buoy 41 close aboard south of course:		
Direct	247	2.3
Reverse	*067*	*2.3*
10. **Between James River lighted buoy 46 and buoy 45:**		
Direct (Goose Hill Channel Lighted Range ahead)	228	1.7
Reverse (same range astern)	*048*	*1.7*
11. **James River lighted bell buoy 52** bearing 287°, distant 525 yards. Make sharp right turn between buoy 51 and lighted bell buoy 52, and pass not more than 100 yards south of lighted bell buoy 52:		
Direct	296	0.9
Reverse	*116*	*0.9*

Table 6.—James River, Newport News to Hopewell and Richmond—Con.

Positions (Reverse directions in *italics*—read upward)	True courses	Distances
	Degrees	*Nautical miles*
12. Midway between James River buoys 53 and 54. Pass Church Point Light bearing 045°, distant 300 yards, Chart 530:		
Direct	317	3.0
Reverse	*137*	*3.0*
13. Swann Point Junction lighted bell buoy bearing 272°, distant 0.2 mile. Swann Point Shoal Channel Range astern and Dancing Point Shoal Channel Range ahead. Channels marked:		
Direct	264	5.0
Reverse	*084*	*5.0*
14. Between James River lighted buoy 68 and buoy 67. Round to next course, and pass between lighted bell buoy 69 and buoy 70 which mark the end of the dredged channel:		
Direct	300	2.7
Reverse	*120*	*2.7*
15. Claremont Wharf bearing 150°, distant 600 yards. Brandon Wharf Light ahead and Dancing Point Shoal Channel Front Range Light astern. Pass 400 yards off wreck off Chippokes Point. Wreck showing above high water in 1946 and marked by a light:		
Direct	308	1.8
Reverse	*128*	*1.8*
16. Brandon Wharf Light bearing 308°, distant 0.3 mile. Ritchie Wharf Light ahead:		
Direct	336	0.6
Reverse	*156*	*0.6*
17. Brandon Wharf Light bearing 178°, distant 0.4 mile. Bachelor Point Light ahead and Brandon Wharf Light astern. Pass about 350 yards off Ritchie Wharf Light:		
Direct	358	1.8
Reverse	*178*	*1.8*
18. Bachelor Point Light bearing 358° (ahead) distant 530 yards. Round Kennon Marsh in mid-channel passing 175 yards off Bachelor Point and Sturgeon Point Lights:		
Direct	various	1.9
Reverse	*various*	*1.9*
19. Milton Point Light bearing 315°, distant 300 yards. Head for James River lighted buoy 75 and keep at least 150 yards off eastern shore:		
Direct	219	2.1
Reverse	*039*	*2.1*
20. James River buoy 73 bearing 135°, distant 50 yards. Dredged channel. Pass between James River lighted buoy 75 and buoy 76.		
Direct	various	0.6
Reverse	*various*	*0.6*
21. James River buoy 77 bearing 180°, distant 50 yards. Head for Fort Powhatan Light:		
Direct	269	0.6
Reverse	*089*	*0.6*
22. Fort Powhatan Light bearing 269°, distant 450 yards. Round Weyanoke Point mid-channel; pass 250 yards off Flowerdew Hundred Creek Light, and 100 yards east of buoy 79:		
Direct	various	1.5
Reverse	*various*	*1.5*
23. Ruffins Wharf Light bearing 090°, distant 200 yards:		
Direct	358	0.7
Reverse	*178*	*0.7*
24. Between James River lighted buoy 81 and buoy 82, round Windmill Point:		
Direct	various	0.4
Reverse	*various*	*0.4*
25. Between James River lighted buoy 83 and buoy 84. Dredged channel. Round Windmill Point:		
Direct	various	0.4
Reverse	*various*	*0.4*
26. Between James River lighted buoy 86 and buoy 85. Dredged channel:		
Direct	249	1.9
Reverse	*069*	*1.9*

Table 6.—James River, Newport News to Hopewell and Richmond—Con.

Positions (Reverse directions in *italics*—read upward)	True courses	Distances
	Degrees	*Nautical miles*
27. Between James River lighted buoy 91 and buoy 92:		
Direct (Jordan Point Range ahead)	279	2. 4
Reverse (same range astern)	*099*	*2. 4*
28. Between James River lighted buoy 97 and buoy 98. Follow dredged channel passing between lighted buoy 100 and buoy 99, thence abreast buoy 102, and thence between lighted buoy 104 and buoy 103:		
Direct	various	2. 0
Reverse	*various*	*2. 0*
29. Between James River lighted buoy 106 and buoy 105. Head for lighted buoy 107, Chart 531:		
Direct	246	0. 7
Reverse	*066*	*0. 7*
30. James River lighted buoy 107 bearing 180°, distant 80 yards. At junction with North Flats Range:		
Direct (North Flats Range astern)	237	0. 6
Reverse (same range ahead)	*057*	*0. 6*
31. James River Light 109 abeam. Then follow the marked channel. (The aerial cable wharf has a privately maintained light at its outer end):		
Direct	various	1. 7
Reverse	*various*	*1. 7*
32. Hopewell (City Point) Wharf:		
Direct	various	22. 5
Reverse	*various*	*22. 5*
33. Richmond Wharves: Proceeding to Richmond, pass through Turkey Island Cut-off, Jones Neck Cut-off, and Aiken Swamp-Dutch Gap Cut-off, Chart 531, supplemented by information on pages 202 and 203 is the best guide but strangers of deep draft should take a pilot.		

Table 7.—Hampton Roads to York River

CHART 1222

For vessels of 8 feet draft or less		
1. Old Point Comfort Light bearing 000°, distant 0.2 mile. Fish trap limits 300 yards northward. Course is north of ship track to Hampton Roads.		
Direct	075	1. 7
Reverse	*255*	*1. 7*
2. Old Point Comfort Light bearing 262°, distant 1.6 miles. Pass between fish stake buoys.		
Direct	013	5. 7
Reverse	*193*	*5. 7*
3. Back River lighted gong buoy 1 bearing 223°, distant 0.2 mile. Pass between fish stake buoys. At lighted gong buoy 1 turn left for Back River being guided by the chart and the aids.		
Direct	343	7. 4
Reverse	*163*	*7. 4*
4. York Spit lighted bell buoy 2 bearing 045°, distant 0.2 mile.		
Direct	302	1. 4
Reverse	*122*	*1. 4*
5. York Spit bell buoy 2A bearing 045°, distant 0.3 mile. At this position turn left for Poquoson River, or Bennett, Chisman, and Back Creeks, being guided by the chart and the aids.		
Direct	285	3. 3
Reverse	*105*	*3. 3*
6. Tue Marshes Light bearing 195°, distant 0.5 mile. Mouth of the York River.		

Table 8.—York River From Eastward (Main Ship Channel)

CHARTS 1222, 492, 495

Positions (Reverse directions in *italics*—read upward)	True courses	Distances
	Degrees	*Nautical miles*
1. Middle Ground lighted whistle buoy 10 bearing 090°, distant 0.9 mile. Same as position 3, Table 4. Chart 1222.		
Direct	294	3.1
Reverse	*114*	*3.1*
2. York River Junction lighted bell buoy, bearing 000°, distant 0.5 mile. Pass between fish trap limits, marked by buoys, to York River entrance.		
Direct	320	4.8
Reverse	*140*	*4.8*
3. York Spit Light bearing 045°, distant 0.8 mile. Pass lighted bell buoy 2 bearing 036°, distant 0.3 mile.		
Direct	306	2.9
Reverse	*126*	*2.9*
4. York Spit bell buoy 2A bearing 045°, distant 0.3 mile. Same as position 5, Table 7.		
Direct	285	3.3
Reverse	*105*	*3.3*
5. Tue Marshes Light bearing 195°, distant 0.5 mile. Same as position 6, Table 7. Chart 492.		
Direct	261	4.6
Reverse	*081*	*4.6*
6. Lower Yorktown Light on Naval Fuel Depot Wharf bearing 180°, distant 0.3 mile. Mid-channel off Gloucester Point ahead.		
Direct	297	1.5
Reverse	*117*	*1.5*
7. Gloucester Point Wharf Light bearing 027°, distant 400 yards. Pass 250 yards off Sandy Point Shoal Light and 250 yards off Poplar Creek Flats Buoy 6. Chart 495.		
Direct	313	5.1
Reverse	*133*	*5.1*
8. Pages Rock Light bearing 349°, distant 0.65 mile. Pass 325 yards off this light and 250 yards off buoy 9 heading for outer end of Clay Bank Wharf. **Caution:** Fish stakes are found in great number upstream from Pages Rock.		
Direct	335	2.5
Reverse	*155*	*2.5*
9. Clay Bank Wharf End bearing 335°, distant 0.6 mile. Pass 250 yards off the wharf, 175 yards off buoy 9A, 400 yards off Middle Ground Light and 250 yards off buoy 9B.		
Direct	321½	4.0
Reverse	*141½*	*4.0*
10. Purtan Bay Light (at end of ruins of Allmondsville wharf) bearing 045°, distant 175 yards. Pass 125 yards off buoy 11 and 400 yards off reflector buoy 12. **Caution:** 0.8 mile beyond buoy 12 the course passes close westward of an 18-foot shoal marked by numerous fish stakes. Shape the course to pass between them and those on the western side of the channel.		
Direct	318	4.6
Reverse	*138*	*4.6*
11. Roane Flat Light bearing 000°, distant 450 yards. Bells Rock Light will be slightly on the starboard bow on this course. Fish traps lie on both sides of the channel and the course must be shaped to pass between the ends of the traps. Pass 100 yards off bell buoy 13.		
Direct	332	2.9
Reverse	*152*	*2.9*
12. Bells Rock Light bearing 107°, distant 125 yards.		
Direct (Bells Rock Light slightly on starboard quarter)	299	1.6
Reverse (same light slightly on port bow)	*119*	*1.6*

Table 8.—York River from Eastward (Main Ship Channel)—Continued

Positions (Reverse directions in *italics*—read upward)	True courses	Distances
	Degrees	*Nautical miles*
13. Fillbates Creek Flats Light bearing 160°, distant 300 yards. West side of the channel well marked by buoys. Timber dike parallels the channel about 300 yards west of the buoys.		
Direct	various	2. 0
Reverse	*various*	*2. 0*
14. Abreast of wharf at West Point.		
Pamunkey River: Proceeding up the Pamunkey River, the chart and local knowledge are the best guides.		
Mattaponi River: Entering the Mattaponi River, cross the shoal between buoys 14 and 16, south of Goff Point, and proceed with the aid of the chart and local knowledge. A depth of 11 feet can be carried across the above shoal.		

Table 9.—Mobjack Bay

CHARTS 1222, 494

1. Middle Ground lighted whistle buoy 10 bearing 090°, distant 0.9 mile. Same as position 3, Table 4. Pass York Spit Entrance Channel lighted whistle buoy 1A bearing 090°, distant 1.2 miles. Chart 1222.		
Direct	327	5. 5
Reverse	*147*	*5. 5*
2. Between Fish Net spar buoys 13N and 18N. York Spit Light bearing 290°, distant 2.4 miles. Pass between fish net stake buoys, with this channel 800 feet wide in the main entrance to Mobjack Bay. See Chart 1222 for fish trap limits. Course must be altered to pass wreck, marked by stakes December 1946, distant 1.6 miles 204° from New Point Comfort Light. Change to Chart 494.		
Direct	320	10. 2
Reverse	*140*	*10. 2*
3. East River Entrance bell buoy 6 bearing 000°, distant 0.3 mile. Pass Pultz Bar Light and buoy 2 on range bearing 045°, light distant 0.8 miles.		
Direct	319	3. 6
Reverse	*139*	*3. 6*
4. Ware Point Shoal Light bearing 162°, distant 500 yards. Pass 175 yards off buoy 1.		
Direct (Ware Point Shoal Light astern)	342	2. 4
Reverse (same light ahead)	*162*	*2. 4*
North River		
5. Lone Point Light bearing 263°, distant 470 yards.		
Direct	287	1. 7
Reverse	*107*	*1. 7*
6. Cradle Point Light bearing 000°, distant 100 yards.		
East River		
3. East River Entrance bell buoy 6 bearing 000°, distant 0.3 mile. Pass close westward of buoy 6 and 515 yards eastward of Pultz Bar Light.		
Direct	357	2. 0
Reverse	*177*	*2. 0*
4A. Pultz Bar Buoy 2 bearing 090°, distant 230 yards.		
Direct	019	0. 7
Reverse	*199*	*0. 7*
5A. Pond Point Shoal Light bearing 270°, distant 200 yards. Continue on an approximate mid-channel course being guided to the wharves by the chart and local knowledge.		

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Table 9.—Mobjack Bay—Continued

Positions (Reverse directions in *italics*—read upward)	True courses	Distances
Severn River	*Degrees*	*Nautical miles*
3. East River Entrance bell buoy 6 bearing 000°, distant 0.3 mile. Clear of fish trap limits. Course can be laid from position 3 to position 5B. Good water but through fish trap area.		
Direct	311	1. 4
Reverse	*131*	*1. 4*
4B. Pultz Bar Light bearing 050°, distant 1 mile.		
Direct (above light astern)	229	1. 7
Reverse (above light ahead)	*049*	*1. 7*
5B. Severn River Light 1, bearing 180°, distant 200 yards.		
Direct	244	1. 1
Reverse	*064*	*1. 1*
6B. Turtle Neck Point bearing 332°, distant 500 yards.		
Direct	271	0. 8
Reverse	*091*	*0. 8*
7B. Severn River Light, 3, bearing 180°, distant 100 yards. Entering Southwest Branch, round the above light and pass 100 yards east of buoy 2, then follow the chart to the wharves.		
Entering Northwest Branch, follow the chart, rounding buoy 5.		
Ware River		
4B. Pultz Bar Light bearing 050°, distant 1 mile. Clear of fish trap limits.		
Direct	293	3. 1
Reverse	*113*	*3. 1*
5C. Ware Point Shoal buoy 2 bearing 095°, distant 1,100 yards. Buoy 2 on range with Junction Buoy.		
Direct	315	0. 8
Reverse	*135*	*0. 8*
6C. Piney Point Shoal Buoy 1, bearing 180°, distant 175 yards. Pass Windmill Point Shoal Light bearing 180°, distant 150 yards.		
Direct	253	0. 9
Reverse	*073*	*0. 9*
7C. Island Point Spit Light bearing 000°, distant 200 yards. Thence follow chart, and round the light, passing close eastward of buoy 3.		

Table 10.—Rappahannock River Entrance to Tappahannock

CHARTS 534, 535, 536

1. Stingray Point Light bearing 274°, distant 6 miles. This position is between positions 6 and 7, courses from Chesapeake Bay Entrance to Baltimore, Table 4. Pass 0.9 mile south of Rappahannock Spit lighted bell buoy, and continue clear of fish traps areas, for which see Chart 1223. If proceeding up the Rappahannock River pass 450 yards north of Sturgeon Creek Shoal lighted buoy 1. Other suitable courses may be laid in Chesapeake Bay to the position off the Rappahannock Spit lighted bell buoy.		
From the bell buoy courses may be laid clear of fish trap areas into Piankatank River:		
Direct	284	10. 3
Reverse	*104*	*10. 3*
2. Mosquito Point Shoal buoy 2 bearing 000°, distant 0.4 mile:		
Direct	299	4, 8
Reverse	*119*	*4. 8*
3. Spinhouse Point Shoal Light bearing 000°, distant 1 mile:		
Direct	266	3. 0
Reverse	*086*	*3. 0*
4. Towles Point Shoal lighted bell buoy 4 bearing 000°, distant 0.3 mile, Chart 535:		
Direct	300	2. 4
Reverse	*120*	*2. 4*

Table 10.—Rappahannock River Entrance to Tappahannock—Continued

Positions (Reverse directions in *italics*—read upward)	True courses	Distances
	Degrees	*Nautical miles*
5. Urbanna Creek Outer Light, on range with Inner Light, distant 0.9 mile:		
Direct	346	4.5
Reverse	*166*	*4.5*
6. Smoky Point buoy 1A bearing 270°, distant 0.5 mile:		
Direct	318	3.1
Reverse	*138*	*3.1*
7. Punch Bowl Shoal buoy 3 bearing 225°, distant 300 yards:		
Direct (Jones Point ahead)	291	2.3
Reverse (same point astern)	*111*	*2.3*
8. Tarpley Point Shoal buoy 6 bearing 045°, distant 300 yards:		
Direct	324	1.2
Reverse	*144*	*1.2*
9. Jones Point lighted buoy 5 bearing 225°, distant 250 yards. With Bowlers Rock Light ahead, pass 200 yards north of buoy 7 and 100 yards south of buoy 8. The channel is narrow above Jones Point, and strangers must depend upon the buoys and lights. The current has considerable strength at times and care must be taken not to be set off the course by it.		
Direct	306	3.0
Reverse	*126*	*3.0*
10. Bowler Ledge buoy 10 bearing 345°, distant 325 yards. Fish trap areas shown on Chart 535:		
Direct	327	2.6
Reverse	*147*	*2.6*
11. Between Muddy Gut Upper Entrance buoy 9 and Fish Net Stake buoy 7 AW:		
Direct	320	0.8
Reverse	*140*	*0.8*
12. Between Fish Net Stake buoys 7 CW and 7 BW. Bear somewhat west of course, off and above buoy 12:		
Direct	338	1.8
Reverse	*158*	*1.8*
13. Between Lowery Point Shoal buoy 11 and Fish Net Stake buoy 7 DW. Pass Ross Rock lighted buoy 12A and buoys 14 and 16:		
Direct	308	2.4
Reverse	*128*	*2.4*
14. Between Jones Point buoy 13 and Fish Net Stake buoy 7 EW. Pass buoy 18 and Fish Net Stake buoy 7 FW, and head between the draw span of the river bridge and the ends of the wharves:		
Direct	299	1.6
Reverse	*119*	*1.6*
15. Abreast the wharves at Tappahannock: Anchorage can be had in 13 to 17 feet anywhere in the channel between the wharf and buoy 18, 1 mile east-southeastward. The chart is the best guide to Fredericksburg, and strangers near the limiting draft should take a pilot.		

Table 11.—Potomac River, Chesapeake Bay to Washington

CHARTS 557, 558, 559, 560

1. Smith Point Light bearing 208°, distant 1.4 miles. This position is between positions 8 and 9, courses from Chesapeake Bay Entrance to Baltimore, Table 4. Pass 2.5 miles southwest of Point Lookout Light, and continue clear of fish trap areas, shown on Charts 1224, 557, and 558:		
Direct	306	22.3
Reverse	*126*	*22.3*
2. Piney Point Light bearing 045°, distant 1.4 miles, Chart 558.		
Direct	324	3.2
Reverse	*144*	*3.2*
3. Ragged Point Light bearing 225°, distant 0.7 mile.		
Direct (Blakiston Island Shoal lighted bell buoy ahead)	286	7.5
Reverse (same buoy astern)	*106*	*7.5*

Table 11.—Potomac River, Chesapeake Bay to Washington—Continued

Positions (Reverse directions in *italics*—read upward)	True courses	Distances
	Degrees	*Nautical miles*
4. Potomac River Mid-channel lighted bell buoy F close aboard, north side. Pass between Kettle Bottom Shoals Channel Entrance lighted buoy 1 KB and bell buoy 2 KB:		
Note.—Kettle Bottom Shoals consist generally of small lumps of hardpan, with deep water close-to, and the lead will not serve as a guide to avoid them; there is often a pocket of slightly deeper water around the lumps than is found near by. The area has been closely surveyed, but there are probably lumps which were not found with the lead. They occupy a stretch of the river about 8 miles long, above Wicomico River. The straight channel across the shoals has been dredged to a depth of 24 feet at mean low water and is marked by buoys.		
Direct	295	8.5
Reverse	*115*	*8.5*
5. Between Kettle Bottom Channel lighted buoy 9 KB and buoy 10 KB. Pass south of buoy 20, marking a 19-foot spot, and close aboard mid-channel buoy G:		
Direct	296	3.1
Reverse	*116*	*3.1*
6. Potomac River Mid-channel lighted bell buoy H close aboard south side.		
Direct	327	2.0
Reverse	*147*	*2.0*
7. Upper Machodoc Flats lighted buoy 13 bearing 270°, distant 500 yards. Pass Morgantown Light bearing 090°, distant 510 yards. Aero light at Dahlgren. Pass Lower Cedar Point Light bearing 270°, distant 400 yards; Change to chart 559:		
Direct	358	3.3
Reverse	*178*	*3.3*
8. Center of Channel Span, Potomac River Bridge. Pass Persimmon Point Shoal Light bearing 270°, distant 450 yards:		
Direct (Popes Creek Flats lighted buoy 26 ahead)	340	2.3
Reverse	*160*	*2.3*
9. Popes Creek Flats lighted buoy 26 bearing 340°, distant 550 yards:		
Direct (Port Tobacco River Flats Light ahead)	299	1.2
Reverse (same light astern)	*119*	*1.2*
10. Port Tobacco River Flats Light bearing 299°, distant 0.5 mile. Pass 200 yards north of Mathias Point Shoal Light, 475 yards south of Upper Cedar Point Light, and 200 yards north of Mid-channel Lump buoy 21 A.		
Small boats should not hug Upper Cedar Point Light too close as the 3-foot shoal makes out somewhat to the southward:		
Direct (Riverside Wharf Light ahead)	255	5.1
Reverse (same light astern)	*075*	*5.1*
11. Riverside Wharf Light bearing 255°, distant 0.5 mile. Pass Metomkin Point Middle Ground Light bearing 135°, distant 600 yards:		
Direct	230	2.9
Reverse	*050*	*2.9*
12. Midway between buoys 30 and 23. Pass Maryland Point Light bearing 180°, distant 540 yards and buoy 23A bearing 180°, distant 130 yards:		
Direct (Maryland Point Shoal lighted buoy 25 ahead)	261	1.3
Reverse (same buoy astern)	*081*	*1.3*
13. Maryland Point Shoal lighted buoy 25 bearing 261°, distant 600 yards:		
Direct (Maryland Point Lump buoy 23 A astern)	282	1.0
Reverse (same buoy ahead)	*102*	*1.0*
14. Maryland Point Channel buoy 32 bearing 000°, distant 50 yards. Entrance to dredged channel:		
Direct	303	0.9
Reverse	*123*	*0.9*
15. Maryland Point Channel lighted buoy 27 bearing 270°. In dredged channel. Pass Thomas Point buoy 38 at edge of channel:		
Direct	335	2.5
Reverse	*155*	*2.5*
16. Smith Point Channel lighted buoy 29 bearing 270°. Dredged channel extends to buoy 48. Pass close aboard buoys 31 and 50A, and 175 yards west of Mallows Bay Light. Aero light on Brent Point:		
Direct	356	5.6
Reverse	*176*	*5.6*

Table 11.—Potomac River, Chesapeake Bay to Washington—Continued

Positions (Reverse directions in *italics*—read upward)	True courses	Distances
	Degrees	*Nautical miles*
17. **Sandy Point buoy 33** bearing 270°, distant 150 yards. Pass 350 yards off buoy 33A. Aero light about 1.5 miles, 270°:		
Direct	009	2.1
Reverse	*189*	*2.1*
18. **Chicamuxen Creek Shoal lighted buoy 52** bearing 090°, distant 500 yards:		
Direct	043	2.4
Reverse	*223*	*2.4*
19. **Between Mattawoman Shoal lighted bell buoy 35 and buoy 52A.** Enter the dredged channels. Change to Chart 560:		
Direct	039	2.7
Reverse	*219*	*2.7*
20. **Between Mattawoman Shoal lighted buoy 39 and buoy 52B.** Leave dredged channel. Hallowing Point ahead. Fog bell on Indian Head Lower Pier. See chart:		
Direct	053	1.3
Reverse	*233*	*1.3*
21. **Indian Head buoy 52C** bearing 115°, distant 350 yards:		
Direct (Glymont Light ahead)	083	1.5
Reverse (same light astern)	*263*	*1.5*
22. **Glymont Light** bearing 090°, distant 0.4 mile. Chapman Point ahead:		
Direct	064	0.6
Reverse	*244*	*0.6*
23. **Glymont Light** bearing 211°, distant 0.3 mile:		
Direct (Glymont Light astern)	031	0.9
Reverse (same light ahead)	*211*	*0.9*
24. **Midway between Hallowing Point Shoal lighted buoy 43 and buoy 54:**		
Direct	349	2.1
Reverse	*169*	*2.1*
25. **Brent Shoal lighted buoy 56** on range with Whitestone Point Light, distant 575 yards:		
Direct	012	0.3
Reverse	*192*	*0.3*
26. **Brent Shoal lighted buoy 56** bearing 135°, distant 100 yards:		
Direct	033	1.0
Reverse	*213*	*1.0*
27. **Between Whitestone Point Light and buoy 58:**		
Direct	052	0.6
Reverse	*232*	*0.6*
28. **Dogue Creek buoy 45A** bearing 045°, distant 100 yards. Enter dredged channel to buoy 45C:		
Direct	073	2.8
Reverse	*253*	*2.8*
29. **Sheridan Point Shoal lower buoy 47** bearing 000°, distant 200 yards. Pass 100 yards off Old Fort Hunt Wharf Light:		
Direct (Fort Washington Light ahead)	053	0.8
Reverse (same light astern)	*233*	*0.8*
30. **Fort Washington Light** bearing 053°, distant 300 yards:		
Direct	023	0.7
Reverse	*203*	*0.7*
31. **Midway between Riverview Wharf Light and buoy 51:**		
Direct	348	1.0
Reverse	*168*	*1.0*
32. **Broad Creek lighted buoy 62** bearing 090°, distant 150 yards:		
Direct	007	1.9
Reverse	*187*	*1.9*
33. **Fort Foote Wharf Light** bearing 090°, distant 200 yards. Pass Jones Point Light bearing 270°, distant 225 yards:		
Direct	351	1.6
Reverse	*171*	*1.6*
34. **Jones Point Light** bearing 191°, distant 750 yards. (100 yards off Alexandria water front):		
Direct (Jones Point Light astern)	011	1.8
Reverse (same light ahead)	*191*	*1.8*

Table 11.—Potomac River, Chesapeake Bay to Washington—Continued

Positions (Reverse directions in *italics*—read upward)	True courses	Distances
	Degrees	*Nautical miles*
35. Bellevue Magazine Pier Light bearing 090°, distant 180 yards. On outer end of pier with fog bell. Aero Light ashore. Dome of War College ahead:		
Direct	015	1.5
Reverse	*195*	*1.5*
36. Hains Point Junction lighted bell buoy bearing 009°, distant 300 yards. Junction of Anacostia River, Washington Channel, and Virginia Channel. (Guard against old wharf piling east of the channel off the east bank of the Potomac River.) Above this position the chart is the best guide.		

Table 12.—Patuxent River

CHART 539

1. Cedar Point Light bearing 225°, distant 2.2 miles. Between positions 8 and 9, Chesapeake Bay Entrance to Baltimore, Table 4:		
Direct (Drum Point Light ahead)	265	3.0
Reverse (same light astern)	*085*	*3.0*
2. Hog Island Shoal lighted buoy 3 bearing 180°, distant 0.2 mile. Red sectors of Drum Point Light cover the shoals. If bound to an anchorage west of Drum Point, continue on above course rounding Drum Point at 300 yards, and anchor in 26 to 28 feet:		
Direct	257	1.1
Reverse	*077*	*1.1*
3. Drum Point Light bearing 000°, distant 250 yards:		
Direct	251	1.7
Reverse	*071*	*1.7*
4. Sandy Point Shoal lighted buoy 4 bearing 000°, distant 0.2 mile:		
Direct	318	1.2
Reverse	*138*	*1.2*
5. Town Point buoy 7 bearing 225°, distant 200 yards:		
Direct	291	0.7
Reverse	*111*	*0.7*
6. Point Patience Light bearing 045°, distant 250 yards:		
Direct	000	1.1
Reverse	*180*	*1.1*
7. Hawks Nest buoy 9 bearing 200°, distant 0.3 mile:		
Direct (Petersons Point Light ahead)	336	1.3
Reverse (same light astern)	*156*	*1.3*
8. St. Cuthbert Shoal buoy 11 bearing 225°, distant 0.3 mile:		
Direct	310	1.9
Reverse	*130*	*1.9*
9. Sotterley Point Flats buoy 13 bearing 225°, distant 500 yards. Pass Broome Island Light bearing 225°, distant 200 yards:		
Direct	295	1.7
Reverse	*115*	*1.7*
10. Broome Island Light bearing 090°, distant 500 yards. Pass 350 yards off Battle Creek Shoal Light:		
Direct	306	3.5
Reverse	*126*	*3.5*
11. Battle Creek Shoal Light bearing 110°, distant 0.6 mile. Pass 300 yards off buoy 8:		
Direct (Sheridan Point ahead)	329	1.7
Reverse (same point astern)	*149*	*1.7*
12. Sheridan Point bearing 330°, distant 0.7 mile. Long Point ahead. Pass 300 yards northeastward of buoy 15:		
Direct	323	0.8
Reverse	*143*	*0.8*
13. Sheridan Point bearing 110°, distant 300 yards:		
Direct	333	1.5
Reverse	*153*	*1.5*

Table 12.—Patuxent River—Continued

Positions (Reverse directions in *italics*—read upward)	True courses	Distances
	Degrees	*Nautical miles*
14. Buzzards Island buoy 10 bearing 045°, distant 75 yards:		
Direct	326	0.9
Reverse	*146*	*0.9*
15. Benedict buoy 10A on range with Town Point, bearing 005°, distant 350 yards:		
Direct (Long Point astern)	000	0.5
Reverse (Long Point ahead)	*180*	*0.5*
16. Abreast Benedict Wharves, Town Point ahead. Approach wharves on a westerly course to avoid the 6-foot shoal south of them. Or proceed up the river, being guided by the buoys and the chart. Difficulty will be had in crossing the broad part of the river 1 mile below Nottingham, where there is a depth of 9 feet in a very narrow channel. The best water follows a curved line favoring the western shore. There is a stone pile, with a depth of 5 feet over it, near the center of this broad section.		

Table 13.—Pocomoke Sound and River

CHARTS 1223, 1224

1. Wolf Trap Light, bearing 270°, distant 3 miles. Position 6, Table 4. Pass Chesapeake Bay East Side buoy 2 bearing 290°, distant 0.4 mile, Chart 1223:		
Direct	020	18.1
Reverse	*200*	*18.1*
2. Chesapeake Bay East Side buoy 4 bearing 135°, distant 0.5 mile:		
Direct	046	5.3
Reverse	*226*	*5.3*
3. Pocomoke Sound Shoal lighted bell buoy 2A, bearing 135°, distant 0.5 mile: If entering from the northward, keep south of the shoals and fish trap limits, see Chart 1223, and direct course to enter the sound from this position. Guard against the San Marcos wreck which is marked by by a lighted bell buoy:		
Direct	059	2.9
Reverse	*239*	*2.9*
4. Watts Island Light bearing 315°, distant 0.5 mile. Pass Beach Island Shoal Light bearing 115°, distant 0.2 mile:		
Direct	027	4.4
Reverse	*207*	*4.4*
5. Upper Watts Island Shoal buoy 5 bearing 270°, distant 0.4 mile. If bound for Hunting, Guilford or Messongo Creeks leave at position 5 following the chart:		
Direct	000	2.8
Reverse	*180*	*2.8*
6. Tunnel Island Spit lighted buoy 6 bearing 090°, distant 0.4 mile. Change to chart 1224. Pass 0.3 mile off the light and 175 yards off buoy C7:		
Direct	037	2.6
Reverse	*217*	*2.6*
7. Boundary Line turn buoy C bearing 315°, distant 0.5 mile:		
Direct	058	3.0
Reverse	*238*	*3.0*
8. Messongo Point Shoal buoy 9 bearing 315°, distant 0.2 mile. Pass 300 yards off North End Point Light.		
Direct (Pocomoke River Light ahead)	044	1.6
Reverse (same light astern)	*224*	*1.6*
9. Midway between Pocomoke River Light 1 and Pocomoke River Daybeacon 2. From this position follow the chart and the aids through the dredged channel into the Pocomoke River. From here mid-channel is clear to within 5 miles of Snow Hill where local knowledge should be obtained.		

Table 14.—Tangier Sound

CHARTS 1223, 1224

Positions (Reverse directions in *italics*—read upward)	True courses	Distances
	Degrees	*Nautical miles*
1. Wolf Trap Light bearing 270°, distant 3 miles. Position 6, Table 4. Chart 1223:		
Direct	005	17.6
Reverse	*185*	*17.6*
2. Chesapeake Bay East Side buoy 6 bearing 315°, distant 0.35 mile. Pass about 0.9 mile off San Marcos wreck bell buoy and 0.4 mile off buoy 2. Fish trap limits shown on Chart 1223:		
Direct	045	9.0
Reverse	*225*	*9.0*
3. Tangier Sound Light bearing 270°, distant 0.5 mile:		
Direct	014	4.0
Reverse	*194*	*4.0*
4. Tangier Sound lighted bell buoy 9 bearing 270°, distant 500 yards:		
Direct	355	3.4
Reverse	*175*	*3.4*
5. Great Fox Island Shoal lighted bell buoy 2A bearing 090°, distant 0.5 mile; Chart 1224:		
Direct	015	3.7
Reverse	*195*	*3.7*
6. James Island Shoal buoy 4 bearing 090°, distant 250 yards. Pass 200 yards off lighted bell buoy 11:		
Direct	022	2.7
Reverse	*202*	*2.7*
7. Terrapin Sand lighted bell buoy 11 bearing 210°, distant 0.7 mile:		
Direct	323	3.5
Reverse	*143*	*3.5*
8. Piney Island Shoal buoy 6 bearing 053°, distant 0.3 mile. Solomons Lump Light and South Marsh Spit lighted bell buoy 1 on range at this position:		
Direct	340	3.3
Reverse	*160*	*3.3*
9. Deal Island Shoal lighted bell buoy 8 bearing 090°, distant 0.3 mile. Pass 0.4 mile off buoy 2 and 0.2 mile off buoy 8A:		
Direct	000	5.3
Reverse	*180*	*5.3*
10. Sharkfin Shoal Light bearing 316°, distant 0.65 mile. Pass 0.25 mile off Clay Island Shoal Light and 0.2 mile off buoy 2:		
Direct	052	2.7
Reverse	*232*	*2.7*
11. Clay Island Shoal Light and Sharkfin Shoal Light on range, first light distant 0.55 mile. Pass 200 yards off buoy 4:		
Direct	007	2.5
Reverse	*187*	*2.5*
12. Roaring Point Light bearing 090°, distant 150 yards. Continue up the Nanticoke River following the chart and local information.		
Little Annemessex River		
Leave course between positions 5 and 6 above; when Little Annemessex River bell buoy and Great Point Light are on range, bearing 048°, head for the buoy, and thence follow the aids and chart to Crisfield.		
Big Annemessex River		
Continue course between positions 6 and 7 above, beyond position 7 to buoy 2A, and thence proceed eastward following the aids and chart.		
Manokin River		
Leave the course between positions 7 and 8 above, when off the northeast end of Smith Island, steer 039° so as to pass 300 yards off the Junction Buoy 200 yards off Porpoise Point lighted buoy 2 and 300 yards off Piney Island Shoal lower buoy 1, thence follow the aids and chart.		

Table 14.—Tangier Sound—Continued

Positions (Reverse directions in *italics*—read upward)	True courses	Distances
	Degrees	*Nautical miles*
Kedges Straits		
Leave the course between positions 7 and 8 above when 1.5 miles beyond position 7. Steer **289°** to pass 400 yards off South Marsh Spit lighted bell buoy 1 and 500 yards off Solomons Lump Light. When north of buoy 2 continue westerly to Chesapeake Bay, passing south of Holland Island Bar and the fish trap limits, see Chart 1224.		
Wicomico River		
Leave the course when 1.25 miles beyond position 10. Steer **101°** to enter the dredged cut heading to pass 350 yards off Wicomico River lighted bell buoy 1. Thence follow the aids and chart.		
Fishing Bay		
Leave the course between positions 10 and 11 above, steering **330°** with buoy 10 astern, passing close to Sharkfin Shoal buoy and 100 yards westward of Clay Island Shoal buoy 2, and thence follow the aids and chart.		
Hooper Strait		
10. **Sharkfin Shoal Light** bearing 316°, distant 0.65 mile.		
Direct	000	0.9
Reverse	*180*	*0.9*
11A. **Sharkfin Shoal buoy** bearing 270°, distant 300 yards. Enter the dredged cut with Sharkfin Shoal North Side lighted bell buoy 8 slightly on the port bow:		
Direct	280	1.3
Reverse	*100*	*1.3*
12A. **Sharkfin Shoal North Side lighted bell buoy 8** close aboard. Round the buoy and head to pass 200 yards off buoy 6.		
Direct	238	1.3
Reverse	*158*	*1.3*
13A. **Bishops Head Shoal lighted bell buoy 1** bearing 315°, distant 150 yards. Round the buoy:		
Direct	various	0.3
Reverse	*various*	*0.3*
14A. **Bishop Head Shoal lighted bell buoy 1** bearing 090°, distant 250 yards:		
Direct (Hooper Strait Light ahead)	304	1.6
Reverse	*124*	*1.6*
15A. **Bloodsworth Island Flats North End buoy 4** bearing 225°, distant 200 yards:		
Direct	292	1.3
Reverse	*112*	*1.3*
16A. **Hooper Strait Light** bearing 078°, distant 0.3 mile. Pass 150 yards off buoy 2;		
Direct (Hooper Strait Light astern)	258	
Reverse (same light ahead)	*078*	
17A. **Chesapeake Bay.**		
Honga River		
Leave the course between positions 16A and 17A above, on a **345°** course with Crab Point Light ahead when 300 yards beyond buoy 2. Pass 175 yards off Honga River Light to bell buoy 1. Thence follow the river aids and the chart to and through Fishing Creek and Tar Bay dredged channels to Chesapeake Bay. See Chart 1224 for fish trap limits.		

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Table 15.—Choptank River

CHART 1225

Positions (Reverse directions in *italics*—read upward)	True courses	Distances
From Southward	*Degrees*	*Nautical miles*
1. Sharps Island lighted bell buoy 18A bearing 315°, distant 0.5 mile. Position 9, Table 4, Chesapeake Bay Entrance to Baltimore, is to the westward of this buoy. Pass between buoys 1 and 2. See Chart 1225 for fish trap limits:		
Direct	045	5.2
Reverse	*225*	*5.2*
2. Midway between Choptank River buoy 5 and buoy 6. Steer with Choptank River buoy 11 slightly on the starboard bow; pass 0.9 mile off lighted bell buoy 7:		
Direct	035	3.1
Reverse	*215*	*3.1*
3. Choptank River lighted bell buoy 10 bearing 135°, distant 0.5 mile:		
Direct (Choptank River Light ahead)	088	4.0
Reverse (Choptank River Light astern)	*268*	*4.0*
4. Choptank River Light bearing 088°, distant 1.75 miles. Pass 500 yards off buoy 13:		
Direct	108	2.5
Reverse	*288*	*2.5*
5. Choptank River buoy 14 bearing 225°, distant 350 yards:		
Direct	127	0.9
Reverse	*307*	*0.9*
6. Choptank River lighted buoy 16 bearing 217°, distant 200 yards. Vessels drawing 8 feet or less steer course 136° following edge of red sector Choptank River Light to Position 9 off buoy 20 and passing westward of buoy 19:		
Direct	093	1.0
Reverse	*273*	*1.0*
7. Choptank River buoy 18 bearing 225°, distant 400 yards:		
Direct	170	1.3
Reverse	*350*	*1.3*
8. Choptank River buoy 19 bearing 090°, distant 250 yards:		
Direct (buoy 20 ahead)	133	0.8
Reverse (buoy 20 astern)	*313*	*0.8*
9. Choptank River lighted buoy 20 bearing 133°, distant 400 yards. Pass 200 yards off buoy 20:		
Direct	103	1.0
Reverse	*283*	*1.0*
10. Choptank River buoy 21 bearing 000°, distant 200 yards:		
Direct	093	0.8
Reverse	*273*	*0.8*
11. Hambrooks Bar Light bearing 180°, distant 400 yards. Head for the south edge of the bridge draw and pass close northeastward of buoy 24:		
Direct	136	1.4
Reverse	*316*	*1.4*
12. Cambridge Channel lighted bell buoy 2 bearing southwest and distant 100 yards. Rounding the bell buoy at this distance:		
Direct	various	0.2
Reverse	*various*	*0.2*
13. On Cambridge Lighted Range with Cambridge Channel lighted bell buoy 2 bearing north. Pass south of buoy 4:		
Direct (Lighted Range ahead)	245	0.6
Reverse (Lighted Range astern)	*065*	*0.6*
14. Entrance Cambridge Inner Harbor. See page 320.		
If continuing up the river, pass through the draw from Position 11. The aids and chart are the best guide, and above Tuckahoe Creek the channel is narrow, crooked and difficult without local knowledge.		

Table 15.—Choptank River—Continued

Positions (Reverse directions in *italics*—read upward)	True courses	Distances
Route North of Sharps Island	*Degrees*	*Nautical miles*
A. Sharps Island Light bearing 157°, distant 3.2 miles. This position is just west of the red sector of Sharps Island Light and 0.4 mile south of Fish Net Stake buoy 8B. Course passes between fish trap areas:		
Direct	137	4.3
Reverse	*317*	*4.3*
B. Choptank River lighted bell buoy 7 bearing 000°, distant 0.3 mile:		
Direct	056	1.9
Reverse	*236*	*1.9*
C. Same as Position 3 above.		

Table 16.—Eastern Bay and Miles River to St. Michaels

CHART 1225

From Southward		
1. Poplar Island Shoal lighted bell buoy 20A bearing 090°, distant 100 yards. Fish trap limits shown on Chart 1225:		
Direct	032	2.3
Reverse	*212*	*2.3*
2. North End of Poplar Island bearing 100°, distant about 2.2 miles. Pass 0.3 mile southeast of Kent Island Spit lighted bell buoy 1, 0.3 mile northwest of Wades Point Shoal lighted bell buoy 2A, and close south of buoy 3:		
Direct	054	9.6
Reverse	*234*	*9.6*
3. Tilghman Point Shoal lighted buoy 4 bearing 180°, distant 150 yards. Entrance to the Miles River. Continue up the river to St. Michaels by following the aids and chart. See directions on page 325 to enter St. Michaels Harbor.		
From Northward		
Steer 105° to pass 0.5 mile south of Bloody Point Bar Light and 230 yards south of Kent Island Spit lighted bell buoy 1 to a junction with course between positions 2 and 3 above, 0.3 mile southeast of the latter buoy.		

Table 17.—Chester River

CHART 548

From Chesapeake Bay enter on any course between 146° and 081°. Pass 450 yards off Swan Point Shoal bell buoy 2, to the north of the entrance, and pass 1,550 yards off Love Point Light to keep clear of the fish trap limits, and the dumping ground area northwest of Kent Island, as shown on Chart 1226, to:		
1. Love Point Shoal bell buoy 2 bearing 180°, distant 0.3 mile. Round the buoy. Chart 548.		
Direct	various	0.4
Reverse	*various*	*0.4*
2. Love Point Shoal bell buoy 2 bearing 270°, distant 0.3 mile. Pass 0.8 mile off Love Point Light.		
Direct	187	2.0
Reverse	*007*	*2.0*
3. Chester River buoy 3 bearing 090°, distant 350 yards.		
Direct	147	1.9
Reverse	*327*	*1.9*

Table 17.—Chester River—Continued

Positions (Reverse directions in *italics*—read upward)	True courses	Distances
	Degrees	*Nautical miles*
4. **Chester River lighted buoy 6** bearing 225°, distant 230 yards. Pass 0.1 mile off buoy 7.		
Direct	122	2.0
Reverse	*302*	*2.0*
5. **Chester River lighted buoy 9** bearing 000°, distant 300 yards.		
Direct	050	1.8
Reverse	*230*	*1.8*
6. **Chester River buoy 11** bearing 285°, distant 700 yards:		
Direct (Ringgold Point Lighted Range ahead)	338½	2.4
Reverse (Ringgold Point Lighted Range astern)	*158½*	*2.4*
7. **Chester River buoy 14** bearing 090°, distant 150 yards:		
Direct	005	0.3
Reverse	*185*	*0.3*
8. **Ringgold Point Range Front Light** bearing 301°, distant 500 yards:		
Direct (Nichols Point Lighted Range ahead)	035	2.0
Reverse (Nichols Point Lighted Range astern)	*215*	*2.0*
9. **Nichols Marsh Shoal buoy** bearing 270°, distant 100 yards. Pass 100 yards off buoy 16.		
Direct	046	1.6
Reverse	*226*	*1.6*
10. **Chester River buoy 18** bearing 090°, distant 200 yards. Continue up Chester River by following the aids and the chart.		

Table 18.—Sandy Point, Chesapeake Bay to Delaware River

(Chesapeake Bay, Elk River, and Chesapeake and Delaware Canal)

CHARTS 1226, 570

From Southward		
1. **Sandy Point Light** bearing 270°, distant 0.5 mile. Chart 1226:		
Direct	034	4.3
Reverse	*214*	*4.3*
2. **Upper Chesapeake Bay lighted bell buoy 1** bearing 270°, distant 500 yards:		
Direct	000	4.1
Reverse	*180*	*4.1*
2A. **From Baltimore** use Table 4 until Cut-off Channel lighted buoy 14K is close aboard. Keep Brewerton Channel Range in line astern to (*ahead from*) position 3.		
Direct	111	5.6
Reverse	*291*	*5.6*
3. **Upper Chesapeake Bay lighted bell buoy 3** bearing 270°, distant 200 yards:		
Direct	038	3.2
Reverse	*218*	*3.2*
4. **Upper Chesapeake Bay lighted bell buoy 6** bearing 128°, distant 250 yards, head for the tower:		
Direct	052	1.6
Reverse	*232*	*1.6*
5. **Upper Chesapeake Middle Ground lighted bell buoy 7** bearing 303°, distant 400 yards:		
Direct	016	0.9
Reverse	*196*	*0.9*
6. **Tolchester Beach Light** bearing 090°, distant 400 yards:		
Direct	023	1.4
Reverse	*203*	*1.4*
7. **Upper Chesapeake Middle Ground lighted bell buoy 9** bearing 270°, distant 400 yards:		
Direct	003	1.5
Reverse	*183*	*1.5*

Table 18.—Sandy Point, Chesapeake Bay to Delaware River—Continued

Positions (Reverse directions in *italics*—read upward)	True courses	Distances
	Degrees	*Nautical miles*
8. Midway between Upper Chesapeake Channel lighted bell buoy 1, and Upper Chesapeake Channel buoy 2:		
Direct	015	3. 2
Reverse	*195*	*3. 2*
9. Midway between Upper Chesapeake Channel lighted bell buoy 5, and Upper Chesapeake Channel buoy 6:		
Direct (Pooles Island North Range astern)	048	2. 9
Reverse (Pooles Island North Range ahead)	*228*	*2. 9*
10. Midway between Shad Battery Channel lighted bell buoy 1, and Shad Battery Channel buoy 2:		
Direct	057	2. 4
Reverse	*237*	*2. 4*
11. Shad Battery Channel lighted buoy 5 close aboard:		
Direct (Howell Point Channel Range ahead)	066	4. 0
Reverse (Howell Point Channel Range astern)	*246*	*4. 0*
12. Midway between Howell Point Channel lighted bell buoy 3, and Howell Point Channel buoy 4:		
Direct (Grove Neck Channel Range ahead)	042	5. 6
Reverse (Grove Neck South Channel Range ahead)	*222*	*5. 6*
13. Midway between Arnold Point Channel lighted buoy 1, and Arnold Point Channel buoy 2:		
Direct (Arnold Point Channel Range ahead)	046	3. 3
Reverse (Arnold Point Channel Range astern)	*226*	*3. 3*
14. Town Point Channel lighted buoy 1, close aboard. Change to Chart 570:		
Direct (Town Point Channel East Range ahead)	075	1. 2
Reverse (Town Point Channel West Range ahead)	*255*	*1. 2*
15. Courthouse Point Channel lighted bell buoy 2 close aboard:		
Direct (Courthouse Point Channel Range ahead)	049	1. 4
Reverse (Courthouse Point Channel Range astern)	*229*	*1. 4*
16. Back Creek Light 2 close aboard. Passage through the canal is made by following the aids and proceeding in accordance with the regulations:		
Direct	various	12. 3
Reverse	*various*	*12. 3*
17. Chesapeake and Delaware Canal Light 12 abeam:		
Direct (Chesapeake and Delaware Canal Range astern)	079	3. 4
Reverse (Chesapeake and Delaware Canal Range ahead)	*259*	*3. 4*
18. Intersection of New Castle Range, and Chesapeake and Delaware Canal Range.		

CHAPTER 4

Sandy Hook to Cape May

CHARTS 1108, 1109

THE coast of New Jersey has a general south-southwesterly trend for 43 miles from Sandy Hook to Barnegat Inlet, and then a southwesterly trend for 67 miles to Cape May Point. The coast from Sandy Hook southward to Corson Inlet is free from dangers to vessels if it is given a berth of 5 miles or more. Smaller vessels can follow the coast closer inshore, but they should pass outside the fish weir areas which are shown on the charts. From Corson Inlet to Cape May are shoal spots with a least depth of 15 feet extending in places up to 14 miles offshore, but with channels inside of them.

The recommended courses to be used by vessels of various drafts are given in Chapter 3. Vessels of shallow draft with local knowledge can follow the shore more closely in daytime, being guided by the chart and keeping a careful lookout for dangers.

It is recommended that small vessels wait for favorable weather before attempting the outside run along this coast.

Shoals extend for a considerable distance off many of the inlets; all of the inlets are, or may be, obstructed by shifting bars and generally require local knowledge to carry the best water. The principal inlets are: Shark River Inlet, Manasquan Inlet, Little Egg Inlet, Absecon Inlet, Great Egg Inlet, and Cape May Harbor Inlet. Shark River, Manasquan, Absecon, and Cape May Harbor Inlets are improved. The most favorable time for entering the inlets is on a flood tide with a smooth sea; in easterly gales or in a heavy sea they cannot be entered in safety.

The New Jersey Intracoastal Waterway, extending from Manasquan Inlet to Delaware Bay, and its tributaries are described at the end of this chapter.

The New Jersey coast is particularly distinguished by the large number of summer resorts and standpipes and tanks which show well to seaward. Along the coast from Navesink Highlands southward to Bay Head is practically a continuous line of summer resorts.

Sandy Hook to Shark River

CHART 1215

Sandy Hook (lat. 40°28′, long. 74°01′), the southern point at the entrance of New York Harbor, and the northern point of the New Jersey coast, is low and sandy. On the north end of Sandy Hook is **North Hook Fog signal** which is sounded on an air diaphragm horn. The structure is not visible from seaward. At the northwest end of the hook Sandy Hook Point Light is shown from a red skeleton tower, white central column. The light has both a vertical beam and a horizontal beam. The horizontal

beam is 38 feet above the water and visible 11 miles. The fog signal at the light is sounded on an electric bell.

A Coast Guard station, a storm warning display tower, and two tall observation towers, from which coastwise and foreign vessels are reported to the Maritime Exchange in New York City, are located 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. Southward from these are some houses and Sandy Hook Light.

Sandy Hook, including **Island Beach** at the mouth of the ***Shrewsbury River,*** is a Government reservation and landing is not permitted. Vessels awaiting favorable weather for the outside run to Delaware Bay can find suitable anchorage in Sandy Hook Bay southwestward of and under the lee of the hook.

As a special service to yachtsmen who intend to make the run to Manasquan Inlet, the Sandy Hook Coast Guard station will, on application, furnish weather reports and will request the other stations southward to maintain a special lookout for any particular vessel and report it from station to station.

Sandy Hook Light, shown from a white stone tower, is 88 feet above the water and visible 15 miles. This light was established in 1764 and is the oldest in continuous use in the United States.

Navesink Highlands is a prominent high wooded ridge about 276 feet high, 5 miles southward of the north end of Sandy Hook. On the easternmost spur in a cleared space at an elevation of 180 feet is **Navesink Light.** The lighthouse consists of two brownstone towers connected by a dwelling. The north tower is octagonal and the south tower is square. The light, shown from the south tower, is 246 feet above the water and is visible 22 miles.

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 electric 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 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.

Shark River

CHART 795

Shark River Inlet, the only harbor between Sandy Hook and Manasquan Inlet, is 18 miles south of Sandy Hook and 5 miles north of the northern end of the New Jersey Intracoastal Waterway. The Inlet is frequented by small local yachts and fishing boats. Gasoline and provisions are available.

The inlet has been improved by the construction of two stone jetties, The outer

end of each jetty is marked by a light. They are shown from skeleton steel towers and are 29 feet above the water. At **South Breakwater Light** is a fog signal sounded on an electric trumpet horn. A section near the middle of the north jetty has been destroyed.

The Shark River Coast Guard station is about 0.4 mile north of the entrance. Personnel from the station serve as pilots for the inlet. Storm warning signals are displayed here. A rock jetty extending 600 feet offshore abreast of the station has settled and is a menace to inshore navigation. Between that jetty and the entrance are two rock groins covered at high water.

About 0.1 mile south of the entrance the Belmar Fishing Pier extends 275 yards offshore from the boardwalk. A privately maintained light is shown from the end of the pier. The light is 35 feet above the water and is visible 5 miles.

Shark River divides into the ***North*** and ***South Channels*** at **Shark River Island** about 0.4 mile above the entrance. In October 1946 the controlling depth was about 3 feet to the second highway bridge and about 2 feet above.

A Federal project has been approved to provide a channel 18 feet deep and 150 feet wide across the bar at the entrance to the inlet; thence 12 feet deep and generally 100 feet wide through Main Channel and South Channel to Route 35 bridge; thence 8 feet deep and 100 feet wide to the upper limit of the Belmar Municipal Boat Basin; and an anchorage area 12 feet deep east of Route N–4 or Main Street bridge. In October 1946 no work had been done on this project.

Breakers extend across the approach in stormy weather, but the entrance can be made in moderately rough weather with local knowledge.

In entering, favor the north jetty. At the bridge over the entrance a cross-current, strongest on the ebb, may be experienced. Strong currents sweep through the inlet and entrance should not be attempted by boats for which the bridge clearance is insufficient. Such vessels should wait until the span of the bridge is completely open. It is recommended that strangers employ a pilot.

The mean range of the tide at the inlet entrance is 4 feet. High easterly or westerly winds cause fluctuations of 1 to 2 feet above or below this range.

The highway bridge at the entrance has a double-leaf bascule span, horizontal clearance 90 feet, vertical clearance 12 feet at MHW when closed. Gauge boards showing the vertical clearance under the closed drawspan at all stages of the tide are located on each side of the bridge. Extracts from the regulations governing the opening of the draw of this and other bridges in this vicinity follow:

Drawbridges shall be opened promptly for the passage of any vessel or other watercraft unable to pass under the closed spans, except as hereinafter provided.

Call signals for opening of draw.

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.

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.

Acknowledging signals.

By bridge operator—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.

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.

By the vessel. Vessels or other watercraft 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.

Trains, automobiles, trucks, and other vehicles, vessels or other watercraft 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.

The owners of, or agencies controlling, these bridges shall provide and keep in good legible condition two board gauges 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 gauges 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.

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.

Copies of these regulations 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.

Above the entrance three bridges cross the river. Crossing the North Channel the bridges have fixed spans with the following distances from the entrance and horizontal and vertical clearances at MHW: Main Street or Route 4 bridge, 0.6 mile, 80 feet, 8 feet; railroad bridge, 0.68 mile, 20 feet, 8 feet; Route 35 bridge 0.69 mile, 69 feet, 10 feet. Crossing the South Channel the Main Street bridge has a bascule span with a horizontal clearance of 50 feet and a vertical clearance of 13 feet at MHW. The other bridges have bascule spans but the operating machinery has not been installed. The horizontal clearance of these bridges is 50 feet and the vertical clearance is 10.5 feet at MHW.

In **Belmar (lat. 40°10′, long. 74°01′)** on the south shore are three yacht basins. The ***Municipal Boat Basin*** is 0.3 mile above Route 35 bridge on the South Channel. It has 2,600 feet of berthage available. Dockage is charged. The **Belmar Yacht Club** is on the west side of **Rhode Island Point.** ***Belmar Basin*** is 0.4 mile inside the entrance. Gasoline, oil, and water are available.

A marine railway, just west of the Main Street bridge at **Avon** on North Channel can haul boats 38 feet long, 3- to 4-foot draft, and 10 tons. Gasoline, oil, water, and limited marine supplies are available. A marine railway on the north side of the river at the west end of Avon can haul boats 40 to 50 feet long, 4-foot draft. Limited supplies, gasoline, and water are available. Both railways must haul boats at high water. Berthage is available. Dockage is charged.

Provisions are available in Avon and Belmar.

Shark River to Sea Girt

CHART 1215

From Shark River the coast continues straight for 3 miles to Sea Girt Inlet. **Spring Lake,** on the north side of the inlet, is marked by two large hotels with cupolas. On the south side of the inlet is **Sea Girt.**

Sea Girt Inlet, closed at low water, is only occasionally used at high water and with a smooth sea by fishing boats of 2-foot draft. On the north side of the entrance is a short wooden jetty. The mean range of tide at the entrance is about 4 feet.

Sea Girt Light, 16 miles south of Navesink Light, is shown from a square, brown, brick tower built into the side of a dwelling. From a distance the light appears as a cupola. The light is 60 feet above the water and visible 13 miles.

Sea Girt, Restricted area.—The following regulations are prescribed to govern the use and navigation of the coastal waters, comprising the firing range of the Sea Girt Military Reservation, Sea Girt, New Jersey.

The Danger Zone.—(1) The firing range of Sea Girt Military Reservation includes the waters of the Atlantic Ocean within an area bounded on the north by a line extending east from the end of Sea Girt Avenue, on the east by a line one mile long three miles offshore, and on the south by a line extending southeast from the radio station.

(2) The above-described area will be marked by spar buoys at the two points three miles offshore, to be placed and maintained by the Commanding Officer, New Jersey State Arsenal, Sea Girt, New Jersey.

The Regulations.—(1) Range firing will normally take place between the hours of 8:00 a. m. and 6:00 p. m. on all Saturdays and Sundays during the period April to November, inclusive, and on certain designated week days during the period July to September, inclusive.

(2) No vessel shall enter or remain in the danger zone during the operation of the firing range excepting vessels of the United States.

(3) When firing is scheduled or is in progress a large red flag will be displayed from the flagstaffs on the beach located on both the northern and southern boundaries of the reservation, so as to be clearly visible for a distance of at least three miles offshore.

(4) No permit to erect and maintain fish pounds within the zone will hereafter be issued.

(5) These regulations shall be enforced by the Adjutant General, State of New Jersey, and such agencies as he may designate.

Sea Girt to Little Egg Inlet

CHART 1216

The coast from Sea Girt to Barnegat Inlet has a general south-southwesterly trend, and then a southwesterly trend to Little Egg Inlet. Between Sea Girt and Bay Head the shore presents practically a continuous line of summer resorts. From Bay Head south the resorts are more widely separated on the low narrow barrier beach which separates the inside waters from the ocean.

Manasquan is marked by a Coast Guard station and the lights on the end of the jetties at the entrance to the inlet.

Manasquan Inlet is described on page 84.

Point Pleasant on the south side of the inlet is marked by an elevated tank and a standpipe close together.

Bay Head about a mile south of Point Pleasant is marked by a water tank.

For vessels bound southward along the coast the first landmark below Bay Head is the town of Mantoloking consisting of a large group of houses. Southward of this are other groups of houses at **Normandy Beach, Chadwick,** Lavallette, and **Ortley.** A standpipe is at Lavallette. About 1 mile southward of Ortley is Seaside Heights, a town with a standpipe at the north end, and 1.5 miles farther south is Seaside Park, marked by a water tank. Toms River Coast Guard station is in Seaside Heights.

Barnegat Inlet, about 8.8 miles south of Seaside Heights and 43 miles south of Sandy Hook, is described on page 88.

Barnegat Daybeacon, the most prominent mark in the vicinity of Barnegat Inlet, is a conical red brick tower 161 feet high above the ground. The old lighthouse tower is owned and maintained by the State of New Jersey as a historical monument.

Barnegat Lightship, 8 miles 090° from Barnegat Inlet, has a red hull with BARNEGAT in white on the sides and two masts with lantern galleries. The light is 65 feet above the water and visible 14 miles. A riding light is shown from the forestay 20 feet above the water. The fog signal is sounded on an air diaphragm horn; if the horn is disabled a bell will be struck by hand. The radiobeacon is synchronized with the fog signal for distance finding. The code flag signal is NNBB. Weather signals are displayed during daytime.

Between Barnegat and Little Egg Inlets is broken ground along the outside coast, and vessels should give this area a berth of about 3 miles or more to insure a depth of 30 feet.

Barnegat City, on the south side of Barnegat Inlet at the northern end of **Long Beach,** is a summer resort with a permanent settlement of oystermen and fishermen. Barnegat Coast Guard station is about 0.4 mile south of the lighthouse.

Highpoint (lat. 39°42′, long. 74°08′), marked by a standpipe, is 4 miles southwest of Barnegat Lighthouse. Harvey Cedars, 1 mile farther south, is a settlement without prominent marks. Two miles below it is Surf City marked by a prominent standpipe.

Southwestward of Surf City the beach is a continuous line of houses with standpipes or water tanks, and 14 miles southwestward of Barnegat Lighthouse is Beach Haven, a large town marked by a water tank, standpipe, and a tall yellow smokestack. Holgate is a small group of houses around Bond Coast Guard station, 1.5 miles southwestward of Beach Haven.

Beachhaven Inlet has broken through the beach 3 miles southward of Beach Haven, and should not be mistaken for Little Egg Inlet. The inlet is described on page 91.

Little Egg Inlet to Hereford Inlet

CHART 1217

The coast from Little Egg Inlet to Hereford Inlet has a general southwesterly trend. Atlantic City is the largest municipality on this section of the coast. The other resorts are more widely separated on the barrier beach than those northward of this section.

From Corson Inlet southwestward to Hereford Inlet shoal spots with a least depth of 26 feet extend in places up to 11 miles offshore, but with channels inside of them.

Little Egg Inlet is described on page 91.

From Little Egg Inlet to Absecon Inlet, a distance of 8 miles, are Coast Guard stations, two tanks, and houses at **Brigantine Beach.** A large conspicuous hotel with a pier in ruins are located due south of South Brigantine Coast Guard station, which is now closed. Wrecks, eastward of Little Egg Inlet, and broken ground extend nearly 9 miles offshore. The broken ground is marked at the 36-foot depth by a buoy and at its eastern end by Brigantine Shoal lighted whistle buoy, both buoys due east of the hotel at Brigantine.

Brigantine Inlet is 5 miles northeast of Atlantic City and 4 miles southwest of Tucker Island. The ruling depth is about 7 feet at high water. The entrance buoy is shifted to mark the best channel and is not charted. The only boats using the inlet are small oyster and fishing boats, and then only with a smooth sea and on a rising tide. Strangers should not attempt to enter before obtaining local information as to conditions as the channels are not protected by jetties and are subject to frequent changes. The mean range of tide at the entrance is 3½ feet. The several thoroughfares leading from Brigantine Inlet are shoal at their western ends and can only be navigated by boats of about 4-foot draft at high water. Strangers should not enter them. For a description of Brigantine see page 93.

Absecon Inlet is marked on its south side by a brick conical tower 170 feet high, the former **Absecon Lighthouse,** showing well to seaward; Atlantic City Light; and by the buildings of Atlantic City.

Atlantic City Light (lat. 39° 22′, long. 74° 25′), shown from a white skeleton tower on a concrete block on the west side of the inlet, is 70 feet above the water and visible 14 miles. The light is visible from 209° to 014°.

A whistle buoy 3.4 miles and a lighted bell buoy 1.4 miles south of the inlet mark the seaward and channel entrance, respectively. The several channel buoys in the inlet are shifted as changes occur and should be used only with local knowledge. Buoys mark the channel as far as the north point of Atlantic City, and beyond the bridge several lights mark the Intracoastal Waterway.

Absecon Inlet has been improved by dredging. The project calls for maintaining an entrance channel 20 feet deep and 400 feet wide. The mean range of tide outside the inlet is 4.0 feet, at the inlet gorge 3.6 feet, and at the highway bridge 3.5 feet. Strong currents are experienced in the channel. The shore on the south side of the inlet is protected from extensive change by artificial means.

In November 1946, the controlling depths were: Across the bar, 14 feet; thence 15 feet to Brigantine Beach Bridge.

Regardless of the depth of water available, navigation of the channel across the ocean bar during storms is extremely hazardous. The channel has a north-south direction where it crosses the bar; storm waves and ground swells on the ocean advance from the east-southeast quadrant. The channel across the bar therefore is exposed to violent wave action, and boats navigating this part of the entrance must frequently take the seas broadside on.

Strangers, unless of light draft, usually take a pilot, either picking up a fisherman outside or signaling for a pilot from shore.

Atlantic City is frequented by many boats, both from outside and from points along the interior waterways. Supplies of all kinds are obtainable and ordinary repairs to hulls and motors can be made to boats of the size navigating the inside waters. It has railroad and highway connections with the mainland, and highway connections with Brigantine Beach on the north and Ocean City on the south.

On Absecon Inlet channel and in Clam Creek, Gardner Basin, Snug Harbor, and Delta Basin are approximately 360 piers, wharves, and boat berth structures mostly of

wooden pile and timber construction. Many of these facilities, both public and privately owned, are open to public use either free or on payment of moderate charges. Nine stations where boats may obtain petroleum fuels and other services are available.

The **Yachtsman's Dock** at the north end of Atlantic City has a depth of 30 to 40 feet along the outer face and from 10 to 12 feet along the inner face. Inside is a small basin which shoals gradually to zero at the shore bulkhead. This basin is used only by fishing boats kept for hire. Mariners should avoid an area with a depth of about 5 feet between the horizontal-banded buoy and buoy off the west end of pier.

Gardner Basin, a bulkheaded basin nearly 0.5 mile long and 60 yards wide, has its entrance 500 yards westward of the Yachtsman's Dock. It has a depth of 6 feet in mid-channel to the head and is used by many motor boats. All boats make fast to the bulkheads, for which a dockage charge of $1.00 per day is made. All kinds of supplies are obtainable. Marine railways and machine shops are available; the largest railway is capable of hauling vessels 100 feet in length, 8-foot draft and 85 tons. The mean range of tide is a little less than 4 feet. Daylight storm signals are displayed at the Atlantic City Tuna Club.

Snug Harbor and ***Delta Basin*** are just west of Gardner Basin. In October 1945, both had a depth of about 7 feet at the entrance. The United States Engineer wharf is in Delta Basin.

On the north side of ***Clam Creek*** at the entrance is the United States Coast Guard station bulkhead wharf. Westward of this wharf is a basin owned by the State of New Jersey which is being improved to afford additional berthing and servicing facilities for yachts and small pleasure craft.

Vessels bound for the oil distributing plants and the inland waterways pass through the double-leaf bascule span of the Brigantine Beach Bridge; the horizontal clearance is 75 feet and the vertical clearance is 11.6 feet at MHW. Care must be exercised in making the passage through this bridge. A falling tide causes a cross current which runs west to east; the current on the rising tide runs fair with the bridge.

Description of the waterway above the bridge is given on page 93.

Absecon Island extends southwest about 7 miles from Absecon Inlet to Great Egg Inlet. This island contains the municipalities of Atlantic City, Ventnor, Margate City, and Longport, named in order southward. These municipalities constitute one of the most intensively developed seaside resort areas in the United States.

Great Egg Inlet, at the south end of Absecon Island, has a ruling depth of about 11.5 feet in the channel across the bar. A lighted bell buoy about 1.7 miles southeast of the inlet marks the seaward entrance. The channel buoys are not charted as they are frequently shifted to mark the best water. Local information as to conditions should be obtained before entering. Boats of 4- to 5-foot draft do not usually take a pilot in smooth weather, but follow the buoys, preferably on a rising tide, being also guided by the appearance of the water. Pilots can usually be had from fishing boats outside. The inlet is used by many yachts of 4- to 5-foot draft and local fishing and pleasure boats. In winter the inlet is often rendered dangerous by floating ice. Breakers extend across the inlet in moderate heavy weather. The mean range of the tide at the entrance is about 4 feet.

Vessels bound for the Intracoastal Waterway to the north pass through a bascule bridge with a horizontal clearance of 50 feet and a vertical clearance of 9 feet at MHW. Southbound vessels pass through a bascule bridge with a horizontal clearance of 90 feet and a vertical clearance of 18 feet at MHW.

Ocean City, a large summer resort on the south side of Great Egg Inlet, has railroad

and highway connections with the mainland. Two standpipes, gas tanks, and a stack are prominent. The wharves are on the northwest side 0.5 to 1.5 miles southwestward of the inlet and have depths of 2 to 6 feet at the ends. For further description of facilities see page 94.

Corson Inlet, 7 miles southward of Great Egg Inlet, had a reported depth of 8 feet, September 15, 1946. The seaward entrance is marked by a bell buoy about 1 mile southeast of the inlet. The channel buoys are not charted as they are frequently shifted in position to mark the best water. Local information should be obtained before attempting to enter. The inlet is used by fishing boats and pleasure craft up to 4- to 6-foot draft. The Coast Guard check the depths frequently and also serve as pilots. The mean range of tide at the entrance is about 4 feet.

The channel from Corson Inlet northward to Middle Thorofare is crossed by a fixed bridge having a horizontal clearance of 23 feet and a vertical clearance of 6.2 feet. It is seldom used. ***Main Channel*** leads southward through a swing bridge and along the westerly shore of Strathmere to the Intracoastal Waterway. The swing draw has a horizontal clearance of 32 feet and a vertical clearance of 4.6 feet.

Strathmere is a village on the south side of the inlet. A standpipe is prominent. Berthage is not available at Strathmere; however, in case of emergency boats can tie up to private or Coast Guard wharves.

Sea Isle City is a summer resort on the beach 4 miles southwest of Corson Inlet. By day the most prominent marks are a slender standpipe and two church spires farther south. The **Ludlam Beach Light (lat. 39°10′, long. 74°41′)**, shown from a 35-foot red skeleton tower on white tank house near the north end of the town, is not prominent by day. The light is 45 feet above the water and is visible 12 miles. A red sector west of 356° covers Townsend Inlet.

A shoal with a depth of 16 feet and marked by a horizontal-banded buoy is 3.3 miles southeast of Ludlam Beach Light. ***Avalon Shoal*** with a depth of 26 feet is marked by a lighted gong buoy.

Townsend Inlet, about 6.5 miles southward of Corson Inlet, had a reported depth in October 1946 of about 5 feet. It is used by small fishing and pleasure boats and an occasional cruising yacht up to 5-foot draft. The channel and shoreline are subject to considerable change. The channel buoys are not charted, and strangers should not enter before obtaining local information as to conditions. A pilot is generally taken by strangers; the Coast Guard will act as pilots when needed. The mean range of tide is about 4 feet.

A highway bridge crosses the inlet. The bascule span has a horizontal clearance of 50 feet and a vertical clearance of 23 feet at MHW.

Townsends Inlet is a small resort just north of the inlet without prominent marks.

Avalon is a resort on the south side of Townsend Inlet. A black standpipe is the most prominent mark.

The New Jersey Intracoastal Waterway crosses the inlet inside the bridge. Facilities for Townsends Inlet and Avalon are described under that section on page 97.

Peermont is a small resort on **Seven Mile Beach** 1.5 miles southwestward of Townsend Inlet.

Stone Harbor is a summer resort on the beach about 2 miles northeastward of Hereford Inlet. It is marked by an elevated water tank.

Hereford Inlet, 6 miles northeast of Cape May Harbor, had a reported depth in October 1946 of 4 feet in the main channel which passes north of the Middle Ground. Strangers should take a pilot, as the inlet is subject to rapid change and the buoys cannot always be depended upon to lead in the best water. The channel buoys, except

the entrance sea buoy, are not charted, and entrance should not be attempted before obtaining local information as to conditions. Large areas are bare at low water and usually have a sand ridge showing at high water. Breakers form across the inlet in heavy weather and on the shoals at all times, and the appearance of the water is the best guide in entering. The mean range of the tide at the entrance is about 4 feet.

The inlet is used by many fishing boats and some yachts. Stone Harbor Coast Guard station is the only mark on the north side of the inlet. The Coast Guard serve as pilots for mariners when called on. Pilots can also be obtained from fishing boats outside.

Hereford Inlet Light, shown from a gray shingle tower on a white dwelling on the south side of the inlet, is not prominent by day. The light is 53 feet above the water and visible 13 miles; a red sector west of 226° covers Townsend Inlet.

Nummy Island divides the channel inside the entrance. The Intracoastal Waterway passes west of the island. Great Channel to the north and Grassy Sound Channel to the south are both crossed by a bascule bridge having a horizontal clearance of 50 feet and a vertical clearance of 15 feet at MHW.

Hereford Inlet to Cape May Harbor

CHART 1219

From Hereford Inlet to about 2 miles north of Cape May Harbor the coast is built up with dwellings and has several prominent marks. **North Wildwood (lat. 39°00′, long. 74°48′),** a summer resort on the south side of Hereford Inlet, is frequented by a large number of fishing boats. The Coast Guard station and several wharves are at the northeast end of the town. A marine railway will accommodate boats 40 feet in length and 3-foot draft. Gasoline and limited supplies are available. Berthage is available; dockage is charged. A sandspit separates the 6-foot channel to the wharves from Hereford Inlet. In addition to Hereford Inlet Light, North Wildwood is marked by a black standpipe with an orange band near the top about 0.3 mile westward from the light.

Wildwood and Wildwood Crest are summer resorts on **Five Mile Beach.** A standpipe, black with orange band, a gas storage tank, and a slender black smokestack are at Wildwood. A standpipe, black with orange band, is at Wildwood Crest.

Cape May Harbor

CHART 234

Cape May Harbor, formerly known as ***Cold Spring Inlet,*** is about 4.3 miles northeastward of Cape May Point, the southern extremity of New Jersey, and is used by fishing vessels, pilot boats, yachts, and large pleasure boats. Some of these anchor in the west end of the harbor; others go to the wharves, or up Cape Island Creek to a landing near the bridge. Many fishing vessels go to the fish wharf on Lower Thorofare.

The entrance between **Sewell Point** and **Two Mile Beach** is protected by two parallel jetties. The project for the improved channel provides for an entrance channel 25 feet deep and 400 feet wide from the 25-foot depth curve in the ocean to a point 500 feet harborward of the inner ends of the jetties, thence 20 feet deep and 300 feet wide to deep water in Cape May Harbor. The mean range of tide is 4.4 feet.

In June 1946, the controlling depth from the ocean to the inner end of the project in Cape May Harbor was 19 feet.

The outer end of the west jetty is submerged and should not be rounded close. The **speed** of vessels entering the inlet should not exceed 6 knots except in case of emergency.

The entrance channel is marked by a lighted bell buoy, a direction light, a light near the outer end of each jetty, and a radiobeacon. The outer lighted bell buoy is 0.55 mile southeast of the jetties. The direction light, shown from a white skeleton tower, is 40 feet above the water. The light projects a polychrome beam of white, red, and green as follows: When on the centerline of the dredged channel between the jetties, an occulting white light (the beam is adjusted to a width of approximately 125 feet at the entrance between the jetties); when on the right side of the white center beam of the channel entering from seaward, an occulting red light; when on the left side of the channel entering from seaward, an occulting green light. The east jetty light, shown from a red skeleton tower, red tank house with black slatted daymark, is 23 feet above the water and visible 7 miles. The west jetty light, shown from a black skeleton tower on white battery house, black concrete base, is 34 feet above the water and visible 9 miles. The fog signal on the west jetty light is sounded on an air diaphragm horn. The marker radiobeacon is at the west jetty light.

The watertank on Sewell Point is prominent.

The channel in the harbor is marked by buoys, some of which are lighted.

The **danger area of a rifle range** extends about 1 mile from shore 0.2 mile westward of the entrance. The rifle range is in use from May to October, and vessels are warned to avoid the area during that period.

The channel northeastward of the inlet leads through a bascule bridge having a horizontal clearance of 50 feet and a vertical clearance of 24 feet at MHW. Above the bridge the channel divides into Lower and Middle Thorofares. A fish wharf with railroad connections is on the eastern side of ***Lower Thorofare.*** Middle Thorofare is part of the Intracoastal Waterway and is described on page 97.

Upper Thorofare and ***Skunk Sound,*** entering the harbor from the north, are crossed by fixed bridges with vertical clearances of 6 feet at MHW.

The main wharves on Sewell Point have depths of 12 to 24 feet.

Cape Island Creek enters the western extremity of the harbor. **Schellenger Landing** is on the northern side of the entrance. On both sides of the entrance are boatyards with marine railways. The largest railway can accommodate vessels 110 feet in length, 12-foot draft, and 300 tons weight. Gasoline, Diesel oil, marine supplies, and provisions are available. All types of boat repairs can be made. Berthage is available; dockage is charged. About 0.3 mile inside the entrance a highway bridge with a bascule span having a horizontal clearance of 38 feet and a vertical clearance of 5 feet at MHW crosses the creek. Vessels tie up to landings near this bridge.

Cape May Canal is part of the Intracoastal Waterway and is described on page 98.

Cape May and the shoals and channels to the south and southwest are described in Chapter 5.

New Jersey Intracoastal Waterway

CHARTS 825, 826, 827

The New Jersey Intracoastal Waterway, a sea-level inland water route approximately parallel with the New Jersey coast, extends from the Atlantic Ocean at Manasquan Inlet to Delaware Bay. It is about 102 miles in length. The waterway extends through the Inlet and up Manasquan River; thence by the Manasquan-Bayhead Canal through high ground to the head of Barnegat Bay. It then passes through a series of bays, lagoons, and thoroughfares along the New Jersey coast to Cape May Harbor; thence across Cape May County to Delaware Bay through a land cut.

The Federal project approved March 2, 1945, provides for a channel 12 feet deep and generally 100 feet wide, extending from the Atlantic Ocean at Manasquan Inlet to Delaware Bay above Cape May.

No work had been done to 1947 on this project by the U. S. Engineers except in the Cape May Canal.

In May 1946, the controlling depths were: From Long Branch Railroad Bridge across Manasquan River to Bay Head, 9 feet; thence to a point opposite Waretown in Barnegat Bay, 5 feet; thence to Albany Avenue, Atlantic City, 3 feet; thence to Ninth Street Bridge, Ocean City, 5½ feet; thence to Townsend Inlet, 4½ feet; thence to Rio Grande Avenue Bridge, Wildwood, 3½ feet; thence to Cape May Harbor, 9 feet; and thence through Cape May Canal to Delaware Bay, 10 feet.

Pilots.—No regular pilots for the inside passages or the inlets are available, but, in general, local boatmen are competent pilots. Men familiar with the waterways and who can act as pilots can usually be secured at Brielle, Bay Head, or Cape May. In good weather fishing boats are outside the inlets and strangers can obtain a fisherman for a pilot or a signal may be made off the town nearest the inlet, and one will come from shore. In places where no towns are near the inlets a member of the Coast Guard crew will usually go out if a signal is set.

Supplies.—Gasoline, provisions, and water can be obtained at practically all of the villages and resorts along the interior waters. Ship chandlery can be secured at Bay Head, Atlantic City, and Cape May.

Repairs.—At Bay Head, Forked River, Tuckerton, Nacote Creek, Atlantic City, and Cape May are railways capable of hauling out most of the boats navigating the inside waters. Numerous smaller railways are at other places along the waterway. Shops for ordinary repairs to hulls and motors are located at Bay Head, Atlantic City, and Cape May.

Tides.—In the inland waters the tides are greatly affected by the winds, both in time and height, westerly winds producing low water and easterly winds high water. In Barnegat Bay, northerly and southerly winds drive the water to the ends of the bay. While the normal range of tide is only about ½ foot at sections of the inland waterway removed from the inlets, the change in depth due to strong winds of long duration may amount to a maximum of about 3 feet above or below the normal high or low water, respectively. Near the inlets the wind has a lesser effect, and the normal range of tide is about 3 feet.

Tidal differences, by means of which the daily predicted times and heights of high and low waters may be obtained for numerous places in the inland waterway, are in-

cluded in the *Tide Tables, Atlantic Ocean,* published by the United States Coast and Geodetic Survey.

Currents.—Current velocities may reach 3 knots in the inlets and narrow channels connecting the inlets with adjacent bays and sounds. The *Atlantic Coast Current Tables* give information for a number of locations where current observations have been secured. Velocities of 2½ knots have been reported at the Brigantine Beach Bridge across Absecon Inlet.

Ice.—The inside waters are entirely closed to navigation by ice during extreme winters. During ordinary winters the more open channels, especially near the inlets where the currents are strong, remain open during most of the winter, though ice always forms on the flats. The inlets themselves are rarely closed by ice, though navigation through them is often rendered difficult by running ice. All of the principal inlets and channels adjacent to them are used in winter by local fishing boats, but through navigation is usually blocked.

Aids to Navigation.—The Coast Guard maintains the aids to navigation marking the inlets from the outside. The State of New Jersey maintains those marking the inside route and the side channels. The aids marking the inside route are similar to the Coast Guard's Intracoastal Waterway aids. They are numbered from Manasquan Inlet south to Absecon Inlet, where a new series starts and continues south to Cape May Harbor Inlet. The aids marking the tributary channels are similar to the regular aids to navigation and are numbered proceeding from the main channel.

The buoys and lights are removed before freezing weather sets in. All are restored about March 1, of each year.

Bridges.—All bridges crossing the New Jersey Intracoastal Waterway have draw openings. The minimum horizontal clearance is 30 feet at Ocean City. The vertical clearance for closed positions of the draw spans are indicated at the water level of staff gages in place at the various bridges.

Bridge Regulations.—The regulations for the bridges crossing the waterway are as follows:

(a) The Inland Waterway of New Jersey referred to in these rules and regulations is defined as that waterway so designated by the State of New Jersey extending through the bays and thoroughfares on the eastern coast of that State from Bay Head at the upper end of Barnegat Bay on the north to Cape May on the south.

(b) Where two or more drawbridges are located on the same waterway with a shorter distance than 1,000 feet between the draws, such bridges shall, for the purpose of these regulations, be considered and operated as a unit. The owners thereof shall provide and install, for uninterrupted service, systems of electric signals on their respective bridges, so connected that the operator of any bridge of the group may thereby simultaneously notify, by signal, the operators of all the other drawbridges of that group of the desire of the master of any vessel or other water craft to pass through the draws. The operator of the bridge first in any group of bridges to be passed by an approaching vessel or other water craft shall be responsible for observing the approach of such vessel or other water craft toward that bridge, also for receiving the signal or notice for passing and for communicating, by means of the electric signals prescribed above, to the operators of the other bridges composing such group the purpose of such vessel or other water craft to pass.

(c) When at any time during the day or night any vessel or water craft approaches any bridge affected by these regulations, and under which it cannot pass, the lawful signal of the desire of the master of the vessel or craft to pass through the draw opening shall be three blasts of a whistle or horn blown on the vessel or craft, or notice given in any other convenient manner to the bridge tender of the desire of the master to pass the bridge.

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.

(d) The draws in each and every bridge or group of bridges shall, upon the signal or notice prescribed above, be promptly opened at any and all hours of the day or night, except as provided in paragraph (m) for the passage of any vessel, vessels, or other water craft unable to pass safely underneath the draw when closed. For bridges crossing the Inland Waterway of New Jersey, failure of the draws to be fully opened within 4 minutes from the signal to open shall be considered a violation of the requirement for prompt opening.

(e) If a car, train of cars, or other vehicle is, at the time of receiving the signal or notice prescribed in paragraph (c), approaching any draw so closely that it cannot be safely stopped before reaching such draw, two blasts of a whistle or horn shall be blown on the bridge. As soon thereafter as such draw shall be cleared, such draw or all draws comprised in any group of bridges concerned shall be promptly opened, and three blasts of a whistle or horn blown on the bridge to indicate such clearance. In lieu of signals from the bridge by whistle or horn, a white flag may be waved on the bridge by day and a white light by night, to indicate that the draw opening is clear, or a red flag may be waved on the bridge by day and a red light at night, to indicate that the draw is not clear and cannot be immediately opened.

(f) After the draw or draws of any bridge or group of bridges shall have remained open for a period of 10 minutes or for such shorter period as may be necessary for the passage of vessels or other water craft waiting to pass, the draw or draws may be closed for the crossing of cars, trains, vehicles, or individuals, if any be waiting to cross. After being so closed for a period of 10 minutes or for such shorter times as may be necessary, the draw or draws shall be again promptly opened for the passage of vessels or other water craft, if there be any desiring to pass.

(g) No vehicle, car, locomotive, or train shall be stopped on the drawspan of any bridge subject to these regulations; nor shall any such bridges carrying railway or tramway tracks be used for switching purposes, except those bridges for which special regulations are prescribed in paragraph (m); nor shall locomotives or trains be stopped in bridge blocks of railroad bridges in such manner as to hinder or delay the operation of any draw, except in cases of urgent necessity. Vessels shall not be so moored nor maneuvered as to delay or hinder unnecessarily closing the draw of any bridge. All passages of vessels and other water craft through or under the drawbridge and all passages of cars, locomotives, trains, and other vehicles over drawbridges shall be prompt and as rapid as practicable in order to avoid unnecessary delay to either land or water traffic.

(h) The owner or owners of each and every drawbridge covered by these rules and regulations shall maintain in good and serviceable order the drawspan, together with the machinery and appliances required for operating the same, and the electric signal system prescribed in paragraph (b); shall provide such number of draw operators or tenders as may be found necessary to open and close the draws promptly; and shall also provide and maintain in good order on the bridge piers or fenders such fixtures as may be necessary for vessels to moor or make fast while waiting for the drawspan to be opened.

(i) 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.

(j) At each opening of a draw, full horizontal and vertical clearances shall be provided, regardless of the size or requirements of the passing vessel or other water craft.

(k) The owner or owners of each and every bridge covered by these rules and regulations shall provide and maintain in good legible condition two board gages painted white, with figures not less than 6 inches high painted black, to indicate the vertical clearances under the closed drawspan at all stages of the tide. The gages shall be so placed on the ends of the drawspan fender that they shall be plainly visible to the master of a vessel or other water craft approaching such bridge either upstream or downstream.

(l) The owner or owners of each and every bridge covered by these rules and regulations shall cause to be kept a complete record of all openings of the draw and shall promptly report to the district engineer of the United States in charge of the river and harbor improvements in that vicinity all cases in which the drawspan has been required to remain open for an unreasonable length of time or to re-

main closed for more than 10 minutes after the prescribed signal or notice to open the draw has been given.

(m) The provisions of paragraph (d) shall be applicable to the bridges of the Pennsylvania-Reading Seashore Lines (both steam and electric) and of the Atlantic City Shore Railroad, over Beach Thorofare at Atlantic City, N. J., only between the hours of 11 p. m., and 6 a. m. daily.

Between the hours of 6 a. m. and 11 p. m. these bridges shall be opened upon signal or notice from any vessel or craft desiring to pass at any time during the periods from 20 to 30 minutes past each hour, but may remain closed during such periods if no vessel or craft give such signal or notice, provided that when once opened for the passage of any vessel or craft said bridges shall remain opened sufficiently long to permit the passage of all vessels or craft which may be engaged in passing or which may be presenting itself for passage. Between such hours (6 a. m. and 11 p. m.) these bridges shall not be opened except as provided for above.

Manasquan River

CHART 795

Manasquan Inlet, 23 miles southward of Sandy Hook, is the northern entrance to the New Jersey Intracoastal Waterway which extends south to Delaware Bay. The inlet is protected by two stone jetties. On the outer end of each jetty is a light shown from a skeleton tower. The north jetty light is 34 feet above the water and the south jetty light is 33 feet above the water. A fog signal on the south jetty light is sounded on an electric diaphragm horn. The entrance is marked by a lighted gong buoy 1.0 mile 126° from the north jetty light. The observation tower on the Manasquan Coast Guard station is adjacent to the south jetty.

Strangers should enter with caution and it is recommended that a local pilot be used if one is available.

The Federal project for the improvement of the ***Manasquan River*** provides for a channel 14 feet deep and 250 feet wide from the Atlantic Ocean to the inner end of the north jetty, thence 12 feet deep and 300 feet wide to within 700 feet of the New York and Long Branch Railroad bridge, thence of same depth and narrowing to a width of 100 feet to within 300 feet of the bridge; for a widening on the northerly side of the channel of 200 feet for a distance of 3,150 feet to a depth of 8 feet; for an anchorage of 19 acres to a depth of 10 feet on the south side of the channel and for an anchorage of 27.5 acres to a depth of 12 feet about 0.4 mile west of Route 35 highway bridge.

Above the limit of the previous described project the New Jersey Intracoastal Waterway continues to the Manasquan-Bayhead Canal with a channel 12 feet deep and generally 100 feet wide. In May 1946, the controlling depth was 11 feet to the west end of north bulkhead; thence 6½ feet to 700 feet east of the railroad bridge.

The State of New Jersey has dredged a channel from the Manasquan-Bayhead Canal to about 0.7 mile above Route 34 highway bridge. In June 1935 the controlling depth was 6 feet to the bridge and in June 1938 the same depth above the bridge.

Between the inlet and the railroad bridge the river is entered on the south by ***Cooks Creek*** which is the outlet for ***Lake Louise.*** ***Debbies Creek*** enters from the north; the channel has been improved by dredging and a turning basin 0.4 mile above the mouth.

The mean tidal range is 4.0 feet at the ocean end of the inlet and 3.7 feet at the inner

end; irregular fluctuations due to wind and barometric pressure vary from 2.7 feet below to 7.5 feet above mean low water at the inlet.

The following bridges cross the Manasquan River and tributaries: New York and Long Branch R. R., bascule span, horizontal clearance 47.5 feet, vertical clearance 3.0 feet at MHW; Route 35 highway bridge, bascule span, horizontal clearance 49.5 feet, vertical clearance 9.3 feet at MHW; Route 34 highway bridge, bascule span, horizontal clearance 50 feet, vertical clearance 15 feet at MHW; Cooks Creek, fixed span, horizontal clearance 28.5 feet, vertical clearance 8.5 feet at MHW; Debbies Creek, bascule span, horizontal clearance 29.7 feet, vertical clearance 2.8 feet at MHW.

The regulations governing the opening of the drawbridges are given on page 82.

Considerable berthage is available for all boats using the river. In case of a hurricane boats go to Bay Head for safer anchorage. At **Brielle,** a village on the north side of the river, gasoline, Diesel oil, water, marine supplies, and provisions may be obtained immediately west of the railroad bridge. The dredged basin off the piers has a depth of 15 feet. Dockage is charged. Fishermen and pleasure craft use this basin. Off the wharves at Brielle the **speed** of all boats is limited to 6 miles per hour.

Manasquan (lat. 40°06′, long. 74°02′), on the north and **Point Pleasant** on the south at the entrance are towns with large summer colonies. Two chart agencies are in Point Pleasant.

A marine railway at the Brielle basin can haul boats 65 feet in length, 4.5-foot draft and 35 tons weight. Two other marine railways in the river can handle smaller craft and offer limited supplies of all kinds.

Manasquan Inlet and River have a very large traffic of commercial fishing and pleasure craft.

The Brielle Yacht Club is just east of the railroad bridge.

Manasquan River to Little Egg Harbor

CHART 825

The ***Bayhead-Manasquan Canal*** is a land cut connecting Manasquan River with Barnegat Bay. The sides of the canal have been bulkheaded. At present the depth maintained by the State of New Jersey is about 6 feet.

Speed limit.—The speed limit in the Bayhead-Manasquan Canal is 6 miles per hour.

The canal is crossed by two bridges. Route 35 highway bridge crossing the canal 0.3 mile from Manasquan River has a bascule span with a horizontal clearance of 47.7 feet and a vertical clearance of 13.8 feet at MHW. The second highway bridge has a swing span with a horizontal clearance of 45.4 feet and a vertical clearance of 15.6 feet at MHW. The rules governing these bridges are given on page 82.

Barnegat Bay is 26 miles long and has a general depth of 6 to 8 feet along the western side, with extensive flats extending westward from the beaches. Boats of about 6-foot draft enter through the inland waterway from southward. The usual draft of boats frequenting the bay is 2 to 5 feet.

Bay Head, a summer resort with a large year-around settlement, at the head of Barnegat Bay, is frequented by many motor boats up to 6-foot draft. The harbor

is completely sheltered; the rise and fall of the tide is about ½ foot. The public dock has berthing space for 150 boats in addition to other large berthing areas available for transients. The Bay Head Yacht Club is active. The most prominent landmark is an elevated water tank, conical above and below.

Several boatyards have marine railways where repairs of all kinds can be made. Boats 85 feet long, 7-foot draft and 50 tons can be hauled out. Gasoline, Diesel oil, provisions, and ship chandlery can be obtained. A chart agency is in Bay Head.

Storm warnings, day signals only, are displayed from a signal tower at the Dale Yacht Basin from May to October.

Beaverdam Creek on the north side of **Wardell Neck** is crossed by a swing drawbridge 0.4 mile above the mouth. The horizontal clearance is 40 feet and the vertical clearance is 14.3 feet at MHW. On the south side of the creek just west of the bridge are two marine railways. The larger one can haul boats 40 feet long and 3-foot draft. Gasoline, water, and marine supplies are available.

Metedeconk River is navigable for a draft of 4 to 5 feet to the fork. At the entrance the best water is close to the north shore just westward of Bay Head. On the south side of the river east of **West Osbornville** is a marine railway for boats 30 feet long and 3-foot draft.

Mantoloking is a summer resort 2 miles southward of Bay Head. A highway bridge crosses the bay at this point. The horizontal clearance of the bascule span is 51.5 feet, and the vertical clearance is 14 feet at MHW.

A public dock at Mantoloking has depths of about 4 feet at the ends. Supplies are available in the town. The Mantoloking Yacht Club is just south of the bridge on the east side of the waterway. A marine railway is capable of hauling boats 30 feet long and 3-foot draft.

On the west side of the waterway at the west end of the highway bridge is a marine railway capable of hauling boats 50 feet long, 6-foot draft, and 50 tons weight. Gasoline, motor oil, water, and marine supplies are available. Berthage for 50-foot boats in 5 to 8 feet is available inside the slip at the marine railway.

Kettle Creek has a reported depth of 4 feet in mid-channel to the fork. A boatworks is at **Silverton.** ***South Kettle Creek*** has a marine railway capable of hauling out boats up to 40 feet in length.

Lavallette is a small summer resort on the beach 4 miles southward of Mantoloking. A small public dock has depths of about 3 feet at its face. Gasoline and some supplies are available.

Seaside Heights is a summer resort on the beach 6 miles southward of Mantoloking. A highway bridge connects the town with the mainland. The bascule span has a horizontal clearance of 50.2 feet and a vertical clearance of 9.7 feet at MHW. A public dock has depths of about 7.5 feet at its face. A standpipe is prominent.

Pelican Island (lat. 39°57′, long. 74°05′) near the east end of the highway bridge has a thickly populated permanent settlement. The boatworks has two marine railways capable of hauling boats 35 feet in length and 4-foot draft. Gasoline, motor oil, water, and limited supplies are available. The docks have a depth of 6 feet at the boatworks. Berthage is available; dockage is charged.

Toms River, the most important tributary of Barnegat Bay, enters the bay between **Coates Point** just south of the highway bridge and **Goodluck Point.** The Federal project provides for a channel 12 feet deep and 100 feet wide from the New Jersey Intracoastal Waterway to the highway bridge over South Fork of Toms River, including a turning basin, and a channel 5 feet deep the full width in North Fork to the

highway bridge. In 1946, the controlling depth was 6 feet to the town of Toms River. The upper 0.5 mile is through a dredged channel which is subject to slight shoaling.

Island Heights is a town off the high wooded point on the north side of Toms River. A public dock has a depth of about 6 feet at its face. Gasoline is only available at the public dock. Some supplies are available in the town. Three boatyards are in Island Heights, with marine railways at each. The largest is capable of hauling boats 45 feet in length and 3-foot draft. Marine supplies and water are available at the yards. Depths of 2 to 3 feet are available to the yards and docks.

At the town of **Toms River** the public dock is a concrete wall around the public park with a depth of 5 feet along the face. Boats may lie alongside. The Toms River Yacht Club is open all year around and provides berthage. Public berthage is available along the bulkhead between the gasoline stations in ***South Toms River.*** The depth is about 5½ feet at the bulkhead. Both gasoline stations are equipped for fueling vessels. Dockage is charged. Supplies are available in the town. The two boatyards have three marine railways. The largest is capable of hauling boats 60 feet in length and 7-foot draft. Gasoline, Diesel oil, and all kinds of marine supplies are available. Dockage is charged after the first day.

Berkeley, a resort about 0.7 mile southward of Seaside Heights, has a lagoon or artificial harbor for small boats with depths of 6 to 8 feet.

Seaside Park is adjacent to Berkeley. The public wharf has a depth of 4 feet and the Yacht Club wharf a depth of 5 feet. A distinguishing mark is a black water tank near the south end of the town. A boatyard has a marine railway capable of hauling boats 50 feet in length, 4½-foot draft at low water and 5-foot draft at high water, and about 25 tons. A 15-ton crane is available. Engine repairs can be made. Gasoline, motor oil, water, and marine supplies are available.

The Pennsylvania Railroad Bridge crosses the bay between the south end of Seaside Park and **Barnegat Pier** near Goodluck Point. Use either opening of the swing draw span. The horizontal clearance is 72.0 feet in the east side and 67.0 feet in the west side, the vertical clearance is 4.7 feet at MWH. Barnegat Pier has a depth of 3 feet at the wharf.

Cedar Creek, 3 miles below the Pennsylvania Railroad Bridge, extends about one mile from the mouth. In October 1946, the controlling depth was about 3 feet. A public dock is on the south side of the creek, but the water at the face is very shoal. A marine railway on the north side of the creek is capable of hauling out boats of 30-foot length and 3½-foot draft. Gasoline, water, and some supplies are available at the town of **Lanoka Harbor.**

Forked River, about 6 miles below the Pennsylvania Railroad Bridge, has an improved channel to the state highway bridge at the town of **Forked River.** In April 1946, the controlling depth was 8 feet.

Above the light marking the junction of North and South Branches the **speed of all boats is limited to 3½ knots (4 statute miles per hour).**

Marine Terminal, on the south side of the river adjacent to the main highway, is maintained by the State of New Jersey. In the terminal is approximately 2,400 lineal feet of dock space and accommodations for 100 private boats. Depths in the basin and at the dock faces vary from 6½ to 10 feet. Dockage of $1.00 per night is charged after the first 24 hours. Day and night watchman service is maintained. Boats up to 50 feet in length lie alongside the wharf. The water in the basin is almost fresh. Gasoline, fresh water and lights are available on the dock and ice, coal, and other supplies can be obtained in the town of Forked River.

On the north side of the river is another public dock. These slips are principally for the use of permanent residents and are generally all leased. When vacant, transient vessels may tie up overnight without dockage charge. Gasoline is available at the dock. The depths at the outer ends of the slips vary from 3½ to 4½ feet.

Four boatyards are on Forked River. All have marine railways. The largest railway is capable of hauling out a boat of 50-foot length but is limited to a draft of 4 feet forward.

Oyster Creek, about 1 mile south of Forked River, is reported to have shoaled to a depth of 3 feet at the entrance.

Barnegat Inlet, 43 miles south of Sandy Hook, is marked on the south side by Barnegat Lighthouse, see page 75, the most prominent mark in the vicinity. The channel is protected by two converging stone jetties, submerged at high water, extending to a depth of 12 feet in the ocean and spaced 1,000 feet apart at the outer ends. The outer end of each jetty is marked by a light shown from a skeleton tower with a tank house. The lights are 34 feet above the water; the north jetty light is visible 7 miles and the south jetty light is visible 6 miles.

The entrance, the channel across the bar, and the inner channels are marked by a lighted bell buoy and several other buoys, some of which are lighted, which are moved frequently to conform with the shifting channel but should be used only with local knowledge. The deepest draft taken across the bar is about 10 feet at high water. It is recommended that any vessel not familiar with this inlet lay to outside the entrance and signal for a pilot. With a smooth sea it is usually safe for boats of 7-foot draft to enter by following the buoys.

The Federal project provides for a channel 10 feet deep and 300 feet wide through the outer bar; a channel 20 feet deep and 300 feet wide extending in a northwesterly direction from the gorge in the inlet to ***Oyster Creek Channel*** just northwest of ***Sunset Shoal;*** a channel across the inner bar 8 feet deep and 200 feet wide extending from Oyster Creek Channel to deep water in the bay.

In August 1946, the controlling depths were: Outer Bar, 8½ feet; Main Channel, 8 feet; and Oyster Creek Channel, 7 feet.

The mean range of tide is 2.7 feet at the inlet, 0.5 feet at Oyster Creek Channel, and less than a foot at the south end of Barnegat Bay. For predicted times and heights see *Tide Tables, Atlantic Ocean.*

The average velocity of the current in the inlet is 2.3 knots. For predicted times and velocities see *Current Tables, Atlantic Coast.*

At **Barnegat City (lat. 39°46′, long. 74°06′)** a dredged channel leads from the inlet channel southward to the landings on the inner beach just inside the point. The channel is narrow and boats should pass the mid-channel buoys close aboard. No public dock is available but boats sometimes tie up at the Coast Guard station. Gasoline, fuel oil, and ice may be secured, also supplies in limited quantities, at the fish company wharf at the head of the channel. A marine railway capable of hauling boats 35 feet in length and 4-foot draft is available.

Waretown Creek, on the western side of the bay about 1 mile southward of Oyster Creek, is a sheltered basin area which has been dredged to 6 feet. In 1946, the controlling depth was reported to be 6 feet. At the 200-foot public dock gasoline, oil, and fresh water are available. Minor boat repairs can be made. A dredged cut is south of the town of **Waretown.** In 1946, the controlling depth was 0 feet at the entrance and 7 feet inside to the head of navigation.

Double Creek is on the western side of Barnegat Bay, 4 miles westward of Barnegat

Lighthouse. The entrance is protected on the north side by a jetty which is marked on its outer end by a light. A channel has been dredged to a depth of 6 feet from the mouth upstream approximately 1 mile to the fixed county highway bridge. In 1946 the controlling depth was 5 feet. The horizontal clearance of the bridge is 18.7 feet and the vertical clearance is 6 feet at MHW. The creek shoals above the bridge. There is a public dock. Gasoline, motor oil, and fresh water are available. Provisions can be obtained in limited quantities.

Harvey Cedars is a summer resort on Long Beach about 5 miles southward of Barnegat Inlet. The public dock has about 2 feet at its face. Gasoline and supplies can be obtained in the town.

Surf City, marked by a prominent standpipe, is about 2 miles below Harvey Cedars.

Manahawkin Bay is 8 miles southward of Barnegat Inlet. **Cedar Bonnet Island** is a large group of marshy islands on the eastern side of the bay. The waterway passes eastward and southward of the islands. A highway bridge crosses the bay at this point. The single-leaf bascule span over the waterway has a horizontal clearance of 51.6 feet and a vertical clearance of 7.9 feet at MHW. The bay westward of Cedar Bonnet Island has a ruling depth of 1 to 2 feet, but 5 feet can be carried from southward nearly to the bridge through a narrow unmarked channel.

Ship Bottom is a town extending from the bay to the ocean southward of the bridge and marked by a prominent standpipe. About 1,000 yards south of the bridge a marked, dredged channel, having a controlling depth of 5 feet in 1946, leads to a yacht basin. Berthage is available and dockage is charged. Gasoline, motor oil, fresh water, and marine supplies are available. Diesel oil may be ordered. Provisions are available in the town. The marine railway is capable of hauling boats of 40 feet in length and 5-foot draft. Just south of the basin is a marine railway capable of hauling boats of 50 feet in length and 5-foot draft.

The body of water between Manahawkin Bay and Little Egg Harbor is shoal. The route of the Intracoastal Waterway follows the eastern shore. A natural channel leaves the waterway south of Cedar Bonnet Island and crosses to the western side with that island and **Thorofare Island** on the north and **Flat** and **Reed Islands** on the south. The ruling depth in this channel is 5 feet. The natural channel joins the waterway at Beach Haven.

Cedar Run, on the western side of the bay southward of the bridge, has been improved by a channel dredged to 5 feet from the mouth upstream for a distance of approximately 0.9 mile. In 1946, the controlling depth was 4 feet. Between the mouth of the channel and the natural channel on the western side of the bay the ruling depth was reported to be 3½ feet in 1946. The Cedar Run Dock is open to the public but it has little water at the face. A marine railway on the creek can accommodate boats of 45 feet in length and 4-foot draft.

West Creek on the western side of the bay has been improved by a channel dredged to 6 feet from the mouth upstream, a distance of 2.4 miles to the oyster wharves and public landing. In 1946, it was reported that the depth had shoaled to 3 feet. At the Yacht Club near the mouth of the creek is a marine railway capable of hauling boats 35 feet in length and 4-foot draft. A very small railway is at the head of the creek. Gasoline, motor oil, kerosene, and water can be obtained.

Little Egg Harbor has a general depth of 4 to 6 feet in the northwestern part and is thick with oyster stakes. In the southern part of the harbor is a large group of

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marshy islands surrounded by a shoal area with depths of 1 to 3 feet. Between some of these islands are narrow unmarked channels which end abruptly in the shoal area.

Parker Run flows into ***Parker Cove*** at the northern end of Little Egg Harbor. A channel 6 feet deep has been dredged for a distance of approximately 0.5 mile upstream from the mouth to the oyster wharves. In November 1946, it was reported that the controlling depth in the entrance was 2 to 2½ feet, thence 4 feet to the public docks. The bottom in the entrance is soft mud. At the wharf in the creek is about 700 feet of improved berthing space with 3 to 4 feet at the face. Dockage is not charged. Gasoline, motor oil, prepared meals, and ice are available. At **Parkertown** is a boat works.

Beach Haven (lat. 39°34′, long. 74°14′), a town on the southeasterly side of Little Egg Harbor, is marked by a standpipe, stack, and elevated water tank. A draft of 6 feet can be taken to the public dock where gasoline can be obtained. Good anchorage is available in 15 feet in the channel westward of the town. Two yacht clubs are at Beach Haven. Ice, coal, groceries, and other yacht supplies can be obtained in the town. Just south of the stack is the dredged basin of the boatyard. The basin has been dredged to 8 feet. Berthage is available and dockage is charged. Gasoline, motor oil, kerosene, and Diesel oil are available. The marine railway is capable of hauling out vessels of 45 feet in length and 4-foot draft.

Tuckerton Creek is on the west side of Little Egg Harbor. A channel has been dredged from the head of Marshelder Channel, see page 91, across the harbor south of Parker Island to the mouth of the creek and thence in the creek to Tuckerton at the head of navigation. The creek is very narrow and crooked at low water. The bottom is soft.

The Federal project for improvement provides for a channel 6 feet deep, 80 feet wide, from the head of Marshelder Channel to the mouth, thence 75 feet wide to **Parkers Landing,** thence 60 feet wide to **West Tuckerton Landing,** thence a channel 5 feet deep and 60 feet wide to just above **Scow Landing,** and thence a channel 3 feet deep and 40 feet wide to the mill dam at Tuckerton.

In March 1946, the controlling depths were as follows: The channel across Little Egg Harbor, 1 foot; thence 4 feet to Scow Landing; and thence 3 feet to the mill dam at Tuckerton.

Cross currents keep the channel between Parker Island and the mouth of the creek filled. Local mariners mark the best water, which is always north of Parker Island, by stakes. Boats do not operate in this area at low water as the majority draw about 3 feet.

Speed.—Power boats or other vessels propelled by machinery shall not proceed at any time within the limits of the waters of Tuckerton Creek Channel at a greater speed than 8 statute miles per hour.

The Tuckerton Yacht Club near the entrance of the creek maintains a yacht basin with about 700 feet of berthing space open to the public at a small dockage fee. The general depths in the basin are 1½ to 2½ feet. Gasoline, oil, and water are available at the dock.

Tuckerton is a town with bus connections at the head of navigation on Tuckerton Creek. A water tank is in the town and the radio towers about 3 miles southwestward are prominent. Tuckerton has 3 public wharves (dockage is not charged) and several marine railways. The largest railway can accommodate vessels 50 feet in length and 4½-foot draft. Machine and engine repair work can be obtained. Supplies of all kinds can be secured in Tuckerton.

Little Egg Harbor to Longport

CHART 826

Beachhaven Inlet has broken through the beach 3 miles southward of Beach Haven, and should not be mistaken for Little Egg Inlet. The entrance is marked. The single narrow, shifting, winding channel has a ruling depth of about 6 feet over the outer bar and 4 feet to the inside water. The channel is sounded monthly by the Coast Guard and the buoys are shifted to mark the best water. The buoys are not charted and should be used with local knowledge.

Tucker Island, separating Beachhaven and Little Egg Inlets, is eroding. The mean range of tide is 3.7 feet.

Marshelder Channel trends northwesterly from Beachhaven Inlet around the southwesterly side of **Story Island** and connects with the dredged channel to Tuckerton Creek, see also page 90, and the southwestern part of Little Egg Harbor.

Several thoroughfares lead from Little Egg Harbor to Great Bay. ***Big Thorofare*** is used by small local boats but is shoal and should not be attempted by strangers. ***Sheepshead Creek*** is shoal at its eastern end and is little used. ***Little Sheepshead Creek*** has a ruling depth of about 4 feet and is extensively used. Fixed bridges cross these creeks; the horizontal clearance is 16 feet and the vertical clearance is 6.5 feet for the bridges over Sheepshead and Little Sheepshead Creeks.

Little Egg Inlet, southward of Tucker Island, is used by local fishing vessels and motor boats. The depth on the bar usually is ample for boats that can use the inland waterway. In November 1946, the ruling depth was 15 feet. In very heavy weather breakers form all the way across the entrance. The shore and channels at the inlet are subject to rapid changes, both in location and depths. The entrance is well marked by vertical-striped buoys but strangers should use caution when entering. The buoys are not charted as they are frequently shifted in position. No regular pilots for the inlet are available, but strangers can usually pick up a fisherman outside to act as a pilot, or can set signal and wait for one from the Coast Guard station.

Great Bay, northwestward of Little Egg Inlet, has a ruling depth of 4 to 6 feet. The main entrance is through Shooting Thorofare and Newmans Thorofare, eastward of Seven Islands. The route of the Intracoastal Waterway is southwest of Seven Islands and through Main Marsh Thorofare. Great Bay is frequented by many small boats and vessels bound up the Mullica River. A prominent fish factory is on Seven Islands on the west side of Newmans Thorofare.

Mullica River, flowing into the northwestern part of Great Bay, is navigable for 20 miles to Pleasant Mills. At low water a draft of 4½ feet can be carried from the northern end of ***Newmans Thorofare*** across the flats of Great Bay to the mouth of the river. The most difficult place is off the mouth of Sheepshead Creeks, where the channel is 0.3 mile off the marsh north of the creeks and then follows the main slough westward, as shown on the chart. The shoals are sometimes marked by bush stakes.

The water inside Mullica River is deep and the mid-channel is clear for a long distance. It is reported that a draft of about 9 feet at high water can be taken to **Crowleytown** and about 4 feet at high water for about 3.3 miles farther to **Pleasant Mills** where a dam restricts navigation. The navigation of the river is comparatively easy to Crowleytown but shoal and difficult above. The lower reaches of the river are marked by lights and stake daybeacons. Above the first bridge the channel is marked by stake daybeacons.

Three bascule bridges cross the Mullica River. The Route 9 bridge between New Gretna and Higbeeville has a horizontal clearance of 50 feet and a vertical clearance of 4.2 feet at MHW. The Lower Bank bridge has a horizontal clearance of 30 feet and a vertical clearance of 6.7 feet at MHW. The Green Bank-Weekstown bridge has a horizontal clearance of 30 feet and a vertical clearance of 5.5 feet at MHW.

About 0.5 mile south of the first bridge are 3 marine railways capable of hauling vessels 42 feet in length and 4-foot draft. Gasoline, motor oil, and kerosene are available.

Nacote Creek is a tributary entering the south side of Mullica River 4 miles above the mouth. The entrance is marked by a light. It is reported that a draft of 4 feet at low water can be taken into the mouth of the creek, thence 6 feet to the first bridge, and thence 3 feet to **Port Republic (lat. 39°31′, long. 74°29′)** at the head of navigation. The first bridge has a bascule span with a horizontal clearance of 30 feet and a vertical clearance of 5 feet at MHW. The marine railway at the boat yard just east of the bridge is capable of hauling vessels 36 feet in length and 4-foot draft. Gasoline and kerosene are available. A new railway is being built on the west side of the bridge which will be capable of hauling vessels 50 feet in length and 5-foot draft.

Bass River is a tributary entering the north side of Mullica River, 5 miles above the mouth. The entrance is marked by a light opposite **Doctor Point.** At **New Gretna** the river is crossed by a bascule bridge with a horizontal clearance of 30 feet and a vertical clearance of 9.4 feet at MHW. Approximately 150 feet of bulkheaded berthage with 4 to 5 feet of water is available at the bridge. Gasoline, kerosene, groceries, and fresh water are available. Three small marine railways are on the river. The largest is capable of hauling vessels 32 feet in length and 4-foot draft.

Loveland Thorofare is a small waterway between Bass River and Wading River. A fixed bridge with a horizontal clearance of 16 feet and a vertical clearance of 3.8 feet at MHW crosses the Thorofare.

Wading River is an important tributary entering on the north side of Mullica River, 7 miles above the mouth. It is said to have deep water for several miles. At **Wading River** about 4.5 miles above the mouth the river is crossed by a bascule bridge with a horizontal clearance of 30 feet and a vertical clearance of 5.3 feet at MHW.

Mott Creek, on the west side of Great Bay, is marked by a light. It is reported that about 3 feet can be carried up the creek to a bulkhead wharf. A mud bank makes out from the point opposite the light. A marine railway at the public wharf is capable of hauling boats 30 feet in length and 3-foot draft. The public can tie up to the wharf for 24 hours. Gasoline, kerosene, groceries, fresh water, and ice are available at the wharf.

Oyster Creek, on the west side of Great Bay about 0.8 mile southward of Mott Creek, is also marked at its entrance by a light. A 6-foot channel has been dredged from the mouth into Great Bay. Within the creek 7 feet can be carried to the small fishing village of **Oyster Creek,** thence 4 feet to the public landing where gasoline, kerosene, fresh water, and ice are available. A marine railway is capable of hauling boats 30 feet in length and 3-foot draft. The creek is used by pleasure and fishing boats. Boats are available for rent.

Little Bay is shoal and large areas are bare at low water. The Intracoastal Waterway enters through ***Main Marsh Thorofare*** and follows the western side of the bay across the mouths of ***Hammock Cove*** and ***Perch Cove*** and westward of **Shad Island.** At **Black Point** an alternate route, marked by the State of New Jersey, swings eastward in ***Brigantine Channel*** for 1.3 miles, thence through ***Obes Thorofare*** to the north

end of Brigantine. However, it was reported in 1947 that the alternate channel had shoaled 0.3 mile east of Black Point and was bare at low water.

The main route of the Waterway continues from Black Point along the western side of ***Grassy Bay***, a shoal area mostly bare at low water, to ***Meadow Cut***. From this dredged cut it follows the eastern side of ***Reed Bay*** to and through ***Gull Island Thorofare***, across the mouth of ***Broad Creek***, through ***Middle Thorofare***, where it is rejoined by the alternate route from Brigantine, and into Absecon Channel.

Brigantine (**lat. 39° 24′, long. 74° 22′**) is a city on the beach midway between Brigantine and Absecon Inlets. It is reached from the north through Obes Thorofare, and from the south by ***Golden Hammock Thorofare*** and a channel to the main route. ***Bonita Tideway*** follows the western shore of the town. Opposite the confluence of Obes Thorofare and Bonita Tideway is a cove where good berthage can be obtained. Dockage is charged. The cove is a very safe harbor of refuge in case of a storm. Brigantine is connected by a highway bridge with Atlantic City.

Absecon Bay, at the head of ***Absecon Channel***, is shoal and has some areas bare at low water. A channel has been dredged across the bay with project dimensions of 5 feet deep and 80 feet wide to the mouth of ***Absecon Creek***. The creek has been improved by a dredged channel with project dimensions of 5 feet deep and 50 feet wide to the highway bridge at **Absecon**, and a turning basin of the same depth.

In May 1944, the controlling depths were: Across the flats in Absecon Bay to the mouth, 3¼ feet; thence to the turning basin at Absecon, 2¾ feet; thence to the highway bridge, 4 feet.

Along Absecon Creek are numerous private wharves. At Absecon are one small boat shop that can repair boats 30 to 40 feet in length and 3- to 5-foot draft and a marine railway capable of hauling boats of 45 feet in length and 4-foot draft. All kinds of marine supplies are available in the town.

From Absecon Channel the Intracoastal Waterway follows ***Beach Thorofare*** to the west side of Atlantic City. About 1.6 miles inside the entrance the waterway is crossed by a highway bascule bridge with a horizontal clearance of 60.1 feet and a vertical clearance of 19.6 feet at MHW.

Three railroad swing bridges are about 1.3 miles beyond the highway bridge. The minimum clearances of the bridges are 34.5 feet horizontal and 1.9 feet at MHW vertical. Between the hours of 6 a. m. and 11 p. m. these bridges only open for vessels or other craft desiring to pass during the periods from 20 to 30 minutes past each hour. The bridges open simultaneously on signal and it is advisable to wait until all are opened before beginning passage. Boat operators have reported that these bridges are a hazard to navigation.

Along Beach and ***Inside Thorofares*** are numerous wharves and boathouses on the west front of Atlantic City. Many of them are in bad repair and mariners should use caution when in the immediate vicinity of the ends of such piers as broken piling may exist.

The Albany Avenue Bridge at the Chelsea section of Atlantic City has a double-leaf bascule span over Inside Thorofare with a horizontal clearance of 50 feet and a vertical clearance of 10.4 feet at MHW.

A **speed limit** of 7 miles per hour is enforced in the channel off Ventnor.

Ventnor Heights is on the west side of Inside Thorofare. A double-leaf bascule span highway bridge connects it with **Ventnor**. The horizontal clearance of the bridge is 50 feet and the vertical clearance is 9 feet at MHW. A marine railway and boat-

works are just south of the bridge. The railway is capable of hauling boats 40 feet in length, 3- to 3½-foot draft and 10 to 12 tons weight. Gasoline, motor oil, and Diesel oil can be obtained by truck. All kinds of marine supplies are available. Engine repairs can be made. Berthage is available; dockage is charged. The depth in the vicinity of the docks is 6 feet.

From the southwestern end of **Shelter Island** a natural unmarked channel with a ruling depth of 3 feet skirts the eastern shores of ***Shelter Island Bay*** and ***Lakes Bay*** to **West Atlantic City,** thence along the northern edge of Lakes Bay to **Pleasantville.**

The highway bridge at the northern end of **Margate City** has a bascule span with clearances of 61 feet horizontal and 14.6 feet at MHW vertical. This bridge now remains open.

In the first basin south of the highway bridge in Margate City is a boatyard. At the yard is a crane capable of hauling out boats 38 feet long, 3½-foot draft, and 15 tons weight. Gasoline, motor oil, water, and marine supplies are available. Provisions can be obtained in the city. Berthage is available in both dredged basins and along the water front; dockage is charged.

Longport (lat. 39°18′, long. 74°32′) is a city on the northern side of Great Egg Inlet. ***Risley Channel*** from Great Egg Inlet follows the water front of Longport to a junction with Beach Thorofare and then goes north where it divides into several smaller channels. At Longport it is crossed by a highway bridge having a horizontal clearance of 50 feet and a vertical clearance of 9 feet at MHW. Just south of the bridge on the east side of the channel is a boat repair shop equipped with a crane capable of hauling boats 46 feet long, 5 feet draft, and 12 tons weight. Complete boat service of any kind can be accomplished. Gasoline, motor oil, water, and limited marine supplies can be obtained. Provisions and ice may be obtained in the city. A depth of 10 feet can be carried from the Intracoastal Waterway to the shop. Winter storage and overnight berthage only are available. Longport has neither a public dock nor other berthage facilities.

The Intracoastal Waterway follows Beach Thorofare cuts to Risley Channel thence north in that channel to the cut dredged to ***Broad Thorofare.*** Be guided by the drum buoys and stake beacons. Favor the west bank at a distance of about 50 yards. Follow the dredged cut into Broad Thorofare.

Great Egg Inlet to Delaware Bay

CHART 827

Great Egg Inlet is described on page 77.

Ocean City, see also page 77, has berthage and inside and outside storage; dockage is charged. Three lagoons can accommodate boats up to 5-foot draft. Gasoline may be secured at the wharves. No Diesel oil is available. Ocean City has several marine railways with ample facilities for making hull and engine repairs to boats of all sizes from the smallest motor boats operating in the area to 40-50 feet in length, 4½-foot draft, and 15 tons weight. All kinds of marine supples, gasoline, motor oil, water, provisions, and ice are available.

The Intracoastal Waterway follows Broad Thorofare through the double-leaf bascule-draw span with a horizontal clearance of 50 feet and a vertical clearance of 9.4 feet at MHW. Thence across the southeasterly end of Ship Channel (strong currents are

noted at this crossing) and along the waterfront of Ocean City. Two bridges cross the waterway at Ocean City; the first is a railroad swing bridge with a horizontal clearance of 30 feet and a vertical clearance of 4.0 feet at MHW. Pass through the left-hand opening. The second bridge is a single-leaf bascule highway bridge with a horizontal clearance of 70 feet and a vertical clearance of 14.1 feet at MHW. Follow the wharves at a distance of 50 yards to the lower end of **Cowpens Island,** then be guided by the beacons through the channel south of a small island to Back Thorofare.

Great Egg Bay, extending 4 miles westward from Great Egg Inlet, is frequented by many boats of 5-foot or less draft bound to Somers Point and points in Great Egg and Tuckahoe Rivers. The main channel, ***Ship Channel,*** leads along the north side to the drawbridges at Somers Point, then 0.3 mile east and 0.4 mile south of Sledge Islands, then favors the southwest side of the bay to the mouth of Middle River. It is marked from the inlet to the mouth of Tuckahoe River by vertical-striped buoys and is easily followed by small boats.

About 0.8 mile above **Anchorage Point** on the main channel is a marine railway capable of hauling boats of 40 feet in length, 4-foot draft, and 15 tons weight. Marine supplies are available. Berthage is available; dockage is charged.

Bass Harbor, a small channel leading north from Ship Channel, just east of Somers Point, has a ruling depth in the entrance of 4½ feet. A fixed bridge with a horizontal clearance of 14 feet and a vertical clearance of 5.0 feet at MHW crosses Bass Harbor 0.4 mile above the entrance. The boat yard at Bass Harbor is equipped with a crane capable of handling boats 36 feet in length, 4-foot draft, and 15 tons weight. Engine and hull repairs can be made. Gasoline, motor oil, and marine supplies are available. Provisions can be obtained in **Ocean Heights.** Berthage is available; dockage is charged.

Patcong Creek flows into Great Egg Bay 0.3 mile west of the bridge crossing ***Drag Channel,*** north of **Sledge Islands.** Only 2 feet of water is available across the bar at the mouth of the creek at MLW. A swing span highway drawbridge crosses the creek inside the entrance; the horizontal clearances are 35 feet and the vertical clearance is 7.3 feet at MHW. Passage should be made through the east span of this bridge as the channel veers sharply to the right and passes close to the inside of the first bend. About 2.3 miles above the drawbridge is Ocean Heights Avenue Bridge with a fixed span having a horizontal clearance of 30 feet and a vertical clearance of 7.3 feet at MHW. About 120 yards south of the bridge, the submerged pilings of an old dam extend past midstream from the eastern shore. The western shore should be followed at a distance of 20 yards to clear this obstruction.

Great Egg River, also known as ***Great Egg Harbor River,*** empties into Great Egg Bay from northwestward. The channels in the upper reaches of the river, in the vicinity of Mays Landing, have been dredged by the State of New Jersey to a depth of 6 feet at MLW. Shoaling has occurred and this section of the river now affords a depth of 3 to 4 feet in the channel marked by stake beacons from the mouth upstream to the public landing at Mays Landing. With local knowledge 8 feet can be carried from Great Egg Inlet to Mays Landing. Two aerial wire crossings span the river; each has a vertical clearance of 100 feet.

Somers Point (lat. 39°18′, long. 74°36′), formerly known as **Egg Harbor,** a summer resort on the north side of Great Egg Bay, has a depth of about 6 feet at the wharves. A middle ground separates the wharves from Ship Channel. Passage behind the middle ground can be made by heading inshore from the ship channel about 220 yards

northeast of the railroad bridge and running along the line of the outer ends of the wharves. The channel is very narrow.

At Somers Point, Ship Channel is crossed by two drawbridges. The first is a railroad swing span with horizontal clearances of 40 feet and vertical clearance of 4.4 feet at MHW. The second is a highway bascule span with a horizontal clearance of 50 feet and a vertical clearance of 14 feet at MHW. If bound beyond Somers Point pass through the left-hand opening of the railroad draw to avoid a sharp turn necessary to make the passage through the highway bascule span.

A marine railway, just south of the highway bridge, is capable of hauling boats 40 feet in length, 4-foot draft, and 15 to 20 tons weight.

About 1.7 miles above the railroad and highway bridges at Beesleys Point the main channel is crossed by a highway bascule drawbridge with a horizontal clearance of 60 feet and a vertical clearance of 14 feet at MHW.

Beesleys Point, a small summer resort on the north side of the point between Great Egg and Peck Bays, has landings with about 3 feet at the ends, and this depth can be carried to them from offshore.

A marine railway is on ***Powell Creek*** which enters Great Egg River from the east about 4.6 miles above the mouth. The creek channel is narrow, crooked, and has a depth of about 3 feet in the entrance at MLW. The railway can haul boats 38 feet in length and 3½-foot draft. Gasoline, motor oil, and water are available. All kinds of boat repairs can be made and boats are built. About a hundred boats are stored each year. Berthage is not available.

On the east side of the river above **Scull Landing** is a repair yard with a marine railway capable of hauling boats 40 feet in length and 3½-foot draft. Storage is available. Gasoline can be obtained only by tank truck.

Mays Landing is a town and county seat at the head of navigation of Great Egg River. A basin with a controlling depth of about 5 feet has been dredged at the town. The bulkhead where boats tie up has shoaled at the foot requiring them to keep a few feet off; dockage is not charged. Fresh water can be secured at the bulkhead. Gasoline and supplies can be obtained in the town. The mean range of tide at Mays Landing is 4.0 feet. The water at the town is nearly fresh. A marine railway will accommodate boats 75 feet in length, 6-foot draft, and 80 tons weight. Storage and berthage are available. Gasoline is delivered only by tank truck.

Middle River, the largest tributary of Great Egg River, enters from the west near the mouth. The river flows about 4 miles through fields and marshes. An overhead cable with a vertical clearance of 40 feet at MHW crosses Middle River about 1 mile above the mouth; no bridges cross this river.

Tuckahoe River, on the south side of Great Egg Bay, is reported to have a depth of about 3 feet to the town of Tuckahoe. An overhead cable with a vertical clearance of about 100 feet at MHW crosses the river about 3 miles above the mouth. A bascule highway bridge crosses the river at Tuckahoe; the horizontal clearance is 30 feet and the vertical clearance is 8.8 feet at MHW. About 0.8 mile above the highway bridge is a fixed railroad bridge with a horizontal clearance of 30 feet and a vertical clearance of 6.9 feet at MHW.

Cedar Swamp Creek enters Tuckahoe River from the south about 1.3 miles above the overhead cable. The creek has a ruling depth of 5 feet to the highway culvert 2.3 miles above the mouth.

The Intracoastal Waterway follows ***Back Thorofare*** southeast of **Shooting Island.** Favor the bulkheaded side of the channel at a distance of 75 yards. The mud flats

bordering the channel through ***Peck Bay*** are visible in places at low water. The highway bridge at Peck Beach has a swing drawspan with a horizontal clearance of 49.6 feet and a vertical clearance of 7.1 feet at MHW. Pass through the east opening.

Crook Horn Creek connects Peck Bay and Middle Thorofare. The creek is crossed by a railroad swing-span drawbridge with a horizontal clearance of 59 feet and a vertical clearance of 2.7 feet at MHW. The draw moves slowly. Pass through the east opening; the other is obstructed.

Middle Thorofare leads into Ben Hand Thorofare. Pass through the east opening of the abandoned railway bridge across ***Ben Hand Thorofare.*** The bridge has a horizontal clearance of 54 feet and remains open at all times. Ben Hand Thorofare joins ***Main Channel.*** From the junction the channel to the southeast leads to Strathmere and Corson Inlet, see page 78. The Intracoastal Waterway follows Main Channel to and across ***Ludlam Bay.*** The bay is shallow; the channel through it is marked by stake beacons and an unlighted range at each end.

Ludlam Thorofare, connecting Ludlam Bay and Townsend Channel is crossed at Sea Isle City by a highway bridge having a double-leaf bascule span. The span has a horizontal clearance of 50 feet and a vertical clearance of 10 feet at MHW. Avoid the projecting shoal on the west side of the thorofare about 400 yards north of the bridge.

Sea Isle City, on the east side of Ludlam Thorofare, has several privately dredged basins with a depth of about 3 feet in the entrances and slightly greater inside. In the cut just south of the bridge is a boatyard with a marine railway capable of hauling boats 50 feet in length, 4-foot draft, and 18 tons weight. Hull and engine repairs can be made. Limited inside storage and berthage are available; dockage is charged. Gasoline and motor oil during the summer months, water, groceries, and marine supplies are available.

The town of **Townsends Inlet (lat. 39°07′, long. 74°43′)** at the junction of ***Townsend Channel*** and Inlet has a wharf with a depth of 12 feet alongside. Berthage is available; dockage is charged. Gasoline, water, and limited supplies are available.

Avalon is a resort on the south side of Townsend Inlet. A marsh area separates the town from Ingram Thorofare, the route of the Intracoastal Waterway. A privately dredged channel, ***Cornell Harbor,*** leads from 0.3 mile westward of the Inlet southeastward through the marsh to the town and along the western side. ***Pennsylvania Harbor*** is an outlet from the town channel into Ingram Thorofare just north of the highway bridge and ***Princeton Harbor*** is a parallel outlet into the thorofare just south of the same bridge. These two outlets have a ruling depth of about 2 feet at low water. A fixed bridge between them restricts passage to unmasted boats. Two public wharves with 3 feet at the ends are at the southeast end of Princeton Harbor. Gasoline and some supplies can be obtained at Avalon.

The highway bridge crossing ***Ingram Thorofare*** to Avalon has a swing span with horizontal clearances of 49 feet in the east draw and 50 feet in the west draw, and a vertical clearance of 7.1 feet at MHW. The span is hand-moved; pass through either opening.

Stake beacons mark the channel through ***Great Sound.***

Stone Harbor is a resort northeastward of Hereford Inlet. The Intracoastal Waterway follows the channel along the northwest side of the town. A highway bascule bridge crosses the waterway about midway along the waterfront. The double-leaf drawspan has a horizontal clearance of 50 feet and a vertical clearance of 12.9 feet at MHW. The privately dredged basins, ***North Basin, South Basin,*** and

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Snug Harbor are northeastward of the bridge, and ***Shelter Haven, Stone Harbor,*** and ***Carnival Bay*** are southeastward of the bridge. In Shelter Haven is a marine railway capable of hauling boats 35 feet in length, 3-foot draft, and 6 to 8 tons weight. Hull and engine repairs can be made. Gasoline, coal, oil, provisions, ice, and marine supplies are available. Berthage and inside storage are available; dockage is charged. Stone Harbor has no public wharves.

From Stone Harbor the Intracoastal Waterway follows ***Great Flat Thorofare,*** westward of **Nummy Island,** and ***Grassy Sound Channel*** to Grassy Sound. The highway bridge crossing Grassy Sound Channel has a double leaf bascule span with a horizontal clearance of 51 feet and a vertical clearance of 9.3 feet at MHW.

The channel through ***Grassy Sound*** is well marked by stake daybeacons. At the west end of the sound the channel is crossed by a railroad bridge with a hand-moved bascule draw having a horizontal clearance of 50 feet and a vertical clearance of 6.6 feet at MHW. A channel leads southeast to ***Wildwood Canal*** from the northeast side of the railroad bridge. The canal separates **West Wildwood** and **Wildwood.** Two fixed bridges cross the canal between the two settlements.

About 1.0 mile southward of the railroad bridge ***Post Creek*** enters from the east. The creek widens into a bay at Wildwood which connects on the northeast with Wildwood Canal. ***Ottens Harbor,*** a long slip dredged to accommodate large fishing vessels and other craft, enters Post Creek near its mouth. In the harbor is a marine railway capable of hauling out vessels 60 feet in length and 6-foot draft for scraping and painting. Storage is available; berthage is limited. Gasoline, Diesel oil, motor oil, and water are available.

The light at the junction of Post Creek and Grassy Sound and the lights along the route southward to Cape May Harbor are maintained throughout the year.

About 0.2 mile below Post Creek the route is crossed by a highway bridge having a power-moved swing-type draw with a horizontal clearance of 50 feet in the west opening and 51.5 feet in the east opening, and a vertical clearance of 6.2 feet at MHW. Pass through either opening. A marine railway south of the bridge can haul boats 45 feet in length and of 3-foot draft. General repairs can be made. Gasoline, motor oil, and marine supplies are available. Provisions can be obtained nearby.

Sunset Lake at **Wildwood Crest (lat. 38°58′, long. 74°50′)** is entered either through the channel southwest of **Ephraim Island** or opposite ***Swain Channel. Jarvis Sound*** is marked by lights. ***Middle Thorofare*** connects Jarvis Sound and Cape May Harbor. The bridge at the southwestern end of the Thorofare has a bascule span with a horizontal clearance of 50 feet and a vertical clearance of 25.6 feet at MHW.

Cape May Harbor is described on page 79.

Cape May Canal connects Cape May Harbor with Delaware Bay. The canal is about 4 miles long, the bottom width is 100 feet and the project depth is 12 feet. A turning basin is about 1,200 yards east of the Delaware Bay Entrance. The mean range of tide is 4 feet. The maximum velocity of the normal tidal current in the canal is 2.3 knots. See *Atlantic Coast Current Tables* for predicted times and velocities in the canal.

In June 1946, the controlling depth was 9.2 feet in the canal and 3.4 feet in the turning basin.

A **traffic light** is on the south side of the Cape May Harbor entrance to the canal. Vessels shall not enter except on green light.

Vessels transiting the canal should limit their **speed** to 6 statute miles per hour

(5.2 knots) and should proceed with special care in the vicinity of the bridges. Passage through the canal of barge tows may be delayed dependent upon tide and current conditions.

The canal is crossed by one railroad and two highway bridges, having power-operated swing drawspans. The east highway bridge, U. S. 9-N. J. 4, has a horizontal clearance of 40 feet and a vertical clearance of 20 feet at MHW. The railroad bridge has a horizontal clearance of 50 feet and a vertical clearance of 4 feet at MHW. The west highway bridge has a horizontal clearance of 40 feet and a vertical clearance of 10 feet at MHW.

The Delaware Bay entrance is protected by two parallel stone jetties spaced 500 feet apart and 400 yards in length. The offshore end of the south jetty is marked by a light, 9 feet above the water, shown from a post. A lighted bell buoy is 0.6 mile west of the south jetty light.

CHAPTER 5

Delaware Bay and River

CHARTS 1219, 1218, 294, 295, 296

DELAWARE Bay and River form the boundary between the State of New Jersey on the east and the States of Delaware and Pennsylvania on the west. They are the approach to the cities of Wilmington, Chester, Marcus Hook, Philadelphia, Camden and Trenton, and to many smaller cities and towns, and they have a large trade carried both in foreign and domestic vessels. Philadelphia, one of the important ports of the United States, and Trenton, the head of navigation, are 88 and 116 miles, respectively, above the entrance.

The main entrance to Delaware Bay is between Cape Henlopen and Cape May and is available for vessels of any draft. Vessels of up to 25-foot draft, subject to certain length restrictions, can enter the Delaware River from Chesapeake Bay through the Chesapeake and Delaware Canal, which enters the river north of Reedy Island. The project depth of the canal is 27 feet. The inside route from Chesapeake Bay to the Delaware River is described in Chapter 6.

Delaware Bay is, properly speaking, only an expansion of the lower part of the ***Delaware River.*** The dividing line is 44 miles above the entrance and extends from a monument lying 300 yards northwestward of Liston Point to a monument lying eastward of the south point at the entrance of Hope Creek.

Except at the entrance, Delaware Bay is bordered on both sides by wide areas of marsh, and there are no towns of any size on its shores. Detailed descriptions of the shores and tributaries are given under the headings "Delaware Bay, Eastern Side," and "Delaware Bay, Western Side."

Approaches to Delaware Bay

CHART 1219

The approaches to Delaware Bay have few off-lying dangers and in clear weather there should be no difficulty in entering the bay.

A number of sunken wrecks lie well offshore in deep water to the eastward of the entrance. An underwater obstruction, covered 5 fathoms, has been reported to lie in approximately latitude 38°40.5′ N., longitude 73°52.5′ W. and should be avoided.

Other dangers in the approaches to the bay are Five Fathom Bank, McCrie Shoal

and Fenwick Shoal. In the entrance itself a large shoal area extends southward of Cape May and terminates in Overfalls or South Shoal. From Cape Henlopen, Hen and Chickens Shoal extends southeastward.

Five Fathom Bank is an area of broken ground about 13 miles eastward of Cape May. Inside the 5-fathom curve it is about 9 miles long in a north-south direction and about 2 miles wide, with detached shoal spots to the westward, northward and northeastward, and a number of sunken wrecks to the northward. The least depth on the bank is 17 feet, lying 10 miles southeast of Hereford Inlet Light, and is marked on the northeast side by a horizontal-banded buoy. Southward 3.5 miles, off a 22-foot shoal, is a buoy marking the south end of the bank. It should be passed to the eastward and southward. Lighted whistle buoys mark the northeast and northwest parts of the bank. A lighted bell buoy marks the west side of a small detached shoal and sunken wreck with a depth of 28 feet, which lies about 2 miles west of Five Fathom Bank and should be passed to the westward when using the passage inside the bank. The greater part of Five Fathom Bank is within authorized fish trap limits.

Five Fathom Bank Lightship (***lat. 38°47′, long. 74°35′***), about 4 miles southeastward of the south end of the bank, has a red hull with FIVE FATHOM on each side and two masts with circular galleries. The light is 65 feet above the water and visible 14 miles; there is a riding light on the forestay. The fog signal is sounded on steam diaphragm horns; if horns are disabled a whistle will be blown. The lightship has a radiobeacon equipped for distance finding, and daytime storm warnings are displayed. The code flag signal and radio call is NNBL. An unmarked bank with least depth of 30 feet is 10.5 miles southwestward of Five Fathom Bank Lightship and should be avoided by the deeper-draft vessels.

McCrie Shoal, 7 miles southeast of Cape May Light, has a least depth of 18 feet. It is marked on the southeast side by a lighted whistle buoy.

Overfalls or ***South Shoal*** and numerous other shoals constitute an area of very broken ground, with a least depth of 2 feet, extending as much as 7.5 miles toward Cape Henlopen from Cape May. The southwest end of the shoal is marked by a lighted bell buoy and the western side by two buoys. Near the south side of the area a horizontal-banded buoy is moored to mark a 15-foot shoal which lies 1 mile to the westward of it. Several buoyed channels for light-draft vessels lead through the shoal area, but passage should not be attempted by deep-draft vessels or strangers.

Overfalls Lightship is stationed 1.3 miles southward of the southwest extremity of Overfalls or South Shoal and 3.3 miles east of Cape Henlopen. It has a red hull with OVERFALLS on each side, the lantern and gallery being on a tubular mast forward with a small mast aft. The light is 50 feet above the water and visible 12 miles, and a riding light is on the forestay. The fog signal is sounded on an air diaphone. The lightship has a radiobeacon synchronized for distance finding and daytime storm warnings are displayed. The code flag signal is NNBQ.

Hen and Chickens Shoal, with a least depth of 5 feet, extends 0.3 mile northeastward, 0.5 mile eastward, and 7 miles southeastward of the northern extremity of Cape Henlopen. At night a red sector in Harbor of Refuge Light covers the shoal. Two buoys, and a bell buoy mark the north, east and southeast extremities of the shoaler part. A bank with depths ranging from 22 to 28 feet extends 3 miles farther southeastward and the end of the bank and a sunken wreck near it are marked by a lighted whistle and a lighted bell buoy.

A sunken wreck is 1.3 miles northeastward of Cape Henlopen. A lighted horizontal-banded buoy is moored southward of the wreck.

Fenwick Shoal, with a least depth of 14 feet on the shoal proper, is about 20 miles

south-southeastward of Overfalls Lightship, in the southern approach to Delaware Bay. For a more detailed description of the shoal, see Chapter 7. A lighted whistle buoy is moored 8 miles southeastward of the shoal. Deep-draft coasting vessels normally pass to eastward of this buoy.

Between the parallels of 38°15′ N. and 39°15′ N. the 100-fathom curve is from 70 to 100 miles offshore and the 30-fathom curve is about 25 miles closer in. Both curves have a northeasterly and southwesterly trend. Westward of the 30-fathom curve the water shoals gradually to the 20-fathom curve. Inside the 20-fathom curve the depths are irregular, and if uncertain of her position, especially in thick weather, a vessel, when inside that curve, should approach the coast with care and in no case approach closer than in 12 fathoms until sure of her position. On a clear night the lights of the lightships and lighthouses should be made in time to prevent too close approach to the shore.

Coastwise courses from both northward and southward are given in Chapter 3.

Entering from northward.—The passage inside Five Fathom Bank, eastward or westward of McCrie Shoal, is used by most coasting vessels of less than 24-foot draft. In a heavy sea, vessels of a greater draft than 18 feet are advised to pass eastward of Five Fathom Bank, and this is the safest course at all times for strangers in vessels of a greater draft than 18 feet.

Entering from northward and seaward.—In approaching the entrance from northward and seaward vessels should shape a course so as to cross the meridian of 74°30′ W. in latitude 38°45′ N. Soundings to the northeastward of Five Fathom Bank Lightship are of little value for position finding because of the irregularity of the bottom and, if in doubt as to her position, a vessel should stay outside the 15-fathom curve until the above latitude is reached. In no case should a vessel approach the coast closer than in 12 fathoms unless sure of her position.

Entering from southward and seaward.—Vessels coming from southward and seaward should shape a course so as to cross the meridian of 74°30′ W. in latitude 38°45′ N.; this will lead to within 5 miles of Five Fathom Bank Lightship. If uncertain of the longitude, soundings should be taken frequently and the water not shoaled to less than 20 fathoms until between the parallel of 38°40′ N. and the parallel of Five Fathom Bank Lightship, 38°47′ N., and the entrance then approached between those parallels.

Entering from southward.—Coasting vessels of the deepest draft keep outside Fenwick Shoal lighted whistle buoy. Vessels of 15-foot draft usually pass inside of Fenwick Shoal in good weather, but strangers should use this passage with caution.

General Information—Delaware Bay and River

Channels.—The main entrance to the bay, which is used by deep-draft vessels and strangers, has a clear width of 3 miles between Cape Henlopen and the shoals, which extend 7.5 miles south-southwestward from Cape May Point.

The bay is shoal along its eastern and western sides, and there are extensive shoal areas close to the main channel through the center of the bay. The channel is well marked by lights, ranges and buoys, but strangers in deep-draft vessels should not attempt to enter by night.

The condition of the Delaware Bay and River channel is given at frequent intervals in the Notice to Mariners; see also pages 133 and 140.

Caution.—All persons operating yachts, motorboats, speedboats, and other craft in Delaware Bay are warned to keep clear of the submerged portions of training dikes at Hope Creek, N. J., at the south end of Reedy Island and at the north end of Pea Patch Island. These dikes are shown on Chart 294. They are marked by lights as shown on the chart.

Anchorage.—Delaware Breakwater Harbor and Harbor of Refuge are among the important harbors of refuge on the Atlantic coast and are extensively used by all classes of vessels. For description, see page 109.

Deep-draft vessels can anchor in various places in the vicinity of the main channel between Brown Shoal and the mouth of the river, but generally will continue to the more sheltered anchorages in the river.

The following anchorage areas in Philadelphia Harbor and the Delaware River have been established by the Secretary of the Treasury and approved by the President:

1. *Anchorage No. 1 (Port Richmond Anchorage).*—Located south of the channel, between the upper and lower ends of Petty Island, and between lines opposite Allegheny Avenue and Pier No. 80 North, near Norris Street Philadelphia, marked by white spar buoys A, B, C, and D.

Vessels having a draft less than twenty feet must anchor west of Pier No. 11 at Port Richmond. The area off the Crew Levick Wharf at Petty Island shall be restricted to facilitate the movement of vessels to and from the Company's wharf. Vessels must not cast anchor in the cable area indicated, except in a case of emergency.

2. *Anchorage No. 2 (Cooper Point Anchorage).*—Located east of the channel; between lines marking the prolongation of the south side of Pier No. 25 North and prolongation of the north side of Pier No. 40, North, Philadelphia.

3. *Anchorage No. 3 (Greenwich Anchorage).*—Located east of the channel; between Greenwich Point lighted buoy 48A and Greenwich Point Anchorage buoy 2 at Kaighn Point.

The area between Pier No. 2, New York Shipbuilding Corporation, and the McAndrews and Forbes Company's Pier, Camden, shall be restricted to facilitate the movement of car-floats to and from Bulson Street, Camden. Should the anchorage become so congested that vessels are compelled to anchor in the restricted area, they must move immediately when another berth is available.

4. *Anchorage No. 4 (Gloucester Anchorage).*—Located southeast of the channel, between Howell Cove buoy 48 and Greenwich Point lighted buoy 48A.

5. *Anchorage No. 5 (League Island Anchorage—Naval).*—Located north of the channel between lines which are a prolongation of the east side of Piers No. 1 and No. 7, at the Navy Yard, Philadelphia. This is a restricted naval anchorage.

6. *Anchorage No. 6 (Mantua Creek Anchorage).*—Located southeast of the channel; marked by Mantua Creek Anchorage buoys A, B, C, and D.

7. *Anchorage No. 7 (Thompson Point Anchorage).*—Located south of the channel and marked by a line bearing 000° from Thompson Point and a line bearing 000° from the east edge of Crab Point.

8. *Anchorage No. 8 (Marcus Hook Anchorage.)*—Located southeast of the channel commencing at Marcus Hook Range lighted buoy 6M and extending to line bearing 329° from the lower end of Raccoon Island, New Jersey.

A preferential area is hereby designated for the use of vessels awaiting quarantine inspection, between lines projected from the northeast and southwest boundaries of

the United States quarantine station at Marcus Hook, Pennsylvania, and southeastward of the ship channel. Should the remainder of the anchorage be in use, the preferential area, when unoccupied, may be used by deep-draft vessels not subject to quarantine inspection. The deep-draft area of the quarantine anchorage is marked by Marcus Hook Range lighted buoy 6M, Marcus Hook Anchorage buoy A, Marcus Hook Anchorage Quarantine buoy C, and Marcus Hook Anchorage buoy D. Light-draft vessels should anchor northeastward from Marcus Hook Anchorage buoy D.

9. *Anchorage No. 9 (Deepwater Point Anchorage)*.—Located east of the Cherry Island Range Channel and commencing at a line bearing 280° from Deepwater Point Range front light, to a line bearing 112° from the Christina River South Jetty Light. Vessels must not cast anchor in the cable area indicated except in a case of emergency.

10. *Anchorage No. 10 (Artificial Island Anchorage)*.—Located in the vicinity of Reedy Island at the upper end of Artificial Island to the eastward of Reedy Island Range Channel. The area is marked by Artificial Island Explosive Anchorage buoys A (ex), B (ex), C (ex) and D (ex).

11. *Anchorage No. 11 (Restricted) (Five Mile Point Anchorage)*.—Located north of the Fisher Point Range Channel; between Pier No. 179 North and the Philadelphia Electric Company Pier below the Delair Railroad Bridge, Philadelphia. This anchorage shall be reserved for vessels under custody of the United States. No vessel shall occupy this anchorage without a permit from the Captain of the Port.

12. *Anchorage No. 12 (Restricted) (Petty Island Anchorage)*.—Located south of Fisher Point Range Channel; between a prolongation of the north side of Pier No. 179 north to the prolongation of the north side of the Philadelphia Gas Works Company Pier, Philadelphia. This anchorage shall be reserved for vessels under custody of the United States. No vessel shall occupy this anchorage without a permit from the Captain of the Port.

13. *Anchorage No. 13 (Pea Patch Island Anchorage)*.—Located east of New Castle Range Channel, commencing at New Castle Range buoy 4N and extending to a line bearing 064° from Fort Delaware Light. This anchorage shall be available for general cargo vessels upon permission of the Captain of the Port.

14. *Anchorage No. 14 (General Anchorage) (Bombay Hook Point Anchorage)*.—Located west of Liston Range Channel, between a line bearing 228° from Ship John Shoal Light and a line bearing 228° from Delaware Bay Main Channel lighted bell buoy 42.

The limits of the anchorage areas are shown on the charts. Four of the areas are improved anchorages with project dimensions as follows: Port Richmond Anchorage, 37 feet deep and about 6,400 feet long; Gloucester Anchorage, 30 feet deep and about 3,500 feet long; Mantua Creek Anchorage, 37 feet deep, 1,400 feet wide and having a mean length of 11,600 feet; and Marcus Hook Anchorage, 37 feet deep, 1,400 feet wide and having a mean length of 10,500 feet.

War vessels of the United States and of foreign nations and pleasure yachts, with permission of the Commissioners of Navigation, Philadelphia, may anchor in such location as not to interfere with the navigation of the river.

Vessels must not anchor at any place in the Schuylkill River, nor lie at any wharf in that river more than two abreast, without permission of the above authority.

Tows of seagoing barges must be bunched above the mouth of the Schuylkill River.

Boundary Line of the High Seas.—The inland waters, rivers and harbors of the Delaware Bay and its tributaries are defined as the waters inside a line drawn from Cape May East Jetty Light to Cape May Harbor bell buoy; thence to Overfalls Light-

ship; thence to Cape Henlopen Coast Guard Station. Inside these lines the inland and pilot rules apply and outside, the international rules apply.

Pilotage is compulsory between Delaware Bay entrance and any point on Delaware Bay or River for all vessels, except those employed in and licensed for the coasting trade, except such as are under register bound to or from States or Territories of the United States on the Pacific Ocean, or American vessels entirely loaded with coal mined in the United States, if spoken or offered the services of a pilot outside of a line drawn from Cape May Light to Cape Henlopen.

The fees for piloting between Delaware Bay and the port of Philadelphia or any other place on Delaware River are as follows: Vessels of 12 feet or less draft, $2 per half foot; vessels of over 12 feet draft, $2.50 per half foot. An increase of 10 percent over these fees is charged when a vessel is spoken east of Five Fathom Bank Lightship or north of Hereford Inlet Light or south of Fenwick Island Light, and a deduction of 10 percent is made when a vessel is spoken inside of a line joining Cape May and Cape Henlopen, but pilotage is not compulsory in the latter case: *Provided, however*, under the laws of Delaware, a vessel is not exempt until Brandywine Light bears east.

An additional fee of $25 is charged for transiting the Chesapeake and Delaware Canal and $35 for movement from Philadelphia to Trenton. Pilotage work within Philadelphia Harbor is done by tugboats, and charges are governed by specific cases.

Every ship or vessel bound to the Delaware Breakwater for orders shall be obliged to receive a pilot, provided she is spoken or a pilot offers his services outside of a straight line drawn from Cape Henlopen to Cape May Light, and every ship or vessel bound to the Delaware Breakwater for orders shall pay pilotage fees as follows: A sum equal to half the pilotage to the port of Philadelphia, and she shall be obligated to receive a pilot and pay the same pilotage fees when outward bound from the breakwater, and if such ship or vessel, without discharging her pilot, proceed to the port of Philadelphia, or any other port or place on the Delaware Bay or River, only one full pilotage fee shall be paid, in addition to the fee for detention: *Provided, however*, That the pilot bringing such ship or vessel to the breakwater be there discharged, and if the ship or vessel afterwards proceeds to Philadelphia or any other port or place on the Delaware Bay or River she shall make the usual signal for a pilot and continue to make such signal until reaching Brandywine Light, and if spoken by or offered the services of a duly licensed Pennsylvania pilot before reaching Brandywine Light shall be obliged to employ such pilot and pay him the regular rates in addition to the fee paid for bringing her into the breakwater and for detention, if any.

Either Pennsylvania or Delaware pilots are taken to or from any point on Delaware Bay or River, and the fees in either case are the same. Both Pennsylvania and Delaware pilots are stationed aboard the same pilot boat, which will be found cruising outside the entrance of the bay. The signal for calling the pilot boat in thick weather is four (4) long blasts on the ship's whistle. It may also be contacted by radiotelephone.

In case a pilot having charge of a vessel and whilst conducting said vessel be detained, either by order of the master, owner, or consignee, or by ice or any other unavoidable circumstance not personal to himself, he shall receive compensation for such detention at the rate of $3 per day for each and every day so detained, commencing at a period of 24 hours from the time the detention first occurred.

Vessels waiting at Delaware Breakwater for orders usually retain the pilot and pay him the detention fee.

Speed regulations.—Vessels navigating the Delaware River shall not proceed at a speed greater than 12 knots opposite Marcus Hook, Chester, and the Philadelphia

Navy Yard; nor at a speed greater than 8 knots between Point House Wharf and Pier G at Port Richmond, Philadelphia. Vessels of over 20 tons capacity navigating the Christina River shall not proceed at any time at a greater speed than 8 statute miles per hour (6.9 knots). Vessels navigating the Delaware River and its tributaries shall travel at a reasonable speed to all points and shall limit their speed so as not to endanger or cause damage to moored or anchored vessels, and other craft or property in and along the waterway.

Repairs.—Repairs to the hulls and machinery of large vessels can be made at Philadelphia, Camden, Chester, and Wilmington, and to small vessels and motor boats at these places and at Essington, Pennsylvania, and Leesburg and Dorchester, in the Maurice River. Further information is given under the description of these places.

Freshets are of rare occurrence, except in the vicinity of Trenton, and unless accompanied with ice do not interfere with navigation.

Ice.—In ordinary winters there is usually sufficient ice in the bay and river to make it a source of care to vessels. Thin ice has been known to form early in December between Chester and Philadelphia, but the heavier ice does not usually begin to run before January. The tidal currents keep the ice in motion, except where it packs in the narrower parts of the river, when it often forms an obstruction and the ice boats, of which there are a number at Philadelphia, are employed in keeping these parts of the river open. The greatest danger encountered from the ice is at Ship John Shoal, just above Pea Patch Island, off Deepwater Point, and at the Horseshoe; at these places the ice usually packs heavier than elsewhere. After the first part of March ice is rarely met with.

In severe winters navigation above Chester has occasionally been interrupted, but with the powerful steamers now employed in the foreign and coasting trade to Philadelphia the channel is kept navigable for steamers during the most severe winters. The greatest danger is to wooden vessels, which, if in the thin ice, are liable to be cut through on the water line.

Further information concerning freshets and ice above Philadelphia is given on page 144.

Fogs are most frequent along this part of the Atlantic coast during the months of December, January, and February, but may be met with at other times during the year. Easterly winds bring them and westerly and northerly winds clear them away. In the late fall dense fogs are liable to occur, and may last during forenoons for two or three days in succession. Autumnal fogs nearly always clear up before noon.

Reporting stations.—Vessels are reported to the Maritime Exchange at Philadelphia, during either day or night, from the Delaware Entrance Speaking Station at Cape Henlopen and by day from the reporting station at Marcus Hook. During the ice season an auxiliary station is placed in commission at Gloucester, New Jersey. Messages can be exchanged by International Code with any of the stations during the day and with the Delaware Entrance Speaking Station by night by means of a flashing lamp and the Morse Code. Vessels passing in or out of Delaware Bay should display their signals between Overfalls Lightship and Harbor of Refuge Light. The station will answer all signals with pennant by day and by one long flash, followed by one short flash, at night. The following suggestions are made when signaling by means of a flashing lamp:

1. All other lights in the vicinity of the flashing lamp should be obscured.
2. The flashing lamp should be kept continually pointed directly toward the station or vessel.
3. Care should be taken that proper regularity is observed in the length of the

flashes and spaces, and that the spaces between the words are considerably longer than those between the letters.

4. Vessels should, if possible, avoid coming within the rays of a lighthouse while signaling.

5. When "Morsing" a vessel's name, it is desirable that the name be spelled in full.

A United States Branch Hydrographic Office is established in the Customhouse, Philadelphia. Bulletins are posted here giving information of value to seamen, who are also enabled to avail themselves of publications pertaining to navigation and to correct their charts from standards. No charge is made for this service.

Towboats no longer cruise in the river and bay or at Delaware Breakwater. Towboats to tow or dock vessels in the Delaware River or its tributaries are usually engaged at Wilmington or Philadelphia.

Vessels employing the city ice-breakers for towing purposes when in the ice pay a fixed rate for such service.

Quarantine.—A United States quarantine station and hospital are located at Marcus Hook, Pennsylvania. It is primarily a boarding station and all vessels subject to inspection are required to stop until given pratique. The administrative offices of the Public Health Service and a medical relief station for merchant seamen and other beneficiaries are located at 225 Chestnut Street, Philadelphia, Pennyslvania. Inspection of vessels will be made at the Harbor of Refuge by the quarantine officer at Lewes, Delaware, if desired but this is seldom done.

Customs.—The customhouse is located at Second and Chestnut Streets, Philadelphia, two blocks from the waterfront. There is also a subdistrict customhouse at Fifth and Edgemont Streets, Chester, Pennsylvania. The United States Customs district at Philadelphia, with district headquarters at Philadelphia, includes all that part of the State of Pennsylvania lying east of 79° west longitude, all of the State of Delaware, and all of that part of the State of New Jersey not included in the district of New York.

Immigration.—Philadelphia district headquarters of the Immigration Service is at 605 Customhouse, Second and Chestnut Streets, Philadelphia.

Supplies.—Bunker coal can best be obtained at Greenwich Point and at Port Richmond, Philadelphia Harbor, where vessels may bunker at the tipple. Occasionally vessels take bunker coal at their regular berths while loading or unloading cargo. There are facilities for obtaining fuel oil at Point Breeze, Girard Point and Petty Island in the harbor of Philadelphia, and at Paulsboro, New Jersey, Marcus Hook, Pennsylvania, and Claymont, Delaware. However, many vessels bunker from oil barges while loading or discharging cargoes. Fresh water is obtainable at any of these places and others and gasoline and provisions are obtainable at all the towns on the river and bay. Points near the Delaware where they may be obtained are Lewes, Bivalve, and Bowers, and at Bayside during the fishing season.

Storm warnings of the United States Weather Bureau are displayed at Cape May Point (day only), Delaware Entrance Speaking Station, Cape Henlopen (day and night), and at Bivalve (day and night); see appendix. A branch office of the Weather Bureau is maintained at the Customhouse, Philadelphia, to serve marine interests.

Tides.—The mean range of tide is about 4 feet at Breakwater Harbor, 5 feet at Brandywine Shoal Light and 5½ feet at Ship John Shoal Light, Reedy Island, Marcus Hook and Philadelphia. Tidal information for the tributaries is given under their descriptions. Full tidal information, including daily predictions for Philadelphia, Reedy Point and Breakwater Harbor, is given in the *Tide Tables, Atlantic Ocean.*

Currents.—The predicted times of slack water and the times and velocities of strength of flood and ebb for every day in the year at Overfalls Lightship, Delaware Bay Entrance, are given in the *Current Tables, Atlantic Coast,* issued annually in advance by the Coast and Geodetic Survey. Similar predictions for about 50 other locations in Delaware Bay and River may be readily obtained from the Overfalls Lightship predictions through the use of time differences and velocity ratios given in Table 2 of the Current Tables. A current diagram for Delaware Bay and River is also included in the Current Tables.

Delaware Bay, Western Side

CHART 1218

The western shore of Delaware Bay is low and marshy, with few prominent marks northward of Delaware Breakwater. The principal marks visible from the western channel are as follows: A small group of houses at Waterloo, just above Broadkill River entrance; a group of houses at Slaughter Beach, just below Cedar Beach; the lighthouse and abandoned fish factory in the mouth of Mispillion River; a large group of houses at Bowers; a small group at Kitts Hummock; the lighthouse and a storage tank at Mahon River; and the ranges at Leipsic River. There are also a number of steel observation towers spaced at regular intervals of about 5 miles along the shore.

The rivers on the western side of Delaware Bay are very narrow and crooked, and vessels have considerable difficulty in making some of the turns. They are now little frequented except by local fishing vessels and a few motor vessels carrying gasoline and fertilizer to the towns near their heads, the usual draft of boats engaged in this trade being 6 to 8 feet. Oyster and fishing boats also seek anchorage in the mouths of many of them. Strangers seldom enter.

Caution.—In entering or leaving the creeks allowance should be made for the current in the bay, which sets across the dredged channels and has considerable velocity at times.

Local vessels usually take advantage of the current up and down the Delaware River, leaving the mouths of the creeks bound northward at a little after low water, and leaving the northern ports bound southward at high water or a little before.

There are many detached shoal spots with depths of 2 to 6 feet along the western side of Delaware Bay from Delaware Breakwater northward to Bombay Hook Point. They are generally unmarked, except in the vicinity of the main ship channel, and are subject to some change, both in depth and position. Strangers using any of the channels westward of the main ship channel should proceed with caution.

There is a ***channel along the western side of Delaware Bay*** which is marked by a line of vertical-striped buoys from off the mouth of St. Jones River southward to below Old Bare Shoal. It is used by most of the vessels frequenting the tributaries on the western side of the bay. It is said to lead clear of dangers if the buoys are followed closely but leads close to the shoals in places. Fish and oyster stakes are found in great quantity and must be guarded against. Passage should not be attempted at night.

Vessels entering this channel from northward usually leave the main channel of Delaware River at lighted buoy 35, 2.5 miles southward of Ship John Shoal Light,

pass close eastward of buoy 3, at the north end of ***Blake Channel,*** and steer **181°** to 500 yards east of the lighted bell buoy off the entrance of St. Jones and Murderkill Rivers. The northerly red sector of Mahon River Light covers the entrance to the channel at night. The least depth crossed on this course is 7 or 8 feet but passes about 500 yards east of a 4-foot spot off Little River.

Cape Henlopen, on the southwest side of the entrance to Delaware Bay, is marked by a considerable number of towers and buildings. About 1.5 miles south of the end of the cape is a group of sand hills about 70 feet high.

The Delaware Entrance Speaking Station, from which vessels are reported to the Maritime Exchange at Philadelphia, is located on a tower near the tip of Cape Henlopen. Storm warnings are displayed from the tower.

Delaware Breakwater (Chart 379) is the name generally applied to the entire anchorage in the vicinity of Cape Henlopen, including the inner anchorage (Breakwater Harbor) and the outer anchorage (Harbor of Refuge).

Breakwater Harbor, on the west side of Cape Henlopen, southward of the inner breakwater, is easy of access both day and night. It is a safe harbor for light-draft vessels in all but heavy northwesterly gales, and affords considerable protection even in such weather. The harbor is generally crowded in heavy weather, and vessels of a greater draft than about 10 feet should preferably anchor westward or northwestward of the inner breakwater or in Harbor of Refuge.

Breakwater Harbor has depths of 8 to 18 feet in its southerly and easterly parts. Depths of 6 to 7 feet extend about 0.6 mile to the southward of the western half of the breakwater.

Tides.—The mean range of tides is 4.2 feet. Daily tide predictions are given in the tide tables published annually by the Coast and Geodetic Survey.

Currents.—The tidal currents have considerable velocity behind the breakwater in the inner harbor especially near its eastern end. The flood sets westward and the ebb eastward and at strength have estimated velocities of 1½ to 2 knots. Outside the outer breakwater the velocity of the current at strength is about 2 knots. The general direction of tidal currents is parallel with the breakwater.

Directions, Breakwater Harbor.—From Overfalls Lightship steer **279°** until Delaware Breakwater Light bears about 230°. Then steer this course for that light and when Cape Henlopen is abeam change course to pass about 100 yards southeastward of the light in entering the harbor. The entrance is about 500 yards wide between the light and the edge of the shoal southeastward. Caution is necessary at night during heavy weather on account of the large number of vessels which will usually be found at anchor in the harbor. Vessels should keep in the white sector of the Delaware Breakwater Light when passing Cape Henlopen at night.

Coming down Delaware Bay pass eastward of Delaware Bay Main Channel lighted bell buoy 7 and steer **177°** for Harbor of Refuge Light with Brandywine Shoal Light nearly astern, pass 350 yards eastward of the light and then steer **203°** to pass 100 yards eastward of Delaware Breakwater Light.

Wharves.—The easterly wharf in Breakwater Harbor is maintained by the Army and has depths of 18 feet along its outer face. There is a light at each end of this face. Fresh water can be obtained in an emergency. About 300 yards westward of the Army wharf are the ruins of an old steel pier, most of the piling of which is still standing. Westward of the old steel pier are four wharves, one in ruins, of the two fisheries companies, with about 10 feet of water at their outer ends. A Coast Guard wharf with about 9 feet at the outer end extends off the Lewes Coast Guard Station. The old

D. M. & V. Railway pier has been entirely destroyed and only a few piles now show above water near the outer end; however, there are a considerable number of piles under water where the pier once stood.

The **inner breakwater** is nearly 1 mile long in a west-northwesterly direction, and is marked at its east end by Delaware Breakwater Light, and at its west end by a smaller light.

Delaware Breakwater Light (**lat. 38°48′, long. 75°06′**), on the east end of the inner breakwater, is shown from a brown conical tower. It has a red sector covering a shoal off the point of Cape Henlopen and Breakwater Harbor. It is 61 feet high and visible 13 miles. The fog signal is given on an air horn; if the horn is disabled a bell will be struck by hand.

Lying westward and northwestward of the inner breakwater is an extensive anchorage with depths of 16 to 25 feet, muddy bottom, where vessels are sheltered from southeasterly and northeasterly winds. This anchorage is much used by coasting vessels. Vessels entering this anchorage should keep within 500 yards north of the angular bend of the inner breakwater as there are shoals of from 12 to 15 feet extending about 0.6 mile southeast of Fourteen-Foot Lump buoy.

Harbor of Refuge, lying 1 to 2 miles north-northwestward of Cape Henlopen, is formed by a breakwater which extends 1.3 miles south-southeastward from the southeast end of ***The Shears,*** and by a row of ice fenders (piers) on The Shears. The breakwater is marked on its south end by Harbor of Refuge Light, and at its north end by a smaller light. The harbor, except in its northern part, has depths of 15 to 70 feet, muddy bottom, for a distance of nearly 1 mile west-southwestward from the breakwater. It affords a harbor in easterly gales for deep-draft vessels. The entrance from southward is deep and clear, while that from northward across The Shears has depths of 9 to 12 feet. The deepest water, depths 50 to 70 feet, will be found 500 yards westward of the south part of the breakwater. During seasons of ice, drifting ice often is a danger.

A ridge, having lumps with depths of 9 to 12 feet, extends 145° from the south end of The Shears toward Delaware Breakwater Light. The south end of the shoaler part of the ridge is marked by a horizontal-banded buoy, which is 1.2 miles 273° from Harbor of Refuge Light. On the extension of this ridge depths of 12 to 16 feet exist for another 0.6 mile.

Harbor of Refuge Light, on the south end of Harbor of Refuge Breakwater, is shown from a white conical tower on a brown cylindrical structure. The light is 72 feet above the water and visible 14 miles. Red sectors of the light cover Hen and Chickens Shoal and Brown Shoal. The fog signal is sounded on an air siren.

Measured Mile.—Fixed ranges, lighted on request, mark a measured mile, course 141°30′, off the outer breakwater. The course is shown on Chart 379.

Roosevelt Inlet, a dredged channel with jetties on either side extending 550 yards into Delaware Bay about 1.5 miles northwest of the town of Lewes, is part of a Federal improvement project which provides for an Inland Waterway between Delaware Bay and Rehoboth Bay, extending southeastward to Lewes and thence to Rehoboth Bay, and also for a channel from the entrance northwestward to the Broadkill River. The inlet is marked by an entrance bell buoy, on the center line of the channel, 500 yards off the ends of the jetties, by lights on the outer ends of the jetties and by a lighted range. The project dimensions of the entrance channel are 10 feet deep and 200 feet wide. In June 1945 the controlling depth in the channel was 6.5 feet. A Coast Guard

wharf for small boats is just inside Roosevelt Inlet. The mean range of tide at Roosevelt Inlet is 4½ feet.

The inland waterway between Delaware Bay and Rehoboth Bay extends southeastward from Roosevelt Inlet to the town of Lewes and thence by the ***Lewes and Rehoboth Canal*** to Rehoboth Bay. The improvement project provides for a channel 10 feet deep and 100 feet wide from Roosevelt Inlet to the highway bridge at Lewes, with a turning basin of the same depth 1,200 feet long and up to 375 feet in width to the northwestward of the bridge, and thence 6 feet deep and 50 feet wide (40 feet through Deep Cut) through the Lewes and Rehoboth Canal to Rehoboth Bay. The controlling depths when last ascertained were as follows: Roosevelt Inlet to Lewes Turning Basin, 6 feet in June 1945, thence 6 feet to Rehoboth Bay in March 1946. The maximum draft traversing the canal is about 4 feet and it is much used by pleasure boats and oyster boats in season. Two bridges cross the waterway at Lewes; a bascule lift highway bridge with a horizontal clearance of 46 feet and a vertical clearance of 6.9 feet at MHW when closed and a railroad swing bridge with a horizontal clearance of 46.5 feet and a vertical clearance of 10.1 feet at MHW when closed. The operator of the highway bridge is on duty only from 7:30 a. m. to 5:30 p. m., but in special cases arrangements can be made to have the draw opened at other times.

Just inside the entrance to the waterway is a small oil wharf where gasoline, fuel oil, lubricating oil, and fresh water are obtainable. The depth at the wharf is reported to be 6 feet.

Lewes is a town with railroad communication lying 0.5 mile southwestward of the wharves in Breakwater Harbor. Provisions, gasoline, ice, and some ship chandlery are obtainable, and some coal in case of necessity. It is a port of entry with a customs inspector. Marine documents are issued. The U. S. Public Health Service contract surgeon in Lewes has headquarters in the Beebe Hospital.

There is a small wharf on the south side of the turning basin just westward of the highway bridge. It has a depth of 6 feet alongside and gasoline, lubricating oil, and fresh water are obtainable. The clubhouse landing on the northern shore has a number of slips for boats of not more than 3-foot draft and a landing where gasoline and fresh water are available.

The inland waterway connecting Lewes and Rehoboth Bay is described in chapter 7.

Broadkill River (Chart 1218), empties into Delaware Bay at ***Broadkill Inlet,*** about 3.5 miles northwestward of Lewes and leads westward to the town of **Milton,** about 10.7 miles above the mouth. The old entrance channel of the river, through Broadkill Inlet, is very shoal and is no longer used. Entrance to the river is now made through Roosevelt Inlet and a Federally improved channel leading thence to Broadkill River which has project dimensions of 6 feet deep over a width of 100 feet. The Federal project for improvement of the Broadkill River provides for a depth of 6 feet over a least width of 40 feet. Controlling depths in September 1946 were reported to be 4 feet from Roosevelt Inlet to the drawbridge and thence 2 feet to Milton. The bascule drawbridge has a horizontal clearance of 43 feet and a vertical clearance of 3.5 feet at MHW when closed. It is reported that there is very little traffic in Broadkill River.

There are several drainage canals between Broadkill and Mispillion Rivers which are used to some extent for purposes of navigation by small local boats, but they are of little interest to a stranger.

Mispillion River lies 13 miles northwestward of Lewes and is the approach to the town of Milford. The river is used by pleasure and fishing craft and motor vessels bringing fertilizer to the town. Tugs with barges go to the oil wharves at Milford. The deepest-draft vessel using the river is about 8 feet.

There is a small landing just inside the mouth of the river where gasoline and fresh water can be obtained in the summer season. The oil wharves, fertilizer-plant wharf and power-plant wharf at **Milford** have depths of 6 to 7 feet, mud bottom.

Just below the Milford fixed highway bridge, the head of navigation, is a boat repair yard. The marine railway is capable of hauling out boats 60 feet in length and of 5-foot draft. Gasoline is available at the landing, controlling depth alongside 4 feet.

The highway bascule bridge about 0.5 mile below Milford has a horizontal clearance of 45 feet, and a vertical clearance of 5.5 feet at MHW when closed.

The Federal project for improvement of the Mispillion River provides for a channel 6 feet deep; 80 feet wide in Delaware Bay to the mouth, and thence 60 feet wide to Milford, 11 miles above the mouth, with additional width at sharp bends. It also provides for four cut-offs 50 feet wide and for two parallel jetties at the mouth spaced 210 feet apart. These jetties extend nearly a mile and a quarter into the bay. In September 1946 there was a controlling depth of 5 feet in the entrance channel and to the highway drawbridge, and thence 6½ feet to the bridge at Milford.

The entrance is marked by a bell buoy, a light near the outer end of the south breakwater, **Mispillion River Light (lat. 38°57′, long. 75°19′)**, on the west side of the mouth of the river, and the buildings of the abandoned fish factory just inside the mouth.

Directions.—Vessels bound into Mispillion River from northward steer southwestward from the lighted buoy at the north end of ***Old Bare Shoal*** until off the dredged cut, and then follow the south jetty at a distance of 100 feet through the cut on a **308½°** course for Mispillion River Light.

At night the northeasterly edge of the red sector of Mispillion River Light leads along the axis of the dredged channel, course 308½°. From southward steer on the range of the south jetty light and Mispillion River Light.

From the inner end of the jetty the channel follows closely the south and west sides until above the lighthouse wharf and then follows a general mid-channel course to Milford, passing southward of the island 1 mile above the mouth.

Tides.—The mean range of tide is 5 feet at the entrance and about 4 feet at Milford. High and low waters at Milford are reported to occur 1 hour later than at the entrance.

Murderkill River is 8 miles northward of Mispillion River and 245° from **Miah Maull Shoal Light.** The river is used by motor vessels carrying coal and fertilizer to **Frederica** and by fishing and oyster boats at the entrance. The deepest draft ordinarily going to Frederica is about 8 feet. There is 10 feet at the landing. It is reported that rowboats can go 3 miles farther.

The Federal project for improvement of the Murderkill River provides for a channel 7 feet deep, 150 feet wide in Delaware Bay to the mouth, and thence 80 feet wide to Frederica, 7.5 miles above the mouth. In September 1946 there was a controlling depth of 4½ feet in the entrance channel to the mouth and thence 6 feet to Frederica.

Bowers is a post village and summer resort on the point of land between Murderkill and St. Jones Rivers, and is prominent from offshore. Gasoline, fresh water, and provisions are obtainable. There are two marine railways each capable of hauling out a boat 45 feet long and of 5-foot draft. Repairs are made. The Murderkill River wharves have depths of from 6 to 11 feet alongside. Fishing and oyster boats use them extensively.

Tides.—The mean range of tide is 5½ feet at the entrance and about 3 feet at Frederica.

A lighted range marks the entrance to Murderkill River. The front range is a white skeleton tower just above the steamer wharf, and shows against a low gray building with higher buildings on either side. A low iron chimney shows about 100 feet to the right of it. The rear range is a black skeleton tower which shows well above the buildings at Bowers. A mud bank along the south side of the entrance cut bares for a considerable distance at low water and is marked by bush stakes at times. A lighted bell buoy moored off the entrance, marks the intersection of the Murderkill and St. Jones River ranges.

To enter Murderkill River, from the lighted bell buoy head in on the range, course 247°, passing 40 feet northward of the bushes marking the mud bank. From the wharf at Bowers, the best water generally favors the ebb-tide bends to the head. The river has been straightened by cuts across the sharper bends, the old bed of the stream having been filled by the dredged material near the cuts.

St. Jones River is just north of Murkerkill River and leads to the town of **Dover,** the capital of the State of Delaware. It is now little used except near the mouth by local fishermen and a few pleasure boats. In September 1946 it was necessary to exercise great care in navigating the upper reaches of the river above the Lebanon bridge due to floating timber, sunken logs, and trees which had fallen into the stream.

Bowers Landing, just inside the mouth, is in poor condition but has 11 feet alongside. A bascule highway bridge, having a horizontal clearance of 50 feet and a vertical clearance of 5.2 feet at MHW when closed, crosses the river at **Barkers Landing,** about 4 miles above the mouth. The bridge tender is on duty only from 8:00 a. m. to 6:00 p. m. daily. Barker Landing cannery wharf has 7 feet of water alongside and is also in poor condition. One mile westward of the bridge is the village of **Magnolia.**

About 3 miles farther a swing bridge, crossing the river at **Lebanon** has a horizontal clearance of 30 feet and a vertical clearance of 6 feet at MHW when closed.

Navigation ends below the lower bridge at Dover. There are no landings at the city.

The Federal improvement project calls for dredging a channel 7 feet deep for 10 miles from Delaware Bay to Dover, and the construction of 5,700 feet of jetty on the north side of the entrance channel, and a jetty of 4,100 feet long extending from the south bank of Murderkill River to a point abreast the outer end of the north jetty. Little improvement has as yet been accomplished. In September 1946 there was a controlling depth of 3 feet in the entrance channel. It was reported that there was a controlling depth of 6 feet to Barkers Landing, thence 5 feet to Lebanon, thence 3 feet to Dover.

Tides.—The mean range of tide is 5½ feet at the entrance, about 3 feet at Lebanon, and about 1 foot at Dover.

There is a lighted range for entering St. Jones River. Both lights are on white posts. A mud bank on the south side of the entrance is bare at the inner end at half tide and at the outer end at extreme low water, and is usually marked by bush stakes.

To enter St. Jones River, from the lighted bell buoy (can buoy substituted when the ice runs) off the entrance, head in on the range, course 264½°, passing 40 feet northward of the bushes marking the mud bank. From Bowers Landing the best water favors the southwest side for about 0.5 mile, and then a general mid-channel course in the straight reaches, and the ebb-tide bends in the curves is the best to the head. The deepest draft entering the river is 7 feet. Local knowledge is necessary.

Little River, 1.5 miles southward of Mahon River Light, is navigable to the landing immediately below the highway bridge at the village of **Little Creek** 2.5 miles

above the mouth. By Federal project a channel has been dredged to a depth of 5 feet to Little Creek Landing, 60 feet wide across the bar and 40 feet wide in the river, and cut-offs. In July 1946 the controlling depth from Delaware Bay to Little Creek Landing was 1½ feet

There is a lighted range for entering, course **295°**, the lights being on white posts, plainly visible by day. The best water follows the northeast side around the bend from the north point at the entrance until past the front light, and then mid-channel to the head. Small boats can go a short distance above a drawbridge at Little Creek. The draw has a span width of 24 feet and 4½ feet headroom at high water when closed.

Tides.—The mean range of tide is 5½ feet at the entrance and about 4½ feet at Little Creek. High and low waters at Little Creek are reported to occur about ¾ hour later than at the entrance.

Mahon River is marked by **Mahon River Light (lat. 39°11′, long. 75°24′)**, and three smaller houses around it. A large silver tank is on the opposite bank of the river. There is a depth of about 5 feet across the bar at the mouth and 10 to 15 feet inside, and it is extensively used as an anchorage by oyster and fishing boats. The entrance channel is well marked by bush stakes. The Lighthouse Landing is in poor condition. The point of marsh on the east side at the entrance is wearing away, and a shoal extends southward from it. The base of an old lighthouse, which is covered at high water, lies close inshore, 0.3 mile southward of the entrance. Small boats can pass through Mahon River into Dona River, but there is little business above the mouth.

Dona River, 2.3 miles northward of Mahon River Light, has a depth of about 3 or 4 feet across the flats at the mouth and 6 to 12 feet inside. It is used to some extent as an anchorage. The entrance is not marked. Small boats can, with difficulty, pass through into Leipsic River, but it is not often done.

Leipsic River, 3.6 miles northward of Mahon River Light and 3.8 miles south-southwestward of Ship John Shoal Light, is the approach to the town of **Leipsic,** about 8.5 miles above the mouth. A Federal project channel 6 feet deep and 50 feet wide, with several cut-offs, has been dredged to Leipsic, and 5 feet deep and 40 feet wide to **Garrison Mill** (dam) the head of navigation about 5.5 miles above Leipsic, with a turning basin at the head. The controlling depth in September 1946 was 6 feet from Delaware River to Leipsic, thence about 4 feet to Garrison Mill.

A drawbridge (draw not in operation) with two openings 35 feet wide and 3½-foot headroom at MHW crosses the river at Leipsic. The south opening has the best water. Traffic in the river now consists of local oyster and pleasure boats and an occasional motor vessel with fertilizer. The Leipsic wharves have from 5 to 8 feet alongside. Gasoline, fresh water and provisions are available. The fertilizer wharf has 8 feet of water alongside but is in poor condition.

There is a lighted range for entering Leipsic River, each a post with slatted day-mark, plainly visible by day. The course on the range is **285°**, and it should be closely followed to avoid shoals close to it on the south side. Above the entrance a general mid-channel course is the best.

Tides.—The mean range of tide is 5½ feet at the entrance, 3½ feet at Leipsic, and about 2½ feet at the head of navigation.

Duck Creek, extending from Leipsic River to Smyrna River, is navigable at high water throughout most of its length from Leipsic River, but has a dam at the northern end which prevents entrance from Smyrna River. It is used only by boats with hunting parties. A fixed bridge crosses the creek just back of **Woodland Beach.**

Smyrna River, 3.3 miles southward of Liston Point, is navigable to **Smyrna Landing,** about 9 miles above the mouth and 1 mile from the town of **Smyrna.** An occasional motor vessel with fertilizer comes to the landing. The fertilizer wharf has a depth of 9 feet; the upper wharf 7 feet. There is a small marine railway at Smyrna Landing capable of hauling a boat 40 feet in length and of 3-foot draft. There is no machine shop.

A drawbridge crosses the river at **Fleming Landing,** 3 miles above the mouth. It is a center-pier draw, with horizontal clearances of 36 and 37 feet and a vertical clearance of 5.5 feet at MHW when closed. The north opening is generally used. The landings west of the bridge have a depth of 7 feet alongside but are in poor condition. The fixed bridge just above Smyrna Landing has a span 18 feet wide and headroom of 3 feet at high water.

The deepest draft entering is about 8½ feet, and this draft is taken to **Prices Landing** (Smyrna) at high water. The project provides for jetties at the entrance and a channel 7 feet deep, 100 feet wide off the entrance in Delaware River to the mouth, thence 60 feet wide in Smyrna River and cut-offs to Smyrna Landing. The controlling depth in September 1946 was 6 feet in the entrance channel and 4 feet to Smyrna Landing.

There is a lighted range for entering, course **237°**, the front light on a white iron post, and the rear light on a skeleton tower, both plainly visible by day. A white dwelling shows 250 yards to the left of the range. The outer end of the south jetty is marked by a light.

The range leads across a shoal bar about 0.5 mile outside the entrance. Local vessels usually enter near high water, when the bar can be crossed on the range. If entering at low water, they pass well southward of it and then steer northwestward inside the bar until on the range, but some local knowledge is required to carry the best water. From inside the entrance to the head the best water generally follows a mid-channel course or favors the ebb-tide bends.

Tides.—The mean range of tide is 6 feet at the entrance and 3½ feet at Smyrna Landing. High and low waters at Smyrna Landing are reported to occur about 2¼ hours later than at the entrance.

Delaware Bay, Eastern Side

CHART 1218

The eastern side of Delaware Bay is low and has few prominent marks except the lighthouses. There are many small creeks, frequented mostly by fishing and oyster boats and a few truck boats, and two large tributaries, Maurice and Cohansey Rivers, which have considerable trade, the deepest draft being about 11 feet.

The ruling depth on the eastern side of Delaware Bay is 7 to 15 feet with many spots of less than 6 feet. These shoals are generally unmarked and some local knowledge is required to avoid them. There are bars at the mouths of the creeks and deeper water inside.

Cape May is on the northeast side of the entrance to Delaware Bay. About 2 miles westward of Cape May Harbor, described in Chapter 4, is the summer resort of **Cape**

May which has several large and prominent hotels. Two miles farther westward at the southwest end of the cape is the smaller resort of **Cape May Point.**

Cape May Light (lat. 38°56′, long. 74°58′), 165 feet above the water and visible 19 miles, is shown from a white tower with red lantern at Cape May Point. Two white dwellings are adjacent to the tower. A tall brick stack is about 0.7 mile north of the light.

Storm warnings are displayed at Cape May Point Coast Guard station, southward of the light.

The shoals on the northeastern side of Delaware Bay entrance consist of clay and sand mixed and have the consistency of hardpan. The ridges run approximately in the same directions as the currents.

Cape May Channel is the principal one of the several buoyed channels. Passing through this channel and then between ***North*** and ***Crow Shoals,*** the least depths are 13 to 17 feet. Cape May Channel has narrowed to a width of about 300 yards; North Shoal is shifting northward. Some tugs pass northward of ***South Shoal.*** The channels have strong tidal currents, and many tide rips occur near ***Prissy Wicks Shoal.*** Strangers should enter the bay by the main channel along the southwest side, which is broad and deep.

Small boats may pass along the south side of Cape May and cross Prissy Wicks Shoal about 0.3 mile off Cape May Point. There are depths through here of 9 feet or more.

Delaware Bay Entrance, Aerial Gunnery and Bombing Ranges.—The aerial gunnery and bombing areas include the waters within six sectors as follows:

The Danger Zones.—(1) *Bombing Area Jarvis Sound S–1.* An area 0.5 mile square, the center of which is located 1.4 miles 033° from the water tank at Cape May Naval Air Station, Sewell Point.

(2) *Aerial Gunnery Range Atlantic Ocean S-2.* From a point 2.85 miles 189° from Cape May Light, 5 miles 067°, thence 15 miles 160°, thence 5 miles 247°, and thence to point of beginning.

(3) *Aerial Gunnery Range Atlantic Ocean S–3.* From the northeastern corner of S–2 Range, 5 miles 067°, thence 15 miles 160°, thence 5 miles 247°, and thence to point of beginning.

(4) *Aerial Gunnery Range Atlantic Ocean S–4.* From the northeastern corner of S–3 Range, 2 miles 038°, thence 15 miles 160°, thence 2 miles 218°, and thence to point of beginning.

(5) *Bombing Area Delaware Bay S–5.* From a point 1.87 miles 227° from Cape May Light, 2 miles 281°, thence 6 miles 014°, thence 2 miles 101°, and thence to point of beginning.

(6) *Bombing Area Atlantic Ocean S–6.* An area 0.5 mile square, the center of which is located 1.2 miles 165° from the water tank at Cape May Naval Air Station.

The Regulations.—(1) No vessel or other craft shall enter or remain within the areas during their use for target practice and bombing practice, except as provided in paragraph (5).

(2) Since bombing and target practice will take place in the areas at frequent and irregular intervals throughout the year, regardless of season, advance notice shall be given of the date on which the first of such activities will begin. At intervals of not more than 3 months thereafter, notice will be sent out that bombing and target practice is continuing. Such notices will appear in the local newspapers and in the *Notice to Mariners.*

(3) Prior to the conducting of each target practice the areas will be patrolled by Navy aircraft to insure that no watercraft are within the dangerous areas and any such watercraft seen in the vicinity will be warned by means of signals that target practice is to take place. The patrol aircraft will employ the method of warning known as "buzzing" which consists of low flight by the airplane and repeated opening and closing of the throttle.

(4) Any such watercraft shall, upon being so warned, immediately vacate the areas designated and shall remain outside the areas until the conclusion of the practice.

(5) These regulations shall not deny access to or egress from Cape May Harbor by regular cargo-carrying or fishing vessels, nor shall they deny traverse of portions of the danger areas by regular cargo-carrying vessels proceeding on established steamer lanes. In cases of the presence of any such vessel in a danger area, the officer in charge of gunnery operations shall cause the cessation or postponement

of fire until the vessel has cleared the area. The vessel shall proceed on its normal course and shall not delay its progress.

(6) These regulations shall be enforced by the Commanding Officer, U. S. Naval Air Station, Cape May, N. J., and such agencies as he may designate.

Cape May Canal, connecting Delaware Bay with Cape May Harbor, is described in Chapter 4. The entrance, 2 miles north of Cape May Light, is marked by a lighted bell buoy in ***Bay Shore Channel,*** and a light on the south jetty.

A channel has been dredged to a depth of 11 feet through Crow Shoal. It leads directly from the canal entrance but is unmarked.

There are several unimportant creeks northward of Cape May, but the first one open to navigation is ***Bidwell Ditch.*** This is a drainage canal about 12 miles north-northeastward of Cape May Light. There is 3 feet at the entrance and 6 feet inside for about 1.5 miles to the highway. Jetties mark the entrance.

Goshen Creek, 13.5 miles north-northeastward of Cape May Light, has a depth of about 1 foot across the flats at the mouth and to **Goshen Landing,** 2 miles above the mouth and 1 mile below the village of **Goshen.** It is only entered by small local boats.

Dennis Creek, 6.4 miles eastward of East Point Old Lighthouse (no longer maintained), has a reported depth of about 6 feet across the flats at the mouth and 8 feet to **Jakes Landing** about 4 miles upstream. It is navigable for a considerable distance, but is principally used as an anchorage by oyster boats. There is a fixed highway bridge across the creek near **Dennisville** at the head of navigation about 5 miles above the mouth. It has a span 39½ feet in width and 3 feet vertical clearance at MHW.

West Creek, 1 mile northwestward of the entrance to Dennis Creek, is nearly bare at low water at the mouth and has a depth of about 3 feet inside. It is little used.

Deadman Shoal, lying 5 to 7 miles southward of East Point Old Lighthouse, has a least depth of about 3 feet. It is marked on the east side by a lighted buoy and at the north end by a buoy with horizontal bands. Extending southward from the 5-foot shoal 1 mile westward of Deadman Shoal is a ridge with 6 to 7 feet over it, the south end of which lies 3 miles southwestward from the lighted buoy.

East Point Old Lighthouse (lat. 39°12′, long. 75°02′), a white dwelling on the point on the east side of ***Maurice River Cove,*** is the most prominent mark in the vicinity.

Maurice River is navigable to the city of Millville, 21 miles above the mouth. The landings near the mouth are the center of a large oystering and fishing industry, and there is some trade in the upper river, mostly in logs. There are a number of small yards engaged in building and repairing small craft. In the season over 600 oyster boats operate out of the river. The deepest draft entering the river is 11 feet and this draft is taken to Millville at high water.

The project for improvement of the Maurice River provides for a channel 8 feet deep and 150 feet wide in Delaware Bay across Maurice River Cove to the mouth; thence 7 feet deep and 100 feet wide to the drawbridge at Millville, 21.5 miles above the mouth, and thence 60 feet wide to the mill dam, a farther distance of 0.5 mile, including a turning basin at Millville.

In September 1946 there was a controlling depth of 7 feet on the lighted range marking the dredged channel across the flats at the mouth, thence 5½ feet to the Main Street Bridge at Millville, and thence about ½ foot to the mill dam.

Bivalve is a railroad terminus and important oyster-shipping point on the west bank of Maurice River, 2.5 miles above the mouth. Gasoline and provisions are obtainable and there is water on the wharves. Storm warnings are displayed by day and night.

Maurice River, a post office opposite Bivalve, is also the terminus of a railroad and a shipping point for seafood.

Shellpile is the name of a group of oyster-packing plants just up the river from Bivalve. There is deep water at the docks.

Port Norris is a town and post office about 0.7 mile from the river and northward of Bivalve.

Between Port Norris and Millville are the villages of **Leesburg, Dorchester, Bricksboro,** and **Port Elizabeth** on the east bank, all on the railroad, and **Mauricetown** on the west bank.

Marine railways.—The boatyard at Leesburg has two marine railways, the larger capable of hauling boats 115 feet in length and of 8-foot draft. Engine repairs are made. The wharf has 12 feet of water alongside and gasoline and fresh water are available. The Dorchester yard has four large railways and two for small launches. The largest railway can accommodate a vessel of 100 tons, 115 feet in length and of 8-foot draft. Repairs are made and boats are built. The wharves have from 7 to 16 feet alongside. A marine railway at Mauricetown is capable of hauling out a boat 65 feet long and of 6-foot draft. Port Elizabeth has a boatyard with two marine railways capable of hauling out vessels about 35 feet in length.

The highway swing bridge crossing the river at Mauricetown has horizontal clearances of 57.7 and 59.7 feet and a vertical clearance of 3.6 feet at MHW when closed. Either opening is clear, but the wider eastern opening is the one generally used, as there is a westerly set on both ebb and flood.

Millville is an important town at the head of navigation on Maurice River. It has railroad communication and several factories. A swing bridge, having a horizontal clearance of 35.8 feet and a vertical clearance of 4.8 feet at MHW when closed, crosses the river at the lower end of the wharves. Gasoline and provisions may be obtained. There is a small marine railway about 500 yards below the bridge. A vessel 40 feet in length and of 3-foot draft can be hauled. Hull repairs only can be made.

Tides.—The mean range of the tide is 5½ feet at the entrance and 6 feet at Millville; high and low waters at the latter place occur about 2 hours later than at the mouth of the river. The tidal currents change at the entrance ½ hour and at Mauricetown 1 hour after the currents change at Overfalls Lightship. At Millville the flood current changes to ebb a little before high water, and the ebb changes to flood about ¾ hour after low water; this applies to the river in summer when there are no freshets.

Directions, Maurice River.—The approaches to the river are obstructed by numerous bush stakes marking the extensive oyster beds in this portion of the bay. Care must be exercised in navigating the area as there appear to be no definite lanes of travel and broken stakes are encountered. The following courses will lead in a depth of 9 feet or more until approaching the entrance. Be guided by the fixed aids until sure of the buoys.

A **357°** course from a position 200 yards west of the lighted bell buoy off the entrance to the Cape May Canal will lead to a position 0.5 mile eastward of Deadman Shoal lighted buoy. Then a **335°** course will lead to a position 0.3 mile southward of the entrance to the dredged channel.

Or a **017°** course with **Brandywine Shoal Light** astern will lead to the above position off the entrance.

Coming down Delaware Bay the safest course for a stranger is to leave the main channel when abeam of the lighted bell buoy 2.8 miles southeastward of Miah Maull Shoal Light. A course of **052°** for 8.8 miles passes about 0.4 mile off the lighted buoy

2.7 miles southeastward of Egg Island Light and leads to a position 0.3 mile south of the channel entrance.

The channel across the bar is marked by two lighted and two unlighted buoys, and into the river by a lighted range, course **346°**, and buoys.

To enter, follow the channel across the bar as indicated above. On the flood, vessels should guard against a northwesterly set. For a distance of 16 miles above the entrance the channel has ample width and is easily followed; in the absence of local knowledge it is safer to take it on a rising tide and proceed with caution. In the upper 5 miles to Millville the channel is narrow and some local knowledge is required to follow it. Towboats bound to or from the upper part of the river usually run with the current.

There is a narrow cut through the marsh along the south and east shores of the entrance island leading into Maurice River about 0.4 mile eastward of the main entrance. It has a depth of about 2½ or 3 feet and is much used by motor boats.

Dividing Creek, 2.5 miles northeastward of Egg Island Light, has a depth of about 2½ feet across the flats at the mouth and 5 to 15 feet inside. A draft of about 4 feet at high water can be carried through a very narrow crooked channel to the town of **Dividing Creek,** about 8 miles above the mouth. It is used only by a few oyster boats.

Oranoken Creek, 0.5 mile westward of Dividing Creek, has a depth of about 2½ feet across the flats at the entrance and deeper water inside. It is little used.

Egg Island Light (lat. 39° 11′, long. 75° 08′), shown from a white skeleton tower, is the most prominent mark in its vicinity. It is 45 feet above the water and visible 12 miles. There are shoals southward of the point, marked on the south and west sides by buoys; also an unmarked slough, good for a depth of about 7 feet close along the point inside the shoals. The slough is used by local vessels, but strangers should pass southward of the shoals.

Egg Island Flats abound in bush stakes marking the oyster beds.

Fortescue is a post village and small summer settlement on the shore about 4 miles north-northwestward of Egg Island Light. A light marks the south side of the entrance to ***Fortescue Creek.***

Nantuxent Creek, 6.5 miles east-southeastward of **Ship John Shoal Light,** has a depth of about 5 feet in the entrance, and is navigable at high water to within about 1 mile of the village of **Newport.** It is used only by local oyster boats.

Shoal spots with a least depth of about 5 feet extend about 1 mile south-southwestward of **Nantuxent Point,** and are marked off the west side by a lighted buoy. Boats bound alongshore should keep outside of the buoy and well eastward of ***Ben Davis Point Shoal,*** which has a depth of 5 feet and borders the main channel of Delaware Bay.

Cedar Creek, 1.8 miles eastward of **Ben Davis Point,** has a depth of 4 feet across the flats at the mouth, 4½ feet for a distance of about 3 miles above the mouth, and about 3½ feet at high water for a farther distance of 2.5 miles to the village of **Cedarville.** The mouth is used as an anchorage for small boats and there is little traffic above.

Back Creek, on the east side of Ben Davis Point, has a depth of about 5 feet across the flats at the entrance, and is navigable with a good depth of water for about 3 miles. It is used only as an anchorage by local boats.

Cohansey River, marked by **Cohansey Light,** shown from a steel tower, and a lighted range, is navigable to the city of **Bridgeton,** 16 miles above the entrance. The deepest draft entering the river is about 11 feet and this draft is taken to Bridgeton at high water. There is little trade in the river except for small tankers going to the oil

wharves at Bridgeton and an occasional motor vessel hauling fertilizer. The lighted range is on the west side of the entrance cut which has been dredged into the river 500 yards northwestward of Cohansey Light.

The Federal improvement project provides for a channel 12 feet deep, 100 feet wide from that depth in Delaware Bay through a neck of land at the mouth and within the river to the south side of Glass Street in Bridgeton, 16.5 miles above the mouth; thence a channel 8 feet deep, 100 feet wide to Broad Street; and thence 75 feet wide to Commerce Street Bridge 16.7 miles above the mouth; and for a turning basin 12 feet deep and 800 feet long formed by widening the channel on the south side to a maximum width of 250 feet just below Glass Street.

In September 1946 there was a controlling depth of 11 feet from Delaware Bay to the mouth. In June 1945 there was 9 feet to Glass Street, Bridgeton; thence 4½ feet to Broad Street Bridge; thence 2½ feet to Commerce Street Bridge.

Greenwich Pier, a shipping point for seafood, is on the west bank of Cohansey River, about 4 miles above the entrance. Gasoline, provisions, coal, and water are obtainable at the oyster pier, depth alongside 13 feet. There are two marine railways, the larger capable of hauling out small vessels 115 feet long and of 8-foot draft, and machine shop for ordinary repairs to motors. **Greenwich** is a town about 1 mile distant.

Fairton is a village on the east bank of Cohansey River, 3.5 miles below Bridgeton. There are several railways, the largest capable of hauling out a vessel 40 feet long and of 3-foot draft; repairs can be made.

Bridgeton is an important manufacturing town and railroad center. The depths of water at the six oil company wharves range from 10 to 14 feet. The lumber yard wharf, used for handling fertilizer, has a depth of 8 feet.

Supplies and repairs.—Gasoline, coal, and provisions may be obtained at Bridgeton. There is a marine railway, little used, capable of hauling out vessels 40 feet long and of 3-foot draft. A machine shop is available.

Three bridges cross the river here: Broad Street with 40-foot bascule span and 6½-foot closed clearance, Commerce Street with 23-foot fixed span and 6.8-foot clearance, and Washington Street fixed trestle with 14-foot span and 5.7-foot clearance. All clearances are at high water.

Tides.—The mean range of the tide is 6 feet at the entrance and 6½ feet at Bridgeton. It is high water at the latter place about 1½ hours later than at the entrance.

Directions, Cohansey River.—Vessels approaching the river from northward usually leave the main channel of Delaware Bay southward of the buoy at the south end of ***Arnold Point Shoal,*** steer **104°** with Cohansey Light on the port bow until up to the Cohansey range, then steer **036°** along the axis of the dredged cut, keeping the lighted range open so as to steer south of it, as the range marks the northern edge of the channel.

Vessels from the southward may steer in on Cohansey range from the main channel on a **036°** course, until about 1 mile from shore, then up the axis of the dredged cut as above. A channel sometimes used is to the southward and eastward of Cohansey Light, avoiding the shoal making out from the light in an east-southeasterly direction.

From inside the entrance to about 1 mile below Bridgeton there is a natural channel with ample width and depth and easily followed; in the absence of local knowledge it is safer to take it on a rising tide and proceed with caution. Thence to Bridgeton the channel has been obtained by dredging, and some local knowledge is required to follow it. Vessels bound to or from the upper part of the river usually run with the current.

Stow Creek, 3 miles northwestward of Cohansey Light, has a reported depth of

about 6 feet in the entrance and deeper water inside. It is said to be navigable at high water to within about 1 mile of the village of **Canton,** about 10 miles above the entrance. The best water in entering lies close alongshore southward of the entrance, then eastward and northward of the island in the mouth but local knowledge is necessary for entering.

Bayside, at the mouth of Stow Creek, now has little importance except as a rendezvous for pleasure fishermen. There is a depth of 3 feet at the small landings inside the mouth of the creek. Gasoline and some provisions are obtainable during the fishing season.

Mad Horse Creek, 6 miles northwestward of Cohansey Light, has a depth of about 6½ feet in the entrance. It is navigable for several miles, but is entered only by an occasional truck boat.

Delaware River, Below Christina River

CHART 294

Hope Creek, on the east side, 0.9 mile southeastward of Stony Point, has a depth of about 2 feet at the mouth and is navigable for several miles, but is little used. A jetty about 0.5 mile long extends southwesterly from near the west side of the entrance and terminates with a light on a white post.

Blackbird Creek, on the west side, 0.4 mile southward of Reedy Island Range Front Light, can be entered with a draft of about 3 feet at low water by following the shore from well southward of the entrance, and this draft can be carried several miles above the mouth. It is frequented only by small pleasure boats. The creek is crossed by a swing drawbridge about 4 miles above the mouth, but is seldom opened. The draw has horizontal clearances of 42 and 20 feet and 1-foot vertical clearance at MHW when closed.

Appoquinimink River, marked at the mouth by range lights on white latticed steel posts, is navigable at high water for vessels of 8 feet draft to the village of **Odessa,** 6 miles above the mouth, and for small boats a farther distance of about 4 miles. The river is now little used except by pleasure boats and a few local fishermen. The range is difficult to see in the daytime.

The project for improvement of the river provides for a channel 8 feet deep, 100 feet wide from the mouth to Fennimore Bridge, a distance of 5 miles; and thence 80 feet wide to Odessa, a farther distance of 3.3 miles, including 5 cut-offs. In September 1946 there was a controlling depth of 4 feet from Delaware Bay to the mouth of the creek, thence about 5 feet to Odessa.

A drawbridge crosses about 3 miles above the mouth. The bridge is a swing draw, each opening 39 feet wide, with a vertical clearance of 7.3 feet at MHW. There is a swing drawbridge at Odessa with a single clear opening of 40 feet horizontal clearance and a vertical clearance of 4.8 feet at MHW. This draw has not been opened for a number of years. The wharves at Odessa are in ruins.

Tides.—The mean range of the tide is 6 feet at the mouth and about 3 feet at Odessa. At Odessa high and low waters are reported to occur about one hour after high and low water at the mouth.

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Baker Shoal has been surrounded in its shoalest part by a bulkhead and raised to above high water by dumping, forming an island about 2.5 miles long. The filled area is known as **Artificial Island.** A dike visible at all stages of the tide, connects the south end with Stony Point, and about 1 mile below the north end another dike connects the east side of the island with the river bank. Back of the island above this dike considerable shoaling has taken place. Groups of old vessels are grounded just south of the dike forming a dumping basin, the entrance to which is lighted and buoyed. These lights are maintained by the U. S. Engineers and only lighted when required by them.

Alloway Creek, eastward of the north end of Artificial Island, is navigable for vessels to the village of **Quinton,** and with some difficulty for small boats at high water for a farther distance of 4 miles to the village of **Alloway.** A channel 6 feet deep and 60 to 75 feet wide has been dredged to Quinton. The controlling depth in August 1946 was 7 feet to the mouth, thence 5½ feet to Quinton. Two cut-offs have been made across sharp bends, one 1.2 miles above the entrance and the other above **Hancocks Bridge;** also a shore dike has been constructed 2.5 miles above the entrance at The Square.

The following swing drawbridges cross the creek (distance above the mouth, horizontal clearance, and vertical clearance at MHW follow in the order given): Hancocks, 4 miles, 48 feet, 2½ feet; Upper Hancocks, 5½ miles, 35 feet, 3½ feet; Quinton, 8 miles, 30 feet, 3 feet. The best water is in the north opening in Hancocks Bridge. Vessels unable to pass under the draw span of the State Highway bridge at Quinton are required to give 24 hours' advance notice to have the bridge opened. Call the State Highway bridge, Cohansey River, Bridgeton, New Jersey.

There is a small bulkhead landing just below the Hancocks Bridge. The depth alongside is 7 feet; gasoline is available on the landing and provisions in the town. Another landing, with a like depth alongside and similar facilities, lies just above this bridge.

Boats entering Alloway Creek must pass northward of the artificial island on Baker Shoal, and should enter the creek on an easterly course to avoid shoals off the points on either side. Above the entrance the best water does not always follow midstream, and some local knowledge is required to keep in the best water. Strangers should take it on a rising tide and proceed with caution.

Tides.—The mean range of tide is 5½ feet at the entrance, 4 feet at Quinton, and 2½ feet at Alloway.

Reedy Island was the site of a Federal quarantine station and detention station. It is now in an inactive status. The landing has 10 feet of water at the end. A dike extends 2.8 miles southward from the south end of the island. It is covered by the red sector of Old Reedy Island Light and is marked by two lights. The lower end is submerged at high water, and is marked by a bell buoy. The area to the westward of the dike is closed to navigation. Mariners are cautioned to use the main ship channel.

Old Reedy Island Light (lat. 39°30′, long. 75°34′), shown from a white tower on a dwelling, is on the dike 0.4 mile southward of Reedy Island. The light is 32 feet above the water. About midway between the light and the south end of Reedy Island is an opening in the dike 150 feet wide, with a depth of 5 feet at low water, used by boats up to 7-foot draft bound to Port Penn. The south side of the opening is marked by a daybeacon. The dike on each side of the opening is visible at high water.

Port Penn is a village on the west bank westward of Reedy Island. It can be approached from southward, through the opening in the dike at the south end of Reedy Island. The anchorage off the town, known as ***Reedy Island Harbor,*** has a depth of

about 20 feet, but is little used except during the fishing season. The depths at the wharves at Port Penn are shallow.

Salem River, emptying into ***Salem Cove,*** 3 miles southeastward of Pea Patch Island, is the approach to the city of **Salem,** at the junction of the river with ***Fenwick Creek,*** 3 miles above the mouth. A cut-off channel, 12 feet deep, has been dredged across a neck of land below Salem shortening the distance to Salem by a mile. There is little trade by water except for small tankers bringing fuel oil and gasoline to the oil docks at Salem. The lower landing has a depth of 10 feet; the upper, 8 feet.

In August 1946, from Delaware Bay through the cut-off to Penns Neck Bridge at the junction of Salem River and Fenwick Creek, there was a controlling depth of 10 feet, thence 11 feet to a fixed highway bridge, the head of navigation in the Little Salem River at Salem.

The channel across Salem Cove follows the southeast side and is marked by buoys as far as the cut-off and by a set of range lights. The front range is a white house on brown cylindrical base, and the rear range is a white skeleton tower above a house. On the northwest side of the entrance channel are several areas that are bare at low water.

To enter Salem River, leave the main channel of Delaware River off Elsinboro Point, steering **038°** to pass close southeastward of buoy 1, until up to the Salem River range, thence along this range on course **027°** through the buoyed channel to buoy 6; round eastward, being guided by the buoys, into the cut-off, and then mid-channel of the river above to Salem.

The Penns Neck bascule bridge has a horizontal clearance of 60 feet and a vertical clearance of 5 feet at MHW.

Tides.—The mean range of tide at the entrance and at Salem is 5½ feet, the tides occurring at the latter place 20 minutes later than at the former.

Salem River was originally navigable to **Courses Landing,** 15 miles above Salem and 2.5 miles below the village of **Sharptown.** It has shoaled just above the junction with Little Salem River, and is not now used. There is also a dam about 9 miles above here. ***Salem Canal*** which entered the Delaware River at Deepwater Point front range light has been blocked by a dam near the mouth, and there is now no navigation through it.

Pea Patch Island is low and shoals extend for a long distance northward and southward of it. Large warning signs mark the shore ends of a telegraph cable extending from the wharf on this island to a wharf at **Finns Point** on the east shore of the river. The wharves are in poor condition. Vessels should not anchor in the vicinity of the cable.

A dike extends northward from Pea Patch Island for a distance of about 4 miles and parallels the river axis. It is marked by concrete piers (appearing above high water) about 2,000 feet apart. The greater part of the dike is submerged at high water. The dike is also marked by lights, one at the north end and two at intermediate points. The light about 1 mile above the north end of Pea Patch Island marks the south side of an opening in the dike. The opening is shoal.

Delaware City is on the west bank of Delaware River southwestward of Pea Patch Island. The wharf is in ruins. Small boats occasionally go to the bulkhead just inside the entrance to the Delaware City Branch Canal. There is about 5 feet of water at the bulkhead. This canal, connecting Delaware City with the Chesapeake and Delaware Canal is shoal and little used.

The government wharf, about 0.5 mile below Delaware City, has 14 feet of water alongside.

The Chesapeake and Delaware Canal (Chart 570) is described in Chapter 6. The main entrance is at Reedy Point about 1.5 miles below Delaware City.

5 **Tides.**—Daily tide predictions for Reedy Point are given in the *Tide Tables, Atlantic Ocean.*

Bulkhead Shoal Channel (Chart 294), westward of Pea Patch Island and ***Bulkhead Shoal,*** is sometimes used by small vessels bound through the canal. The wharves south of the entrance to ***Armstrong Creek*** are in ruins.

10 A bulkheaded fill on ***Goose Island Flats*** extends about 0.5 mile offshore and is 1.5 miles long.

New Castle is a town on the west bank of the Delaware River, 4 miles below the entrance of Christina River. It has little trade. The main wharf has a depth of about 12 feet at its end, and the other wharves are in bad repair. There is a small harbor 15 protected from drifting ice by 5 stone fenders (piers) about 10 feet above high water. The yacht basin, formerly maintained by a club on the waterfront, is reported (August 1946) to go dry at low tides. On the north side of town there is a ferry slip which is used by ferries running to Pennsville, on the other side of the river.

Pennsville is a village on the east bank, 3.5 miles below the entrance to Christina 20 River. There are depths of 7 to 8 feet at the docks. A wharf at Riverview Beach north of the ferry slip is used by regular steamers from Wilmington and Philadelphia during the summer. There is a depth of 13 feet at this wharf.

A dike is under construction at **Cedar Point.**

Just south of the Salem Canal are two buoyed channels, each marked by a lighted 25 range, leading to a power-company wharf which accommodates coal barges drawing about 25 feet. The upper channel depth is 25 feet and the lower, 18 feet, and they meet just south of the wharf. In September 1946 there was a depth of 32 feet alongside this wharf and 22 feet alongside the wharf just northward.

There is a railroad wharf and car ferry slip at **Deepwater Point,** which is the site 30 of large factories. There is 29 feet alongside the wharf. An electric fog signal is privately maintained on the pier-end.

A railroad wharf and car ferry slip, with a depth of about 15 feet along the southern side and 12 feet at the end, is on the end of **Pigeon Point,** 1 mile southward of the entrance to Christina River. It is used as a shipping point for coal and other freight, principally 35 in car floats and barges. Coal and water are obtainable.

Christina River

CHART 294

Christina River, on the west side of Delaware River about 64 miles above Cape Henlopen and 26 miles below Philadelphia, is the approach to the city of Wilmington, 40 2.5 miles above the mouth, and the villages of Newport and Christiana.

Wilmington has large manufacturing interests and considerable trade by water. The city is connected with Chester and Philadelphia by passenger and freight steamers. Three important railway systems reach this port. The entrance at the mouth of

Christina River is marked by a lighted bell buoy on the northerly edge of the channel, a light on the southeast corner of a bulk-headed area on the north side of the entrance, and by **Christina River South Jetty Light (lat. 39°43′, long 75°31′)**, on the outer end of the south jetty. The steel sheet-pile jetty is about 0.4 mile long and 4 feet above high water. **Bellevue Range Rear Light** is near the inner end of the bulkhead. The first channel reach of the Christina River is marked by a lighted range.

Just inside the mouth of the Christina River on the south bank is the modern Wilmington marine terminal, with its bulkheaded water front, freight sheds, storage facilities, mechanical freight-handling equipment, and rail and highway connections. The wharf has about 30 feet alongside and is capable of berthing five vessels at one time. Fuel oil is transhipped at the dolphins on the north side of the jetty just westward of the light.

Channels.—The existing Federal project for improvement of Wilmington Harbor (Christina River) provides for a channel 30 feet deep and 400 feet wide from the Delaware River to the Lobdell Canal; thence 21 feet deep and 250 feet wide to the Brandywine River; thence 21 feet deep and 200 feet wide to the former Pulp Works; thence 10 feet deep and 200 feet wide to the Pennsylvania Railroad Bridge No. 4; and thence 7 feet deep and 100 feet wide to Newport, Delaware. It also provides for an inner basin 30 feet deep and generally 600 feet wide extending upstream 4,400 feet to Lobdell Canal, and for jetties at the mouths of the Christina and Brandywine Rivers.

The depths in the channel at the entrance are constantly changing. Strangers in deep-draft vessels should not attempt to enter without obtaining local information. When last ascertained the depths in the channel were as follows: From Delaware River to Lobdell Canal, 27.5 feet in March 1947; thence to Brandywine River, 13.9 feet, in January 1946; thence to the pulp works, 14.4 feet, in January 1946; thence to the Pennsylvania Railroad Bridge No. 4, 9.6 feet in January 1946; and thence to Newport, 6.4 feet in June 1944.

Channel regulations.—Vessels over 20 tons propelled by machinery shall not proceed at any time within the limits of these waters at a greater speed than 8 statute miles per hour.

Speed.—Reports have been received that vessels navigating in Christina River at Wilmington travel at excessive speeds, thus damaging plant and property and causing personal injury. The U. S. Engineers caution masters of vessels to slow down when passing shipyards and floating plants along wharves, piers, and docks, and to proceed at a safe and reasonable speed to avoid excessive wave action or injurious swells.

Lobdell Canal is on the south side of the river just above the marine terminal, It is used by towboats and barges and had a reported depth of about 8 feet alongside the wharf in September 1946.

Brandywine River, emptying into Christina River 1.5 miles above the entrance. is good for a depth of about 4 feet at low water to the railroad bridge 1 mile above the mouth, and a draft of about 6 feet at high water can be taken a farther distance of about 0.8 mile to Market Street bridge, above which there are rapids. The channel is rocky above the railroad bridge. The main use of the river now is for pleasure boats for anchorage and storage. There is a jetty at the north side of the river mouth. A boat yard is on the east side of the river just above the first railroad bridge. The railways are capable of hauling boats 40 feet in length and 3-foot draft. Minor repairs can be made.

Christina River is lined with wharves on both banks in the city of Wilmington. The wharf on the north shore just eastward of the Third Street bridge has from 14 to

22 feet alongside. Between the Third Street and Market Street bridges the wharves on the north shore have depths of 7 to 22 feet, those on the south side 8 to 13 feet. Depths at the shipyard wharf above Market Street vary from 12 to 20 feet; the oil wharves have depths of 15 and 16 feet.

Newport is the head of the dredged channel, and a draft of 2 or 3 feet at low water can be taken to the town of Christiana at the head of navigation about 13.5 miles above the entrance. There is little traffic above Newport. The wharf at the paint works at Newport has 9 feet of water alongside.

Bridges.—The following are the bridges crossing Christina River, the type bridge, the distance in nautical miles above the outer ends of the jetties at the entrance, the horizontal clearance of the draw openings, and the vertical clearance at MHW when closed:

Pennsylvania Railroad (Swing), 1.2 miles, 90 feet, 6.9 feet.
Third Street (Bascule highway), 2 miles, 145 feet, 17.5 feet.
Market Street (Bascule highway), 2.6 miles, 175 feet, 8.5 feet.
Pennsylvania Railroad (Swing), 3.6 miles, 67.3 feet (east), 62.5 feet (west), 6.3 feet.
Philadelphia & Reading Railroad (Swing), 3.7 miles, 66.5 feet (west), 57.3 feet (east), 3.2 feet.
Pennsylvania Railroad (Swing), 4.6 miles, 37 feet, 2.3 feet.
Newport (Bascule highway), 8 miles, 49 feet, 4.9 feet.
Churchman (Fixed highway), 10.7 miles, 61 feet, 8 feet (convertible to bascule).
Christiana (Fixed highway), 13.7 miles, 60 feet, 6.5 feet.

Five bridges cross the Brandywine River between the mouth and the head of navigation, as follows, with data as above:

Seventh Street (Swing highway), 0.1 mile, 48 feet, 10.5 feet.
Eighth Street (Pennsylvania Railroad Swing), 1.0 mile, 48 feet, 18.6 feet.
Church Street (Bascule highway), 1.1 miles, 40 feet, 12 feet.
Sixteenth Street (Highway vertical lift), 1.5 miles, 40.7 feet, 10.2 feet, and lifted 54 feet.
Market Street (Fixed highway), 1.7 miles, 149 feet, 13.5 feet.

Bridge regulations prescribed for the bridges crossing Christina and Brandywine Rivers require that the draws shall be promptly opened at any time during the day or night (see *Exception*) upon receipt of a signal of three blasts of a whistle or horn.

Exception.—Draw tenders are not required to be stationed at the bridges in Wilmington crossing Brandywine River above Seventh Street bridge. However, directions for reaching the draw tenders are posted, along with the regulations, on the sides of the drawbridges.

When the draw of the bridge can be opened immediately, the draw tenders shall reply by two blasts of a whistle or horn and when the draw cannot be opened immediately or when the bridge is open and is to be closed immediately, the draw tender shall reply by one blast of a whistle or horn.

Upon hearing or perceiving the prescribed signal, the bridge tender shall immediately clear the drawspan and open the draw to its full extent for the passage of a vessel or other craft: *Provided,* that the draw of a railroad bridge need not be opened when there is a train in the bridge block approaching the bridge with the intention of crossing, nor within 5 minutes of the known time of passage of a scheduled passenger, mail, or express train; but in no event except in case of break-down of the operating machinery, shall the opening of the draw be delayed more than 5 minutes in the case of a highway bridge, nor more than 10 minutes in the case of a railroad bridge.

Anchorage.—There are no designated anchorage areas for Wilmington Harbor. Vessels may anchor on the edge of the channel in the Delaware River south of the entrance channel to the harbor. Vessels must not anchor in the channel within city limits

or tie at any wharf more than two abreast without permission of the harbor commissioners. The inner basin has not been dredged as projected.

Supplies.—Water, provisions, ship chandlery, Diesel oil, and coal in any amount can be obtained at Wilmington. There are no bunkering facilities, but coal may be obtained at the terminal from railroad cars by crane. (See Pigeon Point.) Vessels may fill their boilers from the river anywhere in the harbor.

Repairs.—There are good facilities for construction and repair of hulls and machinery. There are three marine railways, one in Brandywine River. The shipyard on the northern side of the Christina River east of the Third Street bridge is capable of making major ship repairs. The railway will haul a vessel 105 feet long, 12 feet draft, 400 tons. The boat yard on the south shore has railways capable of accommodating a vessel 85 feet long and of 9-foot draft.

Airport.—The Wilmington airport is located about 6 miles southwest of the city center, to which there is adequate means of transportaion. An airline between Washington and New York is maintained.

Tides.—The mean range of tide is about 5½ feet at Wilmington and 4 feet at Newport.

Tidal currents.—At the entrance of the harbor the strength of the current normally attains a velocity of about ¾ knot. Unless influenced by strong winds, the inner harbor currents rarely impede navigation, and generally follow the channel direction.

Marked local magnetic attraction has been observed in the vicinity of Wilmington, with variation ranging from 4° to 13° west.

Directions, Christina River.—The following directions are available for vessels of 10 feet draft or less; vessels of deeper draft should take a pilot. Enter the river on course **293½°**, following the lighted entrance range until abeam of Lobdell Canal, then favor the west bank to the first bridge. From here to the wharves at Wilmington the mid-channel is clear. Above the wharves a mid-channel course should be followed to the pulp works.

Delaware River, Christina River to Philadelphia

CHART 295

There is a powder factory on **Carney Point (lat. 39°43′, long. 75°29′)**, on the south side of ***Helms Cove,*** eastward of the entrance to Christina River. A tank and several chimneys are prominent.

Pennsgrove is a town on the east side of Delaware River, 2 miles northeastward of the entrance to Christina River. It is a railroad terminus, and has communication with Wilmington and Philadelphia by steamer during the summer. There is a depth of about 12 feet at the steamer wharf.

Edgemoor is a village on the west side of Delaware River, 2 miles northward of the entrance to Christina River. A buoy depot of the U. S. Coast Guard is located here and has a light on the end of the south wharf. **Cherry Island Front Range Light** with a bell fog signal is on this wharf. About 400 yards below, a paint-works wharf has a depth of about 17 feet along the face.

A dike extends from Edgemoor for 0.7 mile south-southwestward parallel with Cherry Island Channel. **Bellevue Front Range Light** is located at the lower end of it.

A dike, marked at its end by a red buoy, extends 580 yards off **Oldmans Point,** on the east bank, between ***Marcus Hook Bar*** and ***Cherry Island Flats.*** The outer end is submerged. Southward of the dike is a pier in ruins. The railroad pier northward of the dike has 6 mooring dolphins off it. There is little depth of water between them and the pier.

Oldmans Creek, on the east side of the Delaware River, 4 miles above Christina River, is the approach to the villages of **Nortonville, Pedricktown** and **Auburn,** 3, 4.5 and 9.5 miles, respectively, above the mouth. There is now little traffic of any kind in the river.

A channel 6 feet deep and 100 feet wide has been dredged across the bar at the mouth, 6 feet deep and 75 feet wide to Pedricktown, and 5 feet deep and 40 feet wide to Auburn, and nine cut-offs have been made between the mouth and Auburn. In September 1946 there was a controlling depth of 4½ feet from Delaware River to the mouth of the creek, thence about 6½ feet to Nortonville, thence 7 feet to Pedricktown, thence about 1½ feet to Auburn.

To enter Oldmans Creek leave the main channel and pass south of buoy 8 B. Steer course **079°** with **Marcus Hook Range Front Light,** on a black, square skeleton tower with white slatted daymark, astern to just south of buoy 1, thence be guided by the buoys to the river, and in the river steer a mid-channel course.

Bridges.—The following are the bridges crossing Oldmans Creek, the least width of the openings, and the vertical clearance at MHW when closed:

Nortonville (vertical lift), 75 feet, 64 feet when open, 5 feet when closed.
Pennsylvania Railroad (swing), 36 feet, 2.1 feet, 3½ miles above mouth.
Pedricktown (highway, swing), 36 feet, 7.8 feet.
Auburn (highway, fixed), 29.4 feet, 0.9 foot.

Tides.—The mean range of tide is about 5½ feet at the entrance, 2½ feet at Pedricktown, and 1 foot at Auburn. The tides at Pedricktown and Auburn are reported to occur about ½ hour and 2¾ hours later, respectively, than at the entrance.

Grubbs Landing (lat. 39°47′, long. 75°28′), 4.8 miles above the Christina River on the west side of the Delaware River, is a stone crib pier above high water and is lighted when Marcus Hook Range lighted bell buoy 2 M is replaced by an unlighted buoy during ice runs. It is off the junction of the Bellevue and Marcus Hook Ranges.

Claymont, on the west side of the Delaware River, 4.5 miles below Chester, has wharves with depths of 25 to 30 feet alongside. There are petroleum and chemical works.

Marcus Hook, on the west side of the Delaware River, 2 miles below Chester, has oil refineries where large quantities of crude oil are received and refined annually. It is an important point for the shipment of oil. One of the fuel oil bunkering facilities can deliver a maximum of 1,500 barrels per hour. One company operates a barge for bunkering vessels.

There is an anchorage area on the east side of the river channel off Marcus Hook.

Speed.—Excessive speed in the Delaware River is causing damage to vessels and property along the banks of the river, particularly in the vicinity of Chester, Pennsylvania. The speed of deep-draft vessels using the Delaware River is limited to 12 miles per hour opposite Marcus Hook and Chester.

The **Federal Quarantine station** operated by officers of the United States Public Health Service for the ports of the Delaware River is maintained here. The wharf,

at the lower end of the river front, has 10 feet of water along its northern face, but little water elsewhere. The channel leading to the wharf is periodically dredged to a depth of 12 feet but fills in rapidly. It is difficult to follow without local knowledge. The quanantine anchorage is opposite the station.

A signal station and day reporting station of the Philadelphia Maritime Exchange is located on the quarantine station wharf.

Raccoon Creek, on the southeast side of Delaware River, 1 mile southward of the lower end of Chester, is the approach to the towns of **Bridgeport** and **Swedesboro,** 1.5 and 8 miles, respectively, above the entrance. Vessels of 8-foot draft, loaded with fertilizer, are taken to Swedesboro at high water. Above Swedesboro there is little traffic. The two wharves on the east side of the creek between the bridges at Bridgeport have a depth of 9 feet alongside. There are two small marine railways at the town capable of hauling a boat 40 feet in length. The landings between Bridgeport and Swedesboro are in ruins.

There is a bar off the entrance with a least depth of 1 foot on it, and a channel eastward of it to the mouth of the creek, with a least depth of 4½ feet from southward.

The entrance to Raccoon Creek has been improved. The project, completed, provides for a channel 7 feet deep and 75 feet wide in Delaware River to the mouth and within the creek to Bridgeport, 1.5 miles above the mouth; thence 60 feet wide to Springer Wharf, 4 miles above the mouth; thence 40 feet wide to Swedesboro, 8 miles above the mouth. It also provides for a cut-off at Molonox Shoal, 7 miles above the mouth, and for a south jetty at the mouth, 950 feet long. The entrance channel is marked by buoys, the outer end of the jetty by a light.

In September 1946 there was a controlling depth of 7 feet in the entrance channel and to Bridgeport. The reported depth to **Springer Wharf** was 6½ feet, thence to Swedesboro 3½ feet.

Enter about 1 mile below the mouth of the creek, pass close southward of buoy 1, and follow along the buoyed channel to north of the jetty, thence follow mid-channel up the river. The channel to the river mouth is marked by bush stakes.

Bridges.—The following are the bridges crossing Raccoon Creek, the distance in nautical miles above the outer end of the jetty at the entrance, the horizontal clearance of the openings, and the vertical clearance at MHW when closed:

Bridgeport (vertical lift), 1.5 miles, 65 feet, 6 feet, 64 feet when raised.
Pennsylvania Railroad (swing), 1.7 miles, 38 feet, 7 feet.
Swedesboro (highway, swing), 7 miles, 60 and 50 feet, 6 feet.
Swedesboro (Pennsylvania R. R., fixed), 7½ miles, 33.2 feet, 21 feet.
Swedesboro (highway, fixed), 8 miles, 40 feet, 7 feet.

Tides.—The mean range of the tide is about 5½ feet at the entrance and 5 feet at Swedesboro. At Swedesboro high and low waters are reported to occur about 1½ hours after high and low water at the entrance.

Chester is an important manufacturing city 73.5 miles above the entrance to Delaware Bay and 14.5 miles below Philadelphia. It has considerable trade by vessels and its industries use the wharfage facilities of the 4 miles of waterfront. These industries generally have open areas for the storage of raw materials and finished products in the vicinity of their wharves but two storage warehouses are available for the handling of general cargo. Mechanical facilities for the transfer between ship and warehouse are available and include movable cranes and lifting magnets. The railroads have connections with the piers and warehouses.

Water and limited quantities of coal can be obtained as well as food supplies.

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The wharves open to the public have 10 to 30 feet alongside, and the principal wharves of the industrial plants have 8 to 30 feet.

There are several machine shops and one of the largest shipyards and repair plants of the Atlantic seaboard. This plant has two drydocks, the larger 522 feet long, with 10,000 ton lifting capacity and 18 feet of water on the blocks at ordinary high water.

A ferry connects Chester with **Raccoon Island** on the New Jersey shore.

The nearest anchorage ground is off Marcus Hook.

A white buoy, maintained by the city from March 1 to December 1, marks the outer end of an intake pipe about 500 yards downstream from Chester Creek.

Chester Creek had a controlling depth in September 1946 of 5 feet from Delaware Bay to the Third Street highway bridge, then about 3 feet to the Pennsylvania Railroad bridge at Sixth Street, and about 1½ feet to the village of **Upland,** the head of navigation about 2 miles above the mouth. There is very little traffic in the river and commerce goes only as far as the Second Street highway bridge.

A swing railroad bridge is just inside the mouth, with a single draw opening 59 feet wide and a vertical clearance of 1½ feet at MHW, and there are eight fixed bridges between this point and Upland, having a least vertical clearance of 6 feet at high water and a least horizontal clearance of 68 feet.

A marine railway capable of hauling boats 45 feet long and of 4-foot draft is on the south side of the creek just inside the entrance. Gasoline and fresh water are available on the landing. There is a depth of 7 feet alongside.

Tides—The mean range of the tide is about 5½ feet at the entrance and about five feet at Upland.

Chester Island (lat. 39°50′, long. 75°20′) in mid-river off the upper wharves at Chester, is marshy and has no prominent mark. A dike visible at high water extends from the northwest side of **Monds Island** nearly to the northeast end of Chester Island. The channel from the dike to the southwest end of the island has been used as a dumping ground and has shoaled to a depth of 4 feet or less.

Ridley Creek has a depth of about 5 feet at high water to a dam 2 miles above the mouth. The shoalest places are at the mouth and at the head of navigation. The creek is crossed by eight fixed bridges having a least headroom of 9.5 feet at MHW and a least span of 50 feet.

Eddystone, a town just above Chester, has a large factory and other industrial works. The Baldwin Locomotive Works ship locomotives from its piers direct to foreign countries. The two wharves at this port have depths of about 24 to 30 feet.

Crum Creek, just westward of **Chester Range Rear Light,** is bare in places at low water, and has a depth of 5 feet at high water to the fixed railroad bridge, about 1 mile above the entrance. It is crossed by several fixed bridges having but little headroom at high water.

Darby Creek, 0.4 mile eastward of Chester Range Rear Light, has a depth of 9 feet to the first railroad bridge; thence about 7 feet to 4 miles above the mouth and 3 feet for a farther distance of about 2 miles to the fork, 0.5 mile from the town of **Darby.** Oil barges and small tankers go to the oil wharf just below the first railroad bridge. There is a depth of 10 feet at the wharf. Above this point the creek is used only by small pleasure boats. Five bridges cross the river below the fork. Three of them have draw-openings and the others are fixed. The lower highway bridge is a fixed span and the railroad bridge just above it is closed to navigation except in an extreme emergency.

Tides.—The mean range of tide at the mouth is about 5½ feet.

Essington is a town on the north side of Delaware River northward of Tinicum

Island. There is a depth of 16 feet at the shipyard wharf and 3 to 11 feet at the clubhouse wharves. The Riverside and Corinthian Yacht Clubs have their waterfront facilities here. This is known as the yacht harbor of Philadelphia. Vessels bound to the town, unless of light draft, must pass around the western end of Tinicum Island. There are four boatyards with a total of 12 railways, the largest of which has a capacity of 125 tons, and can haul out vessels 125 feet long and of 11-foot draft. All kinds of yacht and small-vessel repairs can be made. Gasoline, provisions and fresh water are obtainable.

Tinicum Island, 11 miles below Philadelphia, is a long, marshy island with bushes on its western end.

There are several large factory buildings between **Thompson** and **Crab Points,** on the south side of the river southward of Tinicum Island. There is a depth of 6 feet in the car-ferry slip on Thompson Point. The wharves on Crab Point have depths ranging from 8 to 26 feet, the deepest water being along the face of the wharf that extends farthest into the river.

A general anchorage area is located south of the main channel between Thompson Point and Crab Point.

A large oil depot and refinery is located east of **Bramell Point,** and 33 feet can be carried alongside. In case of emergency fresh water can be supplied.

Billingsport is a village on the southeast side of Delaware River, 1 mile above the upper end of Tinicum Island. At **Lodge Point,** west of Mantua Creek entrance, is an oil terminal wharf with about 30 feet at the face.

Mantua Creek, on the southeast side of Delaware River, 0.5 mile above Billingsport, is the approach to the town of **Paulsboro** and the villages of **Mount Royal** and **Mantua,** 1.5, 4, and 7.5 miles, respectively, above the entrance. The creek has considerable traffic as far as the Paulsboro bridge above which it is little used except by small boats. The wharf at the fertilizer plant has a depth of 18 feet alongside and the oil company wharves above have 18, 20, and 12 feet, respectively. There is a depth of 8 feet at **Parkers Landing.**

The project for improvement of the river provides for a channel 20 feet deep and 110 feet wide from that depth in the Delaware River to the Grasselli Chemical Plant; thence 12 feet deep and 100 feet wide to the Strathman Sand Plant; thence 10 feet deep and 60 feet wide to Friars Landing; thence 7 feet deep and 60 feet wide to Parkers Landing, near Mount Royal; and the dredging of a cut-off 3 feet deep and 50 feet wide 9,000 feet above Mt. Royal, and the construction of two jetties at the mouth.

In September 1946 there was a controlling depth of 20 feet to the phosphate works; thence 11½ feet to the sand plant; thence 11 feet to Friars Landing; thence 6½ feet to Parkers Landing; thence ½ foot to Mantua.

The jetties on both sides at the entrance have lights at the outer ends, and the channel is buoyed to the phosphate works.

The following are the bridges crossing Mantua Creek, the distance in nautical miles above the outer ends of the jetties at the entrance, the horizontal clearance of the openings, and the vertical clearance at MHW, when closed. The aerial cable crossing just above Paulsboro has a vertical clearance of 66 feet.

Paulsboro (Pennsylvania R. R., swing), 1.2 miles, 32 feet, 1.7 feet.
Paulsboro (highway, vertical lift), 1.5 miles, 75 feet, 5 feet, 64 feet open.
Mount Royal (highway, fixed), 4.4 miles, 68 feet, 12 feet.
Mount Royal (Pennsylvania R. R., fixed), 4.5 miles, 42 feet, 13.5 feet.
Mantua (highway, fixed), 7.5 miles, 66.6 feet, 13.5 feet.
Mantua (R. R., fixed), 7.5 miles, 26.6 feet, 14.8 feet.

Tides.—The mean range of tides is about 5½ feet at the entrance, 5 feet at Paulsboro, 4½ feet at Mount Royal, and 3½ feet at Mantua. High and low waters are reported to occur later than at the entrance, as follows: Paulsboro, 20 minutes; Mount Royal, 50 minutes; Mantua, 2 hours.

Woodbury Creek, on the southeast side of Delaware River, 1 mile southward of the entrance to Schuylkill River, has been improved by dredging a channel 6 feet deep and 60 feet wide from Delaware River to a highway bridge 1 mile above the entrance, and 6 feet deep and 40 feet wide to the fixed highway bridge at the town of **Woodbury,** 3 miles above the mouth, with two cut-offs near the mouth and one near the head. The controlling depth in September 1946 was 2½ feet at the mouth, thence 6 feet to the first bridge, thence about 1½ feet to the highway bridge at Woodbury.

There is no longer any commercial traffic in Woodbury Creek. Some pleasure craft use the stream and it is reported that about 5 feet can be carried to Woodbury at high water. There is a boatyard at the town with five small railways. A boat of 4-foot draft and 50 feet in length can be hauled out but the facilities are little used as they can only be reached at high water. Fresh water is available here.

Two drawbridges cross the creek. The lower bridge, about 0.8 mile above the entrance, is a swing bridge with openings 40.5 feet wide and a vertical clearance of 5.5 feet at MHW, when closed; the south opening is the better. The second bridge, 0.7 mile above the lower one, is a bascule draw with an opening 45 feet wide and a vertical clearance of 4 feet at MHW, when closed. There is a fixed highway bridge at Woodbury with a headroom of 10 feet at high water.

Tides.—The mean rise and fall of tides is about 5½ feet at the entrance and 4 feet at Woodbury. High and low waters at Woodbury are reported to occur about three-fourths hour later than at the mouth.

There is a middle ground in Delaware River northwestward of the entrance to Woodbury Creek, which is marked on the southwest end by **Block Island Light (lat. 39°52′, long. 75°12′).** The structure is a white square skeleton tower on cylindrical base. Vessels bound into Woodbury Creek can pass on either side of the middle ground. The channel at the entrance is buoyed, but some local knowledge is necessary to enter with the best water.

Vessels approaching Woodbury Creek from southwestward should pass 400 yards southwestward and southward of Block Island. Approaching from northward, eastward of the middle ground, pass 100 to 200 yards off the wharf at Philadelphia Sanitarium, 350 yards offshore abreast the white monument at **National Park,** and 550 yards off the mouth of the creek. The course in the channel into the entrance, passing on the north side of the two buoys, is **125°** to the entrance. At low water the channel in the creek is well defined.

Hog Island, on the north side of the river 0.7 mile northward of the entrance to Mantua Creek, has a wharf about 0.6 mile long with a least depth of 26 feet alongside.

Speed.—Masters of vessels are requested to limit the speed of their vessels to 6 nautical miles per hour when passing the site of the Hog Island wharf, as well as when passing other wharves along Delaware River while loading and unloading operations are in progress, in order to avoid damage to the moored vessels.

Port of Philadelphia

CHARTS 280, 295, 296

Philadelphia, Pennsylvania, one of the great ports of the United States, is located at the junction of the Delaware and Schuylkill Rivers, 88 miles by water from the Atlantic Ocean.

The Port of Philadelphia (State of Pennsylvania Authority) officially includes the Delaware River from Marcus Hook to Morrisville, Pa.

The harbor of Philadelphia embraces the Delaware River from a point immediately south of **Fort Mifflin** below the mouth of the Schuylkill River to the mouth of ***Poquessing Creek*** at the upper part of the city, a distance of 20 miles, and the Schuylkill River as far as the Fairmount Dam, a distance of 7.5 miles.

Channels.—The existing project for the improvement of the Delaware River provides for a channel 37 feet deep from Allegheny Avenue, Philadelphia, to the Philadelphia Navy Yard, thence 40 feet deep to the sea, 800 feet wide in the straight reaches from Allegheny Avenue to a point in Delaware Bay near Ship John Shoal Light, thence 1,000 feet wide to deep water in the bay with 1,200 feet width at Bulkhead Bar and 1,000 feet width at other bends and in Philadelphia Harbor.

In March–May 1947 the controlling depths in Philadelphia Harbor were as follows: Navy Yard to Philadelphia-Camden Bridge, 33.6 feet; thence to Cumberland Street, 34 feet and thence to Allegheny Avenue, 23 feet.

Speed regulations.—Vessels navigating the Delaware River shall not proceed at a greater speed than 12 nautical miles per hour opposite Marcus Hook, Chester, and the Philadelphia Navy Yard; nor at a greater speed than 8 nautical miles per hour between Point House Wharf and Pier G at Port Richmond, Philadelphia. Vessels navigating the Delaware River and its tributaries shall travel at a reasonable speed at all points and shall limit their speed so as not to endanger or cause damage to moored or anchored vessels, and other craft or property in and along the waterway.

Harbor rules and regulations for the port enforced by the Navigation Commission for the Delaware River and its navigable tributaries include the following:

1. The speed of vessels navigating the Delaware and Schuylkill Rivers is covered by rules and regulations promulgated by the Captain of the Port, United States Coast Guard.

2. Vessels desirous of being reported when passing in or out of the Capes of the Delaware must display their signals by day or night in a position where they can be seen from the Delaware Entrance Speaking Station of the Philadelphia Maritime Exchange on Cape Henlopen, say about one-half mile inside Overfalls Light Vessel.

3. Vessels must not lie at any wharf in the Schuylkill River more than two abreast without the permission of the Navigation Commission.

4. If the Navigation Commission directs the removal of any vessel which lies in the harbor of the port of Philadelphia, and the vessel is not promptly moved as directed, it may cause the vessel to be moved at the expense of the master or owners thereof, and if said master or owners neglect or refuse on demand to pay such an expense, the Navigation Commission may recover the amount in an action of contract.

5. When fasts or lines of vessels extend across a dock so as to obstruct passing vessels, the captain or person in charge shall, when so ordered by the Navigation Commission, cause the fasts or lines to be slackened or cast off. Such fasts or lines shall be marked at night by a red light in the center thereof.

6. Vessels lying at the ends of piers, so as to obstruct the passage to the adjoining docks, must move or slack their lines when necessary to accommodate other vessels entering or leaving the docks.

7. Vessels lying alongside of a wharf, and not taking in or discharging cargo, must make way for and permit other vessels that want to load or unload cargo to come inside next to wharf.

8. No dock shall be unnecessarily obstructed by a vessel so as to prevent the loading or unloading of cargo by another vessel.

9. Vessels that increase their width by using ballast-logs, pontoons, or other devices of like nature, must move to accommodate other vessels, when so ordered by the Navigation Commission, and shall pay the expense of moving such other vessels that have to be moved to allow the vessel with the above appliances to enter or leave dock.

10. All sea-going vessels, when discharging, loading, laying up or being repaired at any wharf in the Port of Philadelphia, are required to have and maintain a safe and convenient ladder, gangplank or side steps for the use of persons having business on board such vessels.

11. All vessels loaded with petroleum, benzine, benzol, gasoline, or naphtha made fast to any wharf in the Port of Philadelphia, and vessels not so loaded, lying within 150 feet of such vessels so loaded and made fast to or lying within that distance of a wharf where petroleum is kept or stored, are not allowed to have aboard any fire or light, lighted cigar or pipe of any kind whatsoever, unless by written permission duly signed by the owner, lessee or superintendent of the wharf at which the vessel is lying, setting forth particularly the lights and fires that may be used and the manner of using them.

12. All vessels carrying bulk cargo of inflammable or combustible liquids having a flash point below 150° Fahrenheit, must conspicuously display a red flag or such other signals as may be lawfully prescribed, when within waters under the jurisdiction of this Commission.

13. It shall be unlawful for any vessel to anchor on the Range Line of any Range Lights established by the United States Coast Guard in this State; and the master of any vessel so anchoring shall be deemed guilty of a misdemeanor, and upon conviction thereof before any Court of competent jurisdiction shall be punished by a fine not exceeding fifty dollars, one-half the fine in such case to be paid to the informer, and one-half to the State.

14. All steamships fitted with twin screws, while occupying berths in the Port of Philadelphia, shall either display continuously on each quarter a sign, which shall be illuminated at night, marked "DANGER, KEEP OFF, THIS VESSEL HAS TWIN SCREWS," or float a spar boom around the stern which shall entirely enclose the space occupied by the propellers.

15. Vessels lying in berths in the Port of Philadelphia, in positions where they extend beyond the line of the pier, do so at their own risk, and may be held responsible for any damage that may occur by reason of their encroachment on the river. Such vessels shall display by night a white light on the extreme outshore end or side.

16. Vessels discharging ballast or any loose material must have tarpaulins from the ship's rail to the wharf or lighter, as the case may be, to prevent such material finding its way into the river or dock.

17. Vessels anchored in the Harbor of the Port of Philadelphia requiring the assistance of the police or fire boats shall display their national flag, union down.

18. The signal for the Navigation Commission's tender shall be the international code letter "N" set in the rigging or hoisted in a conspicuous place, or three short blasts and one long blast (. . . —) of steam whistle, to be continued until answered.

Commerce.—The imports of raw materials are mainly iron ore, sugar, petroleum and its products, manganese ore, sulphur, and nitrates of soda. This represents about 60 percent of the imports.

Exports are made up mostly of heavy commodities, such as petroleum and its products, coal, grain, flour, iron and steel, lumber, and manufactured articles.

Domestic commerce consists mainly of coal, sand, gravel, petroleum and its products, sugar, fertilizers, besides the local business of the Delaware Bay and River.

Pilotage.—See page 105.

Quarantine service.—This is furnished by the United States Public Health Service at 225 Chestnut Street, Philadelphia.

Customs service.—The customhouse is located at Chestnut and Second Streets, and is open from 9 a. m. to 4:30 p. m., except on Saturday, when it is open until noon. Vessels may clear between these hours, or by special arrangement with the customs officials.

Immigration service.—The United States immigration station for the Port of

Philadelphia, and other ports of the Delaware River, is located in the customhouse in Philadelphia. Immigration inspections are made of all vessels arriving from foreign ports.

Anchorages.—The anchorages off Philadelphia are at Port Richmond, Gloucester, Mantua Creek and Marcus Hook. They are more fully described on page 103.

Wharves.—The wharves and piers on the Philadelphia side of the Delaware River are numbered consecutively from the foot of Market Street northward to **Port Richmond** and southward to **Greenwich Point.** The wharves at Port Richmond are numbered independently. Those on the west side of the river, including Petty Island, and the east side opposite Philadelphia have depths of 5 to 38 feet at mean low water. On the Schuylkill River there are depths of 3 to 30 feet at the wharves. There are several municipal piers equipped with modern freight handling equipment.

The wharves on the Camden side are numbered consecutively from Pavonia southward to Newton Creek, except for the Pennsylvania Railroad wharves, which are numbered independently.

Oil bunkering.—There are facilities at the wharves of the oil companies on Point Breeze and Petty Island in the harbor of Philadelphia and at Paulsboro, New Jersey, Chester and Marcus Hook, Pennsylvania, and Claymont and Wilmington, Delaware, for supplying oil-burning vessels with fuel.

Coal bunkering.—Several companies are engaged in bunkering vessels with coal. Vessels as a rule are bunkered from barges while at their regular berths loading cargo. Greenwich Point and Port Richmond have large coal dumping facilities. There is a depth of 30 feet at these wharves.

Grain elevators.—Bulk grain is handled through two elevators which have a total capacity of 4,725,000 bushels. One is located on the Schuylkill River at Girard Point; the other at Port Richmond on the Delaware.

Storage warehouse facilities are adequate and are located in close proximity to the principal general cargo handling piers to which they have connection by railroad or motor truck.

Fresh water.—The supply of water for drinking purposes and for use in boilers is unlimited. Water for boiler purposes may also be pumped from the river anywhere in the harbor. The charge for drinking water at some railroad piers is $10 per vessel and at others $20 per vessel, regardless of the quantity taken. The charges at private piers vary, being a minimum of $10 at some and ranging from 25 cents to 50 cents per ton at others. The charge at municipal piers is 7 cents per ton. The charges for water supplied by water boat are as follows:

In stream, $1.25 per ton; minimum	$37. 50
Girard Point, $1.50 per ton; minimum	50. 00
Point Breeze, $1.75 per ton; minimum	62. 50
Marcus Hook, $2.00 per ton; mimimum	62. 50

Electric current is available at the piers.

Railroads.—Three important railroad systems and one belt line railroad serve the Port of Philadelphia, as follows: The Philadelphia & Reading , the Pennsylvania, the Baltimore & Ohio, and the Philadelphia Belt Line Railroad. The latter waterfront system is controlled by the city and is open to all the railroads on equal terms. All ocean and coastwise steamship lines have direct communication with one or more of the railroads serving this port.

Additional information concerning the facilities at the individual wharves in the

Port of Philadelphia can be secured from the publication *Port and Terminal Facilities at Ports on the Delaware River* prepared by the Corps of Engineers, United States Army.

Dry Docks and Marine Railways.—Much shipbuilding is centered in the Philadelphia area. In addition to the graving docks at the Naval Shipyard there is one yard which has one 645 feet long and 90 feet wide, capable of docking a vessel of 24-foot draft. Another, 412 feet long and 55 feet wide, has a capacity of 6,000 tons, draft 20 feet over a width of 45 feet, length 395 feet. (For additional data see under Camden.) One of the marine railways can accommodate a ship 288 feet long, and has a lifting capacity of 1,500 tons. There are numerous marine railways suitable for hauling out the smaller types of vessels.

Hoisting facilities.—Shipside mechancial hoisting facilities are located at a number of the piers; the capacity of the largest is 100 tons. Barges, equipped with A-frame derricks, maximum capacity 100 tons, are available.

Salvage and wrecking gear are available.

Airports.—Philadelphia has several landing fields. The largest is the Southwest Airport. The regular commercial airlines land here. The Philadelphia-Camden Central airport is 4.5 miles from the center of the city and located in Camden, New Jersey.

Tides.—The mean range of tides at Philadelphia is 5.4 feet. Daily predictions are given in the *Tide Tables, Atlantic Ocean* published annually by the Coast and Geodetic Survey.

Schuylkill River, emptying into Delaware River at the lower end of the city of Philadelphia and at the western end of League Island, is navigable to near the **Fairmount Dam,** 7.5 miles above the entrance. It is an important outlet for a part of the commerce of Philadelphia. There are large grain elevators and oil refineries at **Girard Point,** oil-refinery wharves opposite **Point Breeze** and at **Gibson Point,** and other industrial wharves along both sides of the river.

Channel.—The Federal improvement project in Schuylkill River provides for a channel 30 feet deep and 400 feet wide to Twenty-ninth Street, thence 30 feet deep and 300 feet wide to Passyunk Avenue, thence 26 feet deep and 200 feet wide to Gibson Point, and thence 22 feet deep and 200 feet wide to University Avenue.

Frequent shoaling occurs in many places along the sides of the channel and strangers should obtain local information as to conditions before navigating the river. The latest depths are published in tabular form in *Notice to Mariners*, and are also shown on *Chart 280*.

The channel in the Schuylkill River is crooked but is marked by an entrance range and by buoys as far as the Baltimore & Ohio Railroad bridge. Above this point *Chart 280* is the best guide. A light marks the outer end of the sunken jetty at the mouth. An electric siren is located on the wharf end at Fort Mifflin and a bell at the entrance to the river. A buoy off the mouth of ***Mingo Creek*** marks a rock with 8 feet over it.

Anchorage in Schuylkill River is prohibited except by permission of the commissioners of navigation.

Tides.—The mean range of tides is about 5½ feet.

Schuylkill Navigation Canal was a succession of short canals and slackwater pools following the course of the Schuylkill River from a point near Fairmount Dam, 7.5 miles above the entrance, to **Port Clinton,** a distance of about 80 miles. The lock at the dam has been filled in as well as much of the canal and there is now no navigation.

Bridges.—The following are the bridges below the dam crossing the Schuylkill

River, the distance in nautical miles above the entrance, the horizontal clearance of the openings, and the vertical clearance at MHW, when closed:

Penrose Avenue Ferry (highway, swing), 1.1 miles, 183 feet each, 18.2 feet.
Passyunk Avenue (highway, bascule), 3.0 miles, 200 feet, 33.8 feet.
Baltimore & Ohio Railroad (swing), 4.4 miles, 57 and 58 feet, 15 feet.
Grays Ferry Avenue (railroad, swing), 4.7 miles, 75 and 65 feet, 22.4 feet.
Grays Ferry Avenue (highway, swing), 4.7 miles, 75 feet each, 22.4 feet.
University Avenue (highway, bascule), 5.3 miles, 100 and 87 feet, 32.7 feet.
Pennsylvania Railroad (swing), 5.5 miles, 70 and 67 feet, 26 feet.
South Street (highway, bascule), 5.8 miles, 100 and 101.5 feet, 36.6 feet.
Walnut Street (highway, fixed), 6.2 miles, 113 feet, 99 and 95 feet, 21.7 feet.
Chestnut Street (highway, fixed), 6.3 miles, 160 feet, 32.3 feet.
Market Street (highway, fixed), 6.4 miles, 164 feet, 27.8 feet.
Market Street (railroad, fixed), 6.4 miles, 200 feet, 73 and 69 feet, 29.4 feet.
Arch Street (railroad, fixed), 6.5 miles, 172 feet, 38.2 feet.
Spring Garden Street (highway, fixed), 7.0 miles, 280 feet, 17.3 feet.

Bridge regulations prescribed for the drawbridges crossing the Schuylkill River require that they shall be opened at all times during the day or night to all vessels that cannot pass underneath them, if no person or vehicle passing over the bridge is then in the way or a railroad train is on the bridge or within 5 minutes of the schedule time of a passenger train. The signal is three blasts of a whistle or horn, to be answered from the bridge by two blasts if the bridge can be opened immediately, or one blast if the bridge cannot be opened immediately. The draw need not be opened for the passage of a tug or other craft equipped with a smokestack which can be lowered so as to permit passage under the closed draw.

League Island (lat. 39°53′, long. 75°11′), at the junction of the Delaware and Schuylkill Rivers, is the site of a **United States Naval Shipyard (Navy Yard)**. The basin on the north side of the island and its entrance from Schuylkill River have been dredged to a depth of 30 feet but has shoaled to 25 feet (September 1946) in the entrance. It has shoaled a lesser amount inside. The depths at the wharves are about 20 to 30 feet. The wharves on the south side of the island range in depth from 6 to 40 feet. There are protection lights on the radio towers and the crane on Pier 4.

A ferry connects League Island with National Park, New Jersey. A light and fog signal are on each of the ferry slips. The lights are 20 feet above the water. The fog signals are sounded on electric sirens.

Big Timber Creek, on the southeast side of Delaware River southward of Gloucester, has an improved channel; the project provides for a depth of 10 feet with various widths from the Delaware River to **Clements Bridge** at **Runnemede,** 6 miles above the entrance. In September 1946, the controlling depths were 11 feet from the Delaware River to the mouth, and thence 9 feet to Clements Bridge. The river is navigable at high water for about 8 miles to **Chews Landing.**

The channel is shoaling inside the mouth and care must be taken to follow the ebb-tide bends where the best water is found. Three buoys mark the edge of the dredged channel in the mud flats in the entrance.

Tugs and barges go to the chemical company and oil company wharves on the north side of the channel just inside the entrance. The depths alongside are 14 and 11 feet respectively. Above the mouth the creek is used only by pleasure boats. The wharves at **Westville** are in ruins. Two small boatyards are above the bridges at Westville. The railways are capable of hauling vessels 40 feet in length and of 3-foot draft. Minor repairs are made. Gasoline, fresh water and provisions are obtainable.

Four fixed bridges cross the creek; three at Westville, with a vertical clearance of 14.3 feet each at high water, least width of span of 33 feet in the railroad bridge; and a highway bridge at Runnemede with a vertical clearance of 8.8 feet at high water and two channel spans 60 feet wide.

Tides.—The mean range of tide at Westville is about 5 feet and at Clements Bridge about 4 feet.

Gloucester, a city on the eastern side of Delaware River opposite the lower end of Philadelphia, is the site of shipbuilding and manufacturing plants. The depths at the wharves are from 2 to 36 feet, the principal traffic being coal and building materials. During the ice season a signal station is maintained here by the Philadelphia Maritime Exchange.

The shipyard just northward of the mouth of Big Timber Creek has a marine railway capable of hauling vessels of 400 tons, 120 feet in length, and of 10-foot draft. All kinds of repairs can be made.

Newton Creek, on the eastern side of the Delaware River between Camden and Gloucester, is crossed by two fixed bridges and one bascule bridge near the mouth. The first bridge has a fixed span with a horizontal clearance of 20 feet and a vertical clearance of 6 feet at MHW. The upstream fixed bridge, the narrowest span, has a horizontal clearance of 6½ feet and a vertical clearance of 1.6 feet at MHW. There is about 30 feet of water in the mouth between the wharves of a shipbuilding company.

Camden is an important manufacturing and shipbuilding center opposite Philadelphia, and is connected with it by several lines of ferries, railroad car floats, and a highway suspension bridge. Although a separate municipality, many of the industrial and shipping activities of this port are closely allied to those of Philadelphia and regulations for the latter port are generally applicable. It is in the Philadelphia customs district. The South Jersey Port Commission, with headquarters at Camden, has jurisdiction over the New Jersey port districts bordering the Delaware River from Trenton to the ocean.

A completed project called for dredging in front of this port, to a depth of 18 feet from that depth north of **Cooper Point** to Berkley Street, thence 30 feet deep to Newton Creek, these depths extending from the 35-foot channel in Delaware River to 50 feet from the pierhead line. The latest examination indicates that the project depths are well maintained but shoaling in spots along the eastern border has taken place and the latest information should be obtained locally.

The depth of water at the Camden wharves is from a few feet to 38 feet. Two municipal wharves have depths up to 30 feet, and a third has a depth of 7 feet. Two railroad systems have good waterfront connections here.

Five large shipbuilding plants with deep water at their wharves are located here; four of them on Cooper Point, just northward of the bridge. The largest marine railway has a capacity of 2,000 tons, length 240 feet, beam 35 feet, 12 feet draft. (See under Repairs, page 106, for additional data.) Dry- and cold-storage warehouses are available.

The **Philadelphia-Camden highway bridge** has a clearance of 135 feet at MHW and a center span width of 1,686 feet.

Petty Island (lat. 39°58′, long. 75°06′), eastward of the main channel at the northern

end of the city of Camden, is 1.5 miles long and is the site of several industrial plants. There are oil-storage tanks near the center of this island and bunkering can be done at a wharf on its north side where there is a depth of about 28 feet alongside. The other wharves have about 12 to 18 feet.

Port Richmond anchorage, the buoyed area between the main channel and the island has been dredged, and had depths of from 21 to 32 feet in 1946.

The channel eastward of Petty Island is principally used by the traffic to and from Cooper River, and has a least depth of 15 or 16 feet at the westerly entrance, which is generally used and is easy of access with the aid of the chart. It is crossed by a railroad bascule bridge having a span width of 80 feet and 12 feet vertical clearance at MHW when closed. The regulations of the Schuylkill River bridges apply for this bridge, see page 137. The easterly entrance of the channel is a dredged cut 300 feet wide, with a least depth of about 10 feet between two buoys which mark the ends of spits bare at low water extending from Fisher Point Dike and the northeast end of Petty Island.

Fisher Point Dike, extending 0.7 mile west-southwestward from **Fisher Point,** shows well above high water and is sparsely wooded to the end. It formerly connected with the northeast end of Petty Island.

Cooper River, southward of Petty Island, has been improved by dredging a channel 12 feet deep and 70 feet wide across the flats at the mouth and 1.3 miles above the entrance. In September 1946 there was a controlling depth of 11 feet at mean low water to the Municipal Wharf at Camden. There is a depth of about 6 feet for a farther distance of about 1 mile to the dam, the head of navigation.

Vessels using the creek are tugboats, barges and pleasure craft up to 12 feet draft to the industrial plants in the lower part. Above the municipal wharf the river is reported to be shoaling and is little used. There are buoys at the entrance of the dredged channel. Above the entrance the best water follows a general mid-river course.

The municipal wharf has a depth of 8 feet alongside, the oil wharves 12 feet.

Marine railways.—Two boatyards are located on the river just inside the mouth. The marine railway on the western bank is capable of hauling out a boat 60 feet in length and of 5-foot draft. Gasoline, Diesel oil, and fresh water are available here. Repairs are made. The railway on the eastern shore can haul a boat 50 feet long, 3-foot draft. Boats are stored here.

Cooper River is crossed by six bridges between the entrance and the head of navigation. The first four, all within a distance of 1 mile from the mouth, are drawbridges, having a least draw width of 35 feet and a least vertical clearance of 4 feet at MHW when closed. The others are fixed bridges with a least width of 39 feet and a least vertical clearance of 5.8 feet at MHW.

Tides.—The mean range of tide is 5½ feet at Cooper Point, just outside the entrance.

The yacht club at **Pavonia,** about 0.4 mile northeast of the mouth of the Cooper River, has a marine railway capable of hauling out a vessel 40 feet in length and of 3-foot draft. Gasoline and fresh water are available.

Cramer Hill is the site of a shipbuilding plant. There are two floating drydocks. The larger has a lifting capacity of 600 tons, 200 feet maximum length on blocks and 13-foot draft. Repairs are also made.

Delaware River Above Philadelphia

CHART 296

The Delaware River is navigable for a distance of 24 miles above the Pennsylvania Railroad bridge at Philadelphia to the city of Trenton. It is crooked and has many bars and shoals, but has been improved by dredging.

The Federal improvement project provides for a channel 28 feet deep and 300 feet wide from Allegheny Avenue, Philadelphia, to the Delair Bridge of the Pennsylvania Railroad, thence 25 feet deep and same width as above to the upper end of the Marine Terminal at Trenton, N. J., and for a turning basin 500 feet wide at this upper end, and thence for maintaining the 12-foot deep and 200-foot wide dredged channel to Pennsylvania Railroad bridge at Trenton. As the dredged channels of this river are subject to considerable shoaling, the latest reports as to controlling depths should be obtained from the *Notice to Mariners* issued weekly.

In June-July 1946 the controlling depths in the mid-channel section for one-half project width were as follows: Fisher Point Range, 28 feet; thence to Delair, 25½ feet; thence to Delanco, 20½ feet; thence to Bordentown, 18½ feet; thence to Trenton Municipal Marine Terminal, 14 feet; thence to Railroad Bridge at Trenton, 8 feet. The channels are marked by buoys and by lighted ranges and are easily followed with the aid of the chart. This stretch of the river is also used extensively by yachts and is a favorite cruising ground. Except for coal barges and sand and gravel barges there is now little trade in this portion of the river.

The Pennsylvania Railroad bridge, crossing the river 1 mile above Petty Island, has a center pier swing draw, with openings 122 and 124 feet wide, with a vertical clearance of 50.8 feet at MHW under either the draw when closed or the fixed spans. The regulations of the Schuylkill River bridges apply for this bridge, see page 137.

Pensauken Creek, on the eastern side, 0.8 mile above the railroad bridge, has a depth of about 3 feet for a distance of 5 miles above the mouth, but is crossed by seven fixed bridges, which limit the navigation to barges and motor boats. The first six bridges have a limiting vertical clearance of 8.5 feet at MHW, and the other a vertical clearance of 3.8 feet at MHW.

The **Tacony-Palmyra bridge (lat. 40°01′, long. 75°03′)** crosses the river between the places of these names. It has a bascule span 240 feet wide and a vertical clearance of 53.6 feet at MHW when closed. The main fixed span is 520 feet long and has a vertical clearance of 64.5 feet at MHW. The regulations of the Schuylkill River bridges apply for this bridge, see page 137. Any vessel requiring the opening of Tacony-Palmyra bridge between the hours of 6 p. m. to 8 a. m. must give at least two hours' advance notice to the authorized representative of the owner of, or agency controlling the bridge.

Riverton is a town on the eastern side just above this bridge. There is a depth of 8 feet at the yacht-club wharf.

Bridesburg, Tacony, and **Torresdale** are parts of the city of Philadelphia, 1, 2.5, and 6 miles, respectively, above the railroad bridge. The sand and gravel wharf at Bridesburg has from 6 to 13 feet of water alongside and is much used by tugs and barges. The coal pier has a depth of 28 feet.

The yacht club at Tacony has a marine railway capable of hauling a boat 40 feet in length and of 4-foot draft. The float landing, where gasoline and fresh water can be obtained, has a minimum depth of 6 feet alongside. The yacht club at Torresdale has similar facilities at its float landing. There is a depth of 9 feet. The channel to the westward of Mud Island is much used as an anchorage by small yachts.

Frankford Creek, on the western side, 1.4 miles above the railroad bridge, has been dredged to a depth of 6 feet and width of 60 feet for 0.8 mile above the mouth, and has a controlling depth of 2 feet at the entrance, and then shoals to about 1 foot 0.5 mile upstream to the head of navigation 2 miles above the mouth. It is an open sewer creek with practically no boat traffic. It is crossed by two drawbridges within a distance of 0.5 mile from the mouth and by four fixed bridges between the upper drawbridge and the head of navigation.

The wharves on **Ten Mile Point** have 20 feet of water alongside.

Pennypack Creek, on the western side, 4.5 miles above the railroad bridge, has a depth of about 6 feet at high water to a fixed bridge 1 mile above the entrance. It is used by tugboats and barges of 6 feet draft. The **Philadelphia House of Correction** is on the south side.

The Philadelphia filter plant is on the western side of the river, 0.4 mile above the mouth of Pennypack Creek. A very tall chimney and a straw-colored cylindrical tower are prominent.

Dredge Harbor is a bight on the east side of the river about 0.5 mile southward of the mouth of Rancocas Creek. Formed by dredging operations, still in progress, it is used by tugs and barges and as an anchorage by pleasure boats. The entrance channel is marked by privately maintained, unlighted ranges and by a spar buoy. In September 1946 there was a controlling depth of 10 feet in the entrance channel. Inside the harbor the depths range from 7 to 15 feet with the exception of several spots which bare at low water. These are marked by oil drums.

The yacht basin and yard on the south side, just inside the entrance, has floats with depths of 7 to 9 feet alongside where gasoline, oil and fresh water can be obtained. The largest of the three marine railways will accommodate a vessel 50 feet in length and of 6-foot draft.

A second boatyard located at the eastern end of the harbor has a marine railway capable of hauling boats 60 feet long and of 5-foot draft. A machine shop is available.

Rancocas Creek, on the eastern side of the Delaware River, 5.5 miles above the railroad bridge, has been improved by dredging. The project provides for a channel 6 feet deep, 150 to 200 feet wide, from the Delaware River to Bougher (Centerton), 7 miles above the mouth; and thence 5 feet deep to Mount Holly, 13 miles above the mouth. In September 1946 there was a controlling depth of 8 feet in the river to the mouth; thence 7 feet to Bridgeboro; thence 6 feet to Bougher; and thence 0.3 foot to Mount Holly.

There is some tug and barge traffic, maximum draft 10 feet, as far as the coal wharf at Riverside. Beyond here pleasure boats are the only traffic.

The channel southwest of Hawk Island is marked by a lighted range and buoys. The channel of Rancocas Creek, above Bridgeboro especially, is very narrow and crooked, follows generally the ebb tide bends back and forth between shoals, and is difficult, even with local knowledge. The drawbridges crossing the creek below the fork are described with Delanco, Bridgeboro, and Bougher.

The channel from the fork to the town of Mount Holly, a distance of 4.5 miles, is bare in places at low water and has a depth of about 3 feet at high water. Eight fixed bridges with least span width of 15 feet and a least headroom of 5.5 feet at high water, cross the creek at Mount Holly.

There is a depth of 3 feet at low water in the ***South Branch*** to the town of **Hainesport,** 2.5 miles above the fork, and about 4 feet at high water for a farther distance of 2.2 miles to the town of **Lumberton.** Three bridges cross the South Branch at Hainesport. The lower highway bridge has a draw opening 46 feet wide

with headroom of 5 feet when closed. The other two are fixed with least span of 48 feet and least headroom of 15 feet.

Riverside is a town on the south side of Rancocas Creek, 1.2 miles above the entrance. It has several factories but little business by water.

Delanco is a town on the north side of Rancocas Creek, 1.5 miles above the entrance. There are wharves on both the Delaware and Rancocas River waterfronts. They are, however, in poor condition and little used. There is a railway here capable of hauling out boats of 50 feet length and 5 feet draft. Two center-pier swing drawbridges cross Rancocas Creek between Delanco and Riverside. Each opening in the highway bridge is 50 feet wide and in the railroad bridge 43 feet, with vertical clearances of 4 and 5 feet, respectively, at MHW when closed.

Bridgeboro is a village on the south side of Rancocas Creek, 3 miles above the mouth. A bascule bridge, with opening 60 feet wide and a vertical clearance of 8.6 feet at MHW when closed, crosses the creek at this point.

Bougher is a village on the south side of Rancocas Creek, 7 miles above the mouth. A bridge having a center-pier swing draw with a width of 50.5 feet in the south opening crosses the river at this point. The headroom at high water when the draw is closed is 6.1 feet. The north opening is shoal.

Hawk Island is a marshy island, wooded in the center, at the junction of the Delaware River and Rancocas Creek.

Mud Island, 0.5 mile northward of Hawk Island, is a mud flat covered with marsh grass in summer and is partially submerged at high water. A channel with a controlling depth of about 9 feet leads around the northwest side. The southern end of this channel is much used as a small-boat and yacht anchorage

The yacht club at **Cornwall Heights,** about a mile above Mud Island, has a float landing with a depth of 10 feet alongside. Gasoline, Diesel oil and water are available. Yachts in considerable number anchor toward the southern shore clear of the channel.

Beverly (lat. 40°04′, long. 74°55′) is a city on the eastern side, 9 miles above the railroad bridge at Philadelphia. A black standpipe is prominent.

Edgewater Park is a settlement of summer residences along the high bank eastward of Beverly. There are no wharves except for small motor boats.

Neshaminy Creek, on the northern side, 0.8 mile east-northeastward of the standpipe at Beverly, has a controlling depth of 8 feet from the mouth to the first highway bridge, thence about 3 feet to the third bridge 1.2 miles above the mouth. It is used by barges and by pleasure boats and is crossed by three fixed bridges. The least headroom at high water is 9.5 feet.

There are two boat repair yards about one mile above the mouth. The yard southward of the highway bridge has a railway capable of hauling a boat 45 feet in length and of 4-foot draft. The landing has 9 feet alongside and gasoline and fresh water are available. The upper yard has a railway which can accommodate a boat 36 feet long and of 4-foot draft.

Burlington is a city on the southern side of Delaware River, 12 miles above the railroad bridge at Philadelphia. It has several industrial plants, and at one time had considerable trade by water in steamers and barges, the deepest draft being 15 feet. There is a depth of about 12 feet at the public wharf, which is in poor condition, 400 yards westward of a broad standpipe. The city is connected with Bristol by a vertical lift bridge with center span width of 500 feet; the vertical clearance at MHW, with lift span down, is 62.3 feet, and up, 134.7 feet. The regulations of the Schuylkill River bridges apply for this bridge, see page 137.

Burlington Island, just north of the city of Burlington, is high and sparsely wooded. The center of the island is occupied by a pleasure park (Burlington Island Park). There is a float landing on the northwest side opposite Bristol with a depth of about 8 feet at the end, at which motor boats land.

The channel southeastward of the island has a controlling depth of 7 feet, being shoalest at the upper end. Vessels of 12 to 15 feet draft use the lower end as far as a pipe foundry, 0.8 mile above the entrance, and to the oil wharf about 0.3 mile beyond. The upper end is used only by motor boats. The foundry wharf has about 17 feet alongside. The oil wharf has 13 feet. A dredging project calls for an auxiliary channel 20 feet deep and 200 feet wide east of the island extending from the main ship channel in the river to the upper end of the pipe foundry property. The controlling depth in September 1946 was about 13 feet.

Bristol is a town on the northwest side of the river, 13 miles above the railroad bridge at Philadelphia. It was the terminus of the ***Delaware and Lehigh Canal,*** but the entrance formerly connecting with the Delaware River is now filled in, and the canal is abandoned. The wharves at the upper end of the town are in ruins. The town landing, near the southern end of the waterfront, has about 14 feet alongside but is dangerous to approach because of broken piling. A motorboat passenger ferry runs from here to the landing on Burlington Island.

The yacht club near the northern end of the town has a float landing, depth 12 feet, where fresh water and gasoline can be obtained. The marine railway will accommodate a 40-foot boat of 4-foot draft.

Florence is a town on the south side of the river, 16 miles above the railroad bridge at Philadelphia. There is a large pipe foundry on the point at the bend of the river. The bulkhead wharf has about 13 feet alongside.

Money Island, abreast the eastern end of Florence, is a wooded marsh. The channel northward of the island is bare at low water.

Roebling is a town established in connection with a large wireworks 17.5 miles above the railroad bridge at Philadelphia. There is a depth of about 11 feet at the pumphouse intake and 11 feet at the wireworks wharf, 400 yards above.

There is considerable dredging for sand northward of the dredged channel off Newbold Island.

Newbold Island, 18.5 miles above the railroad bridge at Philadelphia, is high and sparsely wooded, and has a house on the northwest side. The **Kinkora Dike** extends 300 yards westward from the lower end. The channel eastward of the island is nearly bare at low water. The northern end is filled with vessels in process of being scrapped.

A boatyard is just inside the northern entrance to the channel eastward of Newbold Island. The channel from the river has a depth of 9 feet. The marine railway can accommodate a vessel of 100 tons, 100 feet long and 9-foot draft. There is a machine shop and general repairs can be made. Gasoline is available.

Fieldsboro (White Hill), is a town on the high bank on the east side of the river 0.7 mile above the upper end of Newbold Island. There are factories and a railroad yard close alongshore at the foot of the bank. The bulkhead landing, now in poor condition, has a depth of 10 feet alongside.

Bordentown is on the high bank on the east side of the river, 21 miles above the railroad bridge at Philadelphia. It was formerly the outlet to the ***Delaware and Raritan Canal,*** which is now closed. There is a depth of 4 feet in the entrance to ***Crosswick Creek*** and in the channel as far as the railroad bridge, and from there about 3 feet to 3 miles above the mouth, but the channel is crooked and difficult. The

bottom is soft. There are six fixed bridges in this creek for a distance of about 3.5 miles above the mouth, having a least span width of 19.8 feet and least vertical clearance at MHW of 5.5 feet.

Two yacht clubs are located on the east side of Crosswick Creek below the railroad bridge. The float landings are in a depth of 4 feet.

The dredged channel from Bordentown to Trenton is well marked by buoys and range lights, and is easily followed. Four remaining piers of an unfinished railroad bridge are located in the river about 1.5 miles below the Pennsylvania Railroad bridge at Trenton. They are above high water about 15 feet, and on the edge of, but not obstructing, the present dredged channel, which is 300 feet wide. The overhead cable crossing just above them has a vertical clearance of 167 feet.

There are two oil company piers at **Duck Island** with about 10 feet alongside. The remains of a third oil wharf, downstream from the other two, covers at high water and must be guarded against in coming to the lower pier. To approach the piers pass close to the eastward of buoy 12. In September 1946 there was a controlling depth of only 4 feet to the piers.

Trenton, at the head of navigation, 24 miles above the railroad bridge at Philadelphia, has a bulkhead terminal (**Trenton Municipal Marine Terminal**) at the lower end of the city. The upper end of the 25-foot project channel opposite the marine terminal has a width of 500 feet to provide turning room for vessels.

A dredged channel 200 feet wide with a project depth of 12 feet leads above the terminal along the waterfront to the railroad bridge, which is the limit of navigation. There are rapids above the bridge. There is a depth of 10 feet at the old city wharf and at the oil company wharf near the bridge, and 25 feet at the marine terminal. Vessels drawing 25 feet have berthed at the terminal but there has been little traffic in recent years. It is now leased for storage purposes.

Trenton is the capital of the State of New Jersey, and is a large manufacturing center. It is important for its iron and steel products, pottery, textiles, rubber goods and the like.

Pilotage service between Philadelphia and Trenton is performed by the Pilots' Association of the Bay and River Delaware, at a charge of $35.00 each way. Tugs are not ordinarily required for the docking and undocking of ships at Trenton.

Tides.—The mean range of tide is about 5½ feet at Bridesburg and about 6 feet from Burlington to Trenton.

Ice.—The river above Philadelphia is generally closed to navigation by ice for extended periods during January and February, and during severe winters navigation is practically suspended during these months. Ice seldom forms before January.

Freshets.—During March and April freshets of from 10 to 20 feet in height above mean low water may be expected at Trenton. The highest water level is reached during the breaking up of the ice in the spring, and rain freshets do not ordinarily cause a height of over 9 feet above mean low water. Unless accompanied by ice, freshets are not ordinarily dangerous to shipping. The highest freshet on record, occurring in 1903, reached a height above low water of 21.6 feet at Trenton, 19.6 feet at Bordentown, and 12.8 feet at Bristol.

CHAPTER 6

Chesapeake and Delaware Canal

CHART 570

THE ***Chesapeake and Delaware Canal*** is 12 miles long from its eastern entrance at Reedy Point on the Delaware River to its western entrance at Chesapeake City on ***Back Creek***. It is a Government-owned, sea-level canal. No tolls are charged The overhead clearance is limited to 135 feet at MHW by the vertical lift bridge near Reedy Point.

The Federal project provides for a sea-level channel, to accommodate vessels drawing 25 feet, with a depth of 27 feet and a width of 250 feet from the Delaware River to Elk River and thence 400 feet wide down Elk River and Chesapeake Bay to deep water at or near Pooles Island; an anchorage and mooring basin in Back Creek about 400 feet wide, 1,000 feet long, and 12 feet deep; entrance jetties at Reedy Point.

In June 1947 the controlling depth through the dredged channel was 24½ feet.

Information concerning the conditions existing in the canal at any particular time, and authority for wide craft and rafts to traverse the waterway should be obtained from the U. S. Engineer Sub-Office, Chesapeake City, Maryland, telephone Chesapeake City 2621. Circulars are issued monthly showing channel conditions from the latest examinations and surveys and copies will be mailed to interested parties upon request to the District Engineer, United States Engineer Office, Philadelphia, Pennsylvania. The latest conditions are also published in *Notice to Mariners*.

The Delaware River entrance to the canal is at **Reedy Point (lat. 39°34′, long. 75°34′)**, about 1.7 miles below Delaware City. The entrance is between two stone jetties about 800 feet apart at the outer ends, and the channel is midway between them. The south side of the entrance channel to the canal from the Delaware River has been widened on an angle of about 024°. The maximum entrance width at the ship channel on New Castle Range in the Delaware River is 1,800 feet, narrowing to the normal channel width of 250 feet, 1,000 feet east of the end of South Jetty. The north jetty is marked by a light, shown from a red skeleton tower and tank house, and a lighted bell buoy which lies at the north point of the entrance channel. A fog signal is sounded on a bell at the north jetty light. A lighted bell buoy marks the south point. The south jetty is marked by a light, shown from a white skeleton tower and tank house. The entrance is also marked by a lighted range. The front range light is shown from a black pile with cage work at the top. One light is 20 feet above the water and shows only on the range line; a second light on the same structure is 15 feet above the water

and shows around the horizon. The rear range is 75 feet above the water on a white pole. The lights are west of Reedy Point Bridge.

The ***Delaware City Branch Canal,*** leading from Delaware City to the main canal has a project depth of 8 feet for a width of 50 feet. The point of junction of these canals is about 2 miles west of the Delaware River. In September 1946 the controlling depths were: From Delaware River about 5 feet to the bulkhead at Delaware City and thence 2 feet to the main canal.

This branch canal is crossed at Delaware City by a double leaf bascule bridge having a horizontal clearance of 60 feet and a maximum vertical clearance of 6.7 feet at MHW when closed. This bridge is only open for passage of vessels between the hours of 8:00 a. m. and 4:00 p. m., Eastern Standard Time, except Sundays. Two hours' advance notice is required. The branch canal has now little traffic.

Tides.—The normal range of tide is about 5 feet at the Delaware River end of the canal, and about 2½ feet at the Chesapeake City end. Daily tide predictions for Reedy Point, together with differences for other places in the canal, are given in the *Tide Tables, Atlantic Ocean,* published annually by the Coast and Geodetic Survey.

The set of the flood tide is from Chesapeake Bay toward the Delaware River, and there is a difference of about two hours in the times of tide at each end of the canal. The heights of high and low tides are greatly changed by winds at times. During a violent northeast storm the high tide may rise to 9 to 10 feet above zero throughout the canal, and during a westerly storm the low tide may fall to zero or lower at Chesapeake City, and to 1.0 or 1.5 feet below zero at Reedy Point; all references being to canal datum. Staff gages, with zeros set at canal datum, have been installed at numerous places along the canal, including both ends and at the bridges. Local mean low water at the mouth of Back Creek is about +2.0 feet on the canal datum; it increases to +2.2 feet at **Bethel,** and then decreases gradually eastward, being +0.9 feet at Delaware River.

Currents.—The daily predicted times of slack water and the times and velocities of eastward and westward strengths are given in the *Atlantic Coast Current Tables* published annually by the Coast and Geodetic Survey. The velocities at strength of current usually are between 1½ and 2½ knots. Storms may increase these velocities to 3 or more knots. Under such conditions tows usually have difficulty in making headway against the current. At times there is considerable current across the jettied entrance which must be guarded against, especially when passing other vessels.

Ice sufficient to interfere with the navigation of small craft may be expected at any time between December and April and is most severe during January and February. The Chesapeake and Delaware Canal is kept open as long as navigation is possible and is opened as soon as navigation is possible in the spring. During mild winters local vessels use it throughout most of the winter, but strangers should make inquiries about conditions before attempting the passage. It should be borne in mind that wooden vessels running in thin ice are liable to cut quickly through the water line.

Distances through the canal are shown on channel markers at 500 foot intervals and are measured westward from station 0+000 in the Delaware River.

Tie-up facilities.—Tie-up dolphins are available on the north side of the channel about half a mile east of Reedy Point Bridge, and about 1 mile west of Chesapeake City Bridge. Tie-up dolphins are also available on each side of all the bridges, but are for use in emergencies only. There is an anchorage basin for small craft on the south side of the canal at Chesapeake City. In December 1946, the controlling depth was

7½ feet in the basin. Information regarding the use of these facilities may be obtained by telephoning the canal office, Chesapeake City 2621.

Bridges.—Three highway bridges cross the canal at Reedy Point, **St. Georges,** and **Summit;** and one railway bridge crosses at **Canal Station.** Three bridges are vertical lift with a minimum clearance of 135 feet above MHW when open. The other is fixed with a vertical clearance of 135 feet. When closed, the vertical clearances above MHW are as follows: Reedy Point Bridge, 6 feet; St. Georges Bridge, 135 feet; Pennsylvania Railroad Bridge, 45 feet; and Summit Bridge, 67 feet.

Operators of small craft should be familiar with the vertical clearance required by their craft, as well as the vertical clearance afforded by the canal bridges in their closed position in order to eliminate delays to themselves and unnecessary bridge lifts.

To effect proper compliance with the existing regulations covering speed limits, every vessel of 500 deadweight tons or over when approaching a bridge shall stop its engines at the "Blow for Bridge" sign, located 5,000 feet from the bridge. The vessel may then proceed under full control, to the second sign, 2,000 feet from the bridge. If the red light is still showing at this point, the ship will stop or tie up until the green light is shown.

The **signal** for the opening of a bridge shall be three blasts of a whistle or horn blown by the vessel or craft desiring to pass. If the span is to be raised immediately the bridge tender will reply with one blast of a whistle or horn. If the span is not to be raised immediately the bridge tender will reply with two blasts of a whistle or horn. Four blasts of a whistle or horn will be blown by the bridge tender to indicate that the bridge is open to navigation and that the vessel may proceed.

The foregoing horn or whistle signals by the bridge tender will be supplemented by the following lights shown at the center of the drawspan in addition to and above the navigation lights referred to below:

Flashing red light: Vessel must stop and tie up before reaching bridge.

Flashing amber light: Delay approach until vessel coming from opposite direction clears the bridge.

The navigation lights at the center of the drawspan, prescribed by the Coast Guard, will show:

Fixed red light: Bridge closed to navigation, vessels unable to pass under closed drawspan must be kept under control so they can be stopped if necessary.

Fixed green light: Bridge open to navigation, vessels may proceed.

Ferry.—A ferry transits the canal at Chesapeake City.

Traffic regulations.—Vessels requiring a pilot under existing statutes may be handled through the canal by any pilot, duly licensed for this waterway by the Office of Marine Inspection, U. S. Coast Guard, and approved for the District Engineer by the Canal Superintendent. Pilots will be approved upon satisfactory completion of at least three trips through the canal during the past 12 months.

Except as provided below, vessels of 25-foot draft or less may transit the canal at any time under the following conditions:

Vessels under 250 feet in length between perpendiculars may transit the canal without prior arrangements.

Vessels 250 feet in length between perpendiculars and over must make prior arrangements for specific trips with the dispatcher.

Traffic is dispatched through the canal, subject to conditions of tide, weather, and vessels already en route, so that vessels 325 feet in length between perpendiculars or over will not pass each other in the canal between Reedy Point and the tie-up dolphins opposite Grass Point, Maryland.

No vessel having a greater draft forward than aft will be permitted to enter the canal.

Vessels having a draft greater than 23 feet, regardless of length, and all vessels requiring tug assistance may transit the canal during daylight hours only. Such vessels when eastbound must enter the canal in time to clear Reedy Point Bridge, and westbound vessels the Chesapeake City bend, before dark.

Consideration is being given to improving navigation aids and lighting in the canal to provide safer navigation for larger vessels at night. Pending completion of these studies and subject to the conditions set forth above, vessels over 300 feet in length between perpendiculars, in good condition, and in charge of an experienced pilot may be permitted to transit the canal at night by making prior application for each trip, by telephone or telegraph, to the Canal Superintendent before the vessel leaves port, furnishing the name, type, dimensions and draft of the ship, and the name of the pilot. If these data are satisfactory, the superintendent may grant tentative permission for night passage subject to local conditions at the canal, including weather, tide, and traffic en route or at hand. The local conditions will determine final clearance for each ship, which will be given at the canal entrance. In all cases, the superintendent's decision shall be final.

All vessels, regardless of length or draft, whether light or loaded, that are known to have handled badly on previous trips or are observed by the pilots to be difficult to handle, may transit the canal during daylight hours only and must have tug assistance through the bridges. Such vessels must obtain permission to transit the canal from the dispatcher at Chesapeake City and must be provided with the number of tugs specified by the Canal Superintendent before entering the canal. Agents must make their own arrangements for tugs to meet the above requirements.

The granting of permission for any vessel to proceed through the canal, either by day or night, with or without tugs, shall not relieve the owners, agents, and operators of said vessel of full responsibility for its safe passage.

Masters or pilots of vessels intending to transit the canal, whether anchored or under way, will under no circumstances enter the canal until after they have been contacted by the U. S. Engineer Patrol Boat stationed at the canal entrance.

The master of every vessel 200 feet or more in length between perpendiculars shall report to the dispatcher the name of the pilot handling the vessel through the canal.

Traffic control.—A patrol boat is on duty at all times at each end of the canal. All orders in aiding and directing traffic and any enforcement of regulations will be issued by the Dispatcher at Chesapeake City through the patrolmen operating the patrol boat. Each boat is reported as it enters the canal and a log of its name, length, beam, draft, and speed of travel is kept, and the dispatcher, with this information and knowledge of the tide and channel conditions, is able to dispatch traffic safely.

Navigation in and through the Chesapeake and Delaware Canal shall be governed by the following system of traffic control lights: These lights, which are of fixed type, are located on the outer end of the North Jetty at the eastern entrance to the canal; at **Lorewood Grove** about one mile east of the Pennsylvania Railroad Bridge; on the south bank of the canal, approximately one mile west of Chesapeake City.

Green light: Canal open to navigation.

Amber light: Caution. Traffic restricted.

Red light: Canal closed to traffic. Vessel must stop.

Speed limits.—No vessel in the canal shall be raced or crowded alongside another, nor shall it be moved at such a speed as will cause excessive wash. Speed shall be kept

at a minimum consistent with safe navigation. All vessels, in passing other vessels, mooring dolphins, landings, wharves, dredging plant, other working craft, or bathers shall proceed cautiously to avoid wave and suction damage. Upon approaching any bridge the speed of vessels shall be so regulated that they will be under full control and, in the event that the span cannot be raised immediately, be able to stop in order to tie up to the emergency dolphins.

All vessels are requested to navigate between Courthouse Point and Turkey Point at a speed not to exceed 8 miles per hour, in order to avoid damage by wave wash or suction to wharves, landings or boats, or injury to bathers.

Passing in canal.—Large vessels and tows must not overtake and attempt to pass other large vessels or tows in the canal.

Right-of-way.—When meeting in the canal, all vessels proceeding with the tide shall have the right-of-way over those proceeding against the tide.

Tows.—Barges or other vessels not self-propelled, in tow on a hawser or bridle through the Chesapeake and Delaware Canal, shall be towed abreast and not in tandem. Vessels towed abreast shall not have a combined beam of more than 105 feet.

Rafts.—All tows of rafts must, before entering the canal, tie up and be inspected by a representative of the United States Engineer Sub-office at Chesapeake City, Maryland; Telephone Chesapeake City 2621.

Such tows will be allowed in the canal only during daylight hours, and must not exceed 45 feet in width or 800 feet in length. Pontoon rafts exceeding 200 feet in length must be accompanied by two tugs, one forward and one aft, so that the tow can be kept strung out behind the forward tug and on the proper side of the channel. All rafts must be accompanied by sufficient crew to properly care for them during transit, to see that they are secure when tied up, and properly lighted at night.

Chesapeake City (lat. 39°32′, long. 75°48′) and post office, on the canal at the western end, is much frequented by pleasure boats passing through the canal. Supplies, some ship chandlery, gasoline and fresh water can be obtained at the landings. The landing on the north shore just westward of the ferry slip has depths of from 17 to 20 feet alongside; the landing on the south side, about 0.3 mile farther westward, has a depth of 6 feet alongside. There is a small marine railway here.

The boatyard at the mouth of ***Long Creek*** has two marine railways; the larger is capable of hauling a vessel of 500 tons, 150 feet in length, and 12-foot draft. Repairs can be made.

CHAPTER 7

Cape Henlopen to Cape Charles

CHART 1109

FROM Cape Henlopen the coast trends southward for 21 miles to Fenwick Island Light, then south-southwestward for 90 miles to Cape Charles. The coast is a chain of low sand beaches backed by bays, rivers, and creeks which are bordered by marsh and woodland. Broken ground fringes the coast and depths of 6 fathoms or less are found as far as 12 miles from shore.

Visible from seaward are the summer resorts of Rehoboth Beach, Bethany Beach, and Ocean City, all within 30 miles of Cape Henlopen. South of Ocean City the light structures and Coast Guard stations are the most prominent marks.

There are no harbors of refuge for deep-draft vessels between Cape Henlopen and Cape Charles. The inlets are subject to frequent change and their use requires local knowledge.

The bays and connecting channels back of the barrier beach form a continuous inland waterway from Delaware Bay to Chesapeake Bay. However, Assawoman Canal and Little Assawoman Bay are now only navigable for rowboats.

Fish traps along the coast from Cape Henlopen to Cape Charles are limited by regulation to certain areas. Limits of the areas are shown on Charts 1219 to 1222. Numerous pile remains of former fish traps are reported to be a menace to navigation.

Tides.—The mean range of tide along the outside coast varies from about 3½ to 4 feet, and high and low waters occur at approximately the same time as at Sandy Hook.

In the inland waterways the tides are greatly affected by winds both in time and height, westerly winds producing low water and easterly winds high water. In Assawoman, Isle of Wight, Sinepuxent, and Chincoteague Bays northerly and southerly winds drive the water to the ends of the bays. With strong winds of long duration the change in depth may be as much as 3 feet above or below the normal high or low water, respectively, and the time of high or low water may be accelerated or retarded by more than an hour.

In the Lewes and Rehoboth Canal the range of tide opposite Rehoboth Beach is said to be ½ foot. At the bridge across Indian River Inlet the range is 2½ feet as compared with 4 feet outside the entrance. It is probable that there is little, if any, periodic tide in Assawoman Canal.

It is reported that the range of tide in the waters inside Ocean City Inlet is about ½ to 1 foot. From there to the north end of Chincoteague Bay the variation in level is due mostly to winds.

The mean range of tide in Assateague Cove and in the entrances to the inlets southward is about 4 feet. Along the inside waters between Chincoteague Inlet and Cape Charles the mean range is about 4 feet and high and low waters occur from 30 minutes to 1 hour after high and low waters at the inlets, depending on the distance from the nearest inlet.

Currents.—The currents have considerable velocity in the inlets and in the narrow channels connecting the inlets with the adjacent bays and sounds. No observations are available, but it is estimated that current velocities of as much as 3 knots may be experienced at times in places of maximum velocities.

Ice.—The inside waters northward of Chincoteague Bay are usually closed to navigation by ice during ordinary winters. From Chincoteague Bay southward the waters tributary to the inlets are closed by ice during severe winters, but remain so for only short periods of time. The principal inlets are rarely closed by ice and are used by local boats throughout the winter.

Navigational aids.—The more important of the navigable inlets are marked by buoys, but the channels are shifting and the buoys cannot always be depended upon. Breakers form on the shoal areas even in ordinary weather and are a good guide. Some of the more important interior channels are marked by daybeacons and lights, but most of them are marked only by bush stakes maintained by local authorities. The sloughs leading through mud flats can best be followed at low water when the shoals are visible.

Cape Henlopen to Fenwick Island Light

CHART 1219

Cape Henlopen and vicinity have been described in Chapter 5.

Rehoboth Beach (lat. 38°43′, long. 75°05′), a summer resort 5 miles south of Cape Henlopen, has rail and bus communication with Lewes and the interior. A coastal highway runs south to Ocean City, Maryland. A standpipe and water tank, close together, and a large hotel are prominent marks.

Dewey Beach is a small summer resort just south of Rehoboth Beach.

The ***Lewes and Rehoboth Canal,*** linking Rehoboth Bay with Delaware Bay, has been described in Chapter 5. The controlling depth in the canal from Lewes Turning Basin to Rehoboth Bay was 6 feet in March 1946. The canal passes west of Rehoboth Beach and enters Rehoboth Bay between stone jetties, the easterly of which has a light on its south end. Gasoline, provisions, and water can be obtained at Rehoboth Beach.

The canal is crossed at Rehoboth Beach by two bascule highway bridges 0.4 mile apart. The northerly bridge has a vertical clearance (closed) of 17 feet at high water and a horizontal clearance of 49 feet. The southerly bridge has a vertical clearance (closed) of 14 feet at high water and a horizontal clearance of 50 feet.

Rehoboth Bay has depths of 4 to 7 feet and is frequented by boats of 3- to 4-foot draft. From the jetties the best water passes about 0.5 mile east of **Piney Island,** then about 300 yards northeastward of marshy **Bluff Point.** About 4 feet can be carried to this point.

Close southeastward of Bluff Point is a large marshy island with an old house in the center and a cedar thicket on the east end. The southward passage may be made either through the cut on the west side of the island or around the east and south sides. The cut is probably a little the deeper of the two routes but neither has over 2 feet of water through it.

The channel then passes through ***Big Ditch,*** which is between **Middle Islet** and **Long Neck,** and into Indian River Bay. Middle Islet, marked by a single tree and a shanty, is between **Burton Island** and Long Neck.

Love Creek, at the northwest corner of Rehoboth Bay, is navigable for small boats to a mill dam near the village of **Robinsonville,** 3.5 miles above the mouth. A fixed highway bridge 2 miles above the mouth has a vertical clearance of 7 feet at high water and a horizontal clearance of 18 feet. The controlling depth to the bridge is about 2 feet.

Herring Creek, which empties into the southwest corner of Rehoboth Bay, is navigable for a draft of about 2½ feet to the forks 2 miles above the mouth, and for a lesser draft for a short distance up either fork. It is little used. **Angola** is a post village near the head of navigation.

Indian River Bay has general depths of 2 to 7 feet and is crossed by shallow-draft boats making the inside passage. About 2 feet can be carried across the bay behind the shoals at Indian River Inlet and into White Creek to the entrance to Assawoman Canal.

Indian River, at the western end of the bay, has a depth of 2 feet in midchannel to the dam at **Millsboro,** 5.5 miles from the mouth. Millsboro has rail communication. There are two wharves at **Oak Orchard,** on the north side of the entrance to Indian River.

Pepper Creek and ***Vines Creek,*** on the south side of the western end of Indian River Bay, have depths of 1 to 2 feet for about 1.5 miles above their junction; they have several farm and mill landings.

Indian River Inlet, about 11 miles south of Cape Henlopen, is an opening through the barrier beach separating Indian River Bay from the Atlantic Ocean. The entrance is between stone jetties.

Landmarks for the inlet are two high transmission towers and a Coast Guard lookout tower, the latter on the north bank. A swing highway bridge 0.2 mile inside the entrance has a vertical clearance (closed) of 10 feet at high water and a horizontal clearance of 58 feet. The best water in the approach to the inlet is marked by a lighted bell buoy. The channel is subject to change by storms.

A Federal improvement project provides for the fixation of Indian River Inlet by the construction of two parallel jetties extending to approximately the 14-foot depth curve in the ocean, and for dredging an entrance channel 15 feet deep and 200 feet wide for a distance of 7,000 feet inshore from the jetties; thence a channel 9 feet deep, 100 feet wide in Indian River Bay and 80 feet wide in Indian River, to and including a turning basin 9 feet deep, 175 feet wide and 300 feet long at Old Landing; thence a channel 4 feet deep and 60 feet wide to Millsboro.

In June 1945 a depth of 6 feet could be carried through the inlet to the Coast Guard wharf 0.6 mile west of the bridge, thence 2 feet (March 1946) with local knowledge into Indian River Bay.

Just west of the Coast Guard wharf is the entrance to ***Indian River Yacht Basin*** which is about 400 yards in diameter and is between Burton Island and the outer beach. In April 1947 the channel to the basin was being dredged to a depth of 6 feet. Gasoline,

water, and ice can be obtained on the large wharf on the east side of the basin and provisions are obtainable nearby. There is bus service which makes connections for all points.

White Creek, on the south side of Indian River Bay, is about 2 miles long and has a depth of about 3 feet to **Ocean View,** a village at its head. Gasoline, provisions, and water can be obtained at Ocean View. A small marine railway is at the village.

Assawoman Canal connects White Creek with the north end of Little Assawoman Bay. The canal originally had a controlling depth of 4 feet but has shoaled to a depth of about ½ foot and is rarely used except by rowboats. The U. S. Engineers consider the Assawoman Canal project as in an abandoned status. The canal is crossed by three fixed highway bridges, the minimum clearances of which are 4½ feet vertically at high water and 12 feet horizontally.

Bethany Beach is a summer resort 4 miles south of Indian River Inlet. A privately dredged channel leads from Assawoman Canal eastward through the south side of ***Salt Pond*** to a point near the outer beach. It has a depth of about 1 foot.

Little Assawoman Bay has depths of 2 to 4 feet in places but is bare in others and is little used. ***Miller Creek*** and ***Dirickson Creek,*** on the west side of the bay, have depths of about 1½ feet.

Fenwick Island Light to Chincoteague Inlet

CHART 1220

Fenwick Island Light (lat. 38°27′, long. 75°03′), 83 feet above the water and visible 15 miles, is shown from a white tower on the outer beach. The light structure is just north of the boundary line between Delaware and Maryland.

Fenwick Shoal, 6 miles eastward from the light, has a least found depth of 14 feet, but less water may be found over the two sunken wrecks just westward of the highest part of the shoal. A lighted whistle buoy marks the southwest end of the shoal, and a second lighted whistle buoy is moored 8 miles southeastward of the shoal. Deep-draft vessels normally pass to eastward of the outer buoy.

A lighted bell buoy marks a wreck 3.8 miles 075° from Fenwick Island Light.

Isle of Wight Shoal, 7 miles 120° from Fenwick Island Light, has a least known depth of 21 feet and is marked on its west side by a horizontally-banded buoy. A 24-foot shoal is about midway between Isle of Wight Shoal and Fenwick Shoal.

Maryland Beach is a small summer resort just south of Fenwick Island Light.

A narrow thoroughfare 0.4 mile west of Fenwick Island Light links Little Assawoman Bay with Assawoman Bay and has a least depth of about 6 feet. A fixed highway bridge across the thoroughfare has a vertical clearance of 12 feet at high water and a horizontal clearance of 32 feet. The highway leads to **Bayville,** a village about 2 miles northwest of the light.

Assawoman Bay and ***Isle of Wight Bay*** form a continuous lagoon from Fenwick Island Light to Ocean City. They have depths of 4 to 6 feet along their western sides and are frequented by pleasure boats from Ocean City. The channel from Isle of Wight Bay to Ocean City is discussed in connection with Ocean City Inlet.

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Roy Creek and ***Greys Creek,*** on the west side of Assawoman Bay, have depths of 3 feet nearly to their heads but are little used.

St. Martin River, on the northwest side of Isle of Wight Bay, has a depth of 3 feet to the fork 3.5 miles above the mouth and a depth of 1½ feet for 2.5 miles farther to **Bishopville,** a post village at the head of navigation on the north branch. The west branch is said to be navigable for small boats for 1.5 miles.

Ocean City is a summer resort at the south end of **Fenwick Island,** 7 miles from Fenwick Island Light. Two elevated tanks and several hotels are prominent landmarks. Ocean City is frequented by many small boats during the summer and is the shipping point for a large amount of seafood and produce. Gasoline, water, and provisions can be obtained at Ocean City. There is rail communication at the mainland and highway communication both west and north. Three marine railways are operated at the resort; the largest can haul out boats 75 feet long with 8-foot draft and can make major repairs.

Little Gull Bank, 3 miles southeastward of Ocean City, has a least known depth of 15 feet and is marked at its southwest end by a horizontally-banded buoy.

Great Gull Bank, 5 miles southeastward of Ocean City, has a least known depth of 17 feet at its southwest end and is marked by a lighted whistle buoy at its northeast end. Midway between Great Gull and Little Gull Banks is a wreck covered 26 feet.

Ocean City Inlet, between Fenwick Island and **Assateague Island,** is the only break in the barrier beach between Indian River Inlet and Chincoteague Inlet. The ocean entrance is between stone jetties but the north jetty and the outer end of the south jetty are covered at high water. About 400 yards northward of the north jetty is a high pier which extends about 300 yards into the ocean and has a depth of 8 feet at its outer end. There are no landing facilities at the pier.

Ocean City Inlet is marked by a lighted range, a light on the south side of the entrance, and several lighted and unlighted buoys. The range is for use only when passing between the jetties.

The Federal improvement project for Ocean City Inlet provides for the construction of an inlet between the Atlantic Ocean and Sinepuxent Bay, with a depth of 10 feet and a width of 200 feet, protected by jetties; a channel 6 feet deep and 150 feet wide from the inlet to Green Point, and thence 100 feet wide into Chincoteague Bay; a channel 10 feet deep, 100 feet wide, and 3,000 feet long from the inlet channel into the marsh area south of the railroad on the west side of Sinepuxent Bay, with two turning basins of the same depth; and for a channel 6 feet deep and 125 feet wide from the inlet channel to a point opposite North Eighth Street in Ocean City, thence 75 feet wide into Isle of Wight Bay.

In September 1944 the inlet channel had a controlling depth of 10 feet. In September 1945 the Commercial Fish Harbor west of the inlet had a controlling depth of 10 feet. The channel from the inlet to Green Point and Chincoteague Bay had a controlling depth of 2 feet in July 1946. The channel from the inlet to North Ninth Street had a controlling depth of 6 feet in October 1944; thence into Isle of Wight Bay (July 1946) the channel had spots bare ½ foot at low water.

A bascule highway bridge crosses Isle of Wight Bay from the mainland to Ocean City about 0.4 mile north of the inlet. The vertical clearance (closed) is 18 feet at high water and the horizontal clearance is 70 feet. South of the highway bridge is an abandoned bridge which has its 40-foot bascule span removed; the other spans also are to be removed. Pile remains of a former railroad bridge are a danger on either side of the channel just after making the turn north from the inlet channel.

About 0.7 mile northward of the highway bridge is the basin of the Ocean City Yacht Club. The northerly of the two elevated tanks is just east of the basin. A depth of 6 feet can be carried into the basin from the inlet.

Sinepuxent Bay, extending south behind Assateague Island from Ocean City Inlet to Chincoteague Bay, is generally shoal but has a well-marked channel running its entire length. The bay is frequented by fishing and pleasure boats and boats bound north or south along the inland waterway. Controlling depths in the dredged channel are discussed in connection with Ocean City Inlet.

Restricted area.—An area on the east side of Sinepuxent Bay encompassed by a circle of 1,000 yards radius centered on Assateague Island in latitude 38°12.'7, longitude 75°09.'0 has been designated a target area. The center of said circle is about 1,700 yards 019½° from North Beach Coast Guard Station.

Chincoteague Bay, about 20 miles long, has general depths of 5 to 7 feet along its western side but is shoal along its eastern side. The bay is frequented by a large number of boats up to 5 feet draft which are engaged in the oyster, clam, and fishing industry.

Newport Creek, at the north end of Chincoteague Bay, is said to be navigable for a draft of 2 feet to within 1.5 miles of the town of **Berlin**.

Snow Hill Landing (**lat. 38°09′, long. 75°17′**), 2.5 miles southwest of the south end of the dredged channel from Sinepuxent Bay, has a public wharf with a depth of 3 feet alongside. The private landings and fish docks have the same or less depth alongside. A skeleton steel tower about 60 feet high has been erected about 0.5 mile northeastward of the public wharf; it is planned to install a light on the tower. A highway leads westward from the landing to Snow Hill on the Pocomoke River. Gasoline is obtainable at the landing.

There are small marine railways for boats of about 2½-foot draft at the heads of ***Martin Bay*** and ***Johnson Bay,*** 3 and 5 miles southward of Snow Hill Landing.

Franklin City, Virginia, is a post village and rail terminal on the west side of Chincoteague Bay just south of the Maryland boundary line. A draft of 4 feet can be carried to the wharves from southward. Franklin City is a shipping point for seafood and produce of the vicinity. Gasoline, water, and provisions are obtainable and there are three marine railways, the largest of which can accommodate a length of 60 feet and a draft of 4 feet.

Greenbackville is a post village adjoining Franklin City. A white church spire in Greenbackville is a prominent mark.

A Federal improvement project provides for an L-shaped harbor at Greenbackville 5 feet deep, 60 feet wide, and 1,500 feet long, with an approach channel of the same depth and width in Chincoteague Bay.

The channel into Greenbackville is marked by two lights. In August 1945 the controlling depth was 2 feet.

Sinnickson is a post village about 3 miles southwest of Franklin City.

The controlling depth to the south end of Chincoteague Bay from the dredged channel out of Sinepuxent Bay is about 4 feet. After leaving the dredged channel pass about 0.3 mile either side of **Robins Marsh,** which is covered with bushes. Head a little westward of **Big Bay Point,** on the south side of the entrance to Martin Bay, until within a mile of it and then pass 0.3 mile eastward of it. Pass about 250 yards off the southeast end of Big Bay Point and about 0.3 mile westward of ***White Rock,*** which bares at extreme low water and is usually marked by bush stakes. Pass about 200 yards eastward of the southeast end of **Mills Island** and between the two largest

islets southeastward of that point on a southerly course for 0.5 mile; shoals extending a short distance southward from these islets are sometimes marked by bush stakes.

Pass 0.3 mile eastward of the islet off **Long Point,** which is just eastward of Franklin City, and steer southwestward for 1 mile. Ease the course around to southward and pass 500 yards west of Chincoteague Bay Light 4 and about the same distance west of **Killick Shoal Light.** From northwest of the latter light the channel is winding but the bush stakes can be followed to Chincoteague Bay Light 1 which should be rounded on the north and east sides, thence into Chincoteague Channel to the wharves at Chincoteague.

Restricted areas.—Target areas have been established in Chincoteague Bay as follows: (1) A circular area 2 miles in diameter with the center at latitude 37°59.′8, longitude 75°20.′0; (2) a circular area 2 miles in diameter with the center at latitude 38°03.′7, longitude 75°17.′7; and (3) a circular area 1 mile in diameter with the center at latitude 38°06.′7, longitude 75°11.′2 on Assateague Island.

Chincoteague Inlet, 30 miles south-southwestward of Ocean City Inlet, is between Assateague Island and Wallops Island. **Assateague Light,** 154 feet above the water and visible 19 miles, is shown from a red tower 3 miles from the south end of Assateague Island. The light is well above the trees surrounding it and is the most prominent mark in the vicinity of the inlet. An airway beacon, 5.5 miles 292° from Assateague Light, is more brilliant but is not visible as far and may not always be lighted.

Chincoteague Inlet is well marked but should not be entered without local knowledge as the channels are shifting. The controlling depth from the ocean to the town of Chincoteague was reported to be 8 feet in April 1947 and the narrow entering channel was along and close to **Fishing Point,** the northwest end of the narrow hook-shaped sandspit at the southern extremity of Assateague Island. Fishing Point, which is said to be extending rapidly northwestward, is marked by a light 16 feet above the water and visible 6 miles.

Chincoteague Shoals are just off the south end of Assateague Island. A lighted bell buoy is moored near the southernmost point of the 30-foot depth curve.

Blackfish Bank, about 6 miles eastward of the south end of Assateague Island, has several depths of 13 to 16 feet along its 5-mile length, and near its southwest end is a depth of 11 feet over a wreck. A bell buoy is moored 0.6 mile south of the wreck. A 25-foot shoal 2.5 miles east of the wreck is marked on its east side by a lighted whistle buoy. Coasting vessels seeking protection from westerly weather pass westward of Blackfish Bank.

Winter Quarter Shoal, 11 miles 072° from Assateague Light, has a least natural depth of about 10 feet but a wreck just west of the highest part probably has less water over it. A horizontally-banded buoy is moored on the southwest side of the wreck. About 2 miles southeast of Winter Quarter Shoal is a sunken wreck in over 60 feet of water. A lighted whistle buoy is 0.5 mile east of this wreck.

Winter Quarter Shoal Lightship, 20 miles 088° from Assateague Light, has a red hull with WINTER QUARTER in white on the sides and lantern galleries on each of the two mastheads. The light is 66 feet above the water and is visible 14 miles. A riding light is on the forestay. The fog signal is sounded on a steam diaphragm horn. The lightship has a radiobeacon synchronized for distance finding, and daytime storm warnings are displayed. The radio call and code flag signal is NNBZ.

Assateague Cove, known locally as ***Toms Cove,*** is about 1.5 miles in diameter and is just inside Chincoteague Inlet. The entrance is around Fishing Point and has

a controlling depth of about 7 feet. The point should be rounded close-to. The channel is narrow and is dangerous in heavy weather. Depths inside the cove are 8 to 15 feet. A Coast Guard wharf and a large boathouse are on the south side of the cove. A light and a Coast Guard tower on the barrier beach south of the wharf are visible from seaward. Oystering is carried on in Assateague Cove.

Chincoteague (**lat. 37°56′, long. 75°23′**) is a town on the west side of **Chincoteague Island,** which is about 7 miles long and is between the mainland and the south end of Assateague Island. The most prominent mark is a black tank near the swing highway bridge over ***Chincoteague Channel.*** The bridge has a vertical clearance of 16 feet (closed) at high water and a horizontal clearance of 52 feet.

Chincoteague is the center of the oyster and fishing industry in this vicinity. There are several wharves along Chincoteague Channel with depths alongside of 5 to 10 feet. All kinds of supplies and ship chandlery are obtainable in the town. Three marine railways are available, the largest capable of hauling out vessels of 100 feet in length and 10 feet in draft. Chincoteague is headquarters for Coast Guard activities in this area.

Assateague Inlet, between the south ends of Chincoteague and Assateague Islands, has a 2½-foot shifting entrance channel which leads north to deeper water in ***Assateague Channel. Assateague Bay,*** the north end of the passage between the islands, has a shoal entrance from Chincoteague Bay and is not used.

Wire Narrows, Queen Sound and ***Cockle Creek*** are passages from Chincoteague Inlet to Chincoteague Bay through the marshy islands west of Chincoteague Island. They have good depths into them from southward but are shoal at their outlets into the bay. They are used only by small oyster boats. Five fixed bridges cross these secondary channels between Chincoteague Island and the mainland. Clearances range from 4½ to 12½ feet at high water vertically and 33 to 40 feet horizontally.

Chincoteague Inlet to Hog Island Light

CHART 1221

The 33-mile stretch of coast between Chincoteague Inlet and Great Machipongo Inlet is divided into six islands of about equal length. The islands are separated from each other by narrow inlets and from the mainland by marsh and flats intersected by sloughs and channels.

Wallops Island is on the southwest side of Chincoteague Inlet. North and west of the island are ***Watts Bay, Powells Bay*** and ***Bogues Bay*** which have general depths of 1 to 2 feet and are frequented by oyster boats. The dredged section of inland waterway in the east end of Bogues Bay had a reported controlling depth of 2½ feet in April 1947. Daybeacons mark this section.

Wishart is a town on the mainland back of Bogues Bay. A draft of about 2 feet can be carried at low water through ***Ballast Narrows*** to the wharf at Wishart.

Assawaman Inlet, between Wallops Island and **Assawaman Island,** is very shoal and is little used. The changeable entrance is usually marked by breakers.

Kegotank Bay, back of Assawaman Island, has a general depth of about 1 foot. A 2½-foot channel winds through the bay and is partially marked by daybeacons.

Gargathy Inlet, between Assawaman Island and **Metomkin Island,** is unmarked and changeable but is used occasionally by small local boats. In April 1947 a cut-off channel was being dredged inside the inlet to serve as part of the inland waterway.

Gargathy Creek, leading west from Gargathy Inlet into ***Gargathy Bay*** and then north, is navigable for small boats at high water for about 4 miles to within 1 mile of the village of **Modest Town.**

Metomkin Inlet, between Metomkin Island and **Cedar Island,** is used by some local fishing and oyster boats up to 3½ feet draft. The channel is marked but is changeable and should not be entered without local knowledge. A Coast Guard station is on the south side of the inlet.

Porpoise Banks, about 10 miles offshore from Metomkin Inlet, have irregular bottom with depths of 34 to 40 feet.

Metomkin Bay, back of Metomkin Island, has several sloughs leading northward from Metomkin Inlet. The bay is generally shoal. Several daybeacons mark a channel the length of the bay which had a controlling depth of about 1½ feet in April 1947.

Folly Creek, leading westward from the south end of Metomkin Bay, is said to have a depth of 1 foot at low water to the landing at its head, 3 miles above the mouth and 1 mile from the village of **Accomac.** A private marine railway at the head of the creek can haul out boats with a length of 35 feet and a draft of 3 feet.

Longboat Creek, extending westward from Metomkin Inlet to Cedar Island Bay, is comparatively deep throughout.

Cedar Island Bay can be crossed with a least depth of 3 feet at low water. It is connected with the north end of Burtons Bay by ***Teagles Ditch,*** which has a depth of about 9 feet.

Burtons Bay, extending northward from Wachapreague Inlet, is an area of mud flats cut by north-south sloughs. The most important is the marked slough which leads from Teagles Ditch to deep water in ***Hummock Channel*** and ***Black Rock Reach.*** The slough has a least depth of about 2 feet at its northern end.

Wachapreague Inlet, between Cedar Island and **Parramore Island,** had a depth of about 7 feet in April 1947 over the bar and through the channel along the north end of Parramore Island. A lighted bell buoy marks the ocean approach to the channel. Several lights on shore mark the channels to Wachapreague. A Coast Guard station is on the inner side of the north end of Parramore Island.

The inlet is used by many fishing boats and by some boats seeking shelter. It should be entered only with local knowledge as the channel is shifting. The best anchorage is in ***Horseshoe Lead,*** southwest of the entrance, where there are depths of 20 to 30 feet west of the middle ground.

Parramore Banks extend about 8 miles offshore from Wachapreague Inlet. The area is lumpy and has numerous shoal spots of 18 to 30 feet. A lighted whistle buoy is moored east of the banks.

Wachapreague (lat. 37°36′, long. 75°41′) is a post village on the mainland about 4 miles west-northwest of Wachapreague Inlet. It is the center of most of the oystering and fishing industry in this vicinity and is frequented by some pleasure boats in summer. Excellent fishing makes the town a popular summer resort. With local knowledge a draft of 7 feet can be carried from Wachapreague Inlet through Black Rock Reach and ***Wachapreague Channel*** to abreast the wharves. A marine railway is capable of making major repairs on boats up to 60 feet in length with drafts up to 5 feet. Gasoline, water, and provisions can be obtained at the town.

Little Machipongo Inlet, between Parramore Island and **Hog Island,** has a fan

of breakers across the entrance. The channels are changeable but can be followed by the appearance of the water. The best channel is along the shore on the northeast side. The inlet is marked but should not be used without local knowledge. A light and a Coast Guard station are on the inner side of the north end of Hog Island. Local boats of 5- to 6-foot draft use the inlet.

Quinby is a post village on the mainland about 6 miles northwest of Little Machipongo Inlet. A draft of 6 feet can be carried from Little Machipongo Inlet through the deep water of ***Sandy Island Channel*** and into a slough through the mud flats to within 1.5 miles of Quinby. The remaining distance is navigable only for small boats at high water.

Hog Island Light, 180 feet above the water and visible 14 miles, is shown from a black, octagonal, pyramidal, skeleton tower near the south end of Hog Island. A Coast Guard station is on the inner side of the island near the light.

Back of Hog Island is ***Hog Island Bay*** which is mostly mud flats but is intersected by several deep sloughs. The principal slough is ***Great Machipongo Channel*** which makes off from Great Machipongo Inlet on the south and proceeds in a northerly direction through the bay to the mainland where it continues as the ***Machipongo River.***

Great Machipongo Channel is deep throughout and is well marked. From inside the bar across Great Machipongo Inlet depths are in excess of 15 feet through the channel and into Machipongo River to ***Parting Creek,*** 12 miles above the inlet.

Willis Wharf is a post village on the west side of Parting Creek 1 mile above its junction with Machipongo River. It is 2 miles from the railroad station of **Exmore** and is a shipping point for seafood. Two marine railways at Willis Wharf can haul out and repair vessels up to 60 feet in length and 8 feet in draft. Gasoline and supplies are obtainable.

A Federal improvement project provides for a channel 80 feet wide and 8 feet deep from Willis Wharf to deep water in the Machipongo River. The controlling depth is said to be about 6 feet. In entering the mouth of Parting Creek, favor the north side to avoid a shoal area in midstream. The best water leads southward and westward of the island 0.5 mile above the mouth, then favors the west side to the wharves.

About 7 miles above Great Machipongo Inlet a well-marked passage leads eastward from Great Machipongo Channel through ***North Channel*** and ***North Inlet*** to Little Machipongo Inlet. The minimum depth of about 2½ feet is at the western end of North Channel.

Directions.—A Federal improvement project provides for an inland waterway 6 feet deep and 60 feet wide from Chincoteague Bay to Chesapeake Bay. In 1947 only a small part of the project had been completed.

Boats making the passage south from Chincoteague can carry the best water by leaving on the last of the ebb tide. From the wharves at Chincoteague the route follows Chincoteague Channel to Chincoteague Inlet, then across the inlet toward the tower on Wallops Island. When 50 yards north of a single pile swing right and head north for a second pile, keeping a sharp lookout for the channel which passes between two sand bars. When 150 yards north and west of the second pile come sharply to the south and cross a bar, with a controlling depth of 2 feet, in a narrow channel; keep 50 yards off the marsh on the west. When abeam of **Walker Point** turn west and steer for the point until in the middle of Ballast Narrows.

An alternate route follows Queen Sound to the northern end and thence south-

westward in Cockle Creek following the channel close along **Walker Marsh** to Ballast Narrows. The limiting depth is 2 feet in the channel along the marsh.

The route then leads through ***Ballast Narrows, Island Hole Narrows,*** and through the previously described channel in Bogues Bay; thence through ***Cat Creek*** into the easternmost narrow slough to ***Hog Creek,*** and down the latter to Assawaman Inlet. The controlling depth of 2½ feet in this section is in Bogues Bay.

The controlling depth of 2½ feet between Assawaman Inlet and Gargathy Inlet is in Kegotank Bay. From Assawaman Inlet the route follows ***Assawaman Creek*** northwestward for 0.8 mile, then turns west through a short cut-off into a thoroughfare which leads to the north end of Kegotank Bay. A winding channel leads west of a small island just inside the bay and south to ***Kegotank Creek,*** the easterly slough on the south side. Two daybeacons mark the channel in the bay. Kegotank Creek leads to Gargathy Inlet.

In April 1947 the southward passage was blocked at Gargathy Inlet. However, a cut-off was being dredged through from Kegotank Creek to Gargathy Creek.

From Kegotank Creek the route is south and west through Gargathy Creek and ***Wire Passage*** to Metomkin Bay. The marked channel through Metomkin Bay to Metomkin Inlet and Longboat Creek favors the east side of the bay and has a controlling depth of 1½ feet.

The route is then through Longboat Creek, Cedar Island Bay, Teagles Ditch, and Burtons Bay into Hummock Channel, Black Rock Reach, and Wachapreague Inlet. The critical depth along this reach is about 2 feet in Burtons Bay.

From the inlet the route continues south through Horsehoe Lead into ***Drawing Channel,*** across the flats into ***Little Sloop Channel,*** and southward through the flats to Sandy Island Channel. From here the more generally used passage leads southeastward along Sandy Island Channel to Little Machipongo Inlet, then westward through North Inlet and North Channel to Great Machipongo Channel. The route turns south along Great Machipongo Channel and swings westward about 4 miles from Great Machipongo Inlet. The minimum depth of 2½ feet between Wachapreague Inlet and Great Machipongo Channel is at the west end of North Channel.

Hog Island Light to Cape Charles

CHART 1222

Great Machipongo Inlet, between Hog Island and **Cobb Island (lat. 37°20′, long. 75°45′)**, has channel depths across the bar of 7 to 14 feet. The north channel, along Hog Island, is the deepest and is buoyed. The buoys are shifted with changes but they should be used only with local knowledge. Breakers form on the bar only in heavy weather, but form on the shoals on either side at all times. Local boats with drafts up to 8 feet use the inlet.

Prominent marks for entering Great Machipongo Inlet are Hog Island Light (already described) on the north side and a light inside the north end of Cobb Island. The inlet gives access to Great Machipongo Channel, a large and deep waterway which has already been described.

From Great Machipongo Channel the inside passage leads westward through

The Deeps and ***The Outlet*** into ***Ramshorn Channel,*** which is the channel through the northern part of The Thorofare. The controlling depth in this passage is 2½ feet between The Outlet and Ramshorn Channel. An alternate passage is northwestward through the marsh from The Deeps, then northward and finally southwestward into Ramshorn Channel. It is said that the latter passage is deeper and more generally used than the first.

The Thorofare extends south between the mainland and the marsh to a junction with Sand Shoal Channel and beyond to the north end of Magothy Bay.

Sand Shoal Inlet, between Cobb Island and **Wreck Island** had depths of 9 or 10 feet over the bar in ***Southeast Channel*** about 3 miles southeastward of the south end of Cobb Island. The channel is straight but the bar breaks in heavy weather. ***Northeast Channel,*** which leads along the south end of Cobb Island, is marked by buoys and is said to have a controlling depth of 13 feet. ***South Channel,*** with a controlling depth of about 10 feet, and Southeast Channel are used to some extent by local boats, but are unmarked and should not be attempted by strangers. The usual draft of boats using the inlet is 5 to 6 feet.

Eight miles offshore from Sand Shoal Inlet is a sunken wreck marked by a lighted whistle buoy.

Prominent in approaching Sand Shoal Inlet are the light on the south end of Cobb Island and the Coast Guard station on the inner side of the island 0.5 mile from the light. ***Loon Channel,*** between Cobb Island and **Little Cobb Island** leads from the inlet to the Coast Guard station and can be entered with a draft of about 8 feet. It has a depth of about 20 feet off the station and is a good fair-weather anchorage.

Sand Shoal Channel, leading westward from Sand Shoal Inlet, has a least depth of about 30 feet in mid-channel in the 5 miles between the inlet and The Thorofare. It is marked by buoys, lights, and daybeacons, and is easily followed.

Oyster, a post village on the mainland about 2 miles from the railroad station of **Cheriton,** is the shipping point for a large amount of seafood. Gasoline, provisions, and water can be obtained at the village.

Oyster can be reached through ***Lipscombes Channel,*** 0.5 mile northwest of the intersection of Sand Shoal Channel and The Thorofare, and a narrow connecting slough which has been deepened but, in 1947, was reported to have shoaled to about 1 foot at low water. The channel is marked by lights.

The Federal improvement project provides for a channel 0.9 mile long, 6 feet deep, and 60 feet wide from deep water in Lipscombes Channel to and including a turning basin 200 feet long and 125 feet wide at Oyster.

Mockhorn Channel, leading south through The Thorofare from Sand Shoal Channel to the north end of Magothy Bay, has a controlling depth of about 9 feet. A buoy about midway along the waterway marks a rock in mid-channel.

New Inlet, between Wreck Island and **Ship Shoal Island** and 9 miles northeast of Cape Charles Light, is shoal and unmarked, is very changeable, and is seldom used even by local boats.

Ship Shoal Inlet, between Ship Shoal Island and **Myrtle Island,** is shoal and unmarked and is used only by local oyster boats. There is deep water inside but the connections with the inland waterways are shoal and tortuous.

Little Inlet, between Myrtle Island and Smith Island, is shoal and is little used. Small boats may connect with inside passages at high water.

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Cape Charles is the name generally applied to the whole of the northern point of the entrance to Chesapeake Bay. It includes Smith Island, Fisherman Island, and the south point of the mainland. The point is low and bare but the land back of it is high and wooded.

Smith Island is low and sparsely wooded and is 6.5 miles long in a northeast-southwest direction. It is awash at half tide near the middle in what is known as ***Bungalow Inlet.***

Cape Charles Light, 180 feet above the water and visible 20 miles, is shown from an octagonal, pyramidal, skeleton structure (upper part black, lower part white) 1 mile from the southwest end of Smith Island. A Coast Guard station is just west of the light. The ruins of the old light tower are 0.7 mile eastward of the present light.

Smith Island Shoal has a least depth of about 21 feet 7.5 miles 104° from Cape Charles Light. Depths of less than 36 feet extend 4.5 miles northeastward, and are marked at their outer limit by a lighted whistle buoy. In heavy weather the shoal breaks.

Nautilus Shoal has a least depth of about 9 feet 4 miles southwest of Cape Charles Light. The shoal covers an extensive area.

Smith Island Inlet, between Smith Island and Fisherman Island, has considerable breadth, but the channel is narrow and changeable and must be followed between sandbars and breakers. It is the southern outlet of the inside passage and is used at high water by many local boats of 3- to 4-foot draft which carry seafood to Norfolk, Cape Charles, Crisfield, and other points. The controlling depth over the bar is said to be about 3 feet. The inlet is not marked and should not be attempted by strangers.

Magothy Bay, extending northward from Smith Island Inlet to a junction with The Thorofare (already described) is shoal except in the channel, which has a least depth of about 9 feet.

Magotha (lat. 37°10′, long. 75°57′) is a village on the west side of Magothy Bay about 3.5 miles northwestward of Cape Charles Light. Three private wharves at the village can be reached at high water. Oysters are handled at the wharves.

Fisherman Island is a low island 1 mile south of Cape Charles mainland. The tank at the quarantine station on the northwest end of the island is a prominent mark. The station has a wharf on the west side of the island which extends out into deep water.

Fisherman Inlet, between Fisherman Island and Cape Charles mainland, has a depth of 1 foot at low water. It is used by boats of 2- to 3-foot draft and is preferred to Smith Island Inlet when the depth is sufficient, as it has ample width and is protected from heavy seas.

CHAPTER 8

Chesapeake Bay Entrance

CHART 1222

General

CHESAPEAKE BAY is the largest inland body of water on the east coast of the United States. No single chart shows the entire area. Chart 77, the southern part, and Chart 78, the northern part, show the bay and its tributaries to the heads of navigation. These charts should not be used for navigation of the tributaries.

Chesapeake Bay is 170 miles long from the entrance to the mouth of Susquehanna River at the head. It is the approach to the seaports of Baltimore, Norfolk, Newport News, and many other important cities, and has a large trade carried in foreign and domestic vessels. It is also the center of a large oystering and fishing industry.

The main entrance is between Cape Charles on the north and Cape Henry on the south. It can also be entered from Delaware River through the Chesapeake and Delaware Canal at the north end of the bay; and from Albemarle Sound through the Dismal Swamp Canal or through the Albemarle and Chesapeake Canal, both connecting the inside waters southward with the Chesapeake Bay at Norfolk.

The shores of the bay from the south end northward to Patuxent River entrance on the western side and to Chester River entrance on the eastern side are generally low and present no prominent features. Above these points they are hilly and generally wooded, rising to a considerable height in the vicinity of Northeast and Susquehanna Rivers.

The shoreline and islands on the eastern side of the bay are subject to continual erosion. Many of the islands and points have been completely washed away.

The most important tributaries on the western side are generally broad and deep at their entrances, are navigable for long distances, and have a large general trade. Those on the eastern side are generally shoal at the mouths and have little coasting trade, but are frequented by many vessels engaged in the bay trade.

The entrance channel to the bay for deep-draft vessels is close to Cape Henry. The channel has a distinctive deep reaching to a depth of 102 feet. In thick weather soundings are a valuable guide; however, the deepest part of this deep should be avoided as it lies close to a shoal area.

Channels.—The main channel of Chesapeake Bay has a Federal project for a depth of 39 feet over various widths between Cape Charles and Fort McHenry, Baltimore, a distance of 149 miles. It follows the natural channel of the bay from the entrance

to Sandy Point, 21 miles from Baltimore, except through York Spit dredged channel. The channel in the bay has ample room, is well marked and is easy of navigation by day or night. It leads close to middle ground just inside the entrance, but above there the mid-channel is clear, although shoals make off for a long distance from many of the points.

York Spit Channel, 3.5 miles long, is about 5 miles eastward of York Spit Light. The channel is marked by buoys, some of which are lighted. The project provides for a channel 39 feet deep over a width of 1,000 feet. In April 1947, the controlling depth was 36 feet.

York Spit Channel Regulations.—The use of this channel is restricted to vessels or other water craft passing up or down the bay, and no vessel or other water craft shall cross said channel or enter it at any point other than at the ends and in the direction of its axis. A vessel having entered the channel must follow the course thereof for its entire length.

A natural channel of about 20 feet between the Tail of the Horseshoe and Horseshoe Shoal leads northward into Chesapeake Bay from the vicinity of Thimble Shoal Channel. It is marked by two vertical-striped lighted bell buoys. Two unlocated railroad cars lie sunk in this channel off the northern end of the Tail of the Horseshoe.

Rules of the Road.—The boundary line of the high seas extends from Cape Charles Light to Cape Henry Junction lighted whistle buoy to Cape Henry Light. Inland Rules must be followed inside of this boundary.

Pilots.—Pilotage is compulsory between Chesapeake Bay entrance and Smith Point, Yorktown, Newport News, Norfolk, or any intermediate point, for all vessels other than vessels exclusively engaged in the coastwise trade and those made exempt by United States statutes, if spoken outside of a line with Cape Henry bearing south. Pilotage is also compulsory for foreign vessels and vessels from a foreign port and all vessels sailing under register, bound to and from Baltimore, except vessels employed in and licensed for the coasting trade and American vessels laden either in whole or in part with coal or coke mined in the United States.

Virginia pilots are taken to any port in Virginia, and Maryland pilots to any port in Maryland, although vessels bound up the Potomac River may take either a Virginia or a Maryland pilot. Two pilot steamers will usually be found anchored at the entrance of the bay about 0.7 mile north of Cape Henry Light, except when one goes in for supplies, at which time both Virginia and Maryland pilots are aboard one steamer. The night signal for a Virginia pilot is one long and one short blast of whistle, and for a Maryland pilot three long and one short blasts. Pilotage is not compulsory up the Potomac River, but if a pilot is taken, the rates of pilotage to Smith Point and $1.50 per foot in addition shall be paid. Pilots for the smaller tributaries of the bay are oystermen or fishermen living in the vicinity, and can be obtained from boats at work near the entrance, or on signal from shore.

The fees for piloting to or from Smith Point, Yorktown, Newport News, or Norfolk or intermediate points are as follows:

		Cargo	Bunkers or orders
Under 501 N. R. T.	per foot	$3.00	$2.35
501 to 1,000 N. R. T.	do	3.50	2.65
1,001 to 1,500 N. R. T.	do	4.00	3.00
1,501 to 2,000 N. R. T.	do	4.50	3.35
Over 2,000 N. R. T.	do	5.00	3.70

		Any tonnage, paying no sea pilotage	Any tonnage, paying sea pilotage
Newport News to Richmond or intermediate points	per foot	$3.00	$1.50

For each message or order delivered to any ship	$5.00
Shifting between Norfolk and Newport News or from one anchorage to another—any tonnage	15.00

Detention after six hours later than sailing time $1 per hour, but not to exceed $7.50 for any 24-hour day.

Ships entering waters of Chesapeake Bay for shelter, and not entering into port are charged one-half of the full rates.

Pilotage fees to or from Baltimore or Washington are as follows:

Vessels drawing 13 feet or over	per foot	$5.50
Vessels drawing 10 feet or less than 13 feet	do	4.00
Vessels drawing less than 10 feet	do	3.50
Detention, extra	per day	5.00
Pilot service in Baltimore (not compulsory)		15.00

Towboats.—At Old Point Comfort tugs may be ordered by telegraph to Hampton Roads from Norfolk and Baltimore. They may also be ordered through the pilot boats.

Quarantine.—Quarantine inspection for all ports on Chesapeake Bay and tributaries, except Baltimore, is conducted in Hampton Roads, off Old Point Comfort.

Vessels bound to Baltimore are not required to undergo quarantine inspection in Hampton Roads, and should proceed direct to the quarantine anchorage off Leading Point, Patapsco River, and there undergo the required quarantine inspection.

Vessels bound for Alexandria or Washington should undergo quarantine inspection in Hampton Roads, but may be inspected at port of arrival; this latter procedure, however, may subject the vessel to some delay, as facilities for performing the necessary inspections are not as good as in Hampton Roads.

All quarantine inspections are conducted by the United States Public Health Service at the above localities.

Fumigation facilities are available at Hampton Roads and Baltimore.

Customs.—A list of the Customs Ports of Entry is in the Appendix.

Immigration.—A list of the stations of the Immigration Service is in the Appendix.

Anchorages.—The following anchorages are the principal ones available for vessels bound up and down Chesapeake Bay: Lynnhaven Roads, just westward of Cape Henry, affords shelter against southerly winds in depths of 20 to 28 feet; Hampton Roads is a secure anchorage in all weather for vessels of any draft; York River above

Tue Marshes Light affords good anchorage in 36 to 60 feet, protected from all but easterly winds; Mobjack Bay has secure anchorage westward of New Point Comfort in depths of 10 to 24 feet; Rappahannock River has anchorage within its mouth in depths of 18 to 60 feet; Great Wicomico River affords secure anchorage in depths of 15 to 20 feet; anchorage secure from northerly winds can be had in depths of 15 to 30 feet in Cornfield Harbor inside of Point Lookout, and secure anchorage in any weather in St. Marys River, 5 miles northwestward; Patuxent River entrance affords secure anchorage for the largest ships, well sheltered and with good holding ground. On the eastern side of the bay are several good anchorages, but they are seldom used by strangers.

Where the limits of the anchorage areas have been defined the areas and regulations will be found in the description of the locality.

Supplies.—Baltimore, Norfolk, and Newport News are available as coaling ports for large vessels and have wharves equipped for rapid coaling. Fuel oil, Diesel oil, water, and ship-chandlers' supplies are obtainable at these places. As mentioned under the different headings, supplies can be obtained at many other places, but the quantity is apt to be limited and the facilities are not always good. Small vessels and motor boats bound up and down Chesapeake Bay and desiring supplies can best obtain them at Cape Charles, Reedville, Solomons Island, or Annapolis.

Repairs.—Repairs to the hulls and machinery of large vessels can be made at Baltimore, Newport News, and Norfolk. Places near Chesapeake Bay where repairs to small vessels can be made are Hampton, Weems, Solomons Island, Annapolis, and Crisfield. Further information is given under the different headings, and a table of drydocks and marine railways is given in the Appendix.

Storm warnings.—A list of storm warning display stations of the United States Weather Bureau within the limits covered by this volume is given in the Appendix.

Reporting stations.—The Hampton Roads Maritime Exchange maintains a reporting station for vessels entering Chesapeake Bay at the signal tower at Fort Story, Cape Henry, from which vessels are reported to Norfolk and Baltimore either day or night, and with which vessels can communicate by use of the International Code by day or a flashing lamp and the Morse Code by night. Messages to or from vessels will be forwarded to destination. Vessels bound to Baltimore are also reported from Cove Point and Sparrows Point.

Speed trial courses.—Measured courses for speed trials have been established at the following places: Just north of Cove Point off the western shore of the bay. On Kent Island off the eastern shore of the bay. Complete description of the marks and distances will be found in the description of the locality.

Oyster dredging limits are marked by white spar buoys. These buoys are shifted from time to time by the State authorities.

Fish weirs are numerous in Chesapeake Bay and tributaries in season, the fishing season usually lasting from about March to July and from October to December, and many of them will be found in position throughout the year. They are thickest on the western side of the bay from Hampton Roads to Potomac River, but will be found throughout the bay and for a considerable distance about the entrances to the tributaries. Areas of possible fish traps should be avoided by small craft, especially at night, on account of the danger from stakes which may have been broken off and not removed. Fish-trap limits are shown on Charts 1222 to 1226. They are generally marked by black and white horizontal-banded spar buoys.

Duck blinds may be found in the fish-trap areas. The blinds generally have the

appearance of a 3-pile daybeacon and they should not be confused with navigational aids.

Ice.—In severe winters ice forms in the head of the bay and in many of its tributaries. Under the influence of wind and tide ice will sometimes be met as far down the bay as Cove Point, very seldom below this. The weather shore is generally free from ice. Large steam vessels can always pass up and down the bay, but some of the tributaries may be closed to navigation for a period of a month or more during the winter. When conditions warrant, the lighted buoys may be replaced by unlighted aids from time to time.

To vessels bound to and from Baltimore, ice sufficient to interfere with navigation of vessels is most often found in the vicinity of Sevenfoot Knoll Light, where ice packs are of frequent occurrence. The ice-breaker steamers from Baltimore attempt to keep the channel open, but navigation is sometimes blocked for limited periods, and none but the largest vessels enter or leave at night when ice may be expected.

In the tributaries of the Pocomoke Sound entrance on the eastern side and York River on the western side ice sufficient to interfere with navigation of small vessels and motor boats may be met with at any time between January 1 and April 1, and north of Patapsco River entrance ice is sometimes found a little before and after these dates.

The ice from Tangier and Pocomoke Sounds does not interfere with the larger vessels in the bay, but small vessels engaged in oystering and fishing are frequently held up by the ice, especially in Kedges and Hooper Straits, and are forced to employ towboats to assist them.

Vessels not sheathed for ice should never attempt to force their way through even a thin skim of ice. Small craft have had their planks cut and have sunk after passing through only a few yards of thin ice.

Tides.—Data relative to tides are given in the text with the descriptions of the different places. Full tidal information is given in the *Tide Tables, Atlantic Ocean.*

Currents.—Current information for Chesapeake Bay is given in the *Current Tables, Atlantic Coast.* These tables include the predicted times of slack water and the predicted times and velocities of strengths of flood and ebb for Chesapeake Bay Entrance, Baltimore Harbor Approach (off Sandy Point), and the Chesapeake and Delaware Canal (Chesapeake City), for each day of the year for which they are issued. They also contain a current diagram of Chesapeake Bay with explanation, and a table of differences and constants by means of which the predicted times and velocities of the current at a large number of places in Chesapeake Bay and tributaries, and in the Chesapeake and Delaware Canal, may be obtained.

The tidal currents throughout the bay and its tributaries are often influenced by winds. In the bay proper, a northerly wind increases the velocity of the ebb current and decreases the velocity of the flood current, while a southerly wind increases the velocity of the flood and decreases the velocity of the ebb. Strong winds at times reverse the normal direction of flow for an entire flood or ebb period.

On the northern side of Chesapeake Bay Entrance and in the vicinities of Middle Ground and Inner Middle Ground Shoals, current velocities are somewhat greater than those predicted for Chesapeake Bay Entrance, and under the influence of strong winds the shoals are sometimes marked by rips.

The effects of the flood and ebb currents are marked at the entrances of the principal tributaries, the effects being felt sometimes for considerable distances from the entrances. Off the mouths of York, Rappahannock, and Potomac rivers, especially the Potomac, eastward-setting ebb currents or westward-setting flood currents are often experienced.

Approaches to Chesapeake Bay

The prominent landmarks visible in approaching Chesapeake Bay entrance are described on page 170.

From northward.—General remarks and directions for the outside coast from New York to Chesapeake Bay are given in Chapter 3. Currents for the outside coast are described in Chapter 2.

From eastward.—The entrance may be approached boldly, as there are no outlying dangers. Twenty fathoms will be found about 45 miles eastward of Cape Henry; inside that depth the water shoals irregularly. In clear weather Chesapeake Lightship, 15 miles eastward of Cape Henry, should be picked up and the lighted and whistle or bell buoys followed to Chesapeake Bay. In thick weather vessels should keep outside the 10-fathom curve unless the lightship is sighted.

In rough weather vessels of deepest draft should enter the bay through the channel about 2.5 miles off the shore south of Cape Henry. This channel, extending from the proximity of the lighted whistle buoy 2 CB to the proximity of Cape Henry, has depths greater than 50 feet which afford an excellent guide in thick weather. If sounding is resorted to in thick weather to enter the bay, it is recommended that the 60-foot depth curve lying between Cape Henry and the deep water off the cape be followed. This will insure passing the cape at a safe distance of 1 mile. Depths in the neighborhood of 100 feet should be avoided as these are found dangerously close to the shoal northeast of the cape.

From southward.—Between Cape Henry and Cape Hatteras, a distance of about 105 miles, there are no dangerous shoals over 5 miles from the beach; with the exception of a few places, 5 to 9 fathoms may be carried as close as 1 mile from the beach. Vessels of the deepest draft may, in smooth weather, run as close as 5 miles from the beach but are not advised to do so, as it is a dangerous coast to be caught on in an easterly gale. The narrow stretch of sand beach forming the greater length of the coast is low and frequently may not be visible more than 4 or 5 miles. The 100-fathom curve, which, abreast of Cape Henry, is about 65 miles offshore, gradually approaches the coast southward, and southeastward of Cape Hatteras is only about 20 miles from the beach. The 30-fathom curve is about 5 miles inside of the 100-fathom curve. Abreast of Cape Henry 20 fathoms will be found about 45 miles off the coast, but farther southward that depth is found closer in, and at Cape Hatteras it is only 11 miles offshore. Inside of 15 fathoms the depths are extremely irregular, and there are many holes of limited extent lying far inside of the general limits of corresponding depth. In thick weather close attention should be paid to the soundings and the chart, and even then the navigator may be confused by the irregularities in depth. See preceding paragraph concerning the deep in the proximity of Cape Henry.

Chesapeake Bay Entrance

CHART 1222

The entrance to Chesapeake Bay, leading between Cape Charles on the north and Cape Henry on the south, is about 10 miles wide; the main channel leads along the south side and is broad and deep. The northern half of the entrance is obstructed by shoals through which are several minor channels.

The channel south of ***Nautilus Shoal*** and between Fisherman Island and ***Inner Middle Ground,*** and thence through either ***North Channel*** or ***Beach Channel,*** had a depth by the last survey of 24 feet, but with spots of 16 and 17 feet close to its southern side. The shoals on the north side have shifted southward. The channel is used by fish steamers and tugboats up to 12 feet draft, but is not recommended for strangers.

Three wrecks are charted to the eastward and southward of Nautilus Shoal, 4.7 miles 148½°, 4.0 miles 176°, and 5.2 miles 195½°, respectively, from Cape Charles Light. The last two have been wire-dragged.

Cape Charles firing area.—A restricted firing area has been established in the entrance to Chesapeake Bay as follows:

The Area.—An area consisting of the arc of a circle between two lines, each 14,000 yards in length and drawn 100° and 210° respectively from the southern extremity of Cape Charles.

The Regulations.—(1) The above-described area shall be open to the public for fishing and traffic on week-ends and holidays (as defined below) throughout the year, and on weekdays except when firing exercises are under way. The term week-end shall include those hours between 6 p. m. of the day preceding a National (not State) holiday and 7 a. m. of the day following such a holiday.

(2) At any time, even when exercises are in progress, vessels propelled by mechanical power at a speed of five miles per hour or more may proceed directly through the firing area without restriction except when notified to the contrary. Vessels propelled mechanically at less than five miles, and *all* sailing vessels, must keep clear of the area when firing flags are displayed as described below.

(3) On days of firing a large red flag will be displayed from one of the towers on Fisherman Island and/or on Fort John Custis proper. These flags will be displayed not later than 7 a. m. of that day, and will be removed when firing ceases for that day.

(4) When night firing is scheduled, large white flags will be displayed from the same towers at 4 p. m. of that day.

(5) With reference to the provisions contained in Section 1, Act of July 9, 1918 (40 Stat. 892; 33 USC3), the authority of the War Department to issue permits to food fishermen for operating within the restricted areas is hereby delegated to the Commanding General, Fort Monroe, Virginia.

(6) These regulations shall be enforced by the Commanding General at Fort Monroe, Virginia, through such officers, enlisted men, and employees as may be assigned thereto.

Fort Story firing area.—The firing range off Fort Story includes the waters of the Chesapeake Bay and Atlantic Ocean within the following areas:

The Danger Zone.—A sector, the northerly limit of which bears 345° from Cape Henry Light, and the southerly limit bears 290° from Cape Henry Light, both limits having a length of 5,000 yards; and within another sector, the northerly limit of which bears 045° from Cape Henry Light and the southerly limit of which bears 150° from Cape Henry Light, both limits having a length of 30,000 yards.

The Regulations.—1. Except as hereinafter provided, the above-described waters are open throughout the year to the public for fishing and traffic from 12:00 noon Saturdays to 7:00 a. m., Mondays, and National (not State) Holidays, from 6:00 p. m., of the preceding day to 7:00 a. m., on the day following the holiday. Announcements of schedule of firing will be made in advance in local newspapers, the daily Hydrographic Bulletin, and by Government radio.

2. On days of firing a large red flag will be displayed from the old Coast Guard Station tower on the Fort Story Military Reservation and from the observation tower known as Granite located approximately 5,000 yards east of Lynnhaven Inlet. These flags will be displayed not later than 7:00 a. m., of that day, and will be removed when firing ceases for the day.

3. When night firing is scheduled, large white flags will be displayed from the same towers at 4:00 p. m. of that day.

4. With reference to the provisions contained in Section 1, Act of July 9, 1918 (40 Stat. 892; 33 U. S. C. 3), the authority of the War Department to issue permits to food fishermen for operating within the restricted areas so far as they pertain to the Fort Story Firing Ranges, is hereby delegated to the Commanding General, Fort Monroe, Va.

5. Fishermen desiring to set pound nets within the above-restricted waters are required in every case to have a written permit. These permits may be obtained by written application to the Commanding General, Fort Monroe, Va. Application for such permits will state the proposed location of their pound nets. Holders of pound-net permits must comply with the regulations stated herein. No permit is required for fishing with equipment other than pound nets.

6. On days and nights when firing is in progress, no boat or vessel will enter and remain in the restricted areas above described, except under the written authority of the Commanding General, Fort Monroe: *Provided, however,* That the Commanding General may designate, from time to time, by suitably posted bulletins at fishing docks and elsewhere, and at the Commission of Fisheries of Virginia, certain times within which the public, including trawler fishermen and other food fishermen, may enter upon such waters without the necessity of securing individual written permits.

7. Any vessel capable of being propelled by mechanical power at a speed of 5 miles per hour or more may proceed directly through the firing areas without restriction, except when notified to the contrary.

8. These regulations shall be enforced by the Commanding General at Fort Monroe, Va., through such officers, enlisted men, and employees as may be assigned thereto.

Chesapeake Bay entrance, prohibited area.—*The Area.*—(1) North limit, latitude 37°08′00″ N. (2) East limit, longitude 75°50′00″ W. (3) South limit, latitude 36°53′00″ N. (4) West limit, lines drawn in 013° and 187° directions from a point in latitude 37°01′16″ N., longitude 76°02′09″ W.

The Regulations.—Anchoring, trawling, crabbing or fishing are prohibited in the foregoing area.

Tugs and tows, regulations.—The following regulations govern the movement of tugs and tows in the vicinity of Cape Henry:

Vessels entering from the sea, having in tow one or more barges or other vessels, shall, before reaching lighted bell buoy No. 4 in latitude 36°54′15″ N., longitude 75°54′15″ W., shorten all towing hawsers so that each vessel towed is under positive control of the towing vessel.

Vessels departing from Chesapeake Bay, Virginia, having one or more barges or other vessels in tow, shall tow with shortened hawsers so that each vessel or barge towed shall be under positive control of the towing vessel and shall not lengthen towing hawsers until to seaward of lighted bell buoy No. 4, located in latitude 36°54′15″ N., longitude 75°54′15″ W.

Landmarks.—The most prominent landmarks seen in approaching the entrance to Chesapeake Bay are Cape Charles Light and Cape Charles old tower on Smith Island, and a tank and several buildings on Fisherman Island, all on the north side; and Cape Henry, Cape Henry Light, Cape Henry old tower, and the Cavalier Hotel and elevated tank at Virginia Beach, on the south side. Cape Charles Light is described on page 162.

Cape Henry is a prominent bold range of sand hills 80 feet high, with lower ones near the water. On the beach near the point of the cape is Cape Henry Light, and 340 feet southwestward of it is a white unused light tower. The old light tower was built in 1791.

The Pilot Station of the Virginia and Maryland pilots is off Cape Henry. White spar mooring buoys, maintained by the two pilot associations, are moored in 29 feet and 35 feet of water about 0.7 mile north-northwestward of Cape Henry Light.

Chesapeake Lightship (***lat. 36°59′, long. 75°42′***) is 15 miles from Cape Henry Light off the entrance to Chesapeake Bay. The lightship has a red hull with CHESAPEAKE on the sides and a tubular mast with lantern and gallery. The light is 66 feet

above the water and visible 14 miles. A riding light is shown from the forestay. The fog signal is sounded on a two-tone air diaphone; a bell is sounded by hand if the diaphone is disabled. The radiobeacon is synchronized for distance finding. The code flag signal and radio call is NNBF. Storm warning signals are displayed during daytime.

Cape Henry Light is shown from an octagonal pyramidal tower, upper and lower half of each face alternately black and white. The light is 157 feet above the water and visible 19 miles. It has a red sector between 155° and 233°. The fog signal is sounded on two air diaphones operated simultaneously. One horn points 077° and the other 333°. A siren is used if diaphone is disabled. The radiobeacon is synchronized for distance finding.

The wreck of a barge, with 50 feet over it, is about 2.6 miles 063° from Cape Henry Light.

Lynnhaven Roads (Chart 481), an open bight extending from 2 to 5 miles westward from Cape Henry Light, is protected from southerly winds and is sometimes used as an anchorage. Outside of the former dumping ground area it has depths of 20 to 28 feet. The shoaling is abrupt eastward of Lynnhaven Inlet, and the 18-foot curve lies nowhere more than 0.4 mile from shore. Westward of the inlet the shoaling is gradual, and depths of 18 feet can be found 0.8 from shore. The dumping ground in the western part of Lynnhaven Roads has depths of 16 feet and over according to surveys of May 1946. The area as established is indicated on the chart.

The restricted and anchorage areas in Lynnhaven Roads are as follows:

Restricted area.—*The Area.*—Beginning at a point on the beach 1.8 miles east of East Jetty Light, at Little Creek, Va., thence on an angle 012° to the south edge of Thimble Shoal Channel, thence along the south edge of Thimble Shoal Channel to a point made by an intersection of a line drawn on an angle of 012° through Little Creek Harbor Approach lighted bell buoy 2A, thence in a southerly direction along said line extended to the shore, and thence eastward across Little Creek Inlet and along the shore to the point or place of beginning.

The Regulations.—(1) No fish pound stakes or structures shall be located in the area descibed above.

(2) In accordance with general Captain of the Port regulations all boats shall stay at least 300 yards away from naval vessels and 600 yards away from any vessel displaying the red "baker" burgee.

Anchorage areas.—The following anchorage areas have been established in Lynnhaven Roads:

Anchorage L–A, Naval Anchorage.—Beginning at a point 5,350 yards, 308° from Cape Henry Light, a line thence 10,350 yards, 288°, thence 1,820 yards 203°; thence 6,140 yards 108°; thence 1,350 yards 173°30′; thence 4,525 yards 108°; thence 3,075 yards 005°30′ to the point of beginning.

This anchorage is reserved primarily for the use of naval vessels, but in the absence of the fleet, the Captain of the Port may, in his discretion, permit it to be used by merchant vessels. Movement of vessels through the area will not be restricted.

Anchorage L–C (Merchant Ship Anchorage).—Beginning at a point 2,300 yards 145° from Thimble Shoal Light; a line drawn thence, 4,525 yards 108°; thence 1,900 yards 177°; thence 4,525 yards 288°; and thence to the point of beginning.

This anchorage is primarily for the use of merchant vessels but the Captain of the Port may in his discretion permit it to be used by naval vessels, the commercial conditions at the same time being given due consideration. No vessel may occupy any berth in this anchorage without first obtaining permission from the Captain of the Port.

Anchorage L–E (Naval Anchorage for amphibious craft).—The area between two parallel lines running 012° from the East Jetty Light at Little Creek, and from a point on the beach 1.8 miles east fo East Jetty Light, and extending from the shore fo the southern boundary of Anchorage Area "A."

Lynnhaven Inlet, on the south side of Lynnhaven Roads, forms the approach to Lynnhaven Bay and several other shoal bays. It had a depth by the last survey of 2½ feet across the bar, but is subject to frequent change, and local knowledge is required to enter. The depths in the bays inside are 2 to 10 feet and they are frequented by many small craft engaged in oystering and fishing.

Two drawbridges are together at the entrance to Lynnhaven Inlet with a horizontal clearance of 40 feet between fenders and a vertical clearance of 4 feet at MHW, when the draws are closed. Another drawbridge crossing ***Long Creek*** about 1 mile from the entrance has a horizontal clearance of 19 feet between fenders and a vertical clearance of 5 feet at MHW when the draw is closed.

Little Creek, 8 miles west of Cape Henry Light, is a terminal of the Pennsylvania Railroad Co. for car ferries operating to Cape Charles and is the site of several Government installations. The Little Creek Coast Guard station is about 1.2 miles inside the entrance and about 200 yards eastward of the railroad terminal pier. There are no public wharves. **Little Creek** has railway and highway connections with Norfolk.

The entrance is between jetties, the outer ends of which are marked by lights. A fog whistle is located at the eastern jetty light (bell if whistle is disabled). A lighted bell buoy is 1 mile off the entrance on ***Crumps Bank.*** There is a lighted range for entering, bearing 176°. In June 1946 it was reported by Naval officials that the controlling depth in the channel to the ferry slips and to the basin off the wharves was 18 feet. Shoaling occurs on the western side of the channel in the vicinity of lights 4 and 8.

Passage into ***Lake Whitehurst*** is obstructed by a fixed bridge and a submerged wall. Little Creek itself is crossed by a fixed highway bridge with a 27-foot span and 5-foot vertical clearance at MHW 0.5 mile northwestward of the basin.

Hampton Roads and Adjacent Ports

CHART 400

General Information.—***Hampton Roads,*** at the south end of Chesapeake Bay and 16 miles westward of Cape Henry, is the approach to Norfolk, Portsmouth, and South Norfolk and the adjacent industrial areas; and to Newport News and the neighboring cities on the Virginia Peninsula.

The harbor is one of the important anchorages on the east coast of the United States and is formed where the James, the Nansemond, and the Elizabeth Rivers meet the lower Chesapeake Bay. A well-marked, deep-water channel leads into Hampton Roads where there is secure anchorage for vessels of any draft.

The ports adjacent to Hampton Roads carry on a large business in coal, tobacco, grain, cotton, fuel oil, and other commodities. Sugar, molasses, iron, chrome, bauxite and manganese ores, rubber, fertilizer materials, coffee, and a wide variety of other raw materials are imported.

Pilotage into and out of Hampton Roads is compulsory for all foreign vessels and all vessels from or to a foreign port. All vessels sailing under an enrollment and licensed and engaged in the coasting trade are exempt from pilotage, unless a pilot is actually employed. Further details and a listing of pilotage rates are given under General Remarks, Chesapeake Bay, page 164. The Virginia Pilot Association has offices in Norfolk and Newport News.

Towboats can be had at Norfolk. The Chesapeake and Ohio Railway Company operates a number of tugs for use at its terminals at Newport News. Towboats no longer cruise in Chesapeake Bay but may be ordered through the pilot boats. Adequate lighterage facilities are available at the various ports of Hampton Roads.

Quarantine.—Quarantine regulations for Hampton Roads are embodied in the national quarantine regulations.

All vessels subject to quarantine are inspected by the officers of the United States Public Health Service off Old Point Comfort. When awaiting or undergoing examination vessels are required to anchor in Temporary Anchorage A, Hampton Bar. This anchorage is shown on Chart 400 and is described in the following text.

The national quarantine station is at Craney Island, on the western side of the entrance to Elizabeth River. Patients from foreign vessels are cared for here.

The United States Public Health Service maintains an out-patient office in the United States Post Office and Court House Building in Norfolk. The United States Marine Hospital is located on Hampton Boulevard in Norfolk. Applications for admission to the hospital should be made to the officer in charge of the out-patient office.

Hospitals.—In the larger cities are many public and private hospitals. The most prominent of the public hsopitals are as follows:

Norfolk, Virginia
- United States Marine Hospital, Hampton Boulevard
- De Paul Hospital, corner of Granby Street and Kinsley Lane
- Norfolk General Hospital, corner of Raleigh and Colley Avenues

Portsmouth, Virginia
- The Kings Daughters' Hospital, corner Chestnut and Leckie Streets

Newport News, Virginia
- Elizabeth Buxton Hospital, on boulevard overlooking Hampton Roads
- Wittaker Memorial Hospital, corner of Twenty-ninth and Orcutt Avenues
- Riverside Hospital, 245 Fiftieth Street

Hampton, Virginia
- The Dixie Hospital, Old Point Road

Customs.—The Custom House is located at Main and Granby Streets, Norfolk.

Immigration.—The offices of the Immigration and Naturalization Services are located in the New Monroe Building, 254 Granby Street, Norfolk, and at 2500 West Avenue, Newport News.

Anchorages.—The limits of the anchorage areas are prescribed by the War Department and fully described below. They are also shown in red on Charts 1222 and 400. Anchorage regulations are enforced by an officer of the United States Coast Guard designated as Captain of the Port, with offices in the U. S. Post Office and Court House Building, Norfolk.

Hampton Roads, Regulations.—In the Hampton Roads Area, no person is permitted to fish and no pleasure boats may operate within 300 yards of any naval vessel, or within 600 yards of any vessel loading, discharging or laden with explosives. The latter vessels may be identified by the red "Baker" burgee which is flown from a forward halyard.

Hampton Roads, Anchorage areas, Regulations.—

1. *Temporary Anchorage A, Hampton Bar.* To the westward of a line bearing 008° from a point "A" determined by the following cross bearings: Old Point Comfort Light, bearing 031°; range and beacon tower on West end of Fort Wool, bearing 100°; to the northward of a line bearing 229° from point "A" to a point "B", 425 yards distant; to the northeastward of a line bearing 289° from point "B" to the Elizabeth City County shore.

Note 1.—This area is reserved for the use of vessels while undergoing examination by quarantine, customs, and immigration authorities. Upon completion of these examinations, vessels shall move promptly to a regular anchorage area.

Note 2.—See Note 2 under Anchorage B below.

(a) The master of every steam vessel using this temporary anchorage shall keep his vessel in condition to move promptly under her own power upon notification by the Captain of the Port, and, when any such vessel is in charge of a pilot, the pilot shall remain on board until the vessel is safely anchored in a designated anchorage area. No sailing vessel, using this anchorage, shall be left unat-

tended by a steam tugboat while undergoing examination by any of the authorities mentioned herein, except when her stay is likely to be of several hours' duration, when she shall be anchored in the western part of this temporary anchorage out of the way of other vessels before the tug and pilot leave her.

(b) No master of a vessel awaiting or undergoing quarantine inspection shall release any part of the crew until the vessel has been passed by the proper quarantine officials and safely anchored, or moored, in one of the designated areas.

2. *Anchorage B, Naval anchorage.* To the southward of a line extending 289° from point "B" defined under Temporary Anchorage "A"; to the westward of a line extending 3,680 yards 229° from point "B" to point "C"; and to the northward of a line extending 292° from point "C" to the Elizabeth City County shore.

Note 1.—This area is reserved for the use of naval vessels, but in the absence of the fleet, the Captain of the Port may, in his discretion, permit it to be used by merchant vessels.

Note 2.—The established anchorages for naval vessels having been found inadequate at times when an especially large number of Naval vessels are gathered in Hampton Roads, and the Navy Department having requested the establishment of a series of anchorage berths for such occasions in order that a Naval vessel may be ordered to proceed to a designated numbered or lettered anchorage berth in the harbor, the following arrangements have been made: An overlay for Naval anchorage berths in Hampton Roads has been superimposed on U. S. C. and G. S. Chart #400 by the Hydrographic Office of the Navy Department. This overlay, known as H. O. Anchorage Chart G, shows Naval anchorage berths in Anchorages A, B, C, E, F-1, and G. Those designated anchorage berths, with the exception of those in Naval Anchorage B which are primarily for Naval vessels, are not set aside for the exclusive use of Naval vessels, but permission will be given for Naval vessels to use them when available. When the Captain of the Port receives notification from the proper Naval Authorities that it is desired to utilize certain of the anchorage berths set out on the above-mentioned overlay in Anchorages A, C, E, F-1, or G, he will authorize their use by Naval vessels if they can be made available, the commercial condition at the time being given proper consideration. If in the opinion of the Captain of the Port there are sufficient reasons why the berths first asked for should not be used, he will confer with the Naval Officer making the request and if other berths can be agreed upon he will authorize their use, otherwise he will communicate the request to the Secretary of the Navy with a statement of the circumstances and his recommendation.

3. *Anchorage C, Newport News Bar.* To the southward of the southern boundary of Anchorage B, to the westward of an extension of the line forming the eastern boundary of Anchorage B; to the northward of a line running through the red buoys marking the 40-foot dredged channel to Newport News; to the eastward of a line bearing north through buoy No. 8, at the western entrance of the Newport News Channel.

Note 1.—Vessels shall be anchored so as to leave a clear fairway 200 yards wide from Newport News Channel buoy No. 5 to the lighted bell buoy off the Chesapeake Ferry Company's slip at Newport News, thence 200 yards wide to the said ferry slip, except that in an emergency the fairway may be closed and occupied for the anchoring of Naval vessels.

Note 2.—See Note 2 under Anchorage B, above.

4. *Anchorage D.* The area enclosed by lines drawn as follows: From buoy No. 1 at the entrance to the Newport News dredged channel to bell buoy No. 2, on the western side of the Norfolk Harbor dredged channel; thence 229° until Newport News Middle Ground Light bears 303°; thence 250° until Newport News Middle Ground Light bears 003°; thence bearing 003° for a distance of 775 yards to Anchorage buoy E; thence bearing 049° on a line in extension of the southeast boundary of Anchorage B to intersection with the first line.

Note.—This area is to be used by deep-draft vessels, wind-bound vessels from Lambert Point and Sewall Point, and vessels awaiting turn for docking. Other vessels may use this anchorage when permitted by the Captain of the Port. Vessels shall be anchored so as to leave a clear fairway 200 yards wide on a straight line between the slip of the Chesapeake Ferry Company at Pine Beach and Newport News Channel buoy No. 5.

5. *Anchorage E, Middle Ground Anchorage.* To the southward of a line running through the black buoys marking the southern edge of the 40-foot dredged channel to Newport News; to the westward of the northwest boundary line of Anchorage D; to the northeastward of a line bearing 310° from Anchorage buoy E.

Note 1.—Vessels shall be anchored so as to leave a clear fairway 200 yards wide on a straight line between the slip of the Chesapeake Ferry Company at Pine Beach and Newport News Channel buoy No. 5, except that in an emergency the fairway may be closed and occupied for the anchoring of Naval vessels.

Note 2.—See Note 2 under Anchorage B, above.

6. *Anchorage F, anchorage for explosives and other dangerous articles.* To the southward of a line, bearing 310°, through two points determined by the following cross bearings: easterly point, Newport News Middle Ground Light, bearing 020°; Craney Island beacon, bearing 131°; Nansemond River Light, bearing 243°; westerly point, Newport News Middle Ground Light, bearing 089°; Nansemond River Light, bearing 219°; northern red light on the railroad pier at Newport News, bearing 327°45′. To the westward of a line bearing 183° through the above easterly point; to the eastward of a line bearing 183° through the above westerly point. The northeasterly limit of Anchorage F is parallel to and 425 yards southeast of the southeast boundary to Anchorage E. (See Note.)

Note.—All vessels are forbidden to anchor between the northern boundary line of Anchorage F, and the southwestern boundary line of Anchorage E, or within a zone 425 yards wide on the eastern and the western sides of Anchorage F.

7. *Anchorage F–1; anchorage for vessels carrying explosives and other dangerous articles and having drafts too great to permit them to use Anchorage F.* An area within Anchorage C to the westward of the eastern boundary of Anchorage C; to the northward of a line bearing 292° from the southeasterly corner of Anchorage C, 1,800 yards; to the eastward of a line bearing 049° to a point in the northern boundary of Anchorage C, 1,800 yards distant from the easterly corner of Anchorage C; to the southward of the northern boundary of Anchorage C.

Note 1.—When Anchorage F–1 is not occupied by vessels carrying explosives, it may be used as a general anchorage in the same manner as other portions of Anchorage C except that it must be vacated upon notice from the Captain of the Port when a vessel of a draft too great to permit it to use Anchorage F carrying explosives desires to anchor. When Anchorage F–1 is occupied by a vessel carrying explosives, vessels shall not anchor in Anchorage B or C within a zone 425 yards wide on all sides of the area. No vessel carrying explosives shall be anchored in area F–1 so as to swing within 500 yards of the Newport News dredged channel.

Note 2.—See Note 2 under Anchorage B, above.

8. *Newport News, Anchorage G.* The anchorage area lies to the southward of the following lines: From Fishing Point to buoy No. 3 off Naseway Shoal; thence to a point fixed by the following cross bearings; northern red light on railroad pier, Newport News, bearing 135°; Nansemond River Light, bearing 180°; thence to a point determined by the following cross bearings; northern red light on railroad pier, Newport News, bearing 045°; Newport News Middle Ground Light, bearing 119°; Nansemond River Light, bearing 189°35′; thence 145° to Anchorage buoy F, intersecting an extension of a line marking the northern boundary of Anchorage E; thence easterly to the westerly point of Anchorage E. To the wesward of a line parallel to and 425 yards west of the western boundary of Anchorage F.

Note.—See Note 2 under Hampton Roads, Anchorage B.

9. *Anchorage H, Craney Island Flats.* To the southward of the lines forming the southeastern boundary of Anchorage D; to the westward of a line through the red buoys marking the western side of the Norfolk Harbor Channel as far south as Craney Island beacon; to the northward of an east and west line joining Craney Island beacon and a point on the eastern boundary of Craney Island; generally eastward, northward, and westward of the northern portion of Craney Island between the point on the eastern boundary and the mainland west of the island; and to the eastward of a line parallel to and 425 yards easterly of the eastern boundary of Anchorage F.

Note.—Vessels shall be anchored so as to leave a clear fairway 200 yards wide on a straight line between the slip of the Chesapeake Ferry Company at Pine Beach and Newport News Channel buoy No. 5.

10. *Anchorage H–1, West Norfolk.* To the southward and eastward of the southern and eastern boundaries of Craney Island and to the southward of an east and west line joining a point on the eastern boundary of Craney Island and Craney Island beacon; to the westward of a line through the red buoys marking the western side of the Norfolk Harbor Channel; to the northwestward of a line through buoys Nos. 20 and 8, marking the northern side of the Western Branch Channel; and to the northeastward of a line through buoy No. 8 and high stack at West Norfolk.

Note.—No vessel after receiving its load shall remain more than 12 hours in this anchorage, except by special permit from the Captain of the Port.

11. *Anchorage J, Sewall Point.* To the southward of a line bearing 087° from lighted buoy No. 5 on the eastern side of the Norfolk Harbor Channel; to the northward of a line bearing 282° from the northwestern corner of the submarine basin, Naval Operating Base; to the eastward of a line through the black buoys marking the eastern side of the channel to Norfolk.

12. *Anchorage K.* To the southward of lines bearing 087° and 220°, respectively, from buoy

No. 2, marking the southern side of the channel to the Virginian Railway coal pier at Sewall Point; to the northward of a line through buoys Nos. 1 and 3, marking the northern side of the channel to the Norfolk & Western Railway terminal at Sewall Point; and to the eastward of a line through buoy No. 11, marking the eastern side of the Norfolk Harbor Channel.

13. *Anchorage K–1.* To the southward of a line through buoy No. 4, marking the southern side of the channel to the Standard Oil Company's pipe line pier; to the northward of a line 185 yards north of Pier No. 2 of the United States Army Supply Base; and to the eastward of the eastern side of the Norfolk Harbor Channel.

14. *Anchorage K–2.* To the southward of two lines, one 185 yards south of Pier No. 1 of the United States Army Supply Base, and the other running easterly from the extreme tip of Tanner Point on the north side of Lafayette River, at its mouth, to the extreme tip of the most northerly point on the south side of the river; to the northward of a line bearing 112° from lighted buoy No.21, about 835 yards northerly of Lambert Point; and to the eastward of a line through buoys Nos. 15, 19, and 21, marking the eastern side of Norfolk Harbor Channel.

15. *Anchorage K–3, Lafayette River (for yachts and pleasure craft).* To the westward of Hampton Boulevard bridge crossing Lafayette River; and to the northward and eastward of a line running easterly from the extreme tip of Tanner Point on the north side of the river, at its mouth, to the extreme tip of the most northerly point on the south side of the river, this line constituting the dividing line between Anchorages K–2 and K–3.

Note.—It will be understood that the establishment of this area shall not interfere with navigation and oyster cultivation.

16. *Anchorage L, Lambert Point.* To the southeastward of a line bearing 051° from lighted buoy No. 23 off Lambert Point; to the northwestward of a line bearing 051° from buoy No. 25 off Lambert Point Creek; to the northeastward of a line through lighted buoy No. 23 and buoy No. 25 marking the eastern side of channel to Norfolk.

17. *Anchorage M.* To the southeastward of a line bearing 047° from buoy No. 27, 75 yards southeastward of the southernmost pier of the Norfolk & Western Railway on the east side of the channel to Norfolk, to the northeastward of two lines, one bearing 132° from buoy No. 27, 530 yards to a point; and the other bearing 109° from that point.

18. *Anchorage N, Norfolk, Virginia.* To the northeastward of a line running from the westerly end of the Pennsylvania Railroad pier in Norfolk to the southerly end of the pier at Fort Norfolk; and between two lines at right angles to above line, one passing 200 feet northwest of the Chesapeake and Ohio Railroad pier in Norfolk and the other passing 109 feet southeast of the Nottingham & Wrenn pier; and to the southward of a line drawn 100 feet north of and parallel to an extension of the north side of West Freemason Street.

19. *Anchorage N–1, Smith Creek*—(a) *Mowbray Arch.* Between Mowbray Arch and a line described as follows: Beginning at Ghent Bridge 150 feet from Mowbray Arch and continuing westerly the same distance therefrom to the intersection of the prolongation of the east side of Colonial Avenue; thence in a straight line to a point on the south side of Mill Street prolonged and 70 feet from Mowbray Arch; thence parallel to and 70 feet from Mowbray Arch to the south side of Pembroke Avenue prolonged; thence along the prolongation of the south side of Pembroke Avenue to a point 50 feet from Mowbray Arch: thence in a straight line to a point on the south side of Fairfax Avenue prolonged and 40 feet from Mowbray Arch.

(b) *The Hague.* Between the wall on the west side of the Hague, and the straight line joining the point 40 feet easterly thereof in the south side of Fairfax Avenue prolonged, with the point 70 feet easterly from the wall in the perpendicular to the wall at the south end thereof.

Note.—No floats, rafts, lighters, houseboats, or craft laid up for any reason shall be permitted within the Smith Creek anchorages, except by permission of the Captain of the Port. No vessel shall anchor, or moor, alongside any wharf or pier on Smith Creek, so as to extend more than 40 feet beyond the pierhead line, except in the authorized anchorages.

20. *Anchorage O, Hospital Point.* To the southwestward of a line through the red buoys marking the western side of the Norfolk Harbor Channel; to the southward of a line bearing 242° from north tower elevator at Atlantic City.

21. *Anchorage P, Port Norfolk.* To the southeastward of a line bearing 037° from the northeast corner of the Pennsylvania Railroad piers at Port Norfolk; to the southwestward of a line through the red buoys marking the southwestern side of channel to Norfolk; to the northwestward of the outside bulkhead at the north end of Pinner Point and its northeasterly extension.

22. *Anchorage Q.* The area known as Spotico Creek Flats landward of the United States pierhead line, and not within 200 feet of wharves or other permanent improvements.

23. *Anchorage R.* The area landward of the United States pierhead line on the south side of the Eastern Branch of the Elizabeth River extending from a point 700 feet to the eastward from Norfolk & Western Railway bridge to a point 250 feet from the Virginian Railway bridge and not within 200 feet of permanent improvements: *Provided*, That no vessel shall anchor within 100 feet of the eastern and western entrances of Steamboat Creek, or in a position that will obstruct passage thereto.

24. *Anchorage S.* The area landward of the United States pierhead line on the northern side of the Eastern Branch of the Elizabeth River, between a point 250 feet from the Virginian Railway bridge and the western entrance of Broad Creek, not within 200 feet of permanent improvements and exclusive of the area included between the combined pierhead and bulkhead lines in Moseley Creek.

The Regulations.— (1) Except in cases of great emergency no vessel shall be anchored in Hampton Roads or the harbors of Newport News and Norfolk, Virginia, outside of the anchorage areas hereby defined and established, nor be made fast to the exterior end of any pier, nor to any vessel lying at the exterior end of any pier, or along any bulkhead in such manner as to obstruct or endanger the passage of any vessels to or from the adjacent wharf property, or impede the movements of any vessel entering or leaving adjacent slips.

(2) Except as provided in subparagraph (1) of this paragraph, vessels carrying explosives or other dangerous articles, including inflammable liquids, inflammable solids, oxidizing materials, corrosive liquids, compressed gases and poisonous substances, shall be anchored within the Anchorage Areas F and F–1 only, described above in paragraphs (6) and (7). Anchorage F is reserved for this special purpose and is not to be used by vessels carrying other classes of freight except in cases of emergency.

(3) Permits to anchor in channels within the limits of Hampton Roads and the harbors of Norfolk and Newport News, Virginia, may be granted by the Captain of the Port to wrecking plants legally engaged in recovering sunken property, when the application for such anchorage is approved by the District Engineer in charge of works of river and harbor improvements.

Ferry Channel, Caution.—A ferry channel from Newport News Point to Sewall Point, crossing anchorages C, D, E, and H, is plainly marked on the chart. Complaint has been received that much interference has been encountered by the ferry boats. In taking anchorage at Hampton Roads all mariners are cautioned to keep the ferry channel clear at all times.

Harbor Regulations, aside from those prescribed by the Federal Government, are promulgated by the individual port cities and enforced by them.

Bridge Regulations.—For general bridge regulations see Chapter 2. Special regulations are included in the text.

Tides.—The mean range of tide in Hampton Roads is 2.5 feet. Daily predictions (Norfolk Naval Station) are given in the *Tide Tables, Atlantic Ocean* published annually by the Coast and Geodetic Survey.

Currents.—Detailed current information for a number of locations in Hampton Roads may be obtained from the *Atlantic Coast Current Tables*. However, the currents are influenced considerably by the wind and at times attain velocities much in excess of the current-table values.

Along the wharves at Old Point Comfort the current turns about 1 hour earlier than in mid-channel to the southward. Consequently, there is about an hour preceding each mid-channel slack when the currents near the wharves and in the channel set in opposite directions.

Ice.—Ice seldom interferes with navigation in Hampton Roads for full-powered vessels, even in severe weather.

Dockage Charges.—No charge is made for dockage or wharfage against general cargo vessels while along piers for the loading or discharging of freight to the pier. If alongside a pier for the convenience of vessel the charge varies and is usually assessed on a net-registered-ton basis per day. In cases of cargo handled from vessel alongside pier to craft alongside, 1 cent per 100 pounds of cargo handled is assessed against vessel for privilege of so using dock space. Inquiries concerning rates should be made to the various terminals.

Supplies.—Supplies of all kinds are obtainable at Newport News and Norfolk and in limited quantities at Hampton. Ship-chandlers stores may be had in quantity. Fuel oil can be obtained at the wharves of the various oil companies at Norfolk or from tank barges. Hampton Roads is the greatest coal trans-shipment port in America and bituminous coal can be obtained, through chutes, from the coal wharves at Newport News and the coal piers at Sewall Point and Lambert Point in Norfolk.

Fresh water, suitable for both drinking and boiler purposes, is obtainable at the wharves in Norfolk, Portsmouth, and Newport News. Water boats supply vessels in Hampton Roads and Norfolk Harbor.

Repairs.—Repairs to vessels and machinery of all kinds and sizes can be made. The Newport News Shipbuilding and Dry Dock Company at Newport News has the largest equipment. For further information see table of Marine Railways and Drydocks in the Appendix.

Most of the hoisting facilities for public use are located at the various terminals. A derrick barge equipped with an A-frame derrick capable of handling single lifts up to 150 tons is available at Norfolk.

Communications.—The Hampton Roads area is served by eight trunk lines which have excellent terminal facilities. The Chesapeake and Ohio Railroad has its terminals at Newport News and the remainder are in the Norfolk-Portsmouth area where they are interconnected by the Norfolk-Portsmouth Belt Line Railroad.

Hampton Roads has overseas steamship service and is the port of call of several coastwise lines.

Complete radio, telegraph, and telephone facilities are available. Airplane service is maintained between Norfolk and Washington and the north and west.

A **Coast and Geodetic Survey District Office** is located at Room 418, U. S. Post Office and Court House Building, Norfolk, where information relating to the coasts of the United States, Alaska, Hawaii, and the Philippine Islands is furnished without charge. The station 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, etc., 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 U. S. Coast and Geodetic Survey are in Norfolk and Newport News.

A **United States Branch Hydrographic Office** is located in Room 213, U. S. Customhouse, Main and Granby Streets, Norfolk. Bulletins are posted here giving information of value to seamen, who are also enabled to avail themselves of publications pertaining to navigation and to correct their charts from standards. No charge is made for this service.

The **Headquarters, Fifth District, United States Coast Guard,** and the office of the Captain of the Port are located in the U. S. Post Office and Court House in Norfolk.

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 District Coast Guard Officer at Norfolk or the Commandant, U. S. Coast Guard, Washington, D. C., by radio, collect, or other prompt means, defects or deficiencies in aids to navigation affecting the waters of Chesapeake Bay and tributaries and the outer coast between Cape Henlopen, Delaware, and the North Carolina-South Carolina boundary. Recommendations as to aids to navigation or their improvement may be

submitted to these offices. The latest information pertaining to all aids to navigation in these waters is available at the District Office.

Other Federal Activities are listed in tables in the Appendix.

Port Series No. 15 covers the ports of Norfolk, Portsmouth, Newport News and Hampton, Virginia.

Yacht Clubs.—A list of the larger yacht clubs in the area covered by this volume is given in the Appendix.

Ranges for Compass Adjustment.—There are no established ranges for compass adjustment in the Hampton Roads area.

Storm-warning displays of the United States Weather Bureau are shown from a tower on the Royster Building, Norfolk, at Fort Monroe, and on the waterfront at Newport News.

Prominent objects.—In approaching Hampton Roads the most prominent objects are: Thimble Shoal Light, red conical tower on pier; Old Point Comfort Light, white tower; Fort Wool, flashing light on north searchlight tower; the Chamberlain-Vanderbilt Hotel at Old Point Comfort, twin towers on colonial brick building; a low gray structure on the south side of the entrance abreast Old Point Comfort; and a large group of buildings at Ocean View, a summer resort on the beach, 4 miles southeastward of Old Point Comfort.

From inside the entrance may be seen: A tower, the high dome of the Soldiers' Home, and several chimneys at Hampton; Newport News Middle Ground Light, brown conical tower on pier; the elevated tank near the Naval Air Station; the piers and buildings of the naval base on the east side of the channel to Norfolk; the Virginian Railway coal piers; and a large grain elevator southward.

Channels.—The approach from eastward is through ***Thimble Shoal Channel,*** which in May 1946 had a controlling depth of 40 feet and a width of 750 feet, and is marked on both sides of the channel. The least depths outside of and near the dredged channel are about 27 feet on the north side and 28 feet on the south side. As an aid in thick weather in Thimble Shoal dredged channel, it is reported that soundings show hard bottom northward of the channel and soft bottom southward of the channel.

Regulations.—The following regulations prescribed by the Government restrict the use of this channel:

1. The use and navigation of Thimble Shoal Channel are restricted to all vessels, tows, or other watercraft drawing 20 feet or more at the time of navigating the channel, provided that this restriction shall not apply to passenger vessels.

2. Vessels permitted to use Thimble Shoal Channel under Section 1 of these regulations must proceed through channel at a reasonable speed such as not to endanger other vessels and not to interfere with any other 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.

3. These regulations are 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.

From the western end of Thimble Shoal Channel to the eastern end of ***Newport News Middle Ground*** the channel has ample width and depth. It is marked by Thimble Shoal and Old Point Comfort Lights, the navigation light on the north searchlight tower of Fort Wool, and by several buoys, some of which are lighted.

Only one dredged channel is now being maintained around Newport News Middle Ground to Newport News. This straight channel northward of the Middle Ground connecting deep water in the James River with Hampton Roads had a controlling depth

of 40 feet in October 1946. The maintenance project provides for a channel 40 feet deep, 600 feet wide, increased to 1,000 feet at the ends, and 2.9 miles long through the shoal north of Middle Ground Light. It is marked by lighted buoys on both sides. The least depths outside of and near the dredged channel are 21 to 24 feet.

Currents.—The currents do not always set fair with the channel, especially with strong winds, and some trouble has been experienced at times by deep-draft vessels in keeping in the channel.

The area southward of Newport News Middle Ground is now utilized as an anchorage ground as shown on Chart 400, and as described on page 173.

The dredged channel leading to Norfolk, Portsmouth, and beyond is described on page 184.

The Horseshoe is described under the heading Hampton Roads to York River. ***Thimble Shoal,*** with depths of 9 to 12 feet, forms the southern edge of the Horseshoe and the north side of the channel into Hampton Roads between Thimble Shoal Light and Old Point Comfort.

Old Point Comfort (lat. 37°00′, long. 76°19′) is a town and summer resort on the north side at the entrance to Hampton Roads. It has communication by railroad and electric road with Hampton and Newport News, with Norfolk by steamer, and with the west end of Willoughby Spit by ferry. Most of the steamers plying from Norfolk to points on Chesapeake Bay and tributaries land at Old Point Comfort, where the depth at the main wharf at the hotel is about 25 feet. Gasoline, provisions, and water in small quantities are obtainable. The **storm warning display** tower is on the south waterfront. Day and night signals are shown.

Caution.—Landing at the wharf is often rendered difficult by the strong tidal currents. The first of the ebb sets southeastward from the wharf and the last of the ebb sets directly on the wharf and northward through the opening eastward of Hampton Bar. The direction of the flood current is approximately west-southwestward.

Fort Monroe, Restricted area.—*The Area.*—Beginning at a point 825 yards 256°30′ from Old Point Comfort Light; thence about 315 yards 108° to the southeast corner of Old Point Comfort Main Pier at Fort Monroe; thence 425 yards 084°30′ to a point south of the Fort Monroe engineer's pier; thence directly to the southwest corner of the engineer's pier, then north and east along this pier and the Fort Monroe sea wall to latitude 37°00′30″ N., longitude 76°18′05″ W.; thence 675 yards 087°; thence 044° to the parallel of 37°01′ N.; thence due east along that parallel to latitude 37°01′00″ N., longitude 76°15′15″ W.; thence about 1,350 yards 100° to Thimble Shoal Light; thence 2,110 yards due south to Willoughby Bank, in latitude 36°59′49″ N., longitude 76°14′25″ W.; thence 1,110 yards 228°30′; thence in a direction approximately 252° to Fort Wool Light; thence about 900 yards 245° to Sewall Point Spit lighted bell buoy 2; and thence approximately 348°30′ to the point of origin.

The Regulations.—1. Anchoring, trawling, fishing, and dragging are prohibited in this area, and no object, attached to a vessel or otherwise, is to be placed on or near the bottom.

2. The Commanding Officer, Naval Station, Norfolk, Va., or his designated agent, will be the enforcing agency.

Firing range off Fort Monroe.—A danger zone, consisting of firing ranges, has been established in Chesapeake Bay eastward of Fort Monroe, Va., as follows:

The Danger Zone.—1. The sector of a circle, radius 15,000 yards, with center in, approximately, latitude 37°02′00″ N., longitude 76°17′42″ W., included between the bearings 030° and 050°13′ from the center.

2. The sector of a circle, radius 20,000 yards, with center in, approximately, latitude 37°02′00″ N., longitude 76°17′42″ W., included between the bearings 050°13′ and 116°32′ from the center.

3. A triangular area lying between the southern limit of the 20,000 yard radius sector, and a line bearing 105° 19,800 yards from Fort Monroe Light.

The Regulations.—1. During the periods of fire a red flag will be prominently displayed in the vicinity of the firing area.

2. All concerned are cautioned to keep out of this area during periods of fire. Attention is invited to section 3, Chapter XIX, of the Army Act approved 9 July 1918, which provides that willful disregard of the above published provisions is a misdemeanor.

Note.—The intent of the above regulations is not to interfere with normal ship movements, but to prevent loitering, fishing, etc., in the area during firing. Local fishermen having pound nets, etc., in the area are especially warned to stay clear during gunfiring.

Mother Hawkins Hole is an anchorage, with depths of 9 to 12 feet, much used by small local craft, on the west side of Old Point Comfort and north of the easterly end of Hampton Bar. The entrance is between the wharf at Old Point Comfort and the horizontally-banded buoy close westward of it and has a depth of 18 feet.

Phoebus Channel, along the west shore of the Old Point Comfort peninsula also has its entrance between Old Point Comfort wharf and the horizontally-banded buoy. The channel has been improved by dredging; the project provides for a channel 12 feet deep and 150 feet wide from deep water in Hampton Roads to the Phoebus water front, a distance of about 0.7 mile. In July 1946 the controlling depth was 12 feet. The channel is well marked by buoys. The ferry from Willoughby Spit lands on the east side of the channel about 0.3 mile above the entrance.

The wharves at **Phoebus,** at the head of the channel, had a depth of about 14 feet alongside in July 1946. Small boats find good anchorage just outside the channel in 8 to 20 feet of water.

Mill Creek, inside of Old Point Comfort, has large areas bare at low water and several narrow channels. It is crossed by three fixed bridges at the mouth, under which small boats can pass. The vertical clearance through the bridges is 4½ feet, the horizontal clearance 10 feet. The creek is little used.

Hampton Bar, with 1 to 5 feet over it, extends from 100 yards to 2 miles west-southwestward from Old Point Comfort; it is marked by buoys and lights on the south side, a horizontally-banded buoy at the north end, and a lighted buoy at the southwest end.

Hampton Creek, 1.5 miles west-northwestward of Old Point Comfort, is the approach to the town of Hampton. The project for the improvement of Hampton Creek provides for a dredged channel 12 feet deep from the vicinity of Old Point Comfort across Hampton Flats and up the creek to the Hampton Highway Bridge at Queen Street, a distance of about 2.4 miles, with a width of 200 feet in the outer portion of the channel and a width of 150 feet in the creek, suitably widened at the bends. The controlling depth in the channel in July 1946 was reported to be 11 feet. The channel is well marked and easy to follow.

Speed regulation.—The speed of vessels in Hampton Creek is regulated to 4 knots, from the entrance to the Chesapeake and Ohio Railroad bridge.

The creek is crossed by several fixed bridges, and the only navigation above them is by small motor boats. The lower bridge is a fixed trestle with 26-foot span and 10-foot vertical clearance at MHW.

Hampton (lat. 37°01′, long. 76°21′) is the headquarters of a large number of boats engaged in oystering and fishing and has some trade by power boats and barges, the deepest draft being 10 feet. Yachts harbor here. The part of the creek between the public wharf and the lower bridge, a distance of 0.3 mile, is used as an anchorage for boats. Gasoline, provisions, and coal and water are obtainable, and there are two shipyards and railways, the larger capable of hauling out vessels of 125 tons, 125 feet length, 9 feet draft aft, and 6 feet forward. The Hampton Yacht Club is on the western side of the inner harbor.

The gasoline company wharves at the western side of the entrance to the creek have a depth of 8 feet at the face; the gasoline company wharf in the upper part of the creek has a depth of 9 feet. The main commercial landings are just southward of the bridge and had about 11 feet of water alongside in July 1946.

Hampton Creek may be approached from either end of Hampton Bar, but the larger craft use the dredged channel.

In approaching from the southwestward pass close to the lighted buoy which is about 0.3 mile from the southwest end of Hampton Bar and head for the light off the entrance to Hampton Creek on course **031°** until near the light.

Jones Creek, the eastern arm of Hampton Creek near the entrance, has depths of about 9 feet in the channel and serves as a protected anchorage for small boats. The bulkhead along the northern bank has similar depths. Permission to use this area should be obtained from the local authorities.

Herberts (Sunset) Creek, the western arm of Hampton Creek near the entrance, has depths of about 6 to 10 feet, and the wharves have depths of 6 to 9 feet. The entrance channel is narrow and crooked and should not be attempted without local knowledge. A small marine railway is on the southern shore.

Newport News is an important seaport. It is the terminal of the Chesapeake & Ohio Railroad, which owns the piers, grain elevator, and coal chutes near the south end of the city, and it is the site of the Newport News Shipbuilding & Dry Dock Company plant, which has wharves at the northwest end of the city.

Coastwise steamers use the Chesapeake & Ohio Railroad pier 6 where there are depths 20 to 21 feet. Both foreign and domestic steamers use pier 8 where there is a depth of 32 feet.

Depths alongside the railroad coal piers 9 and 15 are from 35 to 37 feet with shoal water on the upper side of pier 15. Coal can be loaded at the normal rate of 1,300 tons per hour with a maximum of 6,000 tons per hour. Other piers of the railroad company have depths of 15 to 35 feet.

The Newport News Shipbuilding & Dry Dock Company piers have depths of 26 to 35 feet, with general depths of 32 feet. The graving dock has a length on keel blocks of 745 feet and a depth over the sill of 30 feet at MHW.

There is a railroad car ferry service and railroad passenger boat service to Norfolk. A passenger and vehicular ferry leaves from just east of the municipal pier for Sewall Point, where electric cars make connection with Norfolk.

A small boat harbor has been constructed by the city in the mouth of ***Newport News Creek*** at the southern end of Newport News. The Federal project for the improvement of the creek calls for a 12-foot channel, with widths from 200 to 60 feet from deep water in Hampton Roads to the ***Municipal Boat Harbor;*** and a turning basin and anchorage 12 feet deep, 220 feet wide and 400 feet long at the upper end of the harbor.

In July 1946 the controlling depth in the entrance was 9 feet; the best water in approaching being from the south and favoring the eastern side of the harbor on entering. The many bulkhead wharves inside had about 7 feet alongside. Gasoline, water, and yacht supplies can be obtained in the small boat harbor.

Water can also be obtained at the municipal pier, at several of the railroad and shipbuilding docks, and by waterboat.

Newport News principal exports are coal with small amounts of tobacco, grain, and lumber. The imports are pulpwood, and wood pulp, manganese and chrome ore, paper, copra, asphalt, etc.

Willoughby Bank is on the south side of the channel into Hampton Roads. From **Fort Wool** (Rip Raps) the shoalest part of the bank extends 2.4 miles east-northeastward. Part of the bank has been used as a dumping ground and has little depth over it.

Just southward of Fort Wool is a narrow channel with a depth of 13 feet, which leads south of Willoughby Bank; it is little used except by local boats.

A submarine cable crosses from Old Point Comfort to Fort Wool and Willoughby Spit.

Willoughby Bay, formed by Willoughby Spit and the shoal extending northward from it and by Sewall Point, has depths of 5 to 12 feet in the outer part. The greater part of the bay is used as a seaplane landing, and, with the exception of the extreme northern part, is a restricted area and closed to navigation. The eastern end is now a dried mud flat, formed by dredging. The slough between this mud flat and the spit itself is used by a few local fishermen as an anchorage for shallow draft boats. The buildings of the Norfolk Naval Station and the Naval Air Station on the south side are prominent.

The wharf near the western end of **Willoughby Spit,** at which the ferry from Old Point Comfort lands, is marked by a light. There is an electric railway from here to Ocean View and Norfolk. The wharf immediately westward of the ferry slip has excellent accommodations for yachts and a controlling depth of 12 feet alongside. Gasoline, Diesel oil, and fuel oil are available.

Prohibited area for seaplane operations.—The area is bounded as follows:

The Area.—Beginning at a point on the northeast corner of the Naval Operating Base; thence 278°, 4,850 feet; thence 012°, 7,600 feet thence 100°, 2,150 feet; thence 189°, 3,600 feet; thence 135°, 2,000 feet; thence 112°, 850 feet; thence 092°30′, 7,300 feet; thence 177°, 3,000 feet; thence 249°, 2,200 feet; thence 159°30′, 550 feet to a point on the shore line fronting the Naval Air Station extended, containing an area of about 1,630 acres.

The Regulations.—(1) All vessels excepting those operated by the Navy and Coast Guard and the Chesapeake Ferry Company shall be prohibited from entering that portion of the Seaplane Operating Area in Willoughby Bay at all times.

(2) Boats without lights shall be prohibited from operating in that portion of the Seaplane Operaing Area in Hampton Roads west of the western end of Willoughby Spit.

(3) No vessel shall at any time moor or anchor within the Seaplane Operating Area.

(4) No fishing, oystering, clamming or crabbing, or any other activities will be permitted at any time within the limits of the Seaplane Operating Area.

(5) All vessels moving in the Seaplane Operating Area shall immediately proceed to leave the area when warned by aircraft employing the "buzzing" method which consists of low flight by an airplane and repeated opening and closing of its throttle.

(6) These regulations will be enforced by the Captain of the Port, Norfolk, Virginia, and by the Commanding Officer, Naval Air Station, Naval Operating Base, Norfolk, Virginia, or such responsible agent or agents as they may jointly designate.

Anchorage for small boats.—Regulations provide a sheltered anchorage for small boats just inside the point of Willoughby Spit as follows:

(1) *Anchorage J-1, Willoughby Bay (for small boats).*—To the westward of a line bearing 223° from the channelward end of the westerly fender of the Chesapeake Ferry Company terminal at Willoughby Spit to the clock tower on the Officers' Club at the Naval Operating Base; and to the northward of a line bearing 138° through Willoughby Spit Ferry Light to the intersection with the line first described.

(2) *Anchorage J-2, Willoughby Bay (for small boats).*—To the eastward of a line bearing 169° from the southeasterly corner of the bulkhead of the Chesapeake Ferry Company terminal at Willoughby Spit to the northeasterly corner of the bulkhead at the Naval Air Station; to the northward of a line bearing 103° from Willoughby Spit Light through a spherical mooring buoy maintained by the Navy Department, and a triangular range target maintained by the War Department; to the southward of

a line bearing 059° from the northeast corner of the bulkhead at the Naval Air Station to the intersection with the line last described and to the eastward of a line bearing 330° from the point immediately east of the mouth of Mason Creek to the intersection with the line last described.

Note.—Where special conditions justify, boats will be permitted to anchor channelward of the limits of Anchorage J–2, subject to written authority of the Captain of the Port.

A dredged channel 300 feet wide extends in part from Hampton Roads, 0.4 mile westward of Fort Wool, to the vicinity of the end of Willoughby Spit. The entrance to this channel is marked by buoys on both sides. The cut through Sewall Point Spit is subject to shoaling, particularly along the west edge of the channel.

In entering pass 60 yards eastward of the lighted bell buoy and buoy 4. In March 1944, the controlling depth was 10 feet along the centerline of the channel.

Sewall Point Spit extends about 2 miles north-northeastward from the bulkhead along the north side of the Norfolk Naval Station. The depths are from 2 to 6 feet.

A channel, marked by buoys, has been dredged through Sewall Point Spit along the north side of the Norfolk Naval Station. This channel had shoaled to a depth of 7 feet in June 1946.

The basin on the north side of the Norfolk Naval Station is used only by small naval boats. The depths are 6 to 8 feet.

Elizabeth River, emptying into Hampton Roads from southward, forms the approach to and the harbors of Norfolk and Portsmouth. It is also important as a part of the inside route, connecting Hampton Roads with the Albemarle and Chesapeake Canal and the Dismal Swamp Canal, both of which lead southward to the sounds of North Carolina.

Channel.—This channel has no natural ranges and some local knowledge is required for vessels of the deepest draft to follow the best water. The channel is well marked and easily followed in clear weather, although it is often crowded with traffic. Shoals rise abruptly in places on the sides of the channel, as shown on the chart. A towboat is generally used by large vessels when docking. The directions for navigating the river are included in the table of directions, Chesapeake Bay to Newport News and Norfolk, in Chapter 3.

The Federal improvement project provides for a channel 40 feet deep over a width of 750 feet from Hampton Roads to the mouth of the Southern Branch and 450 feet wide up this branch to the Belt Line Railroad bridge; thence 30 feet deep over a width of 375 feet to the Virginian Railway bridge; thence 25 feet deep and generally 200 feet wide to a point about 800 yards above the Norfolk & Western Railway bridge; thence 12 feet deep to the tidal guard lock at Great Bridge.

The latest controlling depths and the dates they were determined are as follows: Hampton Roads to Tanner Point, 40 feet in November 1945; thence to Lambert Point, 38½ feet in October 1945; thence to Berkley 39 feet in October 1945; thence to the Belt Line Railroad bridge, 38 feet in October 1945; thence to the Virginian Railway bridge, 23½ feet in March 1946; thence to a point about 800 yards above the Norfolk & Western Railway bridge, 23½ feet in February-March 1946; thence 12 feet in June 1946 to the lock at Great Bridge.

Restricted area.—Pleasure boat operation and fishing are prohibited in the area east of Norfolk Main Channel.

Elizabeth River, Traffic signals.—The presence of vessels during daylight in the Norfolk Ship Channel between buoys 1 and 12 will be indicated by the following signals displayed from the signal station at the Naval Operating Base and at the signal yardarm of the tug office at the end of Pier 7:

(*a*) Vessel or vessels proceeding northward, one black ball.

(*b*) Vessel or vessels proceeding southward, two black balls.

The one black ball, indicating north-bound vessel in the Norfolk Ship Channel, will be hauled down when the vessel is abreast Pier 7 at the Naval Operating Base. The two black balls indicating south-bound vessel in the channel will be hauled down when the vessel is abreast of Pier 2.

Vessels leaving the piers at the Naval Operating Base are warned that the display of the black balls indicates traffic which might impede their departure from the piers.

The special ball-shaped signals are not in any way to be interpreted as giving right of way to ships in the Elizabeth River Ship Channel but rather are to be considered as a warning that such ships are to be handled with more than ordinary caution.

Restricted area off Naval Operating Base.—*The Area.*—Beginning at a point on the eastern shore of the Elizabeth River 3 miles and 50 yards 090° from Newport News Middle Ground Light; thence 279°, 825 yards to the eastern edge of the Norfolk Harbor Channel; thence along the eastern edge of the Norfolk Harbor Channel 004°, 1,200 yards; thence 099°, 875 yards to a point on the eastern shore of the Elizabeth River; thence along the shore of the Elizabeth River to the point of beginning.

The Regulations.—No commercial vessel other than those bound to or leaving the piers in that area may enter or cross the above-described area.

Traffic signals.—The following flag signals will be displayed by a traffic control boat in the Norfolk Ship Channel, to control the traffic leaving the piers at the Naval Operating Base:

(*a*) Flag B.—Dangerous to leave piers and pass beyond pier head line.

(*b*) Flag M.—Area not clear, but vessels may proceed from piers if extra precaution is taken.

(*c*) A white flag.—Reasonably safe for vessels to clear piers.

Note.—The traffic control boat is identified by the Union Jack at the gaff.

The above signals are shown from the jackstaff.

Tides.—The mean range of tide is 2.6 feet at Craney Island and 2.8 feet at Portsmouth.

Currents.—In the Elizabeth River and each of its three branches the average velocity of the current at strength is about ¾ knot. The *Atlantic Coast Current Tables* give detailed information for a number of locations.

Ice.—The harbor is generally free of ice and navigation is never obstructed for full-powered vessels. In severe winters the upper part of Southern Branch is sometimes closed for short periods.

Sewall Point (lat. 36°57′, long. 76°20′) is at the eastern side of the mouth of the Elizabeth River. The north end of the point is occupied by the Norfolk Naval Station. The piers have depths from 27 to 34 feet and an inclosed basin is 30 feet deep, affording protection to small naval vessels. The entrance to the basin had a controlling depth of 40 feet in 1946.

South of the naval station is the ferry slip of a Newport News ferry, and just south of that are the two coal piers of the Virginia Railway Company, with depths of 24 to 35 feet alongside. Loading capacity is 3,600 tons of coal per hour at one pier and 7,200 tons per hour at the other.

The next group of piers have depths of 21 to 26 feet alongside. Surveys in October 1945 show a 22-foot lump 220 feet off the end of pier 22.

South of these are the wharves of the municipal terminal with 30 to 35 feet alongside but only 28 feet in the approach. The municipal grain elevator is operated by the Norfolk & Western Railroad. The normal vessel-loading capacity is 75,000 bushels per hour. General cargo is also handled at the municipal terminal. The terminal is served by the Norfolk-Portsmouth Belt Line Railroad.

Next in order are the Standard Oil Company pier, and two piers (Nos. 1 and 2) with 32 feet depth, operated by the Norfolk-Tidewater Terminal Company.

Dredged channels lead to all these wharves but are subject to change.

Lafayette River, formerly ***Tanner Creek,*** is much frequented by small pleasure boats. A depth of 4½ feet is in the entrance and 7 feet inside to the fork 3.5 miles above the entrance, above which is a depth of 2 feet in either fork to near the head of navigation.

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The entrance between **Tanner Point** and Lambert Point has been improved by a dredged channel 100 feet wide from deep water to the first bridge. In June 1946, the project depth of 8 feet obtained. The channel entrance is marked by an unwatched light on a pile with cage work at the top. Two similar lights and two buoys mark the channel. In running up the channel a tall, white-tipped stack in West Norfolk lies astern. The turn between the beacon and buoy off **Lawless Point** is sharp and vessels must exercise care to keep from going aground. The 6-foot spot shown on the chart 350 yards east of the turn must be avoided. Pass to the north.

The wharf of the Norfolk Yacht and Country Club is located on the north shore, just westward of the first bridge. Gasoline, Diesel oil, fresh water, and ice are obtainable. In June 1946, the depth was 16 feet at the outer face.

The creek and its branches are crossed by several bridges. The first is a fixed concrete arch with a 61-foot span between fenders and a 29-foot clearance above MHW; the second, north of **Lafayette Park,** is a bascule draw with a 40-foot span between fenders and a 20-foot vertical clearance at MHW when closed. A day's notice is required to have this draw opened. A submarine cable crossing is along the west side of the first bridge.

Between the first and second bridges, previously described, the channel is narrow in places but is usually marked by bush stakes. The maximum draft of vessels now passing above the first bridge is 5 feet.

A commercial yacht landing is located on the south side of Lafayette River immediately westward of the second bridge. In June 1946 a depth of 5 feet was in the slips and at the face of the outer landing. Gasoline, Diesel oil, and fresh water are obtainable. Convenient transportation to downtown Norfolk is available.

In the tributaries of the river are numerous small private landings and three small marine railways.

Craney Island to Intracoastal Waterway

CHART 452

Craney Island (lat. 36°54′, long. 76°20′) is low and sparsely wooded and is the site of a quarantine station for the cities of Norfolk and Portsmouth. There is now a depth of about 3½ feet at the Quarantine Station Wharf on the southwest side of the island at the head of the channel. This channel has an entrance depth of 8½ feet but has filled in until the controlling depth to the wharf is only 4 feet. Local knowledge is required as the channel is narrow and unmarked.

The southern end of Craney Island is occupied by a large fuel-oil depot and tanks. Pipe lines extend to wharves along the east side, at which there is 30 feet of water. These wharves are used for loading and discharging crude and refined oils. The wharf at the southeast side of the island has about 27 to 28 feet at the face.

Notice.—A water-pipe line crosses the harbor channel from the island to just above Lambert Point. The crossing is marked by range lights and sign, and vessels are cautioned not to anchor in the vicinity. Another pipe-line area crosses from the southwest of the island to ***Craney Island Creek.***

Craney Island Light, shown from a white skeleton tower on piles, is off the north-

east end of the area. The light is 34 feet above the water. The fog signal is sounded on a bell.

Craney Island Anchorage is a dredged area southeastward of the island and on the west side of the main channel. The deeper water is on the eastern side where there is more than the project depth of 30 feet. Surveys in 1946 showed depths of 25 to 29 feet in the anchorage.

Lambert Point, on the eastern side of ***Elizabeth River,*** 1 mile southward of Craney Island Light, is the site of the large coal and other piers of the Norfolk & Western Railroad. The maximum coal loading capacity is 6,000 tons per hour at coal pier No. 4. Depths of 25 to 35 feet are maintained by dredging alongside the wharves, and vessels load here to a draft of 33 feet. There are also three piers, for overseas, coastwise, and intracoastal merchandise, belonging to the same company, 0.8 mile southeastward, at which depths of 32 to 35 feet have been dredged.

Norfolk, on the east bank of the Elizabeth River, 7 miles above Sewall Point and 30 miles from the entrance to Chesapeake Bay, is one of the important ports of the United States. It has a large foreign, coasting, and bay trade and is the terminus of several railroads. All eight railroads are linked on the Norfolk side by the Norfolk and Portsmouth Belt Line, an industrial switching road 36 miles in length and completely encircling the industrial section. It provides for efficient interchange of traffic from one road to another, serves industries and commercial establishments and connects with steamship terminals. The Belt Line has a car float bridge (slip) at Sewall Point.

The harbor consists of the Elizabeth River, a tidal estuary, and certain portions of its Eastern, Southern, and Western Branches. It is about 16 miles long with a varying width of from 0.2 to 2 miles. The limits of ***Norfolk Harbor*** have been defined as follows:

All of the water-front terminals lying within the area bounded on the north by the north limit of the Naval Operating Base; on the east at the mouth of Moseley Creek, 2,300 feet upstream from the Virginian Railway bridge crossing the Eastern Branch of Elizabeth River; on the south by a limit 2,500 feet upstream from the Norfolk and Western Railway bridge, crossing the Southern Branch of Elizabeth River; and on the west by the limit 3,000 feet upstream from the West Norfolk bridge crossing the Western Branch of Elizabeth River; all water-front property lying within the corporate limits of the city of Portsmouth, including Scott Creek; and Craney Island.

Several lines of coasting and bay steamers ply from the port, and it is the center of steamboat traffic to Cape Charles city and to the tributaries on the west side of the bay as far as the Rappahannock River. It has ferry communication with Berkley and Portsmouth and frequent steamer service to Cape Charles city, Old Point Comfort, Hampton, and Newport News.

The water front is lined with wharves, four of which are public for small craft; one at the foot of City Hall Avenue with 8-foot depth, another at the foot of Main Street with 10-foot depth, the third at the foot of Commerce Street with 18-foot depth, and the Municipal Pier at the foot of Nebraska Street just eastward of the ferry slips. This last provides berthing for yachts in depths varying from 11 to 17 feet. Gasoline is no longer available here.

Gasoline, Diesel oil, and fresh water are available for small craft at the fish company wharf at the foot of Southampton Street in Atlantic City. Depths here range from 8 to 16 feet, the shoaler depth being at the inner end of the slip.

Depths at other wharves range up to 28 feet, the latter depth being at the face of the Southgate Terminal Corporation wharf at the foot of Tazewell Street, the channel

to which is reported dredged to 30 feet. This wharf is used for an overseas, coastwise, and intracoastal freight terminal.

More complete information regarding facilities at the several wharves of Norfolk and vicinity can be found in the Corps of Engineers' publication, *Port Series, No. 15*, (revised 1934), entitled, The Ports of Norfolk, Portsmouth, Newport News and Hampton, Va.

Western Branch, on the west side of Elizabeth River, is frequented by vessels up to 18 feet draft to a wharf at West Norfolk and by towboats, car floats, and barges to the railroad wharves at Port Norfolk, the deepest draft being 14 feet. The channel is well marked, as shown on the chart. The deeper-draft vessels usually employ a towboat when entering.

The project for the improvement of Western Branch provides for a dredged channel 24 feet deep, 300 to 400 feet wide from the 40 foot channel of the Elizabeth River to the bridge, thence a channel 18 feet deep and 150 feet wide to a point 3,000 feet above the bridge. In December 1944, the controlling depths were 14½ feet from the 40-foot channel to the West Norfolk bridge, thence 18 feet for a distance of 3,000 feet above the bridge.

For a distance of 3.4 miles above West Norfolk to just above the third bridge, Western Branch has a ruling depth of 7 feet in a narrow unmarked channel. It is shoal in places above the third bridge, but is navigable for small boats for a farther distance of about 3 miles. Above West Norfolk is considerable traffic in small vessels to farm landings. The chart is the only guide for strangers.

Bridges.—Four bridges cross Western Branch between the entrance and the head of navigation; all have draw openings. These bridges, named in order beginning at the entrance, and their clearances when draws are closed, are: West Norfolk, 140-foot span between fenders, 4¾-foot MHW clearance (south opening obstructed by piling); Churchland, 60-foot span between fenders, 4¾-foot MHW clearance (eastern opening shoal); Atlantic Coast Line Railroad, 50- and 51-foot spans, 4-foot MHW clearance; Hodges Ferry bridge, 32-foot span between fenders, 5½-foot MHW clearance—this bridge is opened only after 8 hours' advance notice has been given.

West Norfolk, on the north side at the entrance of Western Branch, is the site of a smelting plant. A shipyard and railway, just above the bridge, can take out vessels of 90 feet length and 10 feet draft. Wharves both at smelting plant and shipyard have depths of 12 to 18 feet.

The structure shown on the chart on the western side of the main ship channel and on the north side of the entrance to Western Branch is a degaussing station.

Port Norfolk, on the south side at the entrance to Western Branch, has a bulkhead wharf and ferry slip, at which car floats, towboats, and barges from the town of Cape Charles make landings. A depth of 15 to 16 feet can be taken to the wharf. Pile ruins of a former pier are just westward of the ferry slip.

Pinner Point (lat. 36°51′, long. 76°19′), on the southwest side of Elizabeth River just above the entrance to Western Branch, is the main terminal of the Atlantic Coast Line and Southern Railroads and has several wharves at which large vessels load and discharge. Depths at the wharves are from 15 to 30 feet.

Scott Creek, between Pinner Point and Hospital Point, has been improved by dredging a channel 12 feet deep and 100 feet wide from the 40-foot channel in Elizabeth River to a point 100 feet above the Atlantic Coast Line Railroad bridge. It had a 10-foot controlling depth in 1946 in the dredged channel. The entrance channel is marked by bush stakes to the bridge. The drawbridge, opened by hand, has two

35-foot spans with 3-foot MHW clearance when closed. The southeast span is shoal. The creek is used by small boats which land at the oyster houses just above the bridge. Depths alongside the bulkhead vary from 9 to 11 feet.

Hospital Point, the site of a naval hospital, is wooded. A black water tank and the dome of the main hospital building are visible above the trees. The pier had 18 feet at the face in June 1946 and is a private landing for the United States Naval Hospital.

Smith Creek, the ***Hague Anchorage,*** opposite Hospital Point, has a depth of 10 feet in the entrance and inside along the wharves. Depths at the wharves are generally from 8 to 15 feet. There is a small marine railway and repair yard for small craft on the western side. It is frequented by motor boats, oyster boats, and barges carrying sand and gravel, and its northern arm is used as an anchorage for motorboats.

The creek is crossed at the mouth by a drawbridge, western side open to navigation, 49 feet wide and with a MHW clearance, when closed, of 5 feet. The bridge is opened from 5 a. m. to midnight upon signal of three blasts of a whistle.

A naval small-boat landing is at the eastern side of the entrance.

A fuel barge is moored off the entrance to Smith Creek. Gasoline, Diesel oil, and fresh water are available. The outer face has 12 feet of water alongside, the inner face 9 feet.

Portsmouth, on the west side of Elizabeth River, opposite Norfolk and Berkley, is the site of the Norfolk Naval Shipyard and is the main terminus of the Seaboard Air Line Railroad. Wharves have depths from 10 to 31 feet, the latter depth being at the Sinclair Refining Company terminal at ***Paradise Creek.*** The Seaboard Air Line bulkhead pier 3 just above the ferry landings has 30 feet alongside. Portsmouth has several other commercial wharves and has considerable trade in foreign and coastwise vessels.

Berkley, a part of the city of Norfolk, is on the point between the Eastern and Southern Branches of the Elizabeth River. It is the main freight terminus of the Norfolk & Southern Railroad, and has several tobacco, lumber, and fertilizer wharves, and a coal bunkering wharf with 20-foot depth. There are also several shipyards and marine railways.

Eastern Branch, extending eastward along the south side of the city of Norfolk, has been improved by dredging. The Federal improvement project provides for a channel 25 feet deep from the 40-foot channel at the mouth to the Virginian Railway bridge. In February 1947, the controlling depths were: From the mouth to Norfolk & Western Railway bridge, 21¼ feet; thence to the Virginian Railway bridge, 21½ feet.

Above the fourth bridge the branch has a natural channel, usually marked by bush stakes, with a depth of 10 feet to the fork 3.3 miles above the entrance.

Four drawbridges cross Eastern Branch between the entrance and the fork. The Berkley bridge, 0.6 mile above the entrance, is a double-leaf bascule draw, with a clear opening between fenders of 128 feet and a vertical clearance of 35 feet at MHW when closed. The Norfolk & Western Railroad bridge, 0.9 mile above the entrance, has a lift opening 140 feet wide between fenders and a vertical clearance of 5 feet at MHW when closed. The Campostella Bridge, 1.4 miles above the entrance has a double-leaf bascule draw 142 feet wide between fenders and a clearance of 16 feet at MHW when closed. Between the hours of 7:35 a. m. and 7:50 a. m., on week-days only, the drawspan of this bridge need not be opened, except for the passage of tugs with tows. The Virginian Railway bridge, 2.5 miles above the entrance, has a center-pier draw, each opening 60 feet wide between fenders, with a vertical clearance of 6 feet at MHW when closed. The ebb current through this bridge has a southerly set.

Below a point 0.3 mile above the third bridge is an extensive traffic to the wharves at Norfolk and Berkley, but above that point, Eastern Branch is little used except by small local craft.

Broad Creek, the north fork of Eastern Branch, has a depth of 2 feet for 1.4 miles, and the south fork a depth of 2 feet for about 2 miles. Three bridges cross Broad Creek. The first two, just above the fork, have draw openings about 28 feet wide; the vertical clearance of the first bridge is 2½ feet at MHW, and of the second bridge is 11 feet at MHW. The third, 1.1 miles above the fork, is a fixed bridge; the horizontal clearance is 30 feet and the vertical clearance is 4 feet at MHW.

Indian River, on the south side of Eastern Branch, 2.5 miles above the entrance, has a depth of 3 feet for 0.8 mile above the mouth.

Southern Branch of Elizabeth River is the approach to the two canals which afford passages from Chesapeake Bay to the inland waters of North Carolina. This branch is of considerable commercial importance; there are several large lumber mills, fertilizer factories and other manufactories at which vessels load.

The commerce using the Intracoastal Waterway and the canals passes through the branch. The inside route through the canals is described in *United States Coast Pilot, Section D, Cape Henry to Key West.* The controlling depths as far as the entrance to the Albemarle & Chesapeake Canal are given on page 184.

The channel for its whole length of 10.5 miles is marked by buoys and is not difficult to navigate as far as the entrance to Deep Creek and to the lock of the Albemarle & Chesapeake Canal, with the aid of the chart.

Speed.—A speed not to exceed 6 knots must be maintained in Southern Branch of Elizabeth River between Elizabeth River buoy 32, located 400 yards 212°31′ from Norfolk Main Channel Light and the Norfolk and Portsmouth Belt Line Bridge. Vessels passing the Norfolk Naval Shipyard at too great speed are liable to do damage to floating equipment, small craft or vessel moorings. All vessels passing the Navy Yard are warned to reduce speed to that necessary for steerage way only.

Restricted area.—No person is permitted to fish or operate pleasure boats in the Southern Branch of the Elizabeth River off the Norfolk Navy Yard and **St. Helena Annex,** except when navigating the main channel.

Bridges, Southern Branch.—The whistle signal for all bridges across Southern Branch is three long blasts.

Belt Line Railroad bridge, 1.8 miles above the entrance, has a center pier draw, each opening 109 feet wide between fenders, with a vertical clearance of 12 feet at MHW when closed.

Norfolk and Portsmouth highway bridge, 0.2 miles south of the Belt Line Bridge, has a lift span 220 feet between fenders with vertical clearances of 15 feet at MHW when closed and 145 feet when raised.

Virginian Railway bridge, 2.8 miles above the entrance has a center-pier draw, each opening 110 feet wide between fenders, with a vertical clearance of 7 feet at MHW when closed.

The State Highway bridge, 5 miles above the entrance, has a double-leaf bascule lift, 125 feet wide between fenders, and a vertical clearance of 21 feet at high water when closed.

Norfolk & Western Railroad bridge, alongside the highway bridge, has a single-leaf opening 125 feet wide between fenders and a vertical clearance of 7 feet at MHW

when closed. Large vessels must exercise caution in making the turn to these last two bridges. Considerable current is usually present in the river.

The railroad bridge across Southern Branch, 0.7 mile above the mouth of Deep Creek, has a center-pier draw, each opening 80 feet wide between fenders, with a vertical clearance of 7½ feet at MHW when closed.

The highway bridge 0.7 mile farther up has a center-pier draw, each opening 80 feet wide between fenders, with a vertical clearance of 6 feet at MHW when closed.

The ***Albemarle & Chesapeake Canal*** route is owned and maintained by the Government and is free of tolls. This canal connects the Southern Branch of Elizabeth River with North Landing River, and is entered about 10½ miles from Norfolk. The canal is 7.3 miles long and had a controlling depth of 12 feet in April 1946. It is crossed by four drawbridges. The depth of water in the canal is lowered by northerly winds and raised by southerly winds; severe storms may cause a difference of 2 feet or more below or above the normal.

Deep Creek, which empties into Southern Branch about 6 miles above Norfolk, is 2.6 miles long to the entrance of the Dismal Swamp Canal. The creek has been improved by dredging a channel 100 feet wide and 10 feet deep from the Southern Branch to the canal lock. It had a controlling depth of 10 feet in June 1946. On the south side at the entrance of the creek is a signboard directing the way to the Dismal Swamp Canal.

Dismal Swamp Canal, owned by the Government, connects Deep Creek with Elizabeth City, N. C., and the Pasquotank River. The northern lock of the canal is about 8.5 miles from Norfolk. This canal is about 19 miles long, 60 feet wide, and had a controlling depth of 9 feet in June 1946. At intervals of about 3 miles are turnouts where vessels may pass each other; the two locks are each 300 feet long and 52 feet wide. The depth over all miter sills at Deep Creek is 12 feet, and 13 feet at South Mills.

Nansemond River

CHART 529

Nansemond River, on the southwest side of Hampton Roads, between Pig Point and **Barrel Point,** and 2 miles southwestward of Newport News Middle Ground Light, is the approach to the city of Suffolk, 18 miles above the mouth.

At **Pig Point (lat. 36°54′, long. 76°27′)** a long partly ruined wharf leads out to a depth of 10 feet. In June 1946 the controlling depth was 9½ feet in the dredged channel and basin leading to the wharf. The 10-foot depth at the wharf was at the southwest corner; from here the water shoals shoreward along the southern face. Fish stakes are often found close to the channel. The twin tanks on Pig Point are prominent.

Restricted area.—No person is allowed to fish nor is any pleasure boat permitted to operate within 300 yards of the Nansemond Ordnance Depot on Pig Point.

The river has some trade in small produce boats and oil and gravel barges. Several small landings, all in ruins, are below Suffolk.

The channel has been improved by dredging and in 1946 had a controlling depth of about 9 feet from the mouth to a point 0.45 mile above the bridge at Suffolk and 7

feet from there to the head of navigation, a farther distance of 0.5 mile. The deepest draft using the river is about 8 feet. In June 1946, 9½ feet could be carried as far as the oil wharves just above the bridge at Suffolk. Small boats can go several miles above Suffolk.

From the entrance of Nansemond River to the mouth of Western Branch, 6 miles below Suffolk, the river is wide, but the channel is crooked and leads between extensive shoals which are nearly bare in places at low water. At the mouth of the river the shoals on either side abound in fish stakes. Above this point the river is narrow and crooked, but the mid-channel is clear to Suffolk. The channel is marked by buoys and several lights as far as Western Branch. The spar buoys are small and often hard to pick up ahead as they lie low in the water.

Great Shoal, about 1.5 miles above the first bridge, has an oyster bar on it which bares about ½ foot at mean low water.

A dike is on the eastern side of the channel opposite the mouth of Western Branch; the northern end is submerged at extreme high water and unmarked.

Strange vessels up to 6 feet draft should have no trouble in following the channel to Suffolk with the aid of the chart. A pilot can usually be obtained near the mouth of the river or at Norfolk or Newport News if desired.

A highway toll bridge crosses the lower part of Nansemond River. It has a double bascule span with a width of 90 feet between fenders and a vertical clearance when closed of 20 feet of MHW. A center-pier toll drawbridge, with each span 80 feet between fenders and a vertical clearance of 8½ feet at MHW when closed, crosses at **Hollidays Point.**

Gravel barges load in the dredged basin on the southern side of Hollidays Point. In June 1946 there was a controlling depth of 6½ feet from the channel of the Nansemond River to the bulkhead at the loading chutes.

Bennett Creek, on the south side of Nansemond River, 2.8 miles above Nansemond River Light had a depth of about 2 feet in June 1946 on the bar at the entrance and 6 feet inside for 5 miles above the entrance to the A. C. L. bridge. It is frequented by produce and pleasure boats, the deepest draft being 4 feet. A buoyed channel carries 2 feet over the bar into the creek.

Western Branch, on the west side of Nansemond River, had a controlling depth of 10 feet in 1946 as far as the village of **Reids Ferry.** It is said to have a depth of 5 feet at high water for 5 miles above the bridge. It is used by a few small produce and wood boats.

The Reids Ferry bridge is a center-pier draw with 35-foot span between fenders and 9-foot vertical clearance at MHW when closed. The channel is through the south span. At least 8 hours' advance notice is required to have this bridge opened.

Suffolk, a city at the head of navigation for vessels on Nansemond River, is an important railroad center. Some lumber is shipped. Gasoline and provisions are obtainable. A double-leaf bascule bridge, having a draw opening 40 feet wide between fenders and 4-foot vertical clearance at MHW when closed, crosses the river here. The two oil company T-piers above the bridge had 9½ and 8 feet at their faces in June 1946. The oil company bulkhead below the bridge has 7 feet alongside, and the bulkhead wharf across the stream has 10 feet alongside. Fresh water is obtainable at this landing.

Tides.—The mean range of tide is about 3 feet at the entrance and about 4 feet at Suffolk.

James River

CHARTS 529, 530, 531

James River, emptying into the western end of Hampton Roads at Newport News, is the approach to Richmond, Hopewell, Petersburg, and Smithfield. It is navigable to the city of Richmond, 79 miles above Newport News. The river once had a large trade in coal, oil, chemicals, fertilizer, and general merchandise and farm products. In 1946 there was little traffic except for vessels carrying oil and gasoline, and sand and gravel barges. The deepest draft vessel using the river drew 22 feet, but the majority draw 18 feet or less.

The channel has been improved by dredging. The existing project provides for a channel 25 feet deep and 300 feet wide from the mouth to Hopewell, 60 miles; thence 25 feet deep and 200 feet wide, following the cut-off route between Hopewell and the Richmond Deepwater Terminal, 15 miles; thence a channel 18 feet deep and 200 feet wide from the deepwater terminal to the Richmond Lock, 3.8 miles; and for a turning basin 200 feet wide, 600 feet long, and 18 feet deep in Richmond Harbor.

In July 1946 the controlling depths in the river were reported to be as follows: From the mouth to Hopewell, 24 feet; from Hopewell to the deepwater terminal, 25 feet; from the deepwater terminal to Richmond, 17 feet. These depths were in the center section of the channel; depths in the outside quarters were from 2 to 4 feet less in places.

Anchorage areas.—The only established anchorage areas in the James River are as follows:

1. *Anchorage G–1.*—To the northward of a line bearing 121° through a point on the Warwick County shore and a point 450 yards northerly of the midway point of the draw opening in James River Bridge; and to the eastward of a line parallel to James River Bridge and easterly therefrom not less than 200 yards.

2. *Anchorage G–2.*—To the westward of a line parallel to James River Bridge and westerly therefrom not less than 200 yards; to the northward of a line bearing 121° from a point 450 yards northerly of the midway point of the draw opening of James River Bridge, 6,100 yards northwesterly to a point; and to the eastward of a line bearing 030° from that point on the Warwick County shore.

Several wharves are along the main channel of James River, some of them with a store and post office but no settlement near them. Many wharves are neglected and in ruins due to shipments now being made by auto truck.

The small creeks tributary to James River are usually shoal at the entrances with deeper water inside for long distances. Most of them are frequented by small fishing boats and some by barges. Local knowledge is generally necessary to keep in the best water, although the creeks are usually bush staked.

Pilotage is not compulsory for James River above Newport News. Pilots can be obtained at Hampton Roads or Newport News, or at Hopewell for Appomattox River or James River above that point. Strangers should take a pilot if navigating above Hopewell if of more than 15 feet draft.

Supplies.—All kinds of supplies are obtainable at Newport News, Hopewell, and Richmond. Gasoline, Diesel oil, provisions, and water may be obtained at some of the other landings along the river.

Repairs.—Minor repairs to machinery can be made at Richmond, Hopewell, and Petersburg, and there are small railways at Jones Creek, Battery Park, Crittenden, Lanexa, and the Richmond Yacht Basin. The nearest drydock is at Newport News,

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and extensive repairs to hulls and machinery can best be made there or at Norfolk.

Towboats can be had at Hampton Roads, and there is a municipal-owned tug for assistance in Richmond Harbor.

Ice.—Some drift ice is in the river during severe winters, and at times the river is frozen over, interrupting navigation for a few days. Navigation to Richmond is hardly ever suspended more than two days at one time on account of ice.

Tides.—The mean range of tide is 2½ feet at Newport News and Hopewell, and 3½ feet at Richmond.

Currents.—The currents follow the general direction of the channel except between Hog Island and Jamestown Island, where they set across Goose Hill Flats. Their velocities are variable; in the lower reaches the flood current approximately equals the ebb in velocity; the main counteracting effect on the flood is the freshet current. In mid-channel, average velocities at strength of flood or ebb vary from about 1½ knots near Newport News to 1 knot at Dutch Gap.

In the vicinity of Richmond the drainage flow predominates and the current seldom if ever sets upstream.

The above normal conditions are, of course, subject to modification by wind and freshet effects.

The *Atlantic Coast Current Tables* give detailed information for a number of locations.

Freshets occur irregularly in the fall, winter, and spring, their height at Richmond ranging from 6 to 32 feet though the latter is exceptional. The ordinary fluctuations of stage at Richmond due to floods are 6 to 12 feet above mean low water. The maximum freshet heights usually occur between the middle of March and the middle of April, the freshets occurring at other times not usually reaching a greater height than about 6 feet above the normal high water. The number of freshets causing the water to rise above the level of the wharves on the main channel at Richmond average about one per year, and the water level seldom rises above the level of the city river wharf. The flood heights below Richmond diminish rapidly, the extreme being about 11 feet lower at Dutch Gap. The rise of water level is not felt at Hopewell. The cut-offs have reduced the freshet heights at Richmond about one foot.

Bridge.—The James River is crossed by a highway bridge from the north end of Newport News to Fishing Point. It has a vertical lift span in the eastern section with a horizontal clearance between fenders of 250 feet, and a vertical clearance at MHW of 145 feet when raised and 50 feet when closed. At night it is lighted by red lights when the span is down and by green lights when raised. The signal for lifting the lift span of the James River bridge is three blasts of the whistle. An airway beacon is located on each of two towers of the lift span. Another navigable span is located at the western side of the channel. It is fixed and has a vertical clearance of 25 feet at MHW and a span of 82 feet between fenders.

Newport News to Jamestown Island

CHART 529

Chuckatuck Creek, 4 miles southwestward of Newport News, has a depth of 3 feet across the bar at the entrance and deeper water inside to the village of **Crittenden (lat. 36°55′, long. 76°30′)**, just above the entrance. There is a depth of 3 feet to the village of **Chuckatuck,** 5 miles above the entrance. Several boatyards and railways

are at Crittenden, one of which is capable of hauling out boats up to 100-foot length and 5-foot draft. The gasoline wharf just inside the entrance has 6 feet alongside and the oyster-house wharf at Crittenden has 6 to 9 feet at its face, the greater depth being at the northwest corner. The other smaller landings have depths of from 3 to 5 feet at their ends.

The entrance channel through ***Batten Bay*** is marked by buoys and lights which must be followed closely in order to obtain the best depths. Bush stakes usually mark the channel edges.

Chuckatuck Creek is crossed by a double-bascule highway bridge near its lower end; the width between fenders is 80 feet and the vertical clearance is 21 feet at MHW when the span is closed.

Ragged Island Creek, just northward of Chuckatuck Creek, is shoal and little used. Small boats can go to near the head at high water only.

White Shoal, a middle ground 5 miles northwestward of Newport News, is marked on the south side by the tower structure of the discontinued lighthouse. Marked channels are on either side of the shoal. The northwest end of the shoal has extended about 450 yards in recent years.

Pagan River, on the southwest side of James River, southwestward of White Shoal, has been improved by dredging a channel 10 feet deep and 80 feet wide to the town of Smithfield, 5 miles above the entrance. In June 1946 there was a controlling depth of about 7½ feet in the entrance cut and thence 8 feet to Smithfield, but the head of small boat navigation is **Cofer Landing** 4 miles farther. Lumber schooners drawing 12 feet have gone to Smithfield at high water but the usual draft is not over 7 feet. There is now little river trade.

A bell buoy is on the southwest side of the western channel of James River, about 1,100 yards southward of the old tower on White Shoal, and in line with the entrance cut of Pagan River. The entrance to the cut is marked by a lighted buoy and from there the channel to Battery Park is marked by a number of lights and buoys. The dredged cut through ***Bob Shoal*** and in the vicinity of **Chalmers Point** is also marked. Navigation is rendered difficult on account of the narrow channel and the sharp turns, but there are usually bush stakes.

Jones Creek, on the south side of Pagan River, just inside the entrance, has a depth of 3 feet across the flats at the entrance and deeper water inside for 3.5 miles. The channel leads in from close southward of the light off **Goodwin Point,** passes close northward of a line of bush stakes, and leads for the light on the south side of the creek entrance.

The creek is crossed by two fixed bridges. The first, 0.5 mile above the mouth, has a 34-foot span between fenders and 10 feet vertical clearance at MHW; the second, Fulgham Bridge, 2.5 miles above the mouth, has 28 feet between fenders with 8 feet vertical clearance at MHW.

A marine railway which can haul out a boat up to 40 feet length and 3 feet draft is just below the first bridge. All small-boat repairs can be made.

Battery Park is a post village on the south side of Pagan River just inside the entrance. Two marine railways are here, the largest capable of hauling out boats of 100 feet length and 8 feet draft. Small-boat repairs can be made. Gasoline and supplies can be obtained at the easterly wharf at Battery Park where the depth is 10 feet. The oyster-company wharf has 8 feet alongside. The piling of the ruined wharf immediately eastward must be guarded against in coming alongside. Fresh water is available here.

Cypress Creek, a tributary of Pagan River from southward just below Smithfield, has a depth of 4 feet for about 3 miles above the mouth. A double-leaf bascule highway bridge with a single clear opening 40 feet wide and 4½ feet vertical clearance at MHW crosses the creek at the entrance. The landing at the eastern side of the entrance has 7 feet of water at the end.

Smithfield is a town at the head of steamboat navigation on the Pagan River. The main wharves have depths of 6 to 8 feet. There is little use of the river above the bridge. Gasoline, provisions, and water are obtainable.

The concrete highway bridge just above Smithfield wharves has a fixed span 30 feet between fenders and 15 feet vertical clearance at MHW.

A submarine cable crosses the river 0.1 mile below the Smithfield bridge.

Tides.—The mean range of tide at the entrance is about 2½ feet.

On the east side of the James River about 1 mile above the bridge is **Hilton Village.** About 1.3 miles above Hilton Village is ***Lake Maury*** and the **Mariners' Museum.** A monument at the end of the dam on the shore of the river is prominent.

Deep Creek, at the entrance to Warwick River, has been improved by dredging. The completed project provides a channel with a width of 80 feet in the James River and 50 feet in the creek, a turning basin at the upper end 100 feet wide and 150 feet long, and an anchorage basin opposite Menchville all 6 feet deep. In March 1947, the project depth obtained. The channel is buoyed and marked by an entrance light and by a lighted range. The landings at **Menchville (lat. 37°05′, long. 76°32′)** and on the south side of the anchorage basin have a depth of 5 feet alongside. Supplies and gasoline in small quantity are obtainable.

Warwick River, on the north side of James River, 7 miles above Newport News, has a depth of 6 feet in a narrow unmarked channel for 2 miles above the entrance, 2½ feet for the next 0.8 mile, and deeper water for a farther distance of 3 miles or more. The entrance is used as an anchorage by small oyster and fishing boats. The deepest draft entering is about 3 feet. Unmarked shoals with depths of 3 to 5 feet are off the entrance. A **351°** course, with White Shoal tower astern, will lead to the entrance.

Point of Shoals is an extensive shoal area near mid-river 10 miles above Newport News, and there are extensive unmarked shoals extending to the shore northeastward. The main shoal is marked on the western end by the steel-frame base of a former lighthouse. The partly dismantled structure is about 25 feet high.

The main channel of the James River formerly passed southward of the Shoals through Burwell Bay, but this channel is now marked only by buoys. In June 1946 this channel was in most part obstructed by groups of decommissioned vessels.

Burwell Bay has several small landings on its western shore. There are depths of about 4 feet at the outer ends.

Rocklanding Shoal Channel, dredged across Rocklanding Shoal east of Point of Shoals, has a project depth of 25 feet and is the main channel. It is well marked by buoys, many of which are lighted.

Mulberry Point, on the east bank of the river, is low, being of marsh formation.

The prominent long wharf on the east side of the river, 0.7 mile southward of **Deep Water Shoals Light** is the landing for **Camp Eustis.** Groups of decommissioned vessels are moored off the wharf on either side of the main river channel. The wharf has a depth of 14 feet at the end.

A wreck baring 1 foot, lies about 400 yards south by east of the outer end of the wharf. It is shown on the chart as a boiler awash.

Lawnes Creek, 1.8 miles westward of Deep Water Shoals Light has a depth of about 3 feet across the bar, and this depth can be carried for 4 miles above the entrance. The deepest draft entering is about 5 feet.

Skiffes Creek, 2 miles northeastward of Deep Water Shoals Light, has a depth of 2 feet across the flats at the mouth and deeper water inside for about 3 miles. It is little used.

Restricted area.—A restricted area has been established in James River off Skiffes Creek as follows:

The area.—A restricted area, for use of the War Department, located in James River, Va., off the entrance to Skiffes Creek, is hereby established. The area is enclosed within the following boundaries: Beginning at a point lying 650 yards, 015° from Deep Water Shoals Light structure, extending thence 555 yards, 090°; thence 1,650 yards, 018°; thence 760 yards, 270°; thence 1,590 yards, 190° to the point of beginning.

The regulations.—The above area is for the use of vessels of the War Department. No other vessels or craft shall enter the area, except as provided in subparagraph (3).

Vessels anchored in the area shall be anchored so as not to obstruct the arc of visibility of Deep Water Shoals Light.

Nothing in these regulations shall prevent the setting of fish traps within the area, under permits granted by the War Department, nor shall the passage of fishing vessels to and from authorized traps be unreasonably interfered with or restricted.

Hog Point (lat. 37°12′, long. 76°41′), 23 miles above Newport News, is low, with scattered clumps of trees. **Homewood** wharf, marked by a light, is on the east side of the point. This wharf, and the one near the point, are in ruins; in 1946 some of the piling showed above high water.

Tribell Shoal Channel is well marked by buoys, many of which are lighted.

College Creek, on the north side of James River, northward of Hog Point, has a depth of 2 feet across the flats at the mouth, 6 feet inside for 2 miles, and 2½ feet for a farther distance of 0.5 mile to **Williamsburg Landing,** 1 mile from the town of Williamsburg. The channel is difficult without local knowledge.

The Thorofare and ***Back River,*** northward of Jamestown Island, have a depth of about 2 feet at the eastern and western ends and 7 to 20 feet in the narrow channel northward of the western end of the island. They are used to some extent as an anchorage for small boats, but through navigation is limited by a fixed bridge, with span about 15 feet, and a vertical clearance of about 2.6 feet at MHW.

Jamestown Island is on the north side of James River, 27 miles above Newport News. **Jamestown** has two wharves. The face of the Government wharf is in poor repair with 23 feet of water alongside; the ferry slip has a depth of 15 feet. An auto and passenger ferry runs to Scotland. A white monument and the wharves are prominent. The ruins of the old church and other historic monuments are hidden by the trees.

Goose Hill Channel is a dredged cut through the shoals southeast of Jamestown Island. It is marked by buoys and a lighted range on the western shore of ***Cobham Bay.***

A shoal with a least depth of 2 feet has been reported on the Goose Hill range, within the dumping ground, and 975 yards from the front light.

Cobham Wharf is a landing, dilapidated and in ruins, on the south side of James River, southward of Jamestown Island. Another wharf in ruins is 0.2 mile to the eastward.

Jamestown Island to Jordan Point

CHART 530

Scotland, 1.6 miles southeastward of **Swann Point,** is the terminus of the ferry from Jamestown. The northerly slip has a depth of 10 feet and the southerly slip and landing alongside have depths of 8 feet. The old Scotland wharf just southward of the slip is in ruins.

Just westward of Scotland is ***Grays Creek,*** which has a depth of 3 feet across the flats at the entrance and deeper water inside for about 4 miles. A small private landing is on the north side of the entrance.

Chickahominy River is on the north side of James River, 33 miles above Newport News and 5 miles above Jamestown Island. It was improved by dredging a channel 14 feet deep across the bar at the entrance and 8 feet deep to Windsor Shades, but the project is abandoned and the channels have shoaled. By the last survey there was a depth of about 11 feet at the entrance, 10 feet to ***Binns Bar,*** 20 miles above the entrance and 6 to 7 feet for a farther distance of 2 miles to Windsor Shades. Small boats can go several miles farther, but navigation is difficult. The landing at **Windsor Shades** has 12 feet alongside. There is now little trade in the river. It is frequented only by a few local fishermen and pleasure boats.

The head of navigation in 1946 was, for all practical purposes, the **Chickahominy River (Rock-a-Hock) Dam,** about 19 miles above the mouth. The lock in the dam has a length of 60 feet, breadth 15 feet, depth over sill 4 feet at normal tide level. The lock gates are hand operated; there is no tender. The landing just below the lock has 10 feet of water alongside the face. The pump house landing has a depth of 6 feet at the face.

Chickahominy River has several narrow tributaries with a good depth of water for several miles. ***Gordon, Morris,*** and ***Yarmouth Creeks*** are the ones most often entered by barges and schooners.

The channel of Chickahominy River is crooked, narrow, and obstructed by shoals, and local knowledge is necessary to keep in the best water. Two buoys mark the entrance 0.7 mile south of Barrets Point.

The best water in the approach leads along the north shore from Jamestown Landing to the buoys at the mouth. Fish stakes often obstruct this channel. A buoy off the north side of the channel leading to the river marks a submerged wreck about 2.3 miles northwest of Jamestown Island wharf.

Tides. —The mean rise and fall of tides is about 2 feet at the mouth of the Chickahominy River.

A depth of 8 feet can be carried across the shoals north of the main river channel into the Chickahominy River entrance channel by keeping **Ferry Point (lat. 37°16′, long. 76°53′)** just open of Barrets Point, course **347°,** until the outer entrance buoy bears about 295°. Then follow the buoyed channel into the river mouth.

The eastern side of the channel just northward of the entrance buoys is marked by bush stakes. Pass about 100 yards off the ruined wharf at **Barrets Point.**

A buoy about 500 yards northward of Barrets Point marks the wreck of a barge with ½ foot over it at MLW. Pass about 100 yards off the buoy, head for the eastern end of the bridge approach, and then round slowly toward the draw.

The **Barrets Ferry** bridge crossing the Chickahominy River is a swing span, with

a horizontal clearance of 80 feet through the westerly opening and a vertical clearance of 13 feet at MHW when closed. The easterly opening is closed to traffic.

The channel favors the eastern shore for the first mile above the draw. Buoys mark the shoal water in the vicinity of **Shields Point.** Pass about 100 yards off the point and head to pass about 50 yards off the red spar buoy. This leads through the best water.

The buildings at the fish wharf at **Shipyard Landing** are prominent from downstream. The fish wharf has a depth of 14 feet alongside. The original Shipyard Landing is small.

The bulkhead at the brickyard across from Watts Point had a depth of 12 feet alongside in June 1946 but was in poor condition. Above **Watts Point** are a number of small private landings with from 2 to 4 feet of water at their ends.

The western side of the channel off **Big Marsh Point** is marked by buoys. Pass the one north of Big Marsh Point heading for the boat house on the western bank.

Lanexa is a post office and railroad station on Chickahominy River, 15 miles above the entrance. Gasoline and supplies can be obtained. A small marine railway here can haul out a boat up to 50 feet in length and 6 feet draft. Repairs can be made. The landing has a depth of 5 feet alongside. Fresh water is available.

Swann Point Shoal Channel, in the James River, is marked by buoys and a lighted range. This dredged channel has a project depth of 25 feet.

The wreck 0.8 mile west of **Dancing Point** showed only part of the stem above high water in 1946.

Claremont is a village and post office on the south side of the James River, 38 miles above Newport News. The second wharf of a group of four, at the site of the old railroad terminal, is the only one not in ruins. It has a depth of 15 feet at the face and, in June 1946 was used as a naval landing. Gasoline, ice, and some provisions are obtainable. The vehicular ferry which ran from Claremont to Sandy Point wharf, on the north side of the river, is no longer in operation. The ferry wharf has a depth of 6 feet in the slip.

The landing about 0.6 mile southeastward of **Sloop Point** has a depth of only 1 foot at its end.

At **Sandy Point** are two wharves, both in poor condition. One, used mostly by fishermen, has a depth of about 7 feet at the face; the other, the ferry slip, has a depth of 11 feet.

A sunken barge, baring at extreme low water, lies about 400 yards northwest of the ferry wharf.

A number of decommissioned vessels are anchored on the north side of the channel off Sandy Point.

Upper Chippokes Creek is on the south side of James River, 1.5 miles westward of Claremont. It has a depth of about 4 feet for 4 miles and 2 feet to near the head of navigation. The best water in the entrance leads close along the south side. A private wharf is on the south side at the entrance, with 5 feet at the end. Southeast about 300 yards are two wharves in ruins.

A wreck not covered at any stage of the tide and marked by a light lies in 33 feet of water off **Chippokes Point.** The top of the boiler is about 5 feet above water.

Brandon Wharf, on the western shore about 1 mile northward from Upper Chippokes Creek, is in good condition, is marked by a light, and has a depth of 20 feet along the face. **Ritchie Wharf** (Brandon post office), about 1 mile farther north, had a depth

of 12 feet alongside in July 1946. Some gasoline and supplies can be obtained at the store at the inner end of the wharf. The wharf is marked by a light.

The wharves at **Trees Point** and **Oldfield,** on the eastern shore, are in ruins. Just north of this latter wharf a few piles of a former wharf show about 1 foot above high water.

On the north side of the river, on **Sturgeon Point,** opposite **Kennon Marsh,** are two wharves in poor condition. A brickyard is at the lower wharf.

On the south side of the river, westward of Kennon Marsh, are **Upper Brandon** wharf, in ruins; **Upper Brandon Farms** wharf with 19 feet alongside in July 1946; and Stanley wharf marked only by a few rotten piles. Rotten piling, awash at high water, extends about 100 yards into the stream off **Dunmore.**

At **Milton,** about 0.7 mile eastward of the entrance to Kittewan Creek, the ruins of a wharf extend about 100 yards out into the stream. The light is just westward of the inshore end.

Kittewan Creek, on the north side, 1.2 miles westward of Kennon Marsh, is nearly bare at the mouth at low water but has deeper water inside. A cluster of pile stumps is awash at high water in shoal water off the mouth.

Wards Creek, on the south side, about 0.7 mile southeastward of **Weyanoke Point,** has a depth of 1 to 2 feet across the flats at the mouth and deeper water inside for 3 miles.

Fort Powhatan (lat. 37°16′, long. 77°05′) is marked by piling awash at high water and a light about 15 feet inshore.

Flowerdew Hundred Creek flows into the James River from the west about 600 yards upstream from Fort Powhatan. An unwatched light on a black pile structure with cage work at the top is at the north entrance of this creek.

Ruffins wharf, on the eastern shore at Weyanoke, is in good condition and had a depth of 15 feet at the end in July 1946. A privately maintained light is on the house on the wharf.

Willcox wharf, on the north bank of the James River northward of **Windmill Point,** is marked only by broken piling. **Buckland Wharf** is in ruins with broken piling showing above high water. The ruined wharf, 0.3 mile westward, has piling stumps awash at high water.

Herring Creek, on the north side, 2 miles westward of Windmill Point, has a depth of 2 feet across the flats at the entrance and is used by boats of 4 feet draft at high water. A wharf and post office lie 0.5 mile westward of the creek. **Westover** wharf is 0.8 mile farther westward. About 1 mile west of Westover wharf are the ruins of a wharf at **Harrisons Landing.**

On the south side of the river at **Coggins Point** and at the next two points to the eastward are wharf ruins.

Powell Creek, just eastward of Coggins Point, has a depth of 9 feet for 3 miles above the entrance and is entered by boats of 12 feet draft at high water. Tugs drawing 12 feet now use the creek and they keep a channel dredged out. Gravel, loaded about 1 mile above the entrance, is barged out.

Ruins of a private wharf are on the point just west of the mouth of ***Kimages Creek.*** A private wharf, in good condition, is about 0.3 mile west of the mouth of Kimages Creek.

Jordan Point Light on the end of **Jordan Point** is prominent from up or down the river.

A channel for the vehicular ferry crossing the James River has been dredged between landings at Jordan Point and on the opposite side of the river. Shoaling has taken place and in July 1946 there was but 5 feet in the channel and slightly deeper water in the slips, north 9 feet, south 7 feet. The ferry channel is privately marked. Several wrecks lie in the shoal water north of the channel and about 1 mile west of Jordan Point.

Jordan Point to Richmond

CHART 531

Hopewell is composed of the former villages of **City Point** and Hopewell. It lies at the junction of James and Appomattox Rivers, 60 miles above Newport News, and is the terminus of a branch railroad line to Petersburg. A small rayon-silk plant, paper-pulp works, and the large plant of the Atmospheric Nitrogen Corporation are here. The latter has a large concrete wharf with 24 feet alongside. The outer end of the covered conveyor on the wharf is marked by two privately maintained lights. A privately dredged channel, with 24 feet least depth, leads from the main channel of the river to the sides of the wharf. It is marked by several buoys.

Just south of this wharf is the aerial cableway and unloading wharf of the pulp mill. On the channel side of the wharf the depth is 18 feet except toward the eastern end where it has shoaled to about 6 feet. Trucks now haul the wood, and the wharf is not in use. A private light is on the unloading wharf.

The southwestern edge of the dumping ground area, northward of the river channel at the wharves, has a long narrow strip of grass awash at high water.

At the town are wharves for the regular freight steamers, also for sand and gravel barges. The depths in July 1946 were from 13 to 16 feet at the railroad landing, and 21 to 28 feet at the oil wharves. Gasoline, fuel oil, and provisions are obtainable. Pilots for the upper part of James River and Appomattox River can be obtained here, and towboats may be ordered by telephone or telegraph.

Appomattox River, on the west side of James River, 61 miles above Newport News and 18 miles below Richmond, is navigable for vessels to the head of navigation at Petersburg, 10 miles above the mouth. No landings of any importance are along the river.

The river has been improved by dredging and the construction of training walls. The project calls for a channel 80 feet wide and 12 feet deep from the mouth to the head of navigation at Petersburg and includes a basin 200 feet long, 150 feet wide and 20 feet deep at the mouth of ***Poes Run,*** and a turning basin 500 feet long, 140 to 160 feet wide and 12 feet deep at the mouth of ***Lieutenant Run.*** In July 1946 the channel had a controlling depth of 7 feet.

The difficult part of the channel through the flats at the mouth, marked by lights and buoys, has a least depth of about 11 feet. From **Point of Rocks** to 1 mile above it the channel is marked by buoys and two lights. Except at these places a general mid-channel course is best, although unmarked shoals extend nearly to mid-channel in places. Strangers should have no trouble taking a draft of 7 feet to Petersburg with the aid of Chart 531. A pilot can be obtained at Hopewell.

The river is now little used except by some pleasure craft and by tugs and barges transporting sand and gravel to Petersburg.

A highway swing bridge crosses the river at Hopewell with 8 feet MHW clearance. A railway swing bridge (hand power) 1.3 miles above Hopewell, has a 9-foot MHW clearance. The clearances are at high water when closed. Both bridges have double draw spans 80 feet wide between fenders. The range of tides is 2.9 feet. A submarine cable crossing is at the upper bridge.

A number of gravel pits are on the eastern shore of the Appomattox River about 5 miles downstream from Petersburg. The barges are loaded with sand and gravel by means of conveyors and are towed to Petersburg.

Petersburg is a railroad center of some importance. All kinds of supplies can be obtained in the city but are not available at the waterfront. The marginal wharves are now in ruins and the only portion in use is where the gravel and sand barges are unloaded by movable cranes. The railroad siding, extending for almost the entire length of the waterfront, furnishes a means of transfer to the railroad. There were depths of about 8 feet in July 1946 along the waterfront.

Ice and freshets do not interfere with navigation at Petersburg.

The northern branch of Appamattox River, entering the main channel at Point of Rocks, is shallow in places and has no traffic. It is used as a diversion channel.

Above the Appomattox River the James River becomes narrow and winding. The bends are often called the ***Curles of the River*** and the section from Hopewell to Wilton has been called ***The Corkscrew.***

Bermuda Hundred (lat. 37°20′, long. 77°16′) is a post office on the west bank of the James River, 1.5 miles above Hopewell. The wharf is in ruins. A light is shown from one of the piles near the outer end of the wharf.

Turkey Island Bend is now little used, as the main channel passes through Turkey Island Cut-off. The north and west sections of the bend afford an excellent anchorage as the current in the river has been greatly diminished by the cut-off and winds from any direction have little effect. The general bottom characteristic is soft mud.

Shirley wharf, at the lower end of the bend opposite Bermuda Hundred, is dilapidated and no longer usable. **Hardens Landing**, at **Haxall** on the east bank, 2.3 miles above Bermuda Hundred, is in good condition. The face of the wharf is 40 feet in length and has a depth of 10 feet alongside. **Picketts Wharf** is in ruins.

Turkey Island Creek is navigable for about 0.8 mile. It is used by local fishing boats of not over 3 feet draft.

Curles Neck Creek, on the west side, 6 miles above Hopewell, has a depth of about 1 foot at the entrance and deeper water inside. It is navigable for a distance of about 1 mile.

Presque Isle is a small group of houses at the neck of Turkey Island where the land is about 20 feet above ordinary high water. The wharf is in ruins.

Turkey Island Cut-off is a dredged channel about a mile long extending along a curved line across **Turkey Island** above Bermuda Hundred. Both ends are well lighted and buoyed.

A cable-operated auto ferry crosses Turkey Island Cut-off just above the lower entrance. Vessels must proceed with caution when the ferry is underway as the cable comes to the surface.

Several farm landings, but no villages, are between Turkey Island Cut-off and

Richmond. The shores are generally wooded on both sides and high in some places, but present no characteristic features.

The river bend around **Jones Neck** is no longer in use, as a channel has been cut through the lower portion of the neck. Curles Neck Mansion wharf, in the eastern section of the bend, is marked only by a few piling. Tilmans wharf, farther to the north, is dilapidated. The wharf decking is missing in places.

Fourmile Creek is used by local fishermen and is navigable for a draft of 5 feet for 0.3 mile above its mouth. A sunken wreck, on the western side about 200 yards above the entrance, bares at low water.

Woodson Rock is bare at low water.

Jones Neck Cut-off is well marked by lights and buoys.

Meadowville wharf, at the western end of Jones Neck Cut-off, is in ruins. A privately owned float ferry, towed by a small launch, is operated at high water between a small slip just westward of the Meadowville wharf to the southwestern end of Jones Neck.

The old river bed eastward of **Farrar Island** is navigated by vessels of 10-foot draft as far as the gravel pit. About 0.3 mile beyond, the channel is obstructed by a shoal and the controlling depth is limited to 3 feet. A fixed wooden bridge spans the creek south of Farrar Island. It has a vertical clearance of 10½ feet at mean low water and a horizontal clearance of 13 feet between the third and fourth supporting piles, counting from the west end.

Dutch Gap was the first canal dug in the United States. It was cut through in 1611 for the use of small craft and shortened the distance to the falls at Richmond by about 4.5 miles.

The ***Aiken Swamp-Dutch Gap Bend*** of the James River is crossed near its western end by a fixed steel-truss bridge supported by wooden piles. The vertical clearance is 26½ feet at mean low water and the horizontal clearance is 41 feet.

The Richmond Yacht Club at the north side of the bend has a small wharf with a depth of 6 feet at the end and a number of pilings to the westward to which yachts make fast. Diesel oil and gasoline are obtainable here. A small marine railway capable of hauling a vessel of 4-foot draft, 45 feet in length, and 50 tons displacement is here.

Dutch Gap-Aiken Swamp Cut-off is a dredged channel extending in a 294° direction across the marsh flats just westward of **Dutch Gap Point.** The ends of the cut-off are marked by lights. A gravel pit is in operation on the northern side of the cut-off.

The oil wharf at ***Drewrys Bluff,*** of concrete construction, has a depth of 25 feet alongside. There are mooring dolphins.

The **Richmond Deepwater Terminal** (**lat. 37°27′, long. 77°25′**) at **Warwick,** about 4 miles below Richmond, has a berthing space 1,250 feet long. In July 1946 the controlling depth alongside was 22 feet. The terminal is used for the receipt and shipment of general cargo. Transit sheds and warehouses are available. An electric gantry crane capable of a 10-ton lift is on the wharf. Fresh water is supplied in quantity at $0.20 per ton, minimum charge $2.50. The terminal has railroad connections. The small-boat landing at the northern end of the wharf has a depth of 9 feet alongside.

Richmond, at the head of navigation on the James River, has considerable trade in regular steamers and barges, the deepest draft being 18 feet, and the usual draft not over 16 feet. The principal products handled by boat from or to Richmond are ferti-

lizers, tobacco, paper, cotton goods, sand and gravel, and general merchandise. There are railway connections to some of the wharves and highway connections to the others.

In the river itself commercial navigation terminates at the river wharves but small boats can go as far as the first bridge at **Mayos Island.**

The **Kanawha Ship Canal** wharf is 3,450 feet long and is reached from the river through a masonry lock, lift of 15 feet. The lock chamber is 168 feet long and 35½ feet wide. The depth in the canal is reported to be 12 to 14 feet. The canal is now little used except by small private boats. The lock operates only from 8 a. m. to 5 p. m. and is closed to traffic on Saturday and Sunday.

The general cargo for Richmond is handled at the three wharves extending lengthwise along the east side of the river immediately below the lock canal. A number of oil wharves are on the west side of the river. The wharves on the river front have from 10 to 18 feet alongside. The bulkhead at the Richmond Upper Terminal has the greatest depth alongside. There are excellent warehouses here, railroad connection, and a 5-ton traveling electric semi-portable gantry crane. Fresh water is supplied through a one-inch main at $0.20 per ton, minimum charge $2.50.

Anchorage out of the way of traffic is permitted in the channel at Richmond, but vessels usually go the wharves. Small boats anchor on the flats or in the yacht basin, depth 4 feet. The basin has its entrance just westward of the entrance to the canal lock. The harbor master at Richmond attends to the berthing and anchorage of vessels on request. The city has a tugboat ready to assist vessels.

Hampton Roads to Back River

CHART 1222

Horseshoe is a shoal with depths less than 18 feet, which extends 6 miles from the shore between Old Point Comfort and the old tower 5.5 miles northward, and with its southern edge bordering the north side of the channel into Hampton Roads. This shoal has depths of 13 to 18 feet over its eastern half; its western half has a least depth of 8 feet if the shore be given a berth of 0.5 mile, but there are depths of 6 to 7 feet 0.7 to 1 mile southeastward of the old light tower 0.7 mile northward of **Grand View.** The eastern extension is marked by a lighted bell buoy.

Local steamers and small craft of 7 feet or less draft, with a smooth sea, plying between Hampton Roads, York River, and Mobjack Bay, use routes leading across the fish-trap area off Old Point Comfort, varying the courses according to the locations of the traps.

Directions for following the clear channel between fish-trap limits are given in Chapter 3.

Buckroe Beach (lat. 37°03′, long. 76°18′) is a summer resort on the shore 2.5 miles north-northeastward of Old Point Comfort Light. It has communication by electric road with Old Point Comfort, Hampton, and Newport News. The lights at night are prominent during the summer.

Back River to York River

CHART 494

Back River, having its entrance 6.5 miles north-northeastward of Old Point Comfort, has a depth of about 8 feet across the bar at the entrance and 7 feet to abreast **Amorys Wharf** (**Earnest** post office), which is on the north side at the intersection of Northwest and Southwest Branch. There is a depth of 8 feet at the wharf, but the controlling depth to the wharf is 7 feet passing just west of stump piling and submerged oyster-shell spoil which are about 200 feet southeast of the end of the wharf. Gasoline may be obtained at the wharf and general supplies 0.5 mile up the road. There is telephone communication. Gasoline can also be obtained at the fish wharf on **Messick Point.**

Two large hangars and a water tank at **Langley Field,** on the peninsula between Northwest Branch and Southwest Branch, are very prominent for many miles. Flashing flood lights on the water tank are shown at night when airplanes are expected.

Northwest Branch has a depth of 6 feet for 0.7 mile above the entrance and 2 feet to near the head. The Langley Field landing on the shore has a depth of 7 feet alongside. In April 1947, the controlling depth in the channel to and turning basin at Langley Field landing was 7 feet. A red buoy and yellow marker buoy mark a sunken pile northeastward of the end of the pier.

Southwest Branch has a depth of 4 feet for 1.5 miles, above which it shoals rapidly. For about a mile northwest and the same distance southwest of **Willoughby Point,** to off Langley Field boathouse, there is reported to be a dredged channel along the shore about 25 feet deep made in filling swamp land for the flying field. It is bush staked but local knowledge is required. About 0.3 mile northeast of the tank is a red light on a structure at the end of a large water-level pipeline extending offshore about 400 feet.

Bridges.—A fixed concrete bridge with 39-foot span between fenders and vertical clearance of 6 feet at MHW is about 1.5 miles southwest of Willoughby Point. Just above this about 100 feet is a street railway fixed bridge with 14-foot span and 6 feet vertical clearance at MHW.

It is reported that 4 feet can be carried for about 2 miles beyond the bridges in a narrow channel.

Harrison Creek, on the south side of Back River, has a depth of 3 feet for 0.7 mile; **Fox Hill** is a village on the east side near its head.

Back River is the center of a large oystering and fishing industry, the deepest draft being 7 feet. A white tower, old Back River Lighthouse, 1.6 miles southeast of **Northend Point,** is the most prominent landmark in the approach. The main channel is narrow in places, but is marked by buoys and lights and is easily followed with the aid of the chart. The tributaries are unmarked. The shore and shoals near the entrance are subject to some change. A channel 800 yards wide and marked by black and white horizontally-banded buoys is kept clear of fish traps in the approach, the south edge of this channel extending from the buoy at the entrance through the vertically striped bell buoy 2 miles eastward of Back River Lighthouse.

Tides.—The mean rise and fall of tides at the mouth of Back River is about 2½ feet.

Between Back River and Poquoson River entrances are shoals, covered with

scattered oyster rocks nearly bare at low water, extending from 1 to 2 miles offshore. Strangers, even in small boats, should keep outside of the 6-foot curve.

Poquoson River, on the south side of York River entrance, westward of York Spit Light, has a depth of 7 feet to the village of **Yorkville** and 2 feet to near the heads of all its tributaries. The river is frequented by small fishing boats. There are no wharves on the main branch except for small boats. The light on **Fish Neck** is shown from the house on the outer end of one of the private wharves. The channel leading to Poquoson River entrance is clear of fish traps for a width of 400 yards. It extends in an approximate southwest direction from York Spit bell buoy 2A and is marked by two buoys with white and black horizontal bands.

Tides.—The mean range of tides at the mouth is about 2½ feet.

Bennett Creek, on the southeast side, at the entrance of Poquoson River, has a depth of 6 feet for 1.2 miles above the entrance and is marked by a light, and by buoys for 0.8 mile. In ***Easton Cove,*** the branch leading to the east about 0.8 mile southward of the horizontally-banded buoy, is a marine railway capable of hauling out boats of 50 tons and 6-foot draft. All kinds of small-boat repairs are made. Opposite the railway, gasoline and ice can be obtained at a small fish wharf. A post office is at **Messick** about a mile from the wharf, and provisions are available. Another small wharf is on the opposite side of Bennett Creek. From here a highway leads to **Jeffs.**

Chisman Creek, on the north side of Poquoson River, just inside the entrance, has a depth of 6 feet in a narrow channel for 2 miles, and 3 feet nearly to the head. It is unmarked. Gasoline can be obtained at the marine railway and machine shop on the north shore 0.8 mile from **York Point (lat. 37° 10′, long. 76° 24′).** The railway will accommodate a vessel of 80 tons and 6-foot draft. There is another railway on the south side of the creek about 1 mile above **Ship Point.** It is capable of hauling a vessel of 100-foot length and 8-foot draft. Only woodwork and hull repairs can be made at the latter.

Back Creek, having its entrance 2 miles southward of Tue Marshes Light, has a depth of 8 feet to abreast the State wharf, on the south side westward of ***Clarkston Creek,*** and 6 feet to the marine-railway wharf. The creek is frequented by fish boats of 9-foot or less draft, and by many smaller oyster boats.

A marine railway capable of hauling out small boats up to 60-foot length and 5-foot draft is located about 0.3 mile above the State wharf. Deck and engine repairs can be made. Gasoline, Diesel oil, and some provisions are obtainable on the small wharves near the railway. **Seaford,** 0.5 mile inland, is the post office.

The channel is marked by buoys and two lights as far as the entrance to Clarkston Creek. A **269°** course with York Spit Light astern will lead to the first buoy.

The ***Thorofare,*** connecting Back Creek with York River westward of **Goodwin Islands** has been improved by dredging a channel 7 feet deep and 80 feet wide across the York River flats, and 60 feet wide through the Thorofare. The channel is marked by lights, beacons and buoys and is extensively used by small boats. In July 1946 there was a controlling depth of 3 feet in that portion of the dredged cut between the York River channel and Daybeacon 2; elsewhere there was a controlling depth of 7 feet. Use of the channel after dark should be avoided without local knowledge.

York River

CHARTS 492, 494, 495, 504

York River, formed by the junction of Mattaponi and Pamunkey Rivers at West Point, 35 miles above the entrance, has a broad and comparatively straight channel with a least depth of 19½ feet to West Point and 14 feet in the basin. It is marked by lights and buoys and is easily followed by day with the aid of the chart.

The Federal project for improvement of the river provides for a channel 22 feet deep and 400 feet wide through the bars, and a basin of the same depth at the wharves at West Point and the construction of a dike on the right bank at West Point to assist in maintaining the channel. The channels, however, were not dredged to full project width.

The river has some trade, carried mostly in barges. The deepest draft ordinarily taken to West Point is 15 feet. The two main tributaries have a large trade in wood products carried in barges.

Pilots.—Pilotage is compulsory as far as Yorktown for all vessels other than those exclusively engaged in the coastwise trade and those made exempt by United States statutes. Vessels required to take a pilot will get one at Chesapeake Bay entrance or Hampton Roads. Pilots for Mattaponi and Pamunkey Rivers can be obtained at West Point.

Towboats.—Towboats for York River can be obtained at Hampton Roads.

Anchorage.—Vessels can anchor anywhere in the wider part of the channel of York River where the depth is suitable, outside of the naval anchorages. A good anchorage for deep-draft vessels is westward or northwestward of Gloucester Point, on the north side of the channel. The only naval anchorages in the river are as follows:

The anchorage grounds.—(1) Anchorage Y–1, naval anchorage. The area enclosed by lines drawn as follows: Beginning at a point 700 yards, 018° from Tue Marshes Light; thence 900 yards, 359°; thence 4,090 yards, 255°; thence 6,000 yards, 270°30′; thence 450 yards, 180°; thence 2,300 yards 115°; thence 3,690 yards, 083°; thence 4,340 yards, 075° to the point of beginning.

(2) Anchorage Y–2, naval anchorage. The area enclosed by lines drawn as follows: Beginning at a point 2,650 yards, 302° from Gloucester Point Light, a line thence 500 yards, 047°; thence 2,700 yards, 317°; thence 2,960 yards, 302°; thence 2,140 yards, 316°; thence 500 yards, 226°; thence 2,270 yards, 136°; thence 2,850 yards, 122°; thence 2,660 yards, 136° to the point of beginning.

The regulations.—These anchorages are exclusively for the use of naval vessels and, except in cases of emergency, no other vessel shall anchor in the above-described areas without permission from the local naval authorities, attained through the Captain of the Port, Norfolk, Virginia. Movement of vessels through the anchorages will not be restricted.

Repairs to small vessels can be made at West Point, where there is a small marine railway just above the bridge northeast of the town, but extensive repairs to machinery and to hulls of large vessels can best be made at Baltimore, Newport News, or Norfolk. There are also marine railways in Sarah Creek and Perrin River.

Ice sometimes interferes with navigation for short periods during severe winters, but in ordinary winters navigation is not interrupted below West Point.

Tides.—The mean range of tide is 2½ feet at the entrance and at Yorktown, and 3 feet at West Point.

Currents.—The currents follow the general direction of the channel, except in its narrowest parts where they have a tendency to set a vessel on shoals. The velocity of the current and the times of slack water vary somewhat in York River, and to a considerable extent in the Mattaponi and Pamunkey Rivers, due principally to freshets, but also to some extent to winds. The *Atlantic Coast Current Tables* give detailed information for a number of locations.

York River Entrance to Yorktown

CHART 494

Approaches to York River from the northward.—Vessels of 15 feet or less draft from northward may enter the main channel through a side channel between the fish-net-stake buoys west of New Point Comfort Middle Ground, passing 0.2 mile southeast of fish-net-stake reflector buoy 9 A, and steering a 225° course to a junction with the main-channel course 0.2 mile southwest of lighted bell buoy 2.

York Spit Swash, the slough leading through ***York Spit*** 5 miles northwestward of York Spit Lighthouse and 1.3 miles southeastward of the marshy islands between York River and Mobjack Bay, had a least depth of 8 feet by the last survey, and is used by local vessels up to 7-foot draft. It is marked by lighted buoys and a light but strangers should proceed with caution. On a bright day the channel shows up well.

Monday Creek is described under Mobjack Bay.

Perrin River, on the north side, 2 miles northwestward of Tue Marshes Light, has a depth of 8 feet from the entrance to the inner light. From this light, 6½ feet can be carried in the narrow channel to Browns Wharf at the bend 0.4 mile above the entrance. The channel is marked by lights and buoys but is often somewhat obstructed by oyster stakes. The red sector of Tue Marshes Light covers the entrance. Local fishermen may be obtained to pilot strangers.

At **Browns Wharf** is a store where gasoline, Diesel oil, provisions, and fishermen's supplies are obtainable. The post office is inland about 0.5 mile at **Perrin.** There is a marine railway, capable of hauling out a 120-foot boat with 7-foot draft and 100 tons gross weight. A machine shop adjoins the wharf. This wharf has a depth of 10 feet at the end. The oyster-house wharf on the east side of the entrance has a depth of 5 feet alongside. Gasoline is also obtainable here. It is reported that with local knowledge 9 feet can be taken as far as the marine railway.

Tue Marshes Light (lat. 37°14′, long. 76°23′) is shown from a white square tower on brown piles at the south side of the mouth of the river. The light is 41 feet above water and visible 12 miles. The fog signal is sounded on an air diaphragm horn. If the horn is disabled a bell will be used.

Wormley Creek and ***West Branch,*** on the south side, 4 miles westward of Tue Marshes Light, have a common entrance with a depth of 4 feet across the bar and 2 feet in both creeks nearly to the heads. They are little used except by oyster boats. **Callis Wharf** with 6 feet alongside is 0.5 mile from the entrance on the west side of Wormley Creek. An unwatched light has been established on the northeast corner of the dock. Boats drawing 3 feet use this creek.

A naval fuel-oil dock, with 30 feet of water alongside, is located on the York River about 0.7 mile westward of Wormley Creek.

Sarah Creek, on the north side, 1 mile eastward of Gloucester Point, has a depth of about 7 feet in the entrance and for a short distance up the west branch, and 3 feet in either branch for about 0.8 mile. The entrance is marked by two lights and a buoy. The deepest draft using it is 7 feet.

A small railway is 0.3 mile above the entrance and just inside the western branch. The railway handles boats up to 65 feet long and 7-foot draft. Repairs are made. Gasoline, Diesel oil, water, and provisions can be obtained. There is telephone communication. The oyster house in the eastern arm has a depth of 5 feet at the end.

West of Sarah Creek are several docks and a large group of cottages extending as far as Gloucester Point.

Gloucester Point is a village on the point opposite Yorktown. The end of the point is low and marked by several wharves (on the westerly wharf is a light), some conspicuous gasoline tanks, and several buildings. The oil-company wharf has a depth of 11 feet at the end; the partially ruined wharf on the point itself has 16 feet alongside. A ferry for passengers and vehicles crosses the river to Yorktown.

Yorktown is on the south side of York River, 6 miles above Tue Marshes Light. The main part of town is on the high bank and is not visible from the river. The **Yorktown Monument,** a group of buildings along the beach near the wharves, and some oil tanks are prominent. Several wharves are at the west end of town. The westerly of the two oil-company wharves has a depth of 10 feet at the end, the other 11 feet. The fish wharf has 9 to 11 feet alongside; ice and fresh water are obtainable here. The steamship wharf has depths of 13 to 20 feet, the deeper water being at the western end. Some provisions, gasoline, Diesel oil, water, and ice are obtainable at Yorktown.

Yorktown to West Point

CHART 495

The **Naval Mine Depot at Stony Point,** 1.4 miles above Yorktown, has long prominent wharves. In 1946 the southeastern wharf had a depth of 32 feet at the end; the other, which is L-shaped, had a controlling depth of 34 feet along the outer face.

The **Colonial National Monuments Highway** follows a fill adjacent to the shoreline for about one mile southeastward from **Sandy Point.** A fixed concrete bridge in this highway crosses ***Indian Field Creek*** at Sandy Point and has a 46½-foot span and 4½-foot vertical clearance. Another similar bridge with same span and 3¾-foot vertical clearance crosses ***Felgates Creek*** at **Poley Point.** Neither bridge has fenders; above clearances are at MHW. Felgates Creek, on the southwest side, 4 miles above Yorktown, has a controlling depth of 5 feet across the flats at the entrance and deeper water inside. Local knowledge is necessary for the best water.

King Creek has a common entrance with Felgates Creek but a little less water inside. It is little used. A fixed highway bridge of concrete crosses the creek 1.4 miles above the entrance with 46½-foot span, no fenders, and 14½-foot vertical clearance at MHW.

The wharves of **Cheatham Annex,** the Naval Supply Depot, are just westward of King Creek. Depths at the face of the southeasterly wharf range from 52 to 27 feet (east to west); the depths at the other wharf are from 35 to 41 feet.

Queen Creek, on the southwest side, 1.5 miles west-southwestward from **Pages Rock Light,** has a depth of 2½ feet across the flats at the entrance, which is bush staked, 4 feet inside for 2.5 miles, and 1½ feet for a farther distance of 2 miles to a fixed bridge 1.5 miles from the town of **Williamsburg.** It is used by small motor boats to the bridge. The channel is difficult in places without local knowledge. It is reported that a local boat of about 5½-foot draft enters Queen Creek at high water.

The ruins of **Clements wharf** off **Carmines Islands** were not visible above high water in 1946. A buoy marks the outer end of the former wharf.

Timberneck, Cedarbush, Carter, and ***Aberdeen Creeks,*** between Carmines Islands and Clay Bank wharf are shoal and frequented only by small local boats.

Clay Bank wharf and post office are on the northeast side of the river 8.3 miles above Gloucester Point. The wharf is in poor condition but is used by local fishermen.

Allmondsville wharf is in ruins and only a few scattered piles, bare about 5 feet at MLW, mark its site. A light is on the outer end of the ruins.

Poropotank River, 4 miles above Allmondsville wharf and eastward of Poropotank River Light, has a depth of about 6½ feet at high water in the entrance. In 1933 a channel in ***Morris Bay*** was dredged to 6 feet, and above this 5 feet could be taken to **Miller Landing.** Small boats can go several miles farther. There are several landings on the creek from which wood products are shipped in boats of 4- to 6-foot draft. The channel is usually marked by bush stakes, but is crooked and narrow in places and difficult without local knowledge. The best water favors the east shore in the approach through ***Poropotank Bay.***

The 18-foot shoal off Poropotank Bay is marked by bush stakes and fish traps. The wider, deeper channel passes to the westward. Above here fish stakes line both sides of the channel.

Mattaponi and Pamunkey Rivers

CHART 504

West Point (lat. 37°32′, long. 77°48′), at the junction of Mattaponi and Pamunkey Rivers, is the terminus of a branch of the Southern Railway. It has little trade by water with the exception of pulp wood, railroad ties, and piling from up country. Oil boats make regular calls. Gasoline, Diesel oil, provisions, water, and coal in limited quantities are obtainable.

The railroad wharf at the southwest end of town, on the Pamunkey River, has 20 feet at its southeast end but shoals along the face to 9 feet at the northwest end. It is little used. The pulp-mill landing above the bridge has depths of 12 to 14 feet alongside.

In the Mattaponi River the southerly wharf has depths of 13 to 21 feet at its face, the oil wharves 8 and 9 feet. Fresh water is obtainable at the lower oil dock. The marine-railway landing above the bridge has 10 feet, the oil wharf 20 feet.

Towboats and pilots for the Mattaponi and Pamunkey Rivers are maintained by the pulp mill. Just northward of the Mattaponi River bridge is a machine shop for minor repairs to machinery and a railway capable of hauling out vessels of 300 tons, 120 feet length, and 8-foot draft.

Anchorage can be made off the wharves on either side of West Point in depths of 18 to 40 feet.

Mattaponi River is the approach to the villages of **Walkerton** and **Aylett,** 25 and 33 miles, respectively, above West Point, and many other landings. It has a depth of 12 feet to **Mantapike,** 18.5 miles above West Point, and 7½ feet to Walkerton. With local knowledge 7½ feet can be carried across ***Sandy Point Bar,*** 0.5 mile west of **Sandy Point.**

The present Federal project for improvement of the Mattaponi River provides for

a channel 9 feet deep and 150 feet wide from the mouth to **Locust Grove,** 24.3 miles above the river mouth, thence 7 feet deep and 100 feet wide to **Rosespout (Pointers Landing),** a distance of 5.2 miles, with a basin immediately above Rosespout 7 feet deep, 180 feet wide and 400 feet long. The last dredging in the river was accomplished in 1941 after which the depth was 9 feet from the mouth to Locust Grove and 7 feet to Rosespout.

Above Rosespout it is reported that the depth is 5½ feet to ***Walker Bar,*** about 0.5 mile below **Jones Landing,** and 4 feet on the bar, thence the same depth to Aylett.

The depth is about 2 feet for a distance of 2.5 miles above the fixed bridge at Aylett to the fixed bridge at **Dunkirk.** The river for a distance of 53 miles above Dunkirk is shoal, but is used for rafting and logging at high stages.

Bridges.—A highway bridge crosses the river at West Point. It has a swing span 80 feet wide between fenders and a vertical clearance of 7 feet at MHW when closed. The eastern opening is used. A swing bridge, crossing the river at Walkerton, is 53.8 feet wide between fenders, and has a vertical clearance of 6½ feet at MHW when closed. The fixed bridge at Aylett has a span of 119 feet, no fenders, and vertical clearance of 20 feet at MHW. The fixed bridge at Dunkirk is reported to have a span of about 50 feet and 6 feet vertical clearance at MHW.

There is now little trade in the river except in wood products carried in barges, the deepest draft being 14 feet. The river is unmarked and navigation is difficult without local knowledge. Pilots and towboats can be obtained at West Point. Supplies can best be obtained at West Point, though gasoline and provisions are obtainable at some of the landings, particularly at Walkerton where it is reported there is docking for small craft. A vessel carrying oil and gasoline makes regular trips to Walkerton.

Freshets occur at irregular intervals, being more severe during March and April, and have reached a height of 17½ feet above MLW at Aylett and 5 feet at Walkerton, though this is exceptional, but are little felt at West Point or below. The river is not fresh below West Point.

Tides.—The mean range of tide is about 3 feet at West Point and 4 feet at Walkerton.

Pamunkey River has no towns but many landings, from which considerable wood products are shipped in barges, the deepest draft being 15 feet. At **Sweet Hall** and **Lester Manor** are post offices and railroad stations and at **White House** is a railroad station.

The Federal project for improvement of the river provides for a channel 7 feet deep and 100 feet wide between the mouth of the river and Bassett Ferry, a distance of about 40 miles. According to the latest examination the controlling depth at MLW is 5½ feet to **Tyler.** It is navigable for small lighters and rafts for a farther distance of about 9 miles to Hanovertown.

From West Point to **Sweet Hall Landing,** 14½ miles above, the river is easy of navigation with the aid of the chart. Above this point navigation is difficult without local knowledge. Pilots can be obtained at West Point, Lester Manor, and White House, and towboats at West Point. Artesian water can be obtained at several of the landings, and the river water is fresh above **Cumberland Landing.** Several narrow cut-offs have sufficient depth for small boats, but local knowledge is usually necessary. ***Cumberland Thorofare*** is used extensively by local boats.

Bridges.—The highway swing bridge at West Point crossing the Pamunkey River has an 89½-foot span between fenders and a 5-foot vertical clearance at MHW when closed. The northeast channel in the bridge is obstructed by piling. A small boat

opening is just west of the swing with a span of 18½ feet and a vertical clearance of 6½ feet at MHW. Across the ***Eltham Marsch Thorofare*** is a wooden culvert with 19-foot span, no fenders, and 3½-foot vertical clearance at MHW.

The railroad bridge at White House has a draw opening 53 feet wide and a vertical clearance of 4½ feet at MHW when closed. The east opening is fended and must be used.

The **Newcastle** bridge has been removed although the piling remains in place. There is a horizontal clearance of 50 feet.

Freshets occur at irregular intervals in Pamunkey River, being more severe during March and April.

Tides.—The mean range of tide during low stages of the river is about 3 feet at West Point and 2 feet at Newcastle.

Mobjack Bay

CHART 494

Mobjack Bay, having its entrance between York Spit and New Point Comfort, has several tributaries, the most important being East, North, Ware, and Severn Rivers. It is obstructed by extensive shoals, but has a depth of 22 feet in the entrance and 15 feet through the bay and for a considerable distance in the tributaries.

The entrance is marked on the north side by **New Point Comfort Light (lat. 37°18′, long. 76°17′)**, shown from a white tower, and on the south side by **York Spit Light,** shown from a white house on piles. These are the only prominent marks in the approach. Many of the shoals in the bay and tributaries are marked by buoys and lights.

Good anchorage can be found in the bay, with shelter from all but southerly and southeasterly winds. Small craft find safe anchorage in the bight westward of New Point Comfort and in the rivers and creeks.

Pilots.—There are no regular pilots for Mobjack Bay and tributaries, though a pilot can usually be obtained from boats at work near the entrance.

Tides.—The mean range of tide is about 2½ feet.

New Point Comfort, marked by a prominent light, is low and sparsely wooded. The wharf at the west end of the point is in ruins.

Bayside Wharf is a long wharf on the northeast side of Mobjack Bay, 1.5 miles northwestward of New Point Comfort Light. It is in poor condition. In December 1946 it had a depth of 8 feet at its outer end. Some provisions and ice are obtainable.

Pepper Creek, marked by two lights, has a ruling depth of 5 feet for about 0.3 mile above the entrance and 3 feet for about 0.3 mile farther. Fishermen have gasoline tanks on piles over the deeper water inside the creek for refueling small boats.

East River, emptying into Mobjack Bay from northward, has a narrow channel with a depth of 13 feet for 4 miles above the entrance and 4 feet for a farther distance of 2 miles to near the head. The entrance is marked by **Pultz Bar Light,** and **Pond Point Shoal Light** and by buoys. Shoals, unmarked except for bush stakes, extend for some distance off many of the points above the entrance, but mid-channel is clear if points be given a good berth.

The following wharves with post offices are on East River: **Philpots Wharf (Mob-**

jack post office) on the west side; **Diggs Wharf** on the east side, just inside the entrance; and **Williams Wharf**, about 2.5 miles above the entrance.

Philpots wharf, in poor condition, has a depth of 10 feet at the outer face; the oil wharf nearby has 6 feet. Diggs wharf, in need of repair, has 9 feet at its face. Williams wharf has from 9 to 7 feet alongside the bulkhead at the oyster house. Gasoline, water, and supplies are obtainable. The oil wharf has a depth of 10 feet at the end. The landing about 0.3 mile above has a depth of 5 feet. An oyster house and landing are on the western shore of the river opposite Williams Wharf.

North River, emptying into the head of Mobjak Bay from northward, is wide, but has shoals making off for a long distance from many of the points. The channel is marked by lights and buoys. The depth is 12 feet in the channel to abreast ***Belleville Creek.*** There are no commercial landings in the river.

Ware River, emptying into the head of the bay from northwestward, has a depth of 15 feet to the mouth of ***Wilson Creek,*** 3 miles above the entrance, and 7 feet for a farther distance of 2 miles. Shoals, some of them marked by buoys, extend for a long distance off many of the points. The only commercial landing is the Texas Oil Company wharf on the east side, 4.3 miles above the entrance. It has a depth of 10 feet at the end. Gasoline, Diesel oil and lubricating oil can be secured. Fresh water is not available. **Schley**, 0.5 mile inland from the wharf, has a post office and store.

Severn River, emptying into Mobjack Bay from southwestward, has a depth of 15 feet to the junction of Northwest and Southwest Branches, and 8 feet for 1.3 miles in ***Southwest Branch*** and 1.8 miles in ***Northwest Branch.*** The most prominent shoals are marked by buoys.

Greenway Wharf is on the north side of Southwest Branch 1.1 miles above the fork. A marine railway here hauls and repairs boats up to 75-foot length and 7-foot draft, 150 gross tons. The wharf has a depth of 9 feet at the end. Fresh water is piped to the wharf. There is a store and gasoline is obtainable. The post office is at **Glass,** 0.5 mile inland. Small wharves, used by local boats, are on the Northwest Branch.

Browns Bay, just south of Severn River, has a light and buoys at the entrance, and farther inside the channel has two lights and bush stakes. Gasoline can be obtained at the wharf where the depth is 4 feet. A store and post office are inland at **Severn** about 1 mile westward of the wharf.

Monday Creek, a thoroughfare between Mobjack Bay and York River, has a depth of about 3 feet at high water and is extensively used by small local boats. The passage is north of **Guinea Marshes** and east of **Hog Island.** It is bush-staked but difficult of passage without local knowledge.

Courses and Distances for Mobjack Bay are given in Chapter 3.

Mobjack Bay to Wolf Trap

CHART 494

The shoals on the west side of Chesapeake Bay between Mobjack Bay and Rappahannock River are generally more or less obstructed by fish traps during the season. The limits of the fish traps along the west side of the bay in this vicinity are shown on Charts 1222 and 1223.

The directions for this locality route vessels through the channels clear of fish traps. Other courses may be used where local knowledge of the locations of traps is available.

Dyer Creek has a ruling depth of 3 feet in the entrance and is somewhat deeper inside. It is bush-staked but local knowledge is necessary.

Horn Harbor, 3 miles northward of New Point Comfort Light, has a depth of about 3 feet across the bar at the entrance and 6 to 9 feet in a narrow channel inside for about 2 miles above the bar. The depth of the bar is subject to change. The entrance is marked by a bell buoy and lights. Bush stakes are also used but local knowledge is necessary. On the east side of the channel near **Sheep Island** is a cluster of piles above high water. The entrance has been improved by dredging a channel 7 feet deep and 100 feet wide across the bar. In 1946 it was reported that this depth still held.

The harbor is used considerably for fishing and oyster boats. At the head across from **Susan** is a small marine railway, and another is in ***Smith Creek,*** at the south side of the entrance. A store and post office are at **New Point** and gasoline is obtainable.

Winter Harbor and the other sloughs and creeks having their entrance 4.3 miles northward of New Point Comfort have depths of 2 to 4 feet inside. The entrance bar generally has a controlling depth of about 2 feet, being marked by a light on the point north of the entrance channel. After entering and just before reaching the narrows leading to Winter Harbor, the channel favors the **Potato Neck** side. Mud flats lie to the eastward of the channel. There are no buoys or bush stakes marking the channel and local knowledge is necessary. The large bay northward of Winter Harbor has depths of 2 to 4 feet.

Garden Creek, 3 miles northward of Winter Harbor, has an entrance improved by timber jetties about 800 feet long. The controlling depths are about 4 feet in the entrance and from 2 to 3 feet inside the creek.

CHAPTER 9

Chesapeake Bay, Wolf Trap to Smith Point

CHART 1223

SIX miles northward of New Point Comfort is ***Wolf Trap,*** an area of broken ground with numerous shoal spots of 5 to 10 feet, which extends about 3 miles into the bay. **Wolf Trap Light (lat. 37°23′, long. 76°11′)**, 52 feet above the water and visible 13 miles, is shown from a square tower on an octagonal red-brick dwelling with a cylindrical base near the east end of the shoal. The light has a radiobeacon equipped for distance finding and an air-diaphone fog signal.

The eastern end of the shoal is also marked by buoys. An unmarked and crooked channel with a depth of about 19 feet leads northward through the shoal inside Wolf Trap Light, but local knowledge is necessary to navigate it in any but light-draft vessels. All of the shoal area is within authorized fish trap limits.

A **danger area,** established by Federal regulation, is about 5 miles northeastward of Wolf Trap Light and lies between the parallels of 37°24′00″ and 37°24′45″ and the meridians of 76°04′10″ and 76°05′30″. The regulation requires that no vessel shall anchor or drag any gear on the bottom within the designated area. **Wolf Trap Obstruction Light,** shown from a house on piling, is 0.4 mile eastward of the danger area. The light has a bell fog signal.

Piankatank River

CHART 534

Piankatank River, just south of Rappahannock River entrance, has a depth of 12 feet to within 2.5 miles of the village of **Freeport,** and 6 feet to Freeport. Vessels up to 12-foot draft carrying wood products make use of the river.

The entrance to the river, between Stingray Point and **Cherry Point,** is marked on the north side by **Stingray Point Light** on the east end of ***Stingray Point Shoal.*** The light, shown from a white house on brown piles, is 34 feet above the water and visible 11 miles and has a bell fog signal. Several other lights and buoys mark the channel, which is obstructed by many shoal spits and middle grounds. Strangers should have no trouble in taking a draft of 10 feet to **Doctor Point,** 11 miles above the entrance, with the aid of the chart.

Between Doctor Point and Freeport the channel is shoal and very narrow in places. It is usually marked by bush stakes but is difficult without local knowledge. Vessels usually complete their loadings from lighters about 2.5 miles below Freeport. Gasoline and provisions can be obtained at **Dixie,** southward of **Wilton Point,** and at Freeport A ferry crosses the river at Dixie. The oil wharf there has a depth of 6 feet at the end.

Hills Bay, on the south side of Piankatank River, just inside the entrance, forms the approach to Milford Haven and Queens Creek.

Milford Haven can be entered from Piankatank River at the northwest end and from Chesapeake Bay at the southeast end. The entrance at the southeast end, called ***Hole in the Wall,*** has a depth of 3 feet and is used by small local boats, but is exposed to a heavy sea and is difficult without local knowledge. The entrance is marked by a light on a black wooden tower with daymark on piles at the northernmost point of **Rigby Island.**

The main entrance at the northwest end has been improved by dredging a channel 10 feet deep and 200 feet wide from Hills Bay to Callis Wharf, on the north side 0.7 mile above the entrance, and by the construction of a stone jetty 1,200 feet long on the north side at the entrance. The controlling depth in November 1946 to Callis and Cricket Hill wharves was 10 feet with the limiting depth at the ***Middle Grounds.*** The entrance to the dredged channel is marked by buoys and a light. A daybeacon is on the west side of the channel just above the bridge. There is a depth of 6½ feet to ***Stutts Creek.*** Only small local boats use the harbor beyond.

Callis Wharf (**Grimstead** post office) has 10 feet of water alongside. Gasoline, Diesel oil, and supplies can be obtained here. A small marine railway is a short distance to the westward.

Cricket Hill wharf is on the north point of ***Lanes Creek*** entrance. The depth of water alongside is 10 feet. An ice plant is here.

A swing bridge crosses the channel at Cricket Hill. The horizontal clearance is 80 feet between fenders; the vertical clearance is 12 feet at MHW.

In entering Milford Haven a **185°** course with **Stove Point Light** (**lat. 37°33′, long. 76°19′**) astern will lead through Hills Bay to the entrance. Pass 75 yards eastward of the red buoy, follow the jetty at a distance of 60 yards to the inner end, and then head for the draw of the bridge. After passing through the bridge steer **045°** with Callis Wharf a little on the port bow for 350 yards, to avoid a shoal on the northwest side, marked by a beacon and bush stakes, and then bring Callis Wharf well on the starboard bow until close to it to avoid a shoal making off the southern shore, which is nearly bare at extreme low water. From the latter wharf steer **154°** for Cricket Hill wharf.

Queens Creek, at the southern end of Hills Bay, is obstructed by a bar with a depth of 2 feet at the mouth. It is frequented only by small local boats and is unmarked. A wooden jetty has been constructed on the north side of the entrance. The outer end is marked by a light. In November 1946 only the middle section showed at high water; the remainder, a row of broken piling, is visible only at low water.

Jackson Creek, on the north side of the Piankatank River entrance, has depths of 8 to 10 feet inside the bar. The Federal project for improvement of the entrance provides for an entrance channel 8 feet deep and 60 feet wide increased to 80 feet at the outer end. The channel is marked by an entrance light and three daybeacons. Stakes, placed by the local residents, usually define the channel edges. In December 1946 the controlling depth in the entrance channel was 8 feet.

The town wharf, on the north side of the southern arm of the creek, has a depth

of 8 feet at the end. Immediately westward is a small marine railway capable of hauling and repairing boats up to 50 feet in length and 4-foot draft. Supplies and gasoline can be obtained. The small landing on the point of land between the two arms has a depth of 5 feet. The post office is at **Deltaville.**

Fishing Bay, on the north side, has depths of 19 to 20 feet, and at its head is a marine railway capable of hauling and repairing vessels of 12-foot draft, 200 feet length, and 500 tons weight. Ruarks wharf, in ruins, is just above the shipyard. **Ruark** post office is near the wharf. Ice and supplies can be obtained about 1 mile inland.

Ice.—Piankatank River is closed by ice for short periods only, during severe winters.

Tides.—The mean range of tide is about 1 foot at the entrance.

Directions, Piankatank River.—To avoid possible fish traps vessels should approach Piankatank River, heading toward fish-trap buoys Nos. 4W and 6W on any course between **257°** and **310°**.

From midway between these buoys head for **Stove Point** on course **245°**, passing between the fish-trap buoys, to 0.3 mile westward of buoy 3, then steer **185°**, passing 200 yards westward of **Cherry Point Light** and around Stove Point Light at the same distance.

When west of Stove Point Light follow a northwesterly course to a position 300 yards north of buoy 5, then steer **290°** for **Roane Point Light** until off **Iron Point,** crossing a shoal with least depth of 11 feet, then haul around to course **305°** and pass midway between the light and the north shore. Continue on up the river using the chart as a guide, there being no further artificial aids to navigation.

Rappahannock River

CHARTS 534, 535, 536

Rappahannock River, on the western side of Chesapeake Bay, 40 miles above the entrance and 111 miles below Baltimore, is the approach to the city of Fredericksburg, at the head of navigation, 95 miles above the entrance, and to numerous villages and landings. The principal wharves on the river and its tributaries are Irvington, Weems, Urbanna, West Urbanna, and Tappahannock.

The river pilot reports that tugs and barges with 11½-foot draft go to the Sylvania Industrial Corporation wharf at Deep Run about 1 mile below Fredericksburg, but drag through mud at MLW over Mangoright, Nanzatico, Millbank and Farleyvale Bars. Fuel barges drawing 9 to 10 feet go to the wharves at Fredericksburg. In the upper reach the river is lowered by northwest winds 1 to 1½ feet below normal stages, it is reported.

The lower end of the river is frequented by fish steamers of 9- to 11-foot draft and by many smaller craft engaged in the oystering and fishing industry. The tributaries have some trade in wood products carried in barges and lighters.

Channel.—Rappahannock River has a natural channel 30 feet deep for 26 miles,

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and 14 feet deep to the town of Tappahannock, 39 miles above the entrance. Above Tappahannock the river is being improved.

The authorized Federal project for improvement of the river provides for a channel 200 feet wide and 12 feet deep from the mouth to Port Royal, and thence 100 feet wide and 12 feet deep to Fredericksburg. In September–November 1946 project depths obtained in the channel.

The channel from the mouth to Tappahannock is comparatively straight, gradually decreasing in width, and leads between shoals which make out from both banks. The principal dangers are marked. Strangers should have no trouble in taking a draft of 10 feet to Tappahannock by day, with the aid of the chart. Above Tappahannock the river is narrow and crooked and requires local knowledge. Rocks occur in places on both sides of the channel for a distance of 4 miles below Fredericksburg, and the shores should be given a good berth. Strangers can safely carry a draft of 8 feet to Fredericksburg with the aid of the chart, but with with a deeper draft are advised to take a pilot at Tappahannock.

Fish-net-stake buoys, with white and black horizontal bands, mark the clear channels for navigation at the mouth of the river.

Anchorages.—Good anchorages for deep-draft vessels will be found in the mouth of the river southward or westward of **Mosquito Point.** Vessels can anchor anywhere in the channel of the river where the bottom is soft and the depth suitable. Carter and Urbanna Creeks are extensively used as harbors for small craft.

Pilots.—Pilotage is not compulsory for Rappahannock River. Strangers bound up the river can obtain a pilot at Tappahannock, and unless of light draft advisedly should not go above the latter place without one.

Supplies.—Gasoline, ice, and provisions can be obtained at Irvington, Weems, Urbanna, Tappahannock, Port Royal, and Fredericksburg. Artesian water can be had at or near the wharves in Carter Creek, at Urbanna, Tappahannock, Fredericksburg, and several other landings. Coal can be obtained at Fredericksburg and in very limited quantities from the fish factories in Carter Creek.

Repairs to hulls of vessels up to 1,000 tons, 180 feet length and 12-foot draft, can be made in Carter Creek, and to boats of 50 feet length and 5-foot draft in Urbanna Creek. There are machine shops at both places and at Fredericksburg, where ordinary repairs to machinery can be made. Railways for hauling out small motor boats can also be found in Locklies, Lancaster, and Hoskins Creeks, details of which are given in the text describing those localities.

Ice, during severe winters, closes the river nearly to its mouth, but during ordinary winters the channels are usually kept open by the regular steamers. Ice, sufficient to interfere with navigation of small craft, will usually be met with in January and February and is most often found above Port Royal.

Freshets occur during the spring and fall, but are of short duration, and are not ordinarily dangerous to shipping. The highest water level on record was 32.8 feet above MLW at Fredericksburg, but the usual height due to freshets is not over 9 to 12 feet and only occasionally rises above the wharves. The effect on the water level due to freshets decreases rapidly below Fredericksburg, and is ordinarily negligible below Farleyvale Reach, 11 miles below. The water is usually fresh above Port Royal, but is not suitable for use in boilers.

Tides.—The mean range of the tide at the mouth of the river is about 1 foot; at Tappahannock, 1½ feet; and at Fredericksburg, 3 feet.

Currents.—The currents follow the general direction of the channel. In the upper reaches of the river the velocities of the currents and the times of slack water vary considerably, due principally to irregularities in drainage flow, but to some extent to the winds. The currents in the lower part of the river vary similarly but to a lesser degree.

The *Atlantic Coast Current Tables* give detailed information for a number of locations.

Stingray Point to Towles Point

CHART 534

The approach to Rappahannock River leads between Rappahannock Spit on the north and Stingray Point Shoal on the south. The shores on both sides at the entrance are wooded, and the most prominent landmarks are Windmill Point Light and Stingray Point Light, both shown from white houses on piles.

Stingray Point is prominently marked by a large pavilion and a number of houses.

Rappahannock Spit, extending 4.4 miles east-southeastward from Windmill Point, is marked by **Windmill Point Light (lat. 37°36′, long. 76°14′)** near the center, and a horizontal-banded lighted bell buoy 1.2 miles southeastward of the outer end. The light, shown from a white house on brown piles, is 36 feet above the water and visible 11 miles and has a bell fog signal. Vessels of 10-foot draft can cross the spit anywhere between the light and the lighted bell buoy provided it is clear of fish traps. A clear passage is always maintained through the traps in a northeasterly direction 0.5 mile east of the light. It is marked on the eastern side by white and black horizontal-banded buoys. Chart 1223 shows fish-net limits along the entrance of the river, and Chart 534 shows the fish-net-stake buoys outside of the delineated limits.

Westland post office is on the north side, 0.8 mile westward of Windmill Point. The wharf has disappeared.

Windmill Point Creek has a new natural channel about 0.9 mile west of Westland, 1½ feet deep at the entrance and 8 to 10 feet deep inside. The channel is bush-staked but local knowledge is necessary. A shoal channel connects with Oyster Creek, near **Foxwells** post office, at the head of the creek.

Broad Creek, 0.8 mile westward of Stingray Point, is much frequented by oystermen and fishermen. The best water across the shoal to the mouth is marked by three daybeacons. This channel, however, is very shoal and entrance is reported only possible for small boats drawing no more than 3 feet. It is reported that there are several small marine railways in the creek.

Mill Creek and ***Locklies Creek,*** on the south side of Rappahannock River 6 miles westward of the entrance, have depths of 5 feet or more until well inside the entrances and are frequented by many small local craft. The approach to Mill Creek is marked by two lights on the west side of the channel.

The Federal project for the improvement of Mill Creek provides for a channel 11 feet deep and 100 feet wide extending from deep water across an indentation of the Rappahannock River to a turning basin 300 feet square at the wharf at Mill Creek. The controlling depth in this channel in November 1946 was 11 feet.

Mill Creek Wharf, eastward of the entrance to Mill Creek, is in ruins. The broken

piling is covered at low water, with the exception of a group of 3 at the former outer end. Stiffs Wharf, 300 yards southwest of the inner light, is now (November 1946) marked by rows of broken piling bare about 2 feet at MHW.

To enter Mill Creek give the edge of the shoal northeastward of **Parrott Island** a good berth, steer **231°** for the outer light, and pass 50 yards eastward of it. Then be guided by the chart, passing about 50 yards southeastward of the inner light.

Locklies Creek is easily approached by passing midway between the light off Grey Point and Parrott Island, then hauling to southward and, with the light astern, steering to pass 50 yards eastward of buoy 2. Head for the mouth of the creek, keeping south of buoy 4 which marks a shoal off the northern point.

There is a marine railway in Locklies Creek capable of hauling out boats 30 feet long and of 4-foot draft. Gasoline and provisions can be obtained, and there are post offices at **Locklies** and **Regent.** There are no supplies in Mill Creek. A post office is at **Bushy.**

Locklies and Mill Creeks are connected by a dredged channel southwest of Parrot Island. In November 1946 the controlling depth between the two creeks via the cut was 7 feet. There are grass-covered spoil banks on both sides of the cut and bush stakes beyond.

Grey Point has a ferry landing on its north side; the ferry runs to a landing about 0.8 mile northwestward of Cherry Point across the river. Both landings are marked by fixed red and green lights.

Whitestone Wharf (**Taft** post office), is on the north side of Rappahannock River 6 miles above Windmill Point. There is a Public Health Relief Station **at Whitestone.** A prominent fish factory and a wharf are located on **Cherry Point.** This wharf has three individual landings; the depths at their faces, counting from westward, are 21, 13, and 15 feet.

Carter Creek, on the north side of Rappahannock River 9 miles above Stingray Point, is the approach to the villages of **Weems** and **Irvington.**

The channel has been improved by dredging, the Federal project providing for an entrance channel 15 feet deep, 200 feet wide, and about 2,200 feet long across the entrance bar; a channel in Eastern Branch at Galley Hook Point 12 feet deep, 100 feet wide, and 1,100 feet long in Carter Cove a channel 12 feet deep, 100 feet wide, and 1,700 feet long to the marine railways; and a jetty on the eastern side of the entrance channel. In November 1946 the controlling depths were reported to be: Entrance Channel, 15 feet; Galley Hook Channel, 12 feet; Carter Cove to marine railways, 9 feet.

To enter Carter Creek, pass between **Spinhouse Point Shoal Light** and buoy 2 on a **010°** course, then pass close westward of buoy 4 and **Crab Point Shoal Light** and steer for the wharf at Weems. From Weems wharf steer a little to the southward of **Galley Hook Point Light**, then toward the point south of Irvington, and when the main wharf at Irvington bears about 051° steer for it.

Carter Creek has a power plant, ice plant, several oyster houses, and is the center of a large oystering and fishing industry. It is extensively used as an anchorage by local vessels. Gasoline, fuel oil, and provisions can be obtained at Weems or Irvington.

In ***Carter Cove*** is a marine railway capable of hauling vessels of 1,000 tons, 180 feet length, and 12-foot draft. There is a well-equipped machine shop. The landings at Weems have a depth of 6 feet alongside.

The Rappahannock Yacht Club is on the eastern shore of the middle arm of Carter Creek. The landing has 7 feet of water alongside and gasoline and fresh water can be obtained at its outer face. The oil-company and oyster-house wharves immediately above have depths of 6 and 10 feet respectively. The oyster house on the western shore has a depth of 8 feet and fresh water connections.

Two marine railways, the larger capable of hauling a vessel 70 feet long and of 5-foot draft, is located on the north shore just inside the entrance to the Eastern Branch. The town landing at Irvington has a depth of 8 feet alongside but is in poor condition; the oil company wharf has 6 feet.

Tides.—The mean range of tide in Carter Creek is about 1½ feet.

Corrotoman River, on the north side of Rappahannock River 12 miles above the entrance, has a depth of 18 feet to the junction of Eastern and Western Branches, 4 miles above the entrance.

Whitehouse Creek on the western side can be entered with a draft of 7 feet and that draft carried with local knowledge to the landing at **Bertrand** post office. Gasoline and supplies in small quantity are obtainable here.

Millenbeck wharf (lat. 37°40′, long. 76°29′) on the western side of Corrotoman River 1.5 miles above the entrance, is in ruins. A store and post office are here.

Taylor Creek has a depth of 5 feet for about 0.8 mile above the entrance.

Myer Creek is used by local fishermen. The channel is bush-staked to the oyster-house landing about a half mile above the entrance. There is a reported depth of about 5 feet.

Eastern Branch has a depth of 9 feet for 2.5 miles and 6 feet for a farther distance of 0.8 mile.

Western Branch has a depth of 12 feet for 2.5 miles and 6 feet for a farther distance of 1 mile. The channel is obstructed by shoal spits and middle grounds, but the principal shoals as far as the fork, and for 0.5 mile above in Western Branch, are marked by buoys and lights. A cable-drawn county ferry (day service) crosses Western Branch from just north of **Ottoman Wharf** (in ruins) to **Merry Point wharf.** There is a store near Merry Point wharf.

Tides.—The mean range of tide in Corrotoman River is about 1½ feet.

Directions, Corrotoman River.—Head for ***Millenbeck Bar*** buoy 1 on any course between 357° and 033°. Round it to the eastward at 100 yards distance and, when north of it, steer **287°** until Millenbeck Wharf bears 337°.

Then steer for the wharf and, when west of **Corrotoman Point Light,** steer **040°** until buoys 4 and 6 are in range, haul to a true **north** course and pass 75 to 100 yards west of them and between **Bar Point Light** and the point opposite.

When **West Point Light** bears 318°, steer for it, rounding it to the westward at a distance of 100 yards, then pass close eastward of buoy 5 and head for Merry Point wharf.

Beyond this point or in Eastern Branch the chart is the guide.

Burhans Wharf (Cooper post office), on the south side of Rappahannock River southwestward of the entrance to Corrotoman River, is in ruins.

Towles Point to Marsh Point

CHART 535

Urbanna Creek, on the southwest side of Rappahannock River, 15 miles above the entrance, has been improved by dredging. The Federal project provides for a channel with a depth of 10 feet and 150 feet wide through the outer and inner bars at the entrance, and to the wharf at **Urbanna,** 0.5 mile above, near the bridge, with a turning basin of the same depth off the wharf. In November 1946, there was a controlling depth of 10 feet and 100 feet width to the wharf. Above, there was a depth of 6 feet for a distance of about 1 mile; small craft can go another 2.5 miles upstream.

The entrance to Urbanna Creek is marked by two lights and a buoy. There is a stone jetty at the north point and a timber jetty at the south point. A large brick hotel on the hill on the north side and some cottages near the entrance are prominent.

The creek is extensively used as a harbor for small vessels. There is excellent anchorage for a limited number of vessels of 9 feet or less draft, and depths of 7 to 14 feet at the wharves. There is a railway at Urbanna for hauling out boats of 50 feet length and 5-foot draft, and a machine shop for ordinary repairs to motors. A post office and stores are available. Gasoline, Diesel oil, ice, and provisions are obtainable.

The bridge crossing Urbanna Creek has a retractile draw with an opening 30.3 feet wide between fenders, and a vertical clearance at MHW, when closed, of 5 feet. The draw is opened upon a signal of three blasts at any time between sunrise and sunset, daily except Sunday, from September 16 to May 31, and from sunrise until 9:30 p. m. daily from June 1 to September 15.

In May 1947 an 85-foot boat lay partially submerged in the channel 500 yards southwest of the bridge.

To enter, approach the outer light on a westerly course, pass 100 feet southward of it and the buoy near the inner end of the jetty, pass about midway between the wharf just westward of the buoy and the inner light, and then keep in mid-channel to the steamboat wharf at the north end of the bridge.

Tides.—The mean range of tide at Urbanna is about 1½ feet.

There is a long wharf at **West Urbanna (Remlik),** 1 mile northwestward of the entrance to Urbanna Creek. A water tank on shore and the white buildings and smokestacks on the end of the wharf are prominent. Depths at the wharf are: Outside 9 to 7 feet, end 8 feet, north side 8 to 4 feet.

Robinson Creek, just northward of West Urbanna, has a depth of 5 feet in the entrance and 3 feet to the head.

On **Balls Point** is a prominent white flagpole and a water tank showing above the trees.

Lagrange Creek, 1.7 miles northward of Urbanna Creek,h as a depth of 7 feet in the entrance and 3 feet for 1.5 miles above. There is a prominent water tank southwest of **Long Point,** on the opposite shore.

Weeks Creek, on the southwest side of the river, 4 miles above Urbanna Creek, has a depth of about 2 feet and is seldom used.

Greenvale Creek, 2.6 miles north of **Rogue Point,** is much frequented by oystermen. An entrance channel was dredged and a timber jetty built along its upstream side. The jetty has disappeared and shoaling has taken place to the extent that there was only 1½ feet across the shoals at low water in November 1946. The channel is well marked by bush stakes. The oyster-house landing on the west side just inside the entrance

has a depth of 4 feet alongside. Gasoline in small quantity is available here. The north and south prongs have depths of about 2 feet.

The long wharf on the eastern side of the river 0.6 mile above Greenvale Creek has a reported depth of 4 feet at the end.

Monaskon is a post office on the northeast side of the river, 5.7 miles above Urbanna Creek. Gasoline and oil may be purchased. The outer ⅔ of the wharf is in ruins but a few local fishermen use the inner end, lying south of it where they are protected by a shell islet which acts as a breakwater to westward.

Waterview is a post office on the southwest side of the river 5.7 miles above Urbanna Creek. The wharf is in ruins. Just west of Waterview is ***Parrotts Creek,*** which has a depth of 4 feet in the entrance and 2 feet to near the head. There is an oyster dock inside the point to which 3 feet can be carried. ***Mud Creek,*** just northward of Parrotts Creek, is generally bare at low water inside.

Deep Creek, on the northeast side of Rappahannock River 7.8 miles above Urbanna Creek, has a depth of 2 feet across the flats at the entrance and 4 to 6 feet inside to several branches. There are bush stakes but local knowledge is necessary. The deepest draft using it is about 4 feet. **Boer** post office is on the east side of the inner entrance.

Mulberry Creek is on the northeast side of the river 9 miles above Urbanna Creek. In December 1946 there was a depth of 6 feet in a dredged channel across the creek entrance to the ruined wharf at **Morattico**; this depth can be carried eastward to beyond the oyster wharf at **Colbert Point.** The west side of the channel entrance is marked by a light. Whealton Wharf, at the western entrance point, is in ruins. There is a shell islet nearly awash at high water near the outer end of the ruins. A post office is at Morattico. Gasoline and provisions can be obtained.

Lancaster Creek, just westward of Morattico, has a depth of 5 feet for 1 mile and 2 feet to **Woodhouse Landing,** 4.5 miles above the entrance. There is a marine railway near the entrance of the creek capable of hauling out a 30-foot boat with 4-foot draft. All small boat repairs can be made. There is a post office at **Simonson.**

Morattico Creek, emptying into Lancaster Creek from northward, has a depth of 3 feet at the entrance and 2 feet to near the head.

Farnham Creek, 3.5 miles northwestward of Morattico, has a depth of 2½ feet at the entrance and for a distance of 3 miles above. About one mile above the entrance is a bridge with span of about 30 feet and high water clearance of 6 feet. The dimensions of the upper bridge span are reported to be about the same.

Bayport wharf is on the southwest side of the river opposite Morattico. It has a depth of 7 feet at the end but is in poor condition.

Butylo wharf has a depth of 3 feet at its end. There is a fresh water connection. Gasoline can be secured from the town located on the top of the bluff.

On the northeast side 4 miles above Morattico is **Sharps wharf,** and alongside of it a gasoline and oil station with prominent white tanks near the inner end of the wharf. There is a depth of 10 feet at the end.

On the southwest side just westward of **Bowlers Rock Light (lat. 37°49′, long. 76°44′)** is **Bowlers Wharf,** in ruins. A draft of 8 feet can be taken to the latter from north-northwestward and 9 feet east-southeastward.

Danger.—A foul area containing numerous uncharted rocks is reported to exist on the west side of the channel from 0.2 mile southeastward of Bowlers Rock Light to 1.3 miles northwestward of the light.

In November 1946 a wreck, submerged except for the mast, lay on the western edge of the dredged channel about 100 yards north-northeastward of the light.

Richardson Creek, about 3 miles above Sharps wharf, is on the northeast side of the river. It is shoal. A private farm bridge, crossing the entrance with a span of about 10 feet and high water clearance of 6 feet, is in ruins.

Totuskey Creek, on the northeast side of Rappahannock River, 3 miles above Bowlers Rock Light, has been improved by dredging. The Federal project provides for a channel 8 feet deep, 150 feet wide, through the bar at the mouth, and 80 feet wide upstream to Totuskey Bridge, a distance of about 4.5 miles. The channel was at project depth in December 1946.

The channel is marked by entrance buoys, a lighted range across the bar, and then by daybeacons, numbered 4 to 41, as far as the bridge. The river channel, however, is narrow in places and difficult to follow without local knowledge. The deepest draft using the creek is 6 feet. At ***Booker Bar,*** just above **North Bend Landing,** a timber and brush dike at the northeast side of the channel is 2 feet above low water.

Totuskey Bridge is fixed, of concrete, with a 24-foot span and a clearance of 10 feet above high water. A good landing is on the eastern bank just below the bridge where there is a depth of 12 feet. Barges load pulp wood at a landing on the opposite shore about 0.2 mile below. A steel crane is here.

Wellford wharf, in ruins with only the remains of the outer corner dolphins showing above low water, is on the northeast side of Rappahannock River 4 miles above Bowlers Rock Light.

Wares Wharf is directly opposite on the south side. It is in poor condition and is no longer used. There are prominent gasoline tanks on shore.

Piscataway Creek, on the southwest side 2.5 miles below Tappahannock, has a depth of 3½ feet across the flats at the entrance and 6 feet inside for a distance of 5 miles; the deepest draft using it is 6 feet. It is crossed by a new fixed bridge 4 miles above the entrance, having a 30-foot span between fenders and a vertical clearance at MHW of 8.4 feet. The piling of the old bridge is 100 yards upstream.

Directly opposite Piscataway Creek is ***Little Carter Creek,*** have a depth of 3½ feet at the entrance and 2 feet for a distance of 3 miles.

Hoskins Creek, just below Tappahannock, has a depth of 2½ feet across the bar at the entrance and deeper water inside for a considerable distance. It has been improved by dredging. The Federal project provides for a channel 8 feet deep from that depth in the Rappahannock River to the highway bridge 0.6 mile above the mouth of the creek, with widths of 100 feet in the river and 60 feet within the creek and a turning basin of the same depth 200 feet wide and 250 feet long at the public landing 0.4 mile above the mouth of the creek. Shoaling has taken place since the last dredging and in December 1946 there was only 2½ feet on the entrance range.

The channel is marked by a buoy at the entrance, a lighted range for entering, and a number of beacons in the creek itself.

The creek is crossed by a fixed bridge 0.6 mile above the entrance with a 34-foot span between fenders and a vertical clearance at MHW of 8.4 feet. A small marine railway capable of hauling a boat about 30 feet long with a 3-foot draft is on the south bank just below the bridge.

Tappahannock is a village on the western side of Rappahannock River 39 miles above the entrance. There is a wharf with conspicuous red buildings on the end and a depth of 9 feet alongside. Just south of this wharf is an oil dock with about 12 feet at

the end. Gasoline, Diesel oil, and motor oils are for sale here in large quantities. Between these docks the water is shallow. Provisions can be obtained in the village. There is no fresh water on either wharf.

A highway swing bridge crosses the river at Tappahannock. It has a horizontal clearance of 100.7 feet and a vertical clearance of 9.9 feet at MHW when closed. The northeast channel span is protected by fenders, and vessels passing through the draw must use this channel. The bridge tender reports that the southwest channel span is obstructed by sunken piling.

There are numerous wharves and landings between Tappahannock and Fredericksburg, some of them being post offices, but no villages except Port Royal. All but a few of the landings are in ruins.

The channel for 2 miles above the Tappahannock bridge is narrow and shallow. It had a controlling depth of 12 feet in November 1946 in the channel through ***Mangoright Bar*** a short distance above buoy 20. This part of the river is buoyed but the depths outside of the channel are shallow.

The white buildings at **Naylors** are prominent and serve as a leading mark when coming down river. The wharf is in ruins. A course of **280°** with the ruined wharf astern will lead to the buoy off **Mulberry Point.** For the next 14 miles the channel is unmarked but not difficult to follow with the aid of the chart. Bush stakes usually mark the outer ends of the fish traps but in some cases these rows of stakes extend well out into the channel and care must be exercised. Snags in the river are always a danger.

Cat Point Creek, on the northeast side 2.5 miles above Tappahannock, has a depth of about 5 feet across the bar at the entrance and deeper water inside for 7 miles. The deepest draft using it is 6 feet. A retractile drawbridge crosses the creek just inside the entrance with a span 31.5 feet wide between fenders and a vertical clearance of 7 feet at MHW when closed. Another retractile drawbridge 6.5 miles above the latter has a span 31 feet wide between fenders and a vertical clearance of 4 feet at MHW when closed. At least four hours' advance notice is required to have the upper bridge opened.

Mount Landing Creek, on the southwest side 2 miles above Tappahannock, has a depth of 1½ feet across the flats at the entrance and deeper water inside for 3.5 miles. There is a fixed bridge across the entrance with a span 30 feet between fenders and a vertical clearance of 9.3 feet at MHW. The creek is used for fishing.

Occupacia Creek, on the western side 7 miles above Tappahannock, has a depth of 2 feet across the bar at the entrance and 4 feet for 5.8 miles above in the main branch. The eastern branch has a depth of 2 feet to a fixed bridge 1.2 miles above its entrance. There are no wharves on either branch. The creeks emptying into Rappahannock River above Occupacia Creek are all shoal and of little interest to navigation.

Carter Wharf (lat. 38°04′, long. 76°55′), on the east bank about 10 miles above Tappahannock Bridge has some conspicuous buildings. The landings are in very poor condition and only the upper one can be used.

Layton wharf, on the west bank 4 miles above Carter Wharf, has two wharves; one, from which lumber and ties are shipped, is in fair condition. The upper wharf is now in ruins.

Leedstown has several landings but all are in poor condition.

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Marsh Point to Fredericksburg

CHART 536

The landings at **Camden** are in good condition.

Port Royal is a village on the southwest side of Rappahannock River 70 miles above the entrance. **Port Conway** is a village opposite Port Royal. In November 1946 the controlling depth to Port Royal was 12 feet and the width 200 feet. A swing drawbridge crosses the river just above the Port Royal wharf, having a horizontal clearance of 100 feet and a vertical clearance of 8.1 feet at MHW when the draw is closed. The northeast channel span is fended and must be used; this is preferable anyway because of the bar extending from the south bank above the bridge.

The wharf at Port Royal is in ruins.

There is a Government bulkhead landing on the south shore just west of **Hazelwood.**

Newton Rock, on the southwest side 2 miles below the wharves of Fredericksburg, is bare at a little below high water. It lies 50 feet from the high-water shoreline and the best water leads 100 feet outside of it.

Fredericksburg, a city at the head of navigation on Rappahannock River, has some trade by water, carried mostly in motor vessels and in barges of 8- to 10-foot draft. Navigation terminates at the wharves at the southern end of the city, though small boats can go about 1 mile farther. Anchorage is limited and vessels usually make fast to the wharves.

In December 1946 the wharf depths were as follows: Sylvania Industrial Corporation at Deep Run, 11 feet; Standard Oil wharf, 11 feet; Gulf Refining Corporation, 12 feet (in poor condition and no longer used); Steamboat wharf, 12 feet; Standard Oil Company, 7 feet. The river pilot reports that during ordinary weather he regularly takes acid barges drawing 11½ feet up the river to the Sylvania plant, but pushes through mud on several of the bars in doing so.

Bridges.—The river is crossed by two fixed bridges just above the wharves; the lower railroad bridge has a span of 90 feet and maximum high water vertical clearance at the arch center of 44.1 feet, and the upper highway bridge has a span of 152 feet and vertical clearance of 50 feet at high water.

Rappahannock River to Smith Point

CHART 1223

The western shore of Chesapeake Bay between Rappahannock River and Smith Point is generally low and has no prominent features. It is indented by numerous creeks and by Great Wicomico River. Many small villages and landings are on the creeks, but there are no large towns. Fish factories are located on most of them, and they are frequented by fish steamers of 8- to 12-foot draft and by many smaller craft engaged in the oystering and fishing industry. Steamers from Baltimore make regular trips to the principal landings in Great Wicomico River and Indian Creek.

The limits of the fish trap areas between Rappahannock Spit lighted bell buoy and Smith Point Light are shown on the chart. The outer limits are marked by a line of black and white horizontal-banded buoys. Inside these buoys fish traps are numerous

in season, but are prohibited along the regular navigable channels and at a greater distance from shore in the tributaries than one-third the width between shores. On account of the fish traps, strangers should not attempt to enter at night.

Tides.—The mean range of tide in all of the tributaries is about 1 foot.

Danger zone.—A naval firing range, which constitutes a danger zone, has been established in Chesapeake Bay to the eastward of the Rappahannock and Great Wicomico Rivers. The area, as shown on the chart, is bounded by lines connecting the following points: Lat. 37°47.′0, long. 75°58.′0; lat. 37°43.′7, long 75°55.′5; lat. 37°27.′0, long. 76°02.′8; lat. 37°27.′0, long. 76°10.′0; lat. 37°47.′0, long. 76°10.′0 and lat. 37°44.′5, long. 76°00.′5.

Day and night firing over the range will be conducted intermittently by one or more vessels, depending on weather and schedules, and when firing is in progress patrol craft will prevent vessels from entering and crossing the defined area until such time as the firing schedule permits. Any vessel propelled by mechanical or sail power at a speed greater than 5 knots may proceed through the area, to and from points beyond, but not from one point to another within the area, without restriction except when especially notified to the contrary.

All vessels, other than Naval craft, are forbidden to anchor within the area defined except in cases of great emergency. All vessels anchoring under circumstances of great emergency within the area shall leave the area immediately after the emergency ceases, or upon notification by proper authority.

Fishing, oystering, clamming, crabbing and other aquatic activities are forbidden within the limits of the area, except that existing fishing structures licensed by the State of Virginia may be maintained and operated provided their owners obtain written permits from the Commandant, Fifth Naval District, Naval Operating Base, Norfolk, Virginia.

San Marcos wreck, marked on the southwest side by a horizontal-banded lighted bell buoy, is in the northern part of the above danger zone 10.4 miles 120° from Great Wicomico River Light.

Fleets Bay to Dameron Marsh

CHART 534

Fleets Bay, just northward of the entrance to Rappahannock River, forms the approach to Little Bay and Tabbs, Dymer, and Indian Creeks.

Little Bay and ***Antipoison Creek,*** emptying into Fleets Bay from southward, have a depth of 8 feet in a narrow channel for 2.5 miles above the entrance. A prominent shoal in Little Bay is marked by a buoy. The creeks are frequented only by small boats. An ice and fish-packing plant and a wharf with 6 feet alongside are on the north side of Antipoison Creek 0.7 mile above **Clarks Point.** On the south shore, opposite, is ***Harpers Creek,*** into which 5 feet can be carried to a small marine railway capable of hauling out and repairing boats of 50 feet length and 4-foot draft. There is a fish factory and wharf, with 10 feet alongside, and a cable crossing just east of Harpers Creek. Many fish stakes are in the creek. The post office is at **Palmer (lat. 37°37′, long. 76°21′).**

Tabbs Creek has a reported controlling depth of 3 feet in the entrance and 7 feet to near the head. It is unmarked and is frequented only by small craft.

Dymer Creek has a natural channel 15 feet deep for 1 mile above the mouth and 8 feet to near the head. It has been improved by dredging a channel 200 feet wide and 15 feet deep through the sand reefs at the entrance to the creek. In November 1946 the controlling depth on the bar at the entrance was 16 feet. The approach channel is marked by buoys and the entrance to the creek by a light on each side.

Steamers drawing 12 feet are the deepest draft entering. A marine railway in ***Poplar Neck Creek*** is capable of hauling out boats of 40 feet length and 4-foot draft, and deck repairs can be made. A wreck, visible at high water, is in the entrance to ***Johnson Creek.*** On the south side of Dymer Creek 1.1 miles above the entrance is the principal landing, a fish factory, the most prominent mark in the vicinity. Gasoline and water are obtainable in limited quantities from the fish factory. The wharf has 14 feet along the north face but the south face is shoal.

Directions, Dymer Creek.—From 3 miles off the entrance steer **236°** to pass 100 yards north of buoy 3; change course to **295°** when the two lights at Dymer Creek entrance are in range and pass about 50 yards south of lighted bell buoy 4. When about 300 yards past the buoy change course to **315°**, heading for the inner entrance light, and pass close to southwestward of the outer light. Then round to northeastward of the inner light and follow a mid-channel course in the creek.

Indian Creek has a depth of 10 feet to **Kilmarnock Landing** and 6 feet to near the head. The principal wharf, with 12 feet alongside, is at Kilmarnock Landing, on the west side 2.5 miles above the entrance, and is at the foot of a road leading to the village of **Kilmarnock**, where there is a post office and a third-class medical relief station. A fish factory in ruins, is at the landing and Diesel oil, gasoline, and provisions are obtainable. Two oil company wharves with 6 feet alongside are at the creek entrance southwest of Kilmarnock Landing. An oyster house and small landing are on the eastern entrance point to ***Bells Creek.***

There are two lights on the north side of the entrance between the shoals and four daybeacons to mark the ends of the shoals for two miles above the entrance. The water tank at Kilmarnock is visible down Indian Creek.

Directions, Indian Creek.—Pass about 100 yards southward of the horizontal-banded lighted bell buoy off the end of the shoal to the eastward of the entrance and steer **255°** until **Cotton Patch Light** is on range with **Old Toms Light.** Then steer **305°**, passing about 50 yards to the southwestward of the lights; when beyond Old Toms Light bring it astern on course **300°**, passing 100 yards southward of daybeacons 2 and 4, and run to mid-channel off ***Longs Creek***; beyond this point a mid-channel course can be followed.

Dividing Creek has its entrance between shoals 7.3 miles 343° from Windmill Point Light. It has a controlling depth of 11 feet for 1.8 miles above **Hughlett Point,** at the entrance, and 6 feet for a farther distance of 0.7 mile. The channel is marked by lights and buoys from the entrance between the shoals up to ***Prentice Creek*** and by bush stakes on the ends of the prominent shoals above that point. The only landing is on the north side of Prentice Creek. It has 12 feet of water alongside, but is in poor condition and is little used.

Directions, Dividing Creek.—A channel clear of fish traps can be navigated with Windmill Point Light astern on course **344°** to a position 0.2 mile east-northeastward of Dividing Creek lighted buoy; then steer **278°**, passing 250 yards north of the lighted buoy to 250 yards south of **Hughlett Point Flats Light**; then **309°** to close to northward of **Jarvis Point Shoal Light** and **329°** to mid-channel between Hughlett Point and the point north of Prentice Creek. Beyond this steer a mid-channel course.

Great Wicomico River

CHART 534

Great Wicomico River, 6 miles southwestward of Smith Point Light, is a good and convenient harbor and is extensively used by small vessels. It is also frequented by fish steamers, oil barges, and schooners and barges carrying wood products and fertilizer. The draft of vessels entering it does not ordinarily exceed 12 feet. It has a depth of 18 feet for 5.8 miles above Great Wicomico River Light, 10 feet for 2.5 miles farther to off ***Blackwell Creek*** and is navigable for small craft for a farther distance of 2.5 miles.

Great Wicomico River Light (lat. 37°48′, long. 76°16′), 0.6 mile southeast of **Fleet Point,** and on the north side of the entrance channel, is shown from a white structure on brown piles. The light is 42 feet above the water and is visible for a distance of 12 miles. An air diaphragm horn fog signal is at the light. A bell is sounded if the horn is disabled.

The principal marks for the entrance are Great Wicomico River Light, Fleet Point Light, and a group of buildings, a church spire and an iron stack at Fleeton, on Fleet Point. The shoals outside the entrance are generally covered by fish stakes, the limits of the fish trap areas being shown on Chart 1223.

The channel is marked by lights and buoys to **Rogue Point,** 4.4 miles above Great Wicomico River Light. The principal landing on the main channel of the river is at **Mila,** where the landing at the oyster house has 8 feet alongside. Gasoline is available near the landing. There is also an oyster house and small landing on the south side of the entrance to ***Penny Creek.*** A brickyard wharf with 8 feet alongside, but in poor condition, is about 0.2 mile east of ***Horn Harbor.***

The river, at **Glebe Point,** is crossed by a highway swing bridge with a horizontal clearance of 101.2 feet and a vertical clearance of 7.5 feet at MHW when closed. The northeast span only is fended and must be used. There are a number of small oyster-house landings on the east side of Glebe Point, gasoline being available at one with 5 feet alongside. A depth of 8 feet is available at another. Landings are located on either side of the north end of the bridge.

Ingram Bay and ***Mill Creek,*** west-southwestward of Great Wicomico River Light, have a depth of 12 feet for a distance of 3 miles above the light and 8 feet for a farther distance of 1 mile. The channel is narrow and unmarked and local knowledge is advisable.

Cranes Creek, just south of **Sandy Point,** has a depth of 2 feet at the entrance and 3 feet inside. It is little used.

Cockrell Creek, marked by **Fleet Point Light,** on the north side just inside the entrance of the river, has numerous fish factories and is the center of a large trade by water. **Fleeton, Fairport,** and **Reedville** are villages on the creek, and there are several other landings. A third-class medical relief station is at Reedville. Marine documents are issued at the custom house in Reedville.

The wharves in Cockrell Creek have from 8 to 16 feet of water alongside. All kinds of supplies are obtainable, and there are two railways, the largest being capable of hauling out boats of 85 feet length, 7-foot draft, and 85 tons. Some ship chandlery can be obtained at Reedville, as well as water, gasoline, Diesel oil, and coal in limited quantities.

The project for improvement of Cockrell Creek provides for a channel 180 feet wide and 18 feet deep extending from the entrance to the deep water south of **Tim Point.** In 1946 the controlling depth on the entrance bar was reported to be 18 feet, thence 14 to 17 feet as far as Reedville.

The other tributaries of Great Wicomico River are used by small local boats but are unmarked and of little interest to general navigation.

Anchorage.—Vessels entering Great Wicomico River for shelter usually anchor off and in the mouth of Cockrell Creek in 15 to 20 feet. Motor boats usually anchor in the creek. Cockrell Creek is also considerably used as a secure harbor from ice.

Ice does not close the river to navigation except in severe winters, and then only for short periods.

Tides.—The mean range of tide is 1 foot at the entrance of Great Wicomico River.

Directions, Great Wicomico River.—Fish traps will usually be found on the shoals near and off the entrance to Great Wicomico River, and strangers entering at night should follow the deepest water and proceed with caution. Caution should also be used in Cockrell Creek at night due to old wharf piling, and wrecks near shore in the vicinity of Reedville.

Entrance between the fish traps can be made on a **287°** course, passing 300 yards north-northeastward of ***Dameron Marsh Shoal*** buoy 3, 350 yards southward of the light and 150 yards southward of Fleet Point buoy. If bound to Reedville, continue beyond the buoy until the end of the wharf above Fleeton bears 033°, when it may be steered for, until abeam of the first wharf on the east side of Cockrell Point; beyond this point a mid-channel course between the wharves will lead in the best water.

If bound above Cockrell Creek, steer **326°** for **Sandy Point Light,** until off **Cockrell Point Light,** then steer **336°,** rounding Sandy Point Light at a distance of 200 yards until north of the light, then steer **298°** for **Haynie Point Light,** round this light at a distance of 100 yards, and steer **331°** to the eastward of **Rogue Point Light.** Beyond this point the chart is the guide.

CHAPTER 10

Chesapeake Bay, Smith Point to Cove Point

CHART 1224

THE western shore of Chesapeake Bay between Smith Point and Cove Point is generally low and wooded and has few prominent landmarks. The most prominent points and the shoals making off from them, along with the few middle ground shoals, are well marked by lights and buoys. The main channel is wide and clear, with a depth of 40 feet or more available, and presents few difficulties to navigation in clear weather.

Potomac River, St. Jerome Creek, and Patuxent River are the only tributaries of importance.

Restricted areas.—The major portion of Chesapeake Bay between Smith Point and Cedar Point is included in a restricted area and two prohibited areas which have been established by Federal Regulation. The limits of the areas are shown on the chart and are, along with the regulations governing them, defined as follows:

(*a*) *Aerial Gunnery Range—Restricted Area.*—The waters of Chesapeake Bay south of the line between Cedar Point, Maryland, and the southern tip of Barren Island; west of a line between the southern tip of Barren Island and Shanks Island, Virginia; north of a line between Shanks Island and Smith Point Light, Virginia; and east of the lines from Smith Point Light to a point 1.5 miles due east of Point Lookout Light, thence due north to Point No Point Light, and thence northwestward to Cedar Point, Maryland. This area is designated a restricted area.

(*b*) *Ground Firing Range and Seaplane Landing Area.—Prohibited Area.*—The waters on the western shore of Chesapeake Bay within an area bounded as follows: A line drawn from Cedar Point, Maryland, in a southeastward direction to a point in latitude 38°16′00″ N., longitude 76°20′15″ W.; thence by a line to a point in latitude 38°13′42″ N., longitude 76°21′42″ W.; thence by a line to a point in latitude 38°15′06″ N., longitude 76°23′36″ W.; and thence by a line drawn due west to the shore line. This area is designated as a prohibited area.

(*c*) *Point No Point Aerial Bombing and Gunnery Target Area.*—The waters on the western shore of Chesapeake Bay east of Point No Point, Maryland, within an area bounded as follows: A line drawn due east from the shore line to a point in latitude 38°08′42″ N., longitude 76°18′42″ W.; thence by a line drawn due south to a point in latitude 38°07′54″ N., longitude 76°18′42″ W., and thence by a line drawn due west to the shore line. This area is designated as a prohibited area.

The Regulations.—1. No vessel, or other craft, with the exception of specifically authorized military and naval vessels, shall enter or remain in the Ground Firing Range and Seaplane Landing Area or the Point No Point Aerial Bombing and Gunnery Target Area. No vessel or other craft, except military and naval vessels engaged in scheduled gunnery and training exercises, shall enter or remain in the Aerial Gunnery Range during its use for firing practice except as provided in paragraphs (5) and (7).

2. Advance notice shall be given of the date on which the first firing practice is conducted, and such notice shall be published in the "Notice to Mariners." The range will be in use throughout the year, and no further notice is contemplated that firing is continuing.

3. Prior to the conduct of firing practice the area will be patrolled by Navy aircraft to insure that no watercraft are within the danger area, and any watercraft in the vicinity will be warned by means of signals that firing practice is to take place. The patrol aircraft will emoloy the method of warning known as "buzzing", which consists of low flight by the airplane and repeated opening and closing of the throttle.

4. Any such watercraft shall, upon being so warned, immediately vacate the area designated and shall remain outside the area until the conclusion of firing practice.

5. Through navigation of commercial craft proceeding on established steamer lanes shall be permitted traverse of the Aerial Gunnery Range at all times. Such vessels shall proceed on their normal course and shall not delay their progress.

6. The area known as the Ground Firing Range and Seaplane Landing Area will be opened to oystermen for oyster dredging operations during each day of the month of January of each year from 1200 to nightfall. No firing will be conducted in this area during this time.

7. Military and naval vessels will conduct gunnery and training exercises in the Aerial Gunnery Range. Where there is apparent conflict between surface craft with attendant planes and planes operating under the control of the Naval Air Test Center, Patuxent River, the Naval Air Test Center, Patuxent River, planes are expected to keep clear.

8. These regulations shall be enforced by the Commandant, Fifth Naval District, and such agencies as he may designate, and the Captain of the Port.

Note.—Only through navigation of commercial craft proceeding on established steamer lanes will be permitted to traverse the restricted areas at all times.

Potomac River

CHARTS 557, 558, 559, 560

Potomac River, on the western side of Chesapeake Bay, 66 miles above the entrance and 84 miles below Baltimore, forms the boundary between the States of Maryland and Virginia, and is the approach to the cities of Alexandria and Washington and many villages and landings. It is navigable by vessels to Washington 95 miles above the entrance and by small vessels for about 3 miles above to Chain Bridge, just below Little Falls. The vessels using the Potomac River are occasional coasting and foreign vessels bound to Alexandria and Washington, the regular steamers from Washington to Norfolk, and a large number of small craft engaged in oystering, fishing, and obtaining gravel from the river bed.

Fish trap area buoys, black and white horizontal-banded, extend up the river as far as Blakiston Island. Fish trap area limits are shown on Charts 557 and 558.

Channels below Washington.—The project for the improvement of the Potomac River provides for a channel 24 feet deep and 200 feet wide between the mouth of the river and Giesboro Point at Washington. The controlling depth in the bar channels below Washington when last ascertained was 23.7 feet.

Anchorage.—Vessels bound up or down the Potomac River anchor anywhere in the channel where the bottom is soft. St. Marys River is the best anchorage for vessels in the lower end, though deep-draft vessels sometimes anchor for the night in Cornfield Harbor. Small craft can find secure anchorage in any of the tributaries near the lower end. There is no anchorage above Alexandria for vessels of any size, except off Georgetown below Key Bridge. Vessels usually go to the wharves. Motor boats anchor in the north end of Washington Channel, westward of the anchorage buoys. No boat shall anchor in any area in the Anacostia River between its mouth and Benning Bridge

that will interfere with the operations of the United States in the river, including dredging, seawall construction and delivery or disposition of materials. Prohibited areas will be marked at the corners by horizontal-banded white and black buoys, or by similarly marked posts on the shore.

Freshets.—Freshets occur at irregular intervals, but as a rule do not interfere with the navigation of the river below Alexandria unless accompanied by floating ice. At Washington, during the highest freshet recorded, the river rose 13.26 feet at the foot of Seventeenth Street, and the deposit in the dredged channels decreased the depth from 20 feet to 14 feet in some places.

Ice.—During severe winters the tributaries of the Potomac are closed by ice, and the river is frozen over to Cedar Point; the upper part of the river is then closed to navigation. During ordinary winters the towboats and steamers plying the river keep a channel open, but sailing vessels would require the assistance of steam when bound to Alexandria or Washington.

Tides.—The mean range of the tide is about 1½ feet in the lower part of the river, 2 feet in the vicinity of Blakiston Island, 1 foot at Maryland Point, 1½ feet at Indian Head, and 3 feet at Washington. Above Washington the river is tidal as far as Chain Bridge. The tides are influenced by the force and direction of the wind and the freshet conditions, and may at times vary considerably. Daily predictions for Washington are given in the *Tide Tables, Atlantic Ocean*, published annually by the Coast and Geodetic Survey.

Currents.—The velocity of the tidal currents in the Potomac River is variable and is influenced by the force and direction of the wind; the set is generally in the direction of the channel. During freshets there is little or no flood current. The *Atlantic Coast Current Tables* gives detailed information for a number of locations.

Directions.—Course and distance tables for the Potomac River are given in Chapter 3.

Danger zones and prohibited areas.—The Potomac River is used extensively by the Army and Navy for operations in connection with the Piney Point Torpedo Testing Range, the United States Naval Proving Ground at Dahlgren, Virginia, the United States Marine Barracks at Quantico, Virginia, and the United States Military Reservation at Fort Belvoir, Virginia.

The following are the areas affected, which together with the regulations governing them, have been established by Federal Regulation:

Lower Potomac River, Prohibited area.—*The Area.*—Beginning at a point in latitude 38°00′51″ N., longitude 76°20′40″ W., which point will be marked by Torpedo Testing Range lighted bell buoy A, northeasterly to Point Lookout Shoal bell buoy 2, thence northerly to Point Lookout Light, thence northerly and westerly along the shores of Cornfield Harbor past Cornfield Point to the mouth of Potter Creek, thence northwesterly to Gray Point buoy 2 GP, thence northwesterly to a point at the mouth of a creek on St. George Island, the position of said point being latitude 38°06′20″ N., longitude 76°28′08″ W., thence southerly, westerly and northerly along the shores of St. George Island to a point in latitude 38°06′37″ N., longitude 76°28′45″ W., thence northwesterly to the southern tip of Piney Point, thence southwesterly to a point in latitude 38°07′08″ N., longitude 76°32′44″ W., which point is located 1,000 yards 303°16′41″ from Torepdo Testing Range lighted bell buoy D, and thence 123°16′41″ to the point of beginning.

Passage No. 1, a passage 60 yards wide within the following points:

(*a*) Latitude 38°02′36″ N., longitude 76°24′04″ W.
(*b*) Latitude 38°05′27″ N., longitude 76°24′21″ W.
(*c*) Latitude 38°05′32″ N., longitude 76°24′43″ W.
(*d*) Latitude 38°02′50″ N., longitude 76°24′30″ W.

Passage No. 2, a passage 800 yards wide within the following points:

(*a*) Latitude 38°03′08″ N., longitude 76°25′04″ W.

(*b*) Latitude 38°05′48″ N., longitude 76°25′56″ W.

(*c*) Latitude 38°05′56″ N., longitude 76°26′30″ W.

(*d*) Latitude 38°03′28″ N., longitude 76°25′42″ W.

Passage No. 3: A line drawn 221° 700 yards from a point beginning at Piney Point (38°08′01″ N., 76°31′45″ W.), thence 090° for a distance of 1,250 yards, thence 301° to a point of beginning.

The Regulations.—(1) The presence of any vessel in the above-described area is prohibited unless prior permission has been granted by the enforcing officer, except that Passages No. 1, No. 2, and No. 3 may be used to traverse such area when firing is not in progress.

(2) Vessels shall keep under way at all times while operating in Passages No. 1, No. 2, and No. 3.

(3) These regulations shall be enforced by the U. S. Coast Guard Captain of the Port and the Commanding Officer, Piney Point Torpedo Testing Range, Piney Point, Md.

Potomac River, Piney Point to Point Lookout, Danger area.—*The Area.*—The torpedo testing range, which constitutes a danger zone, is defined as follows: Bounded on the north by a line from Piney Point Light to buoy 19DW, thence southward to buoy 19W, thence southeastward to Potomac River lighted buoy 5A, thence southeastward along a line through buoy 18AW to buoy 18W, thence southeastward along a line through buoys 17W, 16AW to buoy 16W, thence northward to Point Lookout Shoal bell buoy 2, thence southwestward to Torpedo Testing Range lighted bell buoy A, thence northwestward along a line through Torpedo Testing Range lighted bell buoys B, C and D to a point in latitude 38°07′08″ N., longitude 76°32′44″ W., which point is located 1,000 yards 303°16′41″ from Torpedo Testing Range lighted bell buoy D and thence northeastward to Piney Point Light, the point of beginning.

The Regulations.—(1) Between the hours of 7:00 a. m. and 4:00 p. m. on all days except Sundays and legal holidays, and at other times and on other days when the range is being operated, no vessel shall enter into or pass through the area above defined and established if specifically forbidden to do so by the officer in charge of the Piney Point Torpedo Range or his duly accredited representative. Passage of traffic in this area will not be unreasonably interfered with or restricted.

(2) Between the hours of 7:00 a. m. and 4:00 p. m. on all days except Sundays and legal holidays, and at other times and on other days when the range is being operated, all vessels are forbidden to anchor within the area defined except in cases of great emergency. Any vessel anchoring under circumstances of great emergency shall move away as soon as the emergency permits.

(3) Any vessel upon being notified by proper authority to shift its position or course must change position or course as directed with reasonable promptness.

(4) During periods when the range is in operation any vessel in danger or any vessels interfering with operations will be met by representatives of the officer in charge, suitably warned and given necessary instructions and orders relative to navigating the zone. The torpedo testing barge will fly "International B" at a yard arm when testing operations are in progress. Government vessels, seaplanes or other craft patrolling the zone will fly or expose a red flag.

(5) Vessels in passage up or down the Potomac River in the danger area shall keep to the south part of the channel in so far as practicable.

(6) The speed of vessels passing within 1,000 yards of the torpedo testing barge during testing operations shall not be in excess of ten knots.

(7) Nothing in these rules shall prevent the setting of fish traps within the area, under permits granted by the War Department, nor shall the passage of fishing vessels to and from authorized traps be unreasonably interfered with or restricted.

(8) These regulations shall be enforced by the U. S. Coast Guard Captain of the Port and the Commanding Officer, Piney Point Torpedo Testing Range, Piney Point, Md.

Newtown Neck, Restricted area.—*The Area.*—The water area enclosed between the following lines and the shoreline of Newtown Neck, St. Marys County, Md. A line from Howards Wharf (38°16′15″ N., 76°42′30″ W.) to Long Point in St. Clement Bay, thence to Newtown Neck buoy 2, thence to Heron Island Shoals buoy, thence to Huggins Point Light, thence to Breton Bay buoy 2A, and thence across the westerly end of Breton Bay to the western shore of the entrance to Combs Creek.

The Regulations.—(1) No vessel or craft shall enter or remain in the area above designated, or any part thereof, when notified to keep clear by an enforcing authority, nor shall any vessel or craft approach at any time within 500 yards of the northwest shoreline of Newtown Neck extending from Long Point, nor the west, south, and east shorelines of Newtown Neck extending from Long Point.

(2) These regulations shall be enforced by the Commandant, Potomac River Naval Command, and by the Commanding Officer, Coast Guard Forces, Potomac River Naval Command, or their authorized representatives.

Potomac River, United States Naval Proving Ground, Dahlgren, Va., Danger zones.—*The Zones.*—The firing range of the United States Naval Proving Ground at Dahlgren, Virginia involves that portion of the Potomac River below the Maryland-Virginia bridge on U. S. Highway 301 as described herein. This range constitutes a danger area composed of two zones to be known as the Upper and Lower Dange Zones.

(1) The Upper Danger Zone in which firing is normally conducted daily except Sunday, is defined as follows: Beginning at tne intersection of the new Potomac River Bridge with the Virginia shore; thence to Lower Cedar Point Light House; thence to white spar buoy 1–A about 2,300 yards east-southeast of Lower Cedar Point Beacon; thence to a line of white spar buoys known as line of fire buoys, No. 1 buoy, 1,500 yards southwest by west of Swan Point, No. 2 buoy, 1,700 yards south of Potomac View, No. 3 buoy, about 1,300 yards south by west of lower end of Cobb Island; thence on a line to buoy No. 4–A breast of Blakiston Island abandoned lighthouse; thence southwesterly to Hollis Marsh along a line of white spar buoys off the Virginia shore as follows: White spar buoy D, about 3,000 yards off Popes Creek; thence to white spar buoy C, 3,500 yards off Church Point; thence to white spar buoy B, 800 yards off Colonial Beach; thence to white spar A, 1,000 yards off Bluff Point; thence on a line to the seaplane hangar at the Proving Ground.

(2) The Lower Danger Zone in which long range firing is normally conducted at infrequent intervals embraces the Naval Torpedo Range at Piney Point, Maryland, and subject to special additional restrictions in the vicinity of that activity, is defined as the entire portion of the lower Potomac River between a line from buoy 4–A off Blakiston Island on a line to Hollis Marsh and a line from Point Lookout, Maryland, to Smith Point, Virginia.

The Regulations.—(1) Firing normally takes place between the hours of 8:00 a. m. and 4:00 p. m. on all days except Saturday and Sunday. During the national emergency, firing will take place between the hours of 7:30 a. m. and 5:00 p. m. daily except Sunday with frequent night firing.

(2) When firing is in progress, no fishing or oystering vessels will be permitted to operate within the danger zone affected, unless so authorized by the Naval Proving Ground's patrol boats. Oystering and fishing boats or other craft may cross the river in the danger zone only after they have reported to the patrol boats and received instructions as to when and where to cross. Deep draft vessels using dredged channels and propelled by mechanical power at a speed greater than five miles per hour, may proceed directly through the danger zones without restriction except when especially notified to the contrary.

(3) These regulations shall be enforced by the Captain of the Port and the Inspector of Ordnance in Charge at the United States Naval Proving Ground through such officers, enlisted men and employees of that station as may be designated, including always the Commanding Officers of the range patrol, using all such Government vessels, planes and other suitable equipment as mav be necessary. These agencies shall fly or expose a square red flag in clearing a danger zone.

Potomac River, United States Marine Barracks, Quantico, Va., Firing range.—*The Danger Zone.*—The firing range, which constitutes a danger zone, involves the entire portion of the Potomac River between a line running due east from Shipping Point, Va., and a line running from Marlboro Point, Va., to Maryland Point, Md.

The Regulations.—1. Firing over this range will normally take place between the hours of 9:00 a. m. and 4:00 p. m. on all days except Saturdays, Sundays, or legal holidays.

2. No phosphorous or other poisonous chemicals injurious to wild fowl, fish or other sea food, shall be discharged into the waters of the range area.

3. Any vessel propelled by mechanical power at a speed greater than 5 miles per hour may proceed directly through the danger zones without restrictions, except when especially notified to the contrary.

4. When firing is in progress all vessels in or near the danger zone will be duly met by representatives of the Commanding General, Marine Barracks, Quantico, Virginia, suitably warned, and given the necessary instructions and orders to insure safety.

5. During the period October 15 to June 15 the range area will not be fired into.

6. These regulations shall be enforced by the Commanding General through such officers, enlisted men, and employees at the U. S. Marine Barracks as may be designated, including always the commanding officer of the range patrol, using all such agencies as Government vessels, seaplanes, and other suitable equipment as may be necessary. These agencies will fly or expose a square red flag in clearing a danger zone.

Accotink Bay, United States Military Reservation, Fort Belvoir, Va., Danger area.—

(a) The target ranges, which constitute a danger area, involve: All of Accotink Bay, the mouth of which the Post Commander shall have marked by a line of suitable buoys warning of the danger area; all of Accotink Creek south of a bridge which crosses Accotink Creek approximately 400 yards

due south of U. S. Highway No. 1; and that portion of the waters of Pohick Bay bordering its north shore, which the Post Commander shall have marked off by suitable buoys warning of the danger area.

(b) When firing affecting the above area is in progress, it shall be the responsibility of the Post Commander to post guards at such locations that the waters in the danger area may be observed and to arrange signals whereby these guards may stop the firing should any person be seen in the waters of the danger area. When firing is in progress, the Post Commander shall cause to be displayed both on the east shore of Accotink Bay at its mouth and near the danger area boundary on Accotink Creek, a red streamer which shall be visible to a person in a boat near those points.

(c) The Post Commander is hereby authorized to use such agencies and equipment necessary to stop all boats at the boundary of the danger area and prohibit their crossing that area until convenient to the firing schedule to do so.

(d) Persons desiring to cross the waters in the danger area shall first determine whether a red streamer is displayed on the east shore of Accotink Bay at its mouth or near the danger area boundary on Accotink Creek. If the red streamer is displayed, it will indicate that firing is in progress and that the waters in the danger area are covered by rifle fire and that the area shall not be entered until the streamer is lowered.

Smith Point to Piney Point

CHART 557

The entrance to the Potomac River is between Smith Point on the south and Point Lookout on the north and is a wide, unobstructed channel suitable for the deepest-draft vessels.

The fish trap areas in the lower Potomac are marked by black and white horizontal-banded buoys and are shown on the chart. Much of the river is included in the restricted and prohibited areas already described.

Smith Point, on the south side of the entrance to the Potomac River, is low and inconspicuous. A shoal area extends to the eastward of the point, there being depths of as little as 11 feet 2 miles offshore. A buoy marks the northeast edge of the shoal.

Smith Point Shoal, about 2.5 miles southeastward of Smith Point, has a least depth of 18 feet and is marked on the east end by **Smith Point Light (lat. 37°53′, long. 76°11′).** The light, shown from a white tower and dwelling on a brown pier, is 52 feet above the water and visible for a distance of 13 miles. A red sector of the light covers the shoal off the point. An air-diaphone fog signal is at the light, along with a radiobeacon synchronized for distance finding. A bell is sounded if the diaphone is disabled.

Two unmarked, detached shoal spots, 2.5 and 3.2 miles eastward of Smith Point Light, have depths of 28 feet and 28 to 30 feet, respectively.

Little Wicomico River enters the south side of the Potomac River at Smith Point. The entrance channel is marked by three lights.

The project for improvement of the river provides for a channel 8 feet deep, 150 feet wide and 4,800 feet long extending from deep water in the Potomac River to deep water in the Little Wicomico River and for two stone jetties extending to the 8-foot contour in the Potomac River.

The project has been completed but since completion shoaling has occurred. In November 1946 it was reported that the controlling depth between the jetties was 3 feet. The general depths in the river inside are said to range from 6 to 15 feet, but only 3 feet can be taken to the upper reach. There is little traffic to and from the river

except for local fishermen. Shipments are made by way of the Great Wicomico River.

Sunnybank is a village with a post office on the south side of the river, 1 mile above the entrance. Gasoline, ice, and supplies can be obtained. A vehicular ferry crosses the river at Sunnybank. There is a marine railway 3.5 miles above the entrance, capable of hauling vessels 45 feet in length with 4 feet draft. Repairs are made.

Hack Creek, Cubitt Creek, Hull Creek, Presley Creek, and ***Cod Creek,*** on the south side of Potomac River between Little Wicomico and Coan Rivers, are not used. The entrances are often dry at low water.

Three wrecks, one sunken and two showing above water, lie 0.3 to 0.5 mile offshore between Little Wicomico River and Cubitt Creek. The one north of Cubitt Creek is marked by a buoy.

Coan River is on the south side of Potomac River, 14 miles above Smith Point Light and 7 miles southwestward from Point Lookout Light. Steamers from Baltimore drawing 9 feet at one time made regular trips to the landings but the service has been discontinued and the landings are mostly in very poor condition. In 1946 the only traffic in the river was local fishing and oyster boats.

The entrance is marked by a light and buoys, and is easy of access. Above the entrance, pile daybeacons, with slatted day marks, or bush stakes are maintained in a depth of about 6 feet on the principal shoals as far as the landings, but some difficulty may be experienced in taking a greater draft than 8 feet to Coan and Bundick.

The project for improvement of the river provides for a channel 14 feet deep and 150 feet wide, suitably widened at the bend, from the mouth to **Cowart,** with a turning basin at the latter point 14 feet deep. The controlling depth in this channel is about 11 feet.

The mean range of tide at the river entrance is about 1½ feet.

The landings are **Lewisetta, Walnut Point, Lake, Coan** and **Bundick.** Lewisetta has a post office, a small cannery, and a store where gasoline, ice, and some supplies can be obtained. The landing has a depth of 4 feet alongside. Oyster shells are shipped in barges. A post office is at Lake but the landing is in poor condition. The wharf at Bundick has a depth of 9 feet alongside. Gasoline and some supplies are obtainable at the store near the landing. Coan wharf is in poor condition with a depth of 6 feet alongside. An overhead power cable crosses the river at Bundick.

The bight on the south side of Walnut Point is used as an anchorage. The Walnut Point wharf is in ruins. A cannery is here.

A machine shop on the south side of **Honest Point** has equipment for making minor repairs to launches.

Kingscote Creek, the northern branch on the west side of Coan River, is navigable for vessels of 8 feet draft for a distance of 0.8 mile above the wharf at Lewisetta. Shoals extend halfway across the entrance from the west side northward of Cowart wharf and the channel is further narrowed by a shoal extending southwestward from the next point above Lewisetta wharf. Above these shoals the mid-channel is clear.

The Glebe, the principal tributary on the west side of Coan River, is navigable for vessels of 9 feet draft for a distance of 1.5 miles above Cowart wharf; the mid-channel is clear, except for a shoal which extends well off from the point on the south side 0.6 mile above Cowart. The south arm at the head of The Glebe has a channel depth of 8 feet for a distance of 0.5 mile above the entrance.

Directions, Coan River.—A channel 500 yards wide is kept clear of fish stakes in the approach to Coan River; passing 0.6 mile southeastward of Coan River lighted bell buoy, the centerline of this channel trends 229° to a position 250 yards northwest-

ward of Coan River buoy 1. Pass 100 yards westward of Coan River buoy 1, steer **169°** and pass eastward and southward of **Travis Point Light (lat. 38°00′, long. 76°27′)**, rounding it at a distance of 200 to 300 feet. Then steer **271°** toward Cowart.

Judith Sound, just northward of the entrance to Coan River, is shallow, and motor boats bound northward from Coan River must go outside of **Hog Island.**

Yeocomico River is on the southwest side of Potomac River, 18 miles above Smith Point Light and 9 miles west of Point Lookout Light. It has a depth of 14 feet in the entrance and 9 feet to Lodge landing on ***South Yeocomico River*** and to Kinsale on ***West Yeocomico River.*** **Lynch Point Light,** on the north side, is the principal guide to the entrance. **Barn Point Light** and a red buoy mark the entrance to West and South Yeocomico Rivers. Bush stakes usually mark the edge of shoal water in the channels.

The mean range of tide is about 1½ feet.

The landings in Yeocomico River are **Kinsale, Mundy Point, Harryhogan Point,** and **Lodge,** the latter partly in ruins. Each landing has a post office. Kinsale is the principal village, and ice, Diesel oil, gasoline, and provisions are obtainable there. The cannery landing has a depth of 6 feet; the bulkhead wharf just southward has 10 feet alongside.

Fresh water can be obtained from a pipe on the cannery wharf at Mundy Point. The depth alongside is 6 feet. Several small landings on the south side of the point have a depth of 9 feet at the outer end. Gasoline and some supplies are available at the store.

Two marine railways are on Harryhogan Point, south of ***Mill Creek,*** the larger capable of hauling a boat 100 feet long and 7-foot draft. All small boat repairs can be made. The northern landing at the cannery has a depth of 9 feet alongside, the southern 5 feet. The landing at the lumber mill about 0.2 mile southwestward has 7 feet of water alongside. Small vessels from Baltimore load lumber here.

White Point Creek, the northwestern branch of Yeocomico River, has a depth of 9 feet for 1 mile above the entrance. **White Point** is a landing on its southwest side. The landing is in poor condition.

To enter White Point Creek, bring Barn Point Light astern and head for White Point, course **308°**. When off White Point, follow a mid-channel course. The entrance to ***Shannon Branch*** is clear except for a shoal which extends northeastward to mid-river from the point on the west side of the entrance.

Directions, Yeocomico River.—From a point 2 miles 068° from Lynch Point Light, steer to a position 325 yards southward of the light, and then **261°** to a position 300 yards north of Barn Point Light. Pass 200 yards northward and westward of Barn Point Light, steer southward for the buoy westward of **Barn Point,** and pass eastward of it.

Directions, West Yeocomico River.—Pass close southward of the buoy off Barn Point and steer about **272°** passing midway between the points. A depth of 9 feet can be taken to Kinsale, or anchorage can be had in a depth of 10 feet in the mouth of ***Hampton Hall Branch*** just below the wharf.

Bridges.—A retractile drawbridge, crossing ***Kinsale Branch*** just above Kinsale, has a span of 29 feet between fenders and a vertical clearance of 8.8 feet at MHW when closed. The western channel through the bridge must be used as the eastern span is obstructed. A fixed bridge near the head of Hampton Hall Branch has a horizontal clearance of 20 feet and vertical clearance of 3.5 feet at MHW.

Directions, South Yeocomico River.—With the buoy off Barn Point astern steer

183° toward Harryhogan Point, and when up to the point on the north side of Mill Creek, follow a mid-channel course to Lodge landing (in ruins), giving the points a good berth. There is a depth of 3 feet for 0.8 mile above the landing.

Point Lookout, on the north side of the entrance to the Potomac River, is low but is well marked by **Point Lookout Light,** a black water tank and a hotel. The light, shown from a white dwelling, is 41 feet above the water and visible for a distance of 12 miles. The fog signal at the light is an air-diaphragm horn; a bell is sounded if the horn is disabled. A shoal extends about 1 mile south of Point Lookout, the southern extremity being marked by a bell buoy.

Cornfield Harbor just inside of Point Lookout, is sheltered from northerly and northeasterly winds and vessels bound up and down the bay frequently use it as an anchorage for the night. The shoaling is gradual and soundings are a good guide except off **Cornfield Point,** and at the south end of the shoal extending southward from Point Lookout, where it is abrupt and the bottom is hard sand. An 18-foot spot is about 0.6 mile southwestward from Point Lookout, and a 10-foot spot, marked by a buoy, lies between it and the shore. A wharf just west of the light extends 330 feet out from shore and has a depth of 12 feet at its end. **Point Lookout post office** is a short distance inland from the small ruined landing in Cornfield Harbor.

Point Lookout Creek has a depth of about 2 feet in its entrance.

The small creeks between Cornfield Point and Smith Creek are shoal and little used; most of them cannot be entered at low water.

Smith Creek, on the north side of the Potomac River, 5.5 miles northwestward of Point Lookout, is used by many small fishing and pleasure boats. The project for improvement of the creek provides for a channel across the bar at the entrance 12 feet deep and 150 feet wide. In August 1946 there was a depth of 12 feet across the bar and 17 feet inside to the junction of the northern and eastern branches. Both branches have a depth of 12 feet for 0.7 mile and 8 feet to near their heads. **Potomac View wharf (Wynne** post office), on the eastern shore near the entrance, is in ruins. A depth of 5 feet is at the fish wharf, where gasoline, provisions, ice, and water can be obtained A small marine railway at ***Fox Harbor,*** 1.5 miles northeastward of the entrance, is capable of hauling out boats 45 feet in length with a draft of 5 feet. It is now little used.

Directions, Smith Creek.—The channel is narrow and difficult at the entrance, but is well marked. To keep clear of fish traps enter on course **356°**, with the middle of the creek ahead, to 300 yards west of Gray Point buoy 2 GP. Then steer **020°** to 80 yards east of Kitts Point Shoal buoy 1; pass the same distance east of **Kitts Point Light** and round it, passing midway between it and buoy 2. Steer **296°** to 100 yards west of **Smith Creek Light (lat. 38°06′, long. 76°24′)**, then **354°** to a position 150 yards west of Potomac View wharf, and then head for it. The chart is the best guide to Fox Harbor.

St. Marys River, on the north side of Potomac River, 6 miles northwestward of Point Lookout, has a depth of 24 feet or more to Priests Point, 21 feet to **St. Marys City** and 8 feet to **Tippity Wichity (Lynch) Island,** distant 3.5, 6, and 8.5 miles, respectively, above the entrance. The river is 2 miles wide at the entrance and has a channel width of 0.5 to 0.9 mile up to Priests Point, forming a secure harbor. It is the principal anchorage in the mouth of Potomac River for vessels seeking shelter in heavy gales. Very little traffic, except local fishing boats, is in the river. The mean range of tides is about 1½ feet.

A shoal extends 1.2 miles southeastward from St. George Island and is marked by a lighted horizontal-banded buoy, which is the principal guide to the entrance. A lighted

buoy with horizontal bands 0.5 mile south-southeastward of **Cherryfield Point,** marks the point of a shoal and has depths of 12 to 17 feet 0.5 mile southeastward of it.

Priests Point is marked by a large white building and water tank, and a light 300 yards off the point. Two landings are on the nothern side of the point. The western one is small with a depth of 5 feet at the end. The eastern landing is used for handling freight and has a small fixed crane on the end. In August 1946 there was a depth of 6 feet at the end of the landing.

Windmill Point is a low yellow bluff, with a cluster of trees at the end. A buoy is moored 250 yards off the point. The landing on **Portobello Point,** 1 mile northward, is in ruins.

St. Marys City, a village on **Church Point,** was the original capital of Maryland. Few traces of the original town remain, but the statehouse was reconstructed in 1934 from the ruins of several other buildings nearby. A low church spire visible above the trees, an elevated tank, and a monument on the end of the point are prominent. The westerly of the two landings, **Broomes Wharf,** on the south side of the point, is in poor condition; the easterly has a depth of 9 feet at the end and is occasionally used by freight boats.

Grason Landing, on the south side of ***St. Inigoes Creek,*** 1 mile above its mouth, is in ruins.

Directions, St. Marys River (clear of fish traps).—Approach the entrance on course **346°** passing 0.6 mile east of the St. George Island Bar lighted buoy to 0.8 mile northeast by east of Cherryfield Point Shoal lighted buoy, then steer **355°**, with Windmill Point ahead, to 400 yards west of **Priests Point Light.** From this point a mid-channel course leads up the river in good depth of water.

St. George Island is a long, low, sparsely wooded island on the west side of the entrance to St. Marys River and the southwest side of St. George Creek. It is thickly settled, mostly by oystermen and fishermen, and is also used to a considerable extent as a summer resort. Adams and Hobbs wharves are in ruins.

St. George Creek has a narrow, crooked channel with a depth of 10 feet for 4 miles. Shoals make out from many of the points. It is frequented by oystering and fishing boats during the entire year, and by many pleasure craft during the summer; 3 to 5 feet is the usual draft of boats frequenting it, though vessels of 8 to 10 feet draft go to the Navy pier. The channel is well marked by lights and, with the aid of the chart, a stranger should have no difficulty.

St. George Creek can be entered with a depth of 7 feet at low water through ***The Straits,*** at the northwest end of St. George Island. The channel is marked by a number of beacons as well as by a light at either end. The fixed bridge crossing The Straits has a horizontal clearance of 32 feet and a vertical clearance of 15 feet at MHW. The centerline of the bridge is marked by lights of low intensity.

Piney Point, a village with a post office, is on the southwest side of St. George Creek just above The Straits. **Swann wharf** with 5 feet alongside is located there. Gasoline and supplies can be obtained.

Piney Point is marked by **Piney Point Light (lat. 38°08′, long. 76°32′),** shown from a white tower. The light is 34 feet above the water and visible 11 miles. A horn fog signal is at the light. The lighthouse wharf and the small private landings on the south shore have a depth of 5 feet at their ends. The point should be given a berth of 300 yards to avoid a shoal, bare at low water, extending southward from it, and to avoid fish stakes just eastward of the point.

Piney Point to Lower Cedar Point

CHART 558

Ragged Point, on the southwest side of the Potomac River, 15 miles above Point Lookout, has shoals extending off it in all directions, the northeast edge of the shoals being marked by **Ragged Point Light,** shown from a white house on brown piles. The light is 44 feet above the water, visible 12 miles and has a bell fog signal. Deep-draft vessels should give the light a berth of 0.3 mile or more.

A cable crosses the Potomac River from Ragged Point Light to Piney Point Light. Vessels are cautioned not to anchor in the cable area.

Lower Machodoc Creek, 2.5 miles westward of Ragged Point Light, has a depth of 12 feet for 1.5 miles, 9½ feet in a dredged channel through the narrows 2 miles above the entrance, and 6 feet above to near the head of navigation.

The entrance is narrow and obstructed by shoals extending from either side and is marked by a light and buoys. A light and buoy also mark the narrows. Bush stakes are usually on all shoal spits. Cables cross the river from **Barnes Point** to a point south of **Cabin Point.**

Supplies and gasoline can be obtained at **Coles Point, Tidwells,** and **Meter,** and water from nearby artesian wells. The wharves at Coles Point have a depth of 6 feet at the end and are located in the bight southeast of the entrance. A small marine railway is in the creek between these two wharves but it can only be reached at high water by boats drawing 3 feet or less. Minor engine repairs as well as hull repairs can be made.

The Tidwells and **Parham Point** wharves are in ruins. Meter wharf, with 5 feet, is in the bight east of the narrows.

Directions, Lower Machodoc Creek.—Approach the creek on course **180°** with **Barnes Point Shoal Light** ahead, then round it to the westward at a distance of 150 yards, pass midway between the buoys southeastward of it, and follow a mid-channel course to **Plumb Point Light.** Pass close eastward of the light and the buoy south of it, favor the western shore of the narrows, and then follow a mid-channel course to the head of navigation, except at **Kirk Point,** which should be passed close-to.

Nomini Bay, on the south side of Potomac River, 22 miles above the entrance and 3.5 miles 165° from Blakiston Island, has depths of 15 to 19 feet and forms the approach to Nomini Creek and Currioman Bay. The shoaling is abrupt on the east side and gradual on the west side.

Nomini Creek has been improved by dredging a channel from the head of Nomini Bay to **Hickory Point,** 1 mile above, and by the construction of a jetty on the east side at the entrance. The project provides for a channel 9 feet deep and 150 feet wide through the bar at the mouth of the creek and 100 feet wide within the creek to Deep Point wharf with a turning basin of the same depth and about 300 feet square at Deep Point wharf and McGuires wharf. In August 1946 the controlling depth in the entrance channel was 10½ feet, and thence 7 feet to the Nomini bridge. Lights and buoys mark the entrance channel. From thence there is reported to be a natural depth of 6 feet to a bridge at **Prospect Hill,** 1.8 miles above Nomini, and 3 feet for a farther distance of 0.5 mile.

The landings are **Beales, McGuires** (post office), and **Mount Holly,** on the southeast side, and **Jenkins, Deep Point,** and **Nomini** on the west side. Gasoline, ice, and provisions are obtainable at Beales, McGuires, and Nomini landings. The first has a depth of 7½ feet at the end, the second 8 feet, and the third 7 feet. A bulkhead landing is at

Nomini just above the bridge, at which there is a depth of 8 feet. The Deep Point and Mount Holly landings are in ruins.

A highway swing drawbridge, with west span 39.3 feet wide between fenders and with a vertical clearance of 5.7 feet at MHW when closed, crosses the creek at Nomini. The east span should not be used. The fixed highway bridge at Prospect Hill has a span of 15 feet and a vertical clearance at MHW of 5 feet.

In ***Matthews Cove,*** opposite **White Oak Point,** is a marine railway capable of hauling out vessels 50 feet in length with 4 feet draft. It is now little used. North of **Icehouse Point Light** 2 feet can be carried into ***Buckner Creek*** at the entrance and 5 or 6 feet inside to about the head. Bush stakes are usually in both creeks. The mean range of tide is about 2 feet.

Directions.—The dredged channel into Nomini Creek is marked by buoys, lights, and bush stakes. To enter give the shores of Nomini Bay a berth of 0.5 mile and head for the outer end of the jetty. Pass 100 yards westward of it, and steer **152°** in the dredged channel, following the buoys, and passing 100 feet westward of **White Point Light** and 250 feet westward of Icehouse Point Light. Bring the latter light astern on a **171°** course, follow the dredged channel, and pass eastward of the buoy at its south end and intermediate private aids. From this point to Nomini the mid-channel is clear. Shoals make off from many of the points, and they should be given a good berth.

Currioman Bay, emptying into Nomini Bay from westward, has a depth of 8 feet at its eastern entrance and 7 to 10 feet anywhere in mid-channel to near the head. It is separated from the river by **Hollis Marsh,** a narrow, marshy spit, wooded in the center, and awash near its western end. The end of the shoal extending southeastward from **Elbow Point** is marked by buoys, and usually by a bush stake. A small landing used by local fishermen is at the east side of the entrance to ***Poor Jack Creek.*** A wreck is awash at low tide in 5 feet of water about 150 yards northeast of Poor Jack Creek entrance and 100 yards offshore. About 2 feet can be carried into Poor Jack, ***Currioman*** and ***Cold Harbor Creeks.***

To enter Currioman Bay, pass 200 yards westward of the north end of the jetty at the head of Nomini Bay, steer **205°** for 400 yards and then **270°** for the same distance, passing southward of the buoys and bush stake marking the end of the shoal. When past the second buoy steer northwestward into the bay, favoring slightly the northeast side at the entrance, and then keep in mid-channel.

Piney Point, Blake, Poplar Hill, and ***Flood Creeks*** between Piney Point and Breton Bay are shoal and unimportant; 1 or 2 feet can be taken into most of them at low water, but they are little used. Piney Point Creek was improved by a dredged channel but by August 1946 had so filled in that the controlling depth was about 6 inches. A cluster of piles are the remains of the beacon which formerly marked the channel entrance. The entrance channel to ***Herring Creek*** is subject to change during storms; a draft of 2 feet can be carried through. Inside the depths are from 4 to 14 feet but local knowledge is needed. The current through the entrance at strength of ebb is strong.

Breton Bay is on the north side of Potomac River, 2 miles eastward of Blakiston Island, and is a favorite anchoring ground for yachts. There is a depth of 13 feet or more for 3.8 miles above the entrance to above **Lovers Point Light (lat. 38°16′, long. 76°39′).** The channel for this distance is marked by buoys and is easily followed, but care is required to follow the best water above this point to Leonardtown.

Restricted area.—The entrance to Breton Bay is included in a restricted area

established by Federal Regulation. The area is shown on the chart and given, along with the regulations governing it, on page 234.

Leonardtown is reached through a dredged channel 200 feet wide and there is a turning basin 10 feet deep, 400 feet wide and 600 feet long off the wharf. The controlling depth in the dredged channel was 7 feet in August 1946. The town wharf and oil landing each have a depth of 8 feet at the face. A post office is in the town and gasoline, ice, and provisions are obtainable. No fresh water is piped to the landings.

The small landing on the east side of **Lovers Point** has a depth of 8 feet alongside.

Combs Creek is on the north side of Breton Bay, 2 miles above the entrance. A channel with a depth of about 6 feet leads into the creek to the landing at **Ewells (Compton** post office). The entrance is narrow between shoal spits marked by stakes. Three marine railways are near the entrance to the creek, the largest capable of hauling out a boat 60 feet long and 7-foot draft. The landing just inside the mouth of the creek has a depth of 5 feet alongside. Gasoline is obtainable here.

A channel with a controlling depth of 6 feet, and marked by private pile beacons, leads into the bight just southwestward of the entrance to Combs Creek. A small boatyard and marine railway are here; vessels 70 feet in length with 7 feet draft can be hauled. . Gasoline is obtainable at the landing.

A shoal with little depth extends 0.7 mile southwestward from **Huggins Point,** on the east side at the entrance to Breton Bay, and is marked near the outer end by a light. The mean range of tide in Breton Bay is about 2 feet.

Directions, Breton Bay.—Keep clear of the shoal off **Heron Island,** passing eastward of the horizontal-banded buoy; then, with this buoy astern, steer **014°** until buoy 4 is on range with Lovers Point, then change course to **062°** keeping 100 yards north of the range until east of the buoy, then bring the buoy astern on the same course. When Lovers Point Light bears 027°, steer **018°** to abeam of the light, round it at a distance of 125 yards to course **125°** and when Lovers Point is abeam continue up the bay on a mid-channel course entering the dredged channel on course **037°** and heading 75 yards to the eastward of **Buzzard Point Light.** Round the light at a distance of 100 yards and steer **305°** for the wharves at Leonardtown.

St. Clement Bay is on the north side of Potomac River, north-northeastward of Blakiston Island. The bay has three entrances. The eastern or main entrance, between Heron Island Shoal and **Newtown Neck,** is 0.5 mile wide with a depth of 18 feet, and is easily followed by day; the middle entrance, between Heron Island Shoal and Blakiston Island, is narrow and crooked, is marked by a light and buoys, and is easily followed in the daytime; the western entrance, called ***Dukeharts Channel,*** requires some local knowledge. The eastern or main entrance is part of a **restricted area** which also covers a portion of St. Clement Bay. For further details and regulations, see page 234.

The mean range of tide in St. Clement Bay is about 2 feet.

Colton Point pier has a depth of 5 feet at the end. Gasoline is obtainable here.

St. Patrick Creek is bush-staked along the south side of the channel at the entrance. It is much frequented by fishermen and oystermen. **Palmers** is a village with a post office on the south side. Some supplies and gasoline are available. The landing has a depth of 5 feet. About 0.5 mile above is a marine railway capable of hauling out boats 40 feet long with 3 feet draft; another railway of similar dimensions is in the north fork. Only hull repairs can be made; there are no machine shops.

Canoe Neck Creek has a depth of 6 feet for about 1 mile. **Morris Point Landing**

is just inside the creek. Gasoline and some provisions can be obtained. The landing has 6 feet of water at the end.

St. Clement is a settlement on the eastern shore of St. Clement Bay about 0.5 mile above **Shipping Point.** A number of small private landings with about 2 to 3 feet of water at the ends are here. Ruins of a wharf extend out to deep water at the northern end of the town.

A private landing with 5 feet of water at the end is on the south side of the point just across the bay from St. Clement.

Stones Wharf, near the head of the bay, is marked only by a pile cluster and a house on the beach.

Directions, St. Clement Bay.—From southeastward.—Pass 0.3 mile northeastward of the horizontal-banded buoy off the east end of Heron Island Shoal, and steer **310°** to a position 200 yards west of buoy 2 off Newtown Neck.

From westward—Through Dukeharts Channel.—Pass close to buoy 6 on course **039°**, and round buoy 5 to the northward. Bring Cobb Point Bar Light astern on course **114°**, pass 60 yards south of buoy 4, steer **078°** heading toward Huggins Point Light until clear of the north point of Blakiston Island, then **089°** passing close northward of buoy 3 to position midway between that buoy and the buoy off the western end of Heron Island Shoal, thence on course **024°** to 200 yards west of buoy 2, off Newtown Neck.

Above this point a mid-channel course leads in deep water except at **Cedar Point Bar Light,** which must be passed 100 yards or more to the eastward.

Heron Island Shoal is an extensive shoal area entirely submerged at high water, and having an extensive area bare at low water. It is marked at the eastern end by a horizontal-banded buoy and at the western end by a spar buoy.

Blakiston Island is sparsely wooded and is marked at the south end by the discontinued lighthouse, an abandoned white dwelling. About 100 yards north of the old lighthouse is a prominent cross, which commemorates the first mass celebrated by Catholic settlers in America. Shoals extend from the island in all directions, the southern limit of the shoal area being marked by a buoy. In August 1946 the long wharf on the north side of the island had a depth of 16 feet at the end.

Wicomico River, on the north side of Potomac River, 28 miles above Point Lookout, has a depth of 24 feet or more for 3.5 miles above **Cobb Point Bar Light (lat. 38°14′, long. 76°50′),** at the entrance, and 12 feet for a farther distance of 1.5 miles. Above this point are many detached shoals which render navigation difficult for boats of a greater draft than 5 feet, though with local knowledge a draft of 8 feet can be taken 8 miles above the entrance, and 3 feet to the head of navigation, 12 miles above the entrance. The river is characterized by spits, with little depth and terminating abruptly, which extend to mid-river in places; those near the entrance are marked by lights and several by buoys. The river channel above buoy 2 has been marked by eight buoys to above **Stoddard Point.**

The mean range of tide is about 2 feet.

Bushwood Wharf is in ruins but the inner end accommodates small boats. **Rock Point** (post office) wharf has a depth of 7 feet. Gasoline and provisions can be obtained near both wharves, and water is piped on the latter. The chief business in the river is oyster tonging. About 0.5 mile south-southwest of **Mills Point** is a dangerous tree stump bare at half tide.

St. Catherine Sound, on the east side of Wicomico River, at the entrance, has depths of 5 to 9 feet through the middle, but there are extensive shoals close to the

channel. The channel is marked by a light and a number of daybeacons but local knowledge is needed. A depth of 2½ feet can be carried through it into Wicomico River.

Neale Sound, on the west side of Wicomico River, southward of Rock Point, has a depth of 7 feet in the entrance and 7 to 11 feet inside, and forms a secure anchorage for motor boats. The entrances have been improved by dredging and are marked by lights and daybeacons. The project provides for a channel 7 feet deep and 100 feet wide through the entrance from Wicomico River, and a second channel 6 feet deep extending from deep water within the sound through the marshy barrier at the head of **Cobb Island** to deep water in the Potomac with widths of 60 feet within the sound and 80 feet elsewhere. In August 1946 there was a controlling depth of 7 feet in the eastern channel and 5 feet in the western.

About 0.5 mile above the eastern entrance is a highway bascule bridge with span 22 feet wide, between fenders, and a vertical clearance of 8.5 feet at MHW when closed. The draw is closed from sunset to sunrise. About 0.4 mile above here is a submarine telephone-cable crossing.

Gasoline and provisions are obtainable at the wharf on the south shore just eastward of the bridge. The landing has a depth of 6 feet alongside. Just westward of the bridge is a small marine railway capable of hauling boats 40 feet in length with 3½ feet draft.

Charleston Creek is used as an anchorage for oyster boats. No supplies are here.

Chaptico Bay, on the east side of Wicomico River, 6.5 miles above the entrance, has a depth of 2 to 5 feet. It has no wharves and little business by water.

Directions, Wicomico River.—Enter on course **339°** passing 500 yards eastward of the horizontal-banded buoy at the entrance and Cobb Point Bar Light, with Rock Point church spire ahead, to 150 yards west of buoy 2, off **St. Margaret Island.** Then head for Rock Point wharf on course **342°**, keeping clear of the shoal off the east point of Cobb Island, or to Bushwood Wharf on a **029°** course, or up the river on course **010°** with the island off **White Point** ahead, to a position 100 yards east of **Rock Point Light 1.** Above this point follow a **339°** course and be guided by the chart.

Popes Creek, on the southwest side of Potomac River, 4 miles below Colonial Beach, leads to **Wakefield, the birthplace of George Washington.** The controlling depth is about 1½ feet at the entrance, and a stone jetty 2 feet high extends 200 feet offshore from the northern point. Currents at strength in the entrance are reported to be as high as 4½ knots.

Mattox Creek, 1 mile southward of Colonial Beach, has a controlling depth of 5 feet in a narrow, crooked channel to **Wirt** and **Massey Wharves,** 2 miles above the entrance, and 4 feet for a farther distance of 2 miles to a concrete fixed highway bridge. Wirt wharf is in ruins. The entrance is marked by lights and a buoy. In entering, pass 100 yards westward of the lights and be guided by the chart and the buoy. Local knowledge is needed for the best water in the creek. The shoal extending eastward from **Paynes Point** is usually marked by a bush stake. The highway bridge has a span of about 20 feet and high water clearance of 6 feet. Old bridge piling with span about 8 feet are just above the new bridge, above which is no traffic although it is reported 4 feet can be carried to the head of the creek.

Colonial Beach is a summer resort on the southwest side of Potomac River, 34 miles above the entrance and 61 miles below Washington. A number of wharves are on the Potomac River; the largest has a depth of 6 feet at the end. Immediately northward of it is a small wharf with 4 feet at the end where gasoline can be obtained. No fresh water is available on the wharves.

Monroe Creek, having its entrance at the south end of Colonial Beach, is extensively used as an anchorage. The channel at the entrance and inside has been dredged and is marked by lights and buoys. The project for improvement of the creek provides for a channel 8 feet deep, 100 feet wide, and 950 feet long, through the bar at the entrance, and within the creek a channel 7 feet deep, 100 feet wide, and 2,500 feet long, with a turning and anchorage basin 500 feet in width at the upper end in the vicinity of the Colonial Beach waterworks. In August 1946 there was a controlling depth of 7½ feet to the turning basin, 6½ feet in the center of the basin, and about 3 feet from the turning basin to the head of the creek.

Ice, gasoline, and provisions are obtainable, and water is piped to one wharf. There is a marine railway just below **Robins Grove Point** capable of hauling out boats 40 feet long with 3 feet draft. The landings in the basin have 7 feet of water at their ends.

To enter, give the east and south shore of Colonial Beach a berth of over 500 yards, round **Monroe Creek Entrance Light (lat. 38°14′, long. 76°58′),** and approach the entrance on a northerly course about 500 feet from the west shore. Pass through the entrance close along the end of **Gum Bar Point,** then follow the buoys and chart.

Potomac Beach (Chart 556) is a village with a post office and landing on the south side of Potomac River southeastward of the mouth of Rosier Creek. A channel has been dredged 10 feet deep, 75 feet wide and 1,100 feet long to the wharves with a turning basin abreast them. Some provisions and gasoline can be obtained. The wharves are now in poor condition and only two can be used, the unused ferry landing and an oil wharf. The latter had a depth of 8 feet alongside in August 1946.

Rosier Creek, 3 miles above Colonial Beach, has a depth of 4 feet in the entrance and 3 feet for 1 mile above. The best water in the approach leads close along the ends of the wharves at Potomac Beach and follows the shore at a distance of 100 yards.

The creek has no wharves and is little used.

Upper Machodoc Creek is on the west side of Potomac River, 2 miles southwestward of Lower Cedar Point Light. Two dredged channels lead into the creek. In August 1944, the main channel had a controlling depth of 18 feet and the secondary channel approaching from the southeast parallel to the shoreline had a controlling depth of 10 feet. A turning basin with a depth of 21 feet has been dredged inside the entrance. The piers along the north side of the creek have depths alongside varying from 6 feet to 21 feet. In August 1944, the controlling depth above the entrance was 5 feet to a point about 4.5 miles above the entrance or about 0.3 mile below Long Point. Above this point the controlling depth was 3 feet to the vicinity of **Milford Landing.**

A new pier has been constructed at the south shore of the creek. In August 1944, the controlling depth in the approaches to this pier was 19 feet. All of the large wharves built in former years are now in ruins, and only small piers remain intact. There is no commercial shipping and the stream is little used except by local inhabitants. No supplies or gasoline are available.

The United States Naval Proving Ground, Dahlgren, occupies land on either side of the entrance and for a considerable distance along the south shore, and the area is restricted. The elevated water tanks and radio masts at Dahlgren are prominent. The major portion of the lower Potomac River is included in **Danger Zones** which are used at various times by the Dahlgren Proving Ground. For limits of the areas and the regulations governing them, see page 235.

Tides.—The mean range of tide at the entrance is about 1½ feet.

Williams Creek, about 1.3 miles above the mouth of Upper Machodoc Creek

had a controlling depth of 3 feet in August 1944, for about 0.5 mile above the mouth and thence 2 feet to the highway bridge. The creek is little used except by local inhabitants who live on the east bank.

Directions, Upper Machodoc Creek.—To proceed up the main dredged channel enter on course **282½°** just north of lighted buoy 13 on range ahead (channel buoyed on north side). To proceed up the secondary channel, which is more removed from the target area of the Naval Proving Ground than the channel above, enter on course **318°** between buoys 1 and 2, pass between buoys 3 and 4 and to the right of **Beabors Point Light.** The main channel should be entered before making the left turn to the turning basin due to the shoal water west of the channel.

If bound up the creek pass close southward of the range lights and then steer a mid-channel course. Pass close to **Howland Point** and head for the middle of **Wood Island.** When about 250 yards past the point to starboard turn right, favor the point west of Wood Island in passing, and pursue a mid-channel course up the creek making allowance for the shifting of the channel at the bends in the stream.

Cuckold Creek (Chart 558), 3 miles southeastward of Lower Cedar Point, is reported to have a depth of 2½ feet at the entrance and deeper water inside. It is unmarked except for bush stakes and is little used.

Piccowaxen Creek, 1.8 miles southeastward of Lower Cedar Point, can be entered only by small boats at high water

Morgantown is eastward of **Lower Cedar Point.** Gasoline and some provisions can be obtained, and there is autobus communication with Washington and Baltimore. A channel 10 feet deep and 150 feet wide, with a turning basin 300 feet wide and 400 feet long, has been dredged to the wharf, which is now in ruins, from the westward, and is marked by a lighted range and buoys on both sides of the channel. The lights, the front being on the wharf and the rear on a white skeleton tower on shore, lead through the channel on a course of **061°**. There is a strong cross current on both the ebb and flood. No landings are available where anything but small boats can tie up.

A depth of 6 feet can be taken to the ruined ferry wharves on a course between northwest and north-northwest, passing eastward of the shoal extending southwestward from the turning basin and marked at its end by **Morgantown Light.**

Lower Cedar Point Light (lat. 38°20′, long. 77°00′), marks the edge of the shoal on the west side of the channel off Lower Cedar Point. The light, shown from a white house on brown piles, is 38 feet above the water and visible 11 miles. Two lighted pyramidal-shaped structures are 500 and 1,100 yards, respectively, northwestward of Lower Cedar Point Light.

Lower Cedar Point to Mattawoman Creek

CHART 559

A fixed highway bridge crosses the Potomac River 1.3 miles above Lower Cedar Point. The center line of the main span is marked by a fixed green light surmounted by 3 fixed white lights mounted vertically 15 feet apart. An air-horn fog signal is located at the center of the main span. Fixed red lights are on the main trusses and approaches. The main span has a horizontal clearance of 480 feet and a vertical clearance of 135 feet at MHW.

Persimmon Point Shoal Light marks a four-foot shoal on the west side of the channel 0.6 mile north of the highway bridge and the same distance southeastward of **Persimmon Point.** The light, shown from a white ball on a pile structure, is 16 feet above the water and visible 7 miles.

Popes Creek, 3.3 miles above Lower Cedar Point, is a post village and the terminus of a railroad from Baltimore and Washington. ***Popes Creek*** is not navigable, but a depth of 8 feet can be taken to the wharf at the railroad. Gasoline and provisions are obtainable in small quantity and there are telephone and telegraph connections. A buoy marks a 3-foot spot just south of the wharf.

Port Tobacco River, having its entrance in the northern end of the shoal bight northward of **Mathias Point,** has a depth of 9 feet to the entrance, 7 feet for 1.8 miles above, and 3 feet to near the head.

The wharves on the north side of **Chapel Point** and at **Brents** have become dilapidated and are no longer used. Chapel Point is a summer resort, and has a wharf on the south side at which there was a depth of 9 feet in August 1946. No gasoline or supplies are available.

The generally used route in entering, which leads in a depth of 8 feet, is to pass 500 yards eastward of **Port Tobacco River Flats Light** and steer **027°** for 1.5 miles to a position 0.4 mile from the eastern shore at the entrance. Steer about **341°** heading up the dredged channel which extends from off **Windmill Point** to the turning basin off Chapel Point wharf, passing just clear of the shoal water off the eastern shore. This channel was dredged in 1930, 10½ feet deep, 100 feet wide, and 9,800 feet long and had a controlling depth of about 9 feet in August 1946. It is no longer marked and is hard to follow without local knowledge.

The mean range of tides is 1½ feet.

Mathias Point landing, in ruins, is on the northwest side of Mathias Point 0.6 mile southwestward of **Mathias Point Light.**

Upper Cedar Point Light, about 2 miles west of Mathias Point, should be given a berth of at least 200 yards to avoid the edge of the 3-foot shoal extending out from the light. The light, shown from a white structure on brown piles, has a red sector covering Port Tobacco River Flats.

Nanjemoy Creek, 1.5 miles westward of Upper Cedar Point Light, has a depth of 7 feet in the entrance and is navigable by small vessels for about 7 miles. The controlling depth in the lower part of the creek is about 4½ feet. The best water favors the east side at the entrance, as shown on the chart. No landings are in the creek.

Riverside landing and post office are 3 miles west-southwestward of Upper Cedar Point Light. The wharf is in ruins and has a light at the end. Gasoline and supplies can be obtained.

Stuart Wharf, on the south side of the river, 0.5 mile southwestward of **Metomkin Point,** is now marked only by a few broken piling.

A small landing with 2 feet of water at its end is about 2 miles eastward of Bull Bluff. Some gasoline and a few supplies are available during the summer months.

Potomac Creek, 4 miles westward of **Maryland Point Light,** has a depth of 7 feet at the entrance and 3 feet for 2 miles above. It is used only by small motor boats. The best water favors the south shore at the entrance, as shown on the chart. **Bull Bluff,** high and wooded, is on the south side, at the entrance.

Aquia Creek, on the west side, 6 miles above Maryland Point Light, has been improved by dredging a channel 6 feet deep and 100 feet wide to a fixed railroad bridge 3.5 miles above the entrance, 6 feet deep and 60 feet wide to **Coals Landing,** 5.8 miles

above the entrance, and widened in the upper 500 yards to a width of 100 to 150 feet to form an anchorage basin. In August 1946 a draft of 5 feet could be carried with local knowledge to the railroad bridge.

Small boats can go 1 mile above Coals Landing. The channel from the entrance to the ***Narrows,*** 1 mile above the railroad bridge, leads between broad flats on either side. Above the Narrows the creek is narrow and crooked. the best water generally favoring the high land. A buoy and two daybeacons off **Brent Point** mark the channel. The buoy is on the end of the shoal extending 0.9 mile southward from Brent Point, on the north side, at the entrance. Above **Thorney Point wharf,** in ruins, there are no aids and strangers may have difficulty in keeping in the dredged channel. A straight course from the wharf to the center of the railroad bridge leads through the best water. There is some fishing but no other business in the creek.

The fixed railroad bridge has a horizontal clearance of 46 feet and a vertical clearance of 26 feet at MHW.

Tides.—The mean range of tide at the entrance is about 1 foot.

Clifton Beach and **Dent Landing,** now in ruins, are on **Smith Point,** 5.5 miles above Maryland Point Light. Smith Point is marked by a light. The broken piles marking the end of the former landing constitute a danger for vessels outside the marked channel as they are nearly awash at high water.

Danger.—A former restricted anchorage ground, located between Brent Point and **Widewater,** west of the 12-foot curve, should be avoided because of possible submerged ship remains.

Liverpool Point, on the east side of the river, 4 miles above Smith Point, is marked by the ruins of a wharf.

Mallows Bay, on the east side, above Liverpool Point, is a ship-graveyard area. The western danger limit is the line joining Sandy Point and Liverpool Point. A buoy in 24 feet marks the channel off the danger area. The southern part of the bay is clear for a depth of 5 feet to the submerged wreck near the head. A small bulkhead landing is on the southern shore.

Sandy Point (lat. 38°29′, long. 77°16′) is marked by a light. A bell fog signal is maintained from September 15 to June 15.

A wharf for an aviation school is on the west side 0.9 mile south of **Chopawamsic Island.** In August 1946 there was a depth of 11 feet at the end. A channel 10 feet deep and marked by buoys leads to the wharf. About 0.5 mile north of the wharf is a diversion canal 10 feet deep, connecting ***Chopawamsic Creek*** with the river. Three fixed bridges, with a least span width of 10 feet and 10 feet vertical clearance at MHW, cross the canal.

Quantico, on the south side of the entrance to Quantico Creek, is a town and the site of the United States Marine Barracks. A T-shaped pier, with depths of 25 to 31 feet, and a launch harbor, with a depth of 11 feet, just south of the mouth of Quantico Creek, front the location of the marine barracks. The lights are prominent at night.

A bell fog signal is established on the end of the pier at Quantico.

Danger Zone.—The firing range for the marine barracks, which constitutes a danger zone, involves the entire portion of the Potomac River between a line running due east from Shipping Point and a line running from Marlboro Point to Maryland Point. For regulations governing the above area, see page 235.

Quantico Creek has a depth of 7 feet in a narrow crooked channel in the entrance, and about 2 feet for about 2 miles above. It is crossed by a railroad bridge at the entrance, having a draw opening 29 feet wide and a vertical clearance of 8 feet at MHW

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when closed. The draw is locked and has not been opened for several years. Headroom is also restricted by telephone and telegraph lines affixed to the bridge trestle. A small landing used by local pleasure boats is on the south side of the entrance.

Chicamuxen Creek, on the east side, opposite Quantico Creek, has a depth of 5 feet in the entrance and to **Poseys Wharf,** in ruins, but shoals up rapidly above. It is little used except by local boats.

Mattawoman Creek, on the east side of Potomac River, 3 miles below Indianhead, has a depth of 7 feet across the flats at the entrance, deeper water for 4 miles above, and 6 feet for a farther distance of 2 miles. The creek is clear in mid-channel for a distance of 0.8 mile, but above this point the channel is very narrow and crooked and leads between flats on both sides. It is sometimes partially marked by brush stakes, but is difficult without local knowledge. The marsh extending southeastward from **Deep Point** to the edge of the channel is marked by a clump of trees at the end. About 2 miles above Deep Point a foot bridge crosses the creek with a bascule draw 80 feet between fenders and with a vertical clearance of 4 feet at MHW, when closed. **Grinders Wharf** is in ruins.

Tides.—The mean range of tide is about 1½ feet at the entrance to Mattawoman Creek.

The Government wharf on **Stump Neck** at the south entrance point of Mattawoman Creek has a least depth of 15 feet at its end. The wharf is marked by a light.

On **Cockpit Point** two smokestacks of the District of Columbia incinerator plant show prominently.

Powells Creek, opposite Mattawoman Creek, has a depth of 4 to 5 feet to within 0.4 mile of a railroad bridge near the entrance and 1 to 2 feet from there for a short distance above the bridge. The fixed railroad bridge has a horizontal clearance of 40 feet and a vertical clearance of 26 feet at MHW. The old bridge 60 feet beyond, has some piling removed. **Cherry Hill,** a village and railroad station 1 mile southward of the entrance, has landings for small boats.

Mattawoman Creek to Georgetown

CHART 560

Occoquan Bay and ***Creek,*** on the west side of the Potomac River, westward of Indianhead and 23 miles below Washington, is the approach to the town of **Occoquan** and the District of Columbia workhouse, at the head of navigation 5 miles above the entrance. It now has little trade and is used as an ice harbor for local boats when the channel of the river above is closed.

The project for improvement of the Bay and Creek provides for a channel 6 feet deep and 150 feet wide to the town of Occoquan and protection of the channel above **Taylors Point** by stone dikes 2,200 feet long. The project has been completed with the exception of the construction of the dike at ***Upper Mud Bar.*** In August 1946 the controlling depth was 6 feet to Occoquan. The channel off the bulkheads at Occoquan has depths of 10 to 16 feet.

The channel is marked by lights and buoys from the entrance to the first bridge.

In the center of the bay west of the channel entrance buoys is a made rocky islet which shows 3 feet above high water.

Belmont Bay is reported to be rocky throughout, but the dangers are covered at low water except during northwest winds.

To enter steer **341°** for 1.8 miles from buoy 39 in the Potomac River to the entrance buoys at the lower end of the dredged channel in Occoquan Bay, bringing buoy 1 and **Taylors Point Light 3** on range. From here the chart and local knowledge is the best guide.

Occoquan Creek is crossed by two fixed bridges 3 miles above the entrance to the dredged channel, having a least span of 115 feet and least vertical clearance of 66.7 feet at MHW; and by a fixed highway bridge just above Occoquan with a span of 205 feet and a vertical clearance at MHW of 16 feet.

Tides.—The mean range of the tide at the entrance to Occoquan Creek is about 1½ feet.

Neabsco Creek, a tributary of Occoquan Bay at its south end, has depths of 2 to 4 feet. It is crossed at its mouth by a fixed railroad bridge, having a navigable span 30 feet wide and 35.8 feet vertical clearance at MHW.

Indian Head is a prominent, high, wooded bluff on the southeast side of the river 21 miles below Washington. The town of **Indianhead** is just south of the bluff.

The wharf about 1 mile below Indian Head has depths along its northern face of from 12 feet at the outer end to 5 feet at the inshore end. The small-boat basin, protected by a seawall, on the south side of this wharf has a depth of 4 feet. An electrically operated bell on the intake house immediately northward serves as a fog signal.

The wharf at Indian Head has depths alongside shoaling from 25 feet at the south end to 14 feet at the north end.

An unwatched light on a pile cluster about 1 mile eastward of Indian Head marks the end of a submerged sewer.

Glymont is a landing, now in ruins, on the southeast side of the river, 1.5 miles above Indian Head. A light is on shore and a horn fog signal is maintained from September 15 to June 15.

Craney Island (lat. 38°38′, long. 77°08′), northward of Glymont, is a small islet marked by a clump of trees and surrounded by an extensive shoal. A narrow unmarked channel with a depth of 7 feet is northward of it.

Pomonkey Creek, 2 miles above Glymont, is nearly bare at low water above the entrance.

Gunston Cove, on the west side, 16 miles below Washington, has a depth of 3 to 4½ feet across the bar, the deeper water favoring the southwest side. Above the bar is a depth of 6 feet, except near the shores, to the junction of ***Accotink*** and ***Pohick Bays,*** and 2 to 4 feet in both bays for about 0.5 mile.

Danger area.—The target ranges of the U. S. Military reservation at Fort Belvoir which constitute a danger area involve: All of Accotink Bay; all of Accotink Creek south of a bridge which crosses Accotink Creek approximately 400 yards due south of U. S. Highway No. 1; and a portion of the waters of Pohick Bay bordering its north shore.

Persons desiring to cross the waters in the danger area shall first determine whether a red streamer is displayed on the east shore of Accotink Bay at its mouth or near the danger area boundary on Accotink Creek. If the red streamer is displayed, it will indicate that firing is in progress and that the waters in the danger area are covered by the rifle fire and that the area shall not be entered until the streamer is lowered.

For complete regulations for the above area, see page 235.

A submarine cable crosses the mouth of Accotink Bay.

Pohick Bay is dangerous due to submerged duck-blind and fish-net stakes; local knowledge is needed to avoid them.

Whitestone Point is marked by a small landing on which is a white house, and by a number of small fuel tanks. A depth of 4 feet is at the landing and in the small boat-basin immediately westward. The outer piles of a former wharf, bare at high water, are just eastward of the landing. Boats approaching the landing or the basin pass outside the private marker buoy off these piles. The controlling depth across the shoals to the landing is 4 feet.

Dogue Creek, on the west side of Potomac River, opposite Marshall Hall, has depths of 2½ to 5 feet, but is covered with grass and is little used. It is dangerous to enter on account of submerged duck-blind stakes. The channel span of the railroad bridge 1 mile above the entrance has been completely removed. **Whitestone Point Light** is at the southern entrance of the creek. The fog signal is sounded on a bell.

The **U. S. Fish and Wildlife Service wharves** on the western shore of the Potomac River just southward of the mouth of Dogue Creek had depths of 18 and 6 feet at their ends in August 1946, the deeper water being at the southern landing. Fresh water is available from pipelines at the shore ends of the landings.

Marshall Hall, on the east side, 14 miles below Washington, is an excursion resort. The wharf had a depth of 11 feet in August 1946.

Mount Vernon, the **home of George Washington,** is on the west side of the Potomac River 13 miles below Washington, with which it is connected by steamer and bus. The buildings are open to the public daily from 9 a. m. to 5 p. m. The custom of tolling the ship's bell while passing Mount Vernon is said to have started the night the first President died, December 14, 1799.

The project for improvement of the channel to the wharf at Mount Vernon provides for dredging a channel 200 feet wide and 9 to 10 feet deep between the main channel of the Potomac River and the Mount Vernon wharf, with a turning basin of the same depth and a radius of 200 feet at the wharf. In August 1946 there was a depth of about 12 feet in the western side of the channel, but the eastern half had spots of 7 feet. The channel is marked by buoys but local knowledge is necessary between buoys 2 and 4. Depths alongside the wharf are from 10 to 15 feet. The wharf is not open to the public.

Bryan Point is marked by white houses and a brown water tank. The wharves are in ruins.

Little Hunting Creek, opposite Bryan Point, has a depth of about 4½ feet in a narrow channel for about 0.6 mile above the entrance. The channel is sometimes marked by bush stakes, but is difficult without local knowledge. A stone arch culvert crosses the entrance and has a span of 51 feet and a center vertical clearance of 19.4 feet at MHW.

Piscataway Creek, on the east side, 11 miles below Washington, has depths of 2 to 4 feet and is little used. Considerable sand dredging has been done in the creek, and there is a dredged channel 8 feet deep to about 0.8 mile above the entrance. This channel is not marked and is hard to follow. There are no wharves.

Sheridan Point is marked by a light 500 yards off the point on the edge of the river channel. Passing vessels should give the light a good berth.

On the point on the east side of the river just north of Piscataway Creek is **Fort Washington.** A wharf on the point has a light on the end. A bell fog signal is at the

light. In August 1946 a controlling depth of 15 feet was along the face. Fresh water is available. A cable crosses the river here and vessels should not anchor near it.

Swan Creek has a depth in the entrance of 2 feet. **Riverview** is an excursion resort just north of this creek. The wharf, in poor condition, has a depth of 7 feet alongside. A light is on the wharf. A small wreck 2 feet below mean low water is about 500 yards northwest of **Hatton Point.** A channel buoy is just east of the wreck.

Broad Creek, on the east side, 8 miles below Washington, has depths of 2 to 4 feet. The creek is covered with grass in summer and is little used.

About 0.5 mile northwest of **Indian Queen Bluff** a channel 8 feet deep has been dredged (for gravel) from the river channel due west to a basin 15 feet deep near the bank. This channel is bush staked.

Rosier Bluff is a prominent wooded bluff on the east side, 2 miles below Alexandria. The wharf at the southern end is in ruins.

The slough, 0.7 mile north of Rosier Bluff, has good depths in the entrance and inside, having been dredged to a depth of 15 feet for gravel, but only depths of from 2 to 3 feet are on the bank extending along the eastern side of the river channel.

Hunting Creek, on the south side of Alexandria, has depths of 1½ to 4 feet, but is covered with grass in summer and little used. It is crossed by two bridges; the lower consisting of 3 arch-culvert openings with 44-foot spans and a center vertical clearance of 9.2 feet at MHW; the upper bridge is fixed, but motor boats without houses can pass under it.

The channel leading to the basin off **New Alexandria** has about 3 feet depth.

Alexandria, on the west side of the Potomac River about 5 miles below Washington, has considerable trade, mostly in river and bay vessels and a few coasting vessels, the deepest draft being 18 feet. There are 19 regular shipping wharves or landings; 15 of these are privately owned, of which 4 are open to the public by special arrangement, and 4 are owned by the United States.

The Federal project for improvement of the water front at Alexandria provides for a depth of 24 feet between the channel in the river and a line 20 feet outside the established pierhead line. Project depth obtained in August 1946.

Coal, water, gasoline, ice, and general provisions are obtainable.

Danger.—In places along the waterfront of Alexandria, particularly along the northern section, are old piling. Many of these are awash at low water and are a menace to vessels approaching or leaving the waterfront.

Oxon Creek, opposite the northern end of Alexandria, has depths of 1 to 3 feet, but is little used except by sand dredges. Channels have been dredged by them across the flats. These are generally marked by bush stakes, and the channels are well indicated at low water by the grass on the spoil banks. **Goose Island** channel has filled in. A sunken wreck is on the west edge of the islet. The channel leading to **Fox Ferry** had a depth of about 10 feet in August 1946. Dredges are working south of the inner end of the channel and barges loaded with gravel are towed from it. The wharf is in ruins and only piling and rock remain; these are dangerous. Local knowledge should be obtained in navigating this area.

Marbury Landing is in ruins. A 7½-foot channel, bush staked, to **Marbury Point** is on the north side of the head of the landing.

The entrance channel to ***Fourmile Run,*** entering the west side of the Potomac River about 1.5 miles above Alexandria, is marked by a lighted range and lighted buoys. In August 1946 there was a controlling depth of 13 feet on the axis of the range. In

the narrow neck extending across Fourmile Run are two culvert spans, both 22.5 feet wide with a vertical clearance of 9.7 feet at MHW.

The **Washington National Airport** is on an extensive filled area on the west side of Potomac River opposite its junction with the Anacostia River. The airport is used by a large number of domestic and international airlines.

The east bank of the Potomac River for a distance of 0.8 mile southward of the river channels off **Hains Point** is infested with dangerous stump piling, the remains of several former wharves. These old pilings extend about 150 feet from the bank to the channel.

Washington, District of Columbia, the **Capital of the United States,** is on the east side of the Potomac River at the head of navigation 95 miles above the mouth. The city, one of the most beautiful in the world, with its impressive memorials, beautiful public buildings and well-kept parks, is host to a constant stream of visitors from all parts of the world.

From the river, the Capitol dome, the Washington Monument, and the Lincoln and Jefferson Memorials are prominent.

Washington Harbor consists of three parts—Virginia Channel, Washington Channel, and the Anacostia River.

Virginia Channel, the main channel of the Potomac River, leads to the wharves at Georgetown, 3.5 miles above the junction with the Anacostia River. The Federal improvement project provides for a channel 24 feet deep and 400 feet wide from **Giesboro Point** to the Francis Scott Key Bridge at **Georgetown.** In February 1946 the controlling depth was 15.6 feet, this being in the section between Arlington Memorial Bridge and **Easby Point.** The depth in the channel is subject to change due to freshets.

The wharves on the Virginia Channel are at Georgetown, there being 9 privately owned, mostly of the bulkhead type, which are used principally by tugs, with sand and gravel barges, and oil tankers.

The channel is crossed by three bridges below Georgetown. The southernmost is a railroad swing bridge with a horizontal clearance of 104.3 feet and a vertical clearance of 18.2 feet at MHW when closed. The second, a highway swing bridge, has a horizontal clearance of 98.9 feet and a vertical clearance of 18.3 feet at MHW when closed. The third is the Arlington Memorial Bridge, a concrete-arch bascule drawbridge with a horizontal clearance of 142.7 feet and a vertical clearance of 30.7 feet at MHW when closed, over the center 80-foot width.

The Francis Scott Key Bridge crosses the river at Georgetown. It is a fixed bridge with a horizontal clearance of 207 feet and a vertical clearance of 61 feet at MHW, for a center width of 80 feet.

The piers of the former Aqueduct Bridge just above the Key Bridge, have a horizontal clearance of 109 feet.

The channel is marked by buoys to Georgetown, but above the Key Bridge is unmarked and very rocky. Gravel barges go to within 0.5 mile of Chain Bridge, but local knowledge is necessary. This section of the river is used by pleasure boats and there are several boat clubs in the vicinity.

The **General Bridge Regulations,** which are given in Chapter 2, except where modified by Supplemental Regulations mentioned in the text, apply within the area of this volume to all bridges in Chesapeake Bay and its navigable tributaries.

Supplemental Regulations prescribed for the two lower drawbridges crossing Virginia Channel are in effect as follows: The signal for opening the bridges is 3 blasts of a whistle by the vessel when within reasonable hearing distance of the bridge. When

the vertical clearance is less than 16.7 feet the draws shall be opened on signal at any time except between 7:15 and 9:30 a. m. and between 3:45 and 6:00 p. m., during which time the draws will not be opened except for the passage of Government vessels. In times of freshet or emergency these restrictions will be suspended. When more than 16.7 feet vertical clearance, the draws will be opened for boats habitually using this waterway only during the periods 10 to 11 a. m., 2 to 3 p. m., and 8 p. m. to 6 a. m., except when the gauges read less than 16.7 feet, the bridges shall be opened to such craft at all hours except the regular closed periods given above. The clearance is indicated by distant reading gauges, one on the downstream end of the railroad pivot-pier fender, one on the upstream end of the highway pivot-pier fender. Owners of tugs and power boats habitually using these waters are advised to reduce the height of their vessels under 16.7 feet in order that they may pass under or through the bridge at all times. No vessel shall pass under the closed draw span of either bridge at any time unless the vertical clearance between the lowest point of said span and the highest vertical projection of the vessel is at least 18 inches.

In case the draws can not be opened immediately, or when the bridge is open and is to be closed immediately, the fact shall be signaled from the bridge by the draw tender swinging to and fro horizontally a number of times a lighted lantern at night and a flag by day, or by sounding two long blasts of a whistle, horn or megaphone or two distinct strokes of a bell.

The Arlington Memorial draw bridge will be opened at all times on signal except between 7:15 and 9:30 a. m. and between 3:45 and 6:00 p. m., during which times the bridge will not be opened except for the passage of Government vessels.

Washington Channel leads northward from its junction with the Virginia Channel at Hains Point, between **Potomac Park** and the wharves of the city to the ***Tidal Basin.*** The Federal improvement project provides for a channel 24 feet deep and 400 feet wide. In February 1946 the controlling depth in the channel was 18.3 feet.

The principal wharves and facilities of the city of Washington are on the eastern side of this channel. A Federal project provides for development of the water front by construction of a yacht harbor in four sections on the upstream half of the channel, with berthing space for about 286 boats; two wharves for activities of the District of Columbia; three wharves for existing transportation lines and general service, and for construction of bulkhead walls and removal of old structures. The project has not been completed and to date only two yacht basins and a commercial pier have been finished.

The Capital and Columbia Yacht Clubs are near the head of Washington Channel and, along with several boatyards and service floats, provide all types of service required by small craft and yachts. Marine railways are available, the largest being capable of hauling out boats 50 feet in length with 8 feet draft.

The water front on Washington Channel is owned by the Government, but some facilities are leased to private organizations and companies. With the exception of the municipal wharves, there are no wharves open to public use. The municipal fish wharf is open to all, the charges for wharfage or dockage varying according to commodity loaded or discharged. The rate for yachts and non-cargo boats is $1 per day.

Several steamship lines have excursion and sightseeing trips from wharves in Washington Channel, and one line has sailings to Norfolk, Virginia.

The ***Anacostia River*** leads northeastward from its junction with the Potomac, and a draft of 6 feet can be carried 4 miles above its mouth. The Federal project for improvement of the river provides for a channel 24 feet deep and 400 feet wide from Giesboro Point to the Anacostia Bridge, with a turning basin of the same depth 800

feet wide and approximately 2,400 feet long opposite the Navy Yard, thence 24 feet deep and 200 feet wide to a turning basin of the same depth 400 feet square at the foot of Fifteenth Street, Southeast. The controlling depths when last ascertained were as follows: Entrance to Anacostia Bridge, 21.7 feet in November 1944; thence to foot of Fifteenth Street, Southeast, including the turning basin, 21.1 feet in April 1946.

On the Anacostia River are about 2 miles of commercial water front on which are 33 privately owned and 2 Government wharves and a large amount of bulkhead with slips for Government agencies.

On the north side of the river, just inside the entrance, is the Corinthian Yacht Club which accommodates yachts up to 90 feet in length and 8 feet in draft. The wharf has a depth of 10 feet alongside. Gasoline is available.

A boatyard is on the north side of the river just below the John Philip Sousa Bridge. Gasoline and oil are available at the wharf, which has a depth of 12 feet alongside. The yard has a marine railway, capable of hauling out a boat 45 feet in length with a maximum weight of 20 tons, and a machine shop which can handle repairs on Diesel and gasoline engines.

The Washington Yacht Club is on the north side of the river above the John Philip Sousa Bridge.

The river is crossed by five bridges between the mouth and the head of navigation, and a sixth is under construction. The South Capitol Street Bridge is to be a swing highway bridge with an authorized horizontal clearance of 150 feet and a vertical clearance of 42.1 feet at high water when closed.

The Anacostia Bridge, just above the Navy Yard, is a bascule highway bridge with a horizontal clearance of 100 feet and a vertical clearance of 21.6 feet at high water when closed. The draw in the Anacostia Bridge will be opened at any time between 9 a. m. and 5 p. m. The John Philip Sousa Bridge, at Pennsylvania Avenue, is a fixed highway bridge with a horizontal clearance of 114.4 feet and a vertical clearance at high water of 32.9 feet for a 40-foot width. The Pennsylvania Railroad bridge, 0.3 mile above, is a vertical-lift bridge with a horizontal clearance of 32 feet and a vertical clearance of 6 feet at high water when down and a horizontal clearance of 35 feet and a vertical clearance of 29 feet at high water when raised. Benning Bridge, 1 mile above, is a fixed highway bridge with a horizontal clearance of 40.7 feet and a vertical clearance of 16.8 feet at high water. The last is a fixed railway bridge, 1.5 miles above Benning Bridge, with a horizontal clearance of 69.4 feet and a vertical clearance of 12.3 feet at high water.

Harbor Regulations.—Every vessel coming to anchor in the Potomac River between the junction of the Washington and Virginia Channels of said river and the extension of the south line of P Street SW., in the city of Washington, shall anchor as near the flats in said river as possible, so that the channel of said river will not be obstructed; and if such vessel is to remain over 12 hours it shall be moored with both anchors, so as to give room for passing vessels and so as not to swing and obstruct said channel. Every vessel coming to anchor in any other portion of the navigable waters in the District of Columbia shall also be so moored under the direction of the harbor master, or the pilot of the police boat acting in the harbor master's absence, as not to obstruct the channel, and be secured with an anchor at bow and stern so as to keep the long axis of the vessel parallel with that of the channel and prevent it from swinging so as to obstruct the free passage of the channel by other vessels.

No vessel shall be permitted to anchor in the Washington Channel of the Potomac River between a point 1,000 feet south of the south line of P Street and the north line

of K Street south extended, each point to be designated by a white buoy; and all vessels coming to anchor above the north line of K Street aforesaid shall come to anchor as near the flats as possible and so that the channel will not be obstructed; and all vessels coming to anchor shall be so moored by the use of both anchors as to prevent obstruction of the channel within 400 feet of the nearest wharf, the said anchorage to continue only 24 hours unless otherwise ordered or directed by the harbor master.

Pilotage.—See Chapter 8.

Towage.—Tugboats are available.

Quarantine.—Vessels bound for Washington or Alexandria and subject to quarantine will be accorded such treatment upon notification of the United States Public Health Service, Washington, D. C.

Customs.—Washington is a port of entry. The customhouse is in Georgetown, at 1221 Thirty-first Street, Northwest, about 500 yards from the water front. The Alexandria customhouse is in the post-office building at South Washington and Price Streets, about 500 yards from the water front. Marine documents are issued at both places. Dockages requiring the services of customs officers are very infrequent.

Hospitals.—Washington has many hospitals. Medical relief for seamen is available in the Railroad Retirement Building, Fourth and D Streets, Southwest.

Dockage.—Vessels arriving at Washington or Alexandria are generally assigned berths by the company or person controlling the vessel or cargo. With the exception of the municipal wharves in Washington, there are no wharves open to public use.

Wharfage.—Charges vary at the different terminals and for different commodities.

Storage.—There are no storage facilities on the immediate water front of this port.

Supplies.—Water is generally available in unlimited quantities but the connections are small. There are no fixed charges. Bunker coal can be obtained at Alexandria. Fuel oil and Diesel oil can be obtained at several piers on the Anacostia River. Gasoline, lubricating oil and water are available to small craft at various piers and floats in Washington Channel and Anacostia River. Provisions can be obtained close to the water front.

Commerce.—Petroleum products and sand and gravel comprise the bulk of the shipping.

Tides, currents, freshets and **ice** are discussed at the beginning of the text on the Potomac River.

Point Lookout to Cedar Point

CHART 557

A middle ground shoal area with depths of 13 to 18 feet is about 7 miles eastward of Point Lookout. The area, about 5 miles long and 2 miles wide inside the 18-foot curve, extends in a north and south direction and has several detached shoal spots to the northward. The western side of the shoal is marked by buoys, and a sunken wreck on the shoal is marked by **Kedges Straits Middle Ground Light** and a horizontal-banded buoy to the southward of it.

An ***underwater obstruction*** has been reported 048° 4.8 miles from Point Lookout Light. Deep-draft vessels should avoid this area.

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Point No Point, 6 miles north of Point Lookout, has no prominent landmarks on the point itself. A part of the shoal area to the eastward of the point is a **prohibited area.** See page 231 for limits of the area, and regulations governing it.

Point No Point Light (lat. 38°08′, long. 76°17′), 1.6 miles southeastward of the point, marks the extremity of the shoal making off from it. The light, shown from a white structure on a brown cylindrical base, is 52 feet above the water and visible for a distance of 13 miles. The fog signal is sounded on an air-diaphragm horn, or a bell if the horn is disabled.

Hooper Island Light, on the east side of the main channel, is near the edge of the shoals of 18 feet or less depth which extend 3 miles west of Hooper Island. The light, shown from a white conical tower on a brown cylindrical base, is 63 feet above the water and visible for a distance of 13 miles. An air-diaphragm horn fog signal is at the light and a bell is sounded if the horn is disabled.

Restricted and prohibited areas.—The major portion of Chesapeake Bay between Smith Point and Cedar Point is included in a restricted area. The area to the southward of Cedar Point is a prohibited area. For limits of the areas and the regulations governing them, see page 231.

St. Jerome Creek is on the western side of Chesapeake Bay 5 miles north of Point Lookout and 2.5 miles 253° from Point No Point Light. It is shoal and of little importance; some oysters, wood, and farm products are shipped in light-draft vessels, but it is principally used as an anchorage for small craft engaged in oystering and fishing. There is a landing at **Airedele,** just inside the entrance. Gasoline can be obtained. The depth alongside is 5 feet.

The entrance channel is subject to change but has been improved by dredging. The project provides for a channel 7 feet deep and 100 feet wide from Chesapeake Bay to the vicinity of Airedele, thence 60 feet wide to deep water in the creek, with a turning basin of the same depth 200 feet wide and 300 feet long opposite Airedele. In November 1946 the controlling depths were 5 feet in the entrance channel and 7 feet in the turning basin.

The entrance channel is marked by a buoy at its outer end and also by a lighted range.

The general depths in the creek are 4 to 7 feet as shown on the chart. The entrance to the south branch of the creek between **Otter Point** and **Deep Point** is nearly bare at low water, and this shoal extends northward of the line joining the points.

Patuxent River

CHART 539

Patuxent River on the western side of Chesapeake Bay, 87 miles above the entrance and 64 miles below Baltimore, has a depth of 30 feet into the entrance and 23 feet to Benedict, 12 feet to Jones Point, 9 feet to Lyons Creek and 7 feet to Bristol Landing, at distances of 18.5, 28, 36, and 40 miles, respectively, above Drum Point at the entrance. It is buoyed to Jones Point. The mouth of the river forms a secure anchorage for vessels of any draft and is extensively used. The river and its tributaries

are also frequented by schooners and a few barges carrying wood products, and in the lower end by vessels engaged in the oystering and fishing industry.

Restricted areas have been established in the mouth of the Patuxent River, as follows:

The Restricted Areas.—Certain below-described areas of the Patuxent River between Prison Point and the river's outlet to the Chesapeake Bay.

The Regulations.—1. *Distance from military establishments.*—Except in the gut of the tip of Point Patience, no craft shall approach closer than 75 yards off the beaches, shoreline or piers of Naval Mine Warfare Test Station. No vessel shall land on Naval Air Test Center property west of Fishing Point. Civilian craft shall not approach range rafts, barges, and platforms closer than 100 yards.

2. *Occasional operations.*—Civilian craft will clear any area used by Naval Mine Warfare Test Station when directed by patrol craft.

3. *Diving operations.*—Diving tenders will exhibit two red conical shapes, arranged vertically, base to base, when underwater diving takes place from naval small craft. At such times civilian craft shall stay at least 200 yards clear of these vessels and proceed at a speed not greater than five knots when within 1,000 yards distance.

4. *Stop engines.*—When two yellow cylindrical shapes are displayed one above the other on a vessel all boats within visual distance must immediately stop their engines and not restart them until the shapes are lowered. Advance warning will be given by hoisting one yellow shape a short period before two shapes are hoisted.

5. *Seaplane landing area.*—On occasions, seaplane landings and take-offs will be practiced in the landing lanes off Naval Air Test Center, Patuxent. The landing area will include those waters in the south side of the river, between Town Point and Hog Point, which are enclosed between the shore and a line joining the following points: (*a*) A point on the shore just west of Lewis Creek, said point 2,000 yards 161°30′ from Point Patience Light. (*b*) A point 1,850 yards 130° from Point Patience Light. (*c*) A point 3,650 yards 247°30′ from Drum Point Light. (*d*) A point 2,060 yards 235° from Drum Point Light. (*e*) A point 700 yards 129° from Drum Point Light. (*f*) A point 1,060 yards 137° from Drum Point Light. (*g*) A point on the shore west of Harper Creek entrance, said point 1,900 yards 158°30′ from Drum Point Light. Operations will be indicated by a square white flag with square blue center by day, and one green light by night (for operations in an easterly direction and/or two vertical green lights for operations in a westerly direction), all signals to be exhibited from Patuxent River Boathouse seawall at the Naval Air Center. In addition, crash boats will patrol the landing lanes throughout the operations, and by night, fleet lights will mark the landing lanes. At such times as the above signals are exhibited, boating in the waters adjacent to the Naval Air Center in the area westward of Fishing Point: (*a*) Will be confined to areas not less than fifty (50) yards nor more than 500 yards from the beaches of the Air Center. (*b*) Will proceed across the seaplane operating area only in accord with instructions from crash boats. (*c*) Will not enter the seaplane basins. (*d*) Will not use the areas adjacent to seaplane basins (boats may cross entrances when no signal is exhibited).

6. *Miscellaneous areas.*—Civilian craft will go no closer than 75 yards to areas defined by small buoys supporting red flags.

7. *Enforcing agents.*—The U. S. Coast Guard Captain of the Port and the Commanding Officer, Mine Warfare Testing Station, Solomons, Maryland, or their designated agents are the enforcing officers.

Note (1).—*Swimming.* Because of the effect of the shock wave from an underwater explosion, swimming in the area between Point Patience and Broome Island should not be engaged in at greater distance from beaches than 200 yards and then only at the risk of the swimmer.

Note (2).—*Licensing discontinued.* Possession of Patuxent River Control Permits is no longer required of draft operators.

Anchorage.—Deep-draft vessels frequently anchor in the mouth of the river for the night. Shelter from westerly winds is found in 18 to 30 feet from 2.2 to 3.5 miles southward of Cove Point Light and quite close in to the shore. If seeking shelter from easterly winds, stand into the entrance and anchor in 30 to 60 feet in the channel about 1.5 miles above Drum Point Light.

Good anchorage for light-draft vessels is found close in to the north bank westward of Drum Point Light, taking care not to go aground on the oyster bank, which is marked by buoys and bush stakes.

Small local vessels up to 10-foot draft anchor in Mill Creek or in the cove north of Solomons Island, but there is little room to swing at this anchorage. St. Leonard Creek is a safe anchorage for small vessels in any weather.

The bottom in the channel as far as Benedict is generally soft, and vessels can anchor where convenient.

Supplies.—Gasoline, Diesel oil, ice, and provisions are obtainable at Solomons and in small quantity at Island Creek, Benedict, Lower Marlboro, and Nottingham. There is artesian water at the wharves at Solomons.

Repairs to hulls of small vessels and minor repairs to machinery can be made at Solomons, but Baltimore is the nearest place for extensive repairs to hull or machinery. Small boat repairs can be made in Island Creek.

Pilots can be obtained at Solomons or Benedict. If the directions are closely followed, a pilot is not required below Benedict, but strangers, unless in small boats, may need one above that place.

Ice closes the river to near the mouth in severe winters.

Tides.—The mean range of tide is about 1 foot at the entrance, 1½ feet at Benedict, and 2½ feet at Nottingham.

Directions.—Courses and distances for Patuxent River are given in Chapter 3.

The Patuxent River enters Chesapeake Bay on the western side, between **Cedar Point** and **Cove Point.** The most prominent marks in approaching the river from southward are the tall tank on Cedar Point and Cedar Point Light, and from northward, Cove Point Light and the high bluffs at **Little Cove Point,** 1.6 miles to the southward. In the entrance the most prominent marks are Drum Point Light and the buildings on Solomons Island. The shoals at the entrance, off **Drum Point, Hog Point, Fishing Point,** and **Sandy Point,** are covered by red sectors of Drum Point Light and marked by lighted buoys.

Cedar Point Light (lat. 38°18′, long. 76°22′) is on a small island 0.3 mile east of Cedar Point, on the south side of the entrance to the river. The light, shown from a wooden tower on a brick dwelling, is 45 feet above the water and visible 6 miles. The end of the shoal extending 0.4 mile eastward from the light is marked by a lighted bell buoy.

Danger.—A sunken dredge, over which is a reported depth of 35 feet, lies 2,150 yards 051° from Cedar Point Light; see Chart 553.

Cove Point Light is on the northeast side of Cove Point, to the northward of the entrance to the river. The light, shown from a white tower, is 45 feet above the water and visible 12 miles. A radio beacon equipped for distance finding and an air-diaphone fog signal are at the light. A bell is substituted if the diaphone is disabled. The light serves as a vessel-reporting station for day service, reporting by telephone to Baltimore. Two detached shoal spots of 16 and 18 feet are about 1.6 and 2 miles, respectively, southeastward of Cove Point Light. A buoy is to the eastward of them.

The entrance to the river is marked on the north side by **Drum Point Light,** shown from a white structure on brown piles, 46 feet above the water and visible 12 miles. It is easy of access either by day or by night for vessels of 24 feet draft without a pilot, and vessels of 28 feet draft can enter by following directions given in Chapter 3. A sunken wreck 0.4 mile southeastward of Drum Point Light has 27 feet of water over it.

The channel between the entrance and Benedict is narrow in places but is comparatively straight except off Point Patience, and the most prominent shoals are marked. Strangers should have little trouble in taking a draft of 20 feet to Benedict in the day-

time with the aid of the chart. Above Benedict the channel is narrow in places and obstructed by shoals and is not sufficiently well marked to be easily followed by strangers.

Solomons Island, 1.6 miles west of Drum Point, is the site of **Solomons,** a village with a post office, inhabited mostly by fishermen and oystermen. The former steamer dock on the northeast end of the island has a depth of 14 feet alongside and the gasoline-station wharves in the cove on the north side of the village have 12 to 15 feet. There is 15 feet generally in the cove. The cove is used as an anchorage by many yachts and fishing boats. Gasoline, Diesel oil, water, ice and provisions may be obtained.

The **Chesapeake Biological Laboratory Wharf,** on the east end of Solomons Island, has a depth of 8 feet at the outer end. A light is on the end of the wharf.

Solomons Island is connected with the mainland by a causeway which prevents navigation around the northwest end of the island.

Mill Creek, north of Solomons Island, has a depth of 22 feet in the entrance and 12 feet for 1.2 miles above in the main branch and 0.8 mile above in the western branch, ***Back Creek.*** Both creeks lie within the area of a naval reservation. The wharves, in Back Creek, beginning at the most southerly, have depths of 17 to 9 feet at their outer ends. The coal dock has a depth of 14 feet alongside.

The approach to Mill Creek is marked by a light and buoys. The deepest draft can be taken to the entrance by heading for the building on the point at the eastern side of the entrance on a **330°** course, passing eastward of the light and entering the creek in mid-channel. A draft of 12 feet or more can be taken to the entrance from eastward by following the north shore at a distance of 200 yards, passing northward of a middle ground marked by buoys and covered with oyster stakes.

There is a shipyard and marine railway, capable of hauling out vessels of 150 tons, 125 feet in length, and with 10 feet draft, above the last buoy at the entrance to the creek on the east side. The shipyard wharf has a depth of 19 feet at the end. A 5-ton crane is here.

The entrance to the harbor of the airbase on the southern side of the Patuxtent River is marked by lights. Speed in the entrance is restricted to 4 miles per hour.

Town Point is low and bare and has two small private landings and several buildings on the north side. The end of the shoal off this point is marked by a buoy.

Point Patience is 1.5 miles northwest of Solomons Island. The shoal off the end of the point is marked by a light and a buoy. The long Government pier on the east side of Point Patience has a depth of 42 feet at the end, shoaling along the eastern face to 12 feet about 150 feet from the shore. The Government pier on the northwest side has a reported depth of about 20 feet.

Mill Creek and ***Cuckold Creek*** have a common entrance with a depth of 15 feet, 1 mile northwestward of Point Patience. Cuckold Creek has a depth of 12 feet for 0.9 mile and 8 feet for a farther distance of 0.6 mile. Mill Creek has a depth of 12 feet for 0.4 mile and 8 feet for a farther distance of 0.6 mile. A buoy on the end of the shoal on the north side at the entrance is the only mark. In approaching the entrance, pass 400 yards southward of the buoy and 600 yards northward of the point south-southwestward of it. The mid-channel is clear above the entrance.

Hellen Creek, 1.7 miles above Point Patience, has a depth of 3 feet across the bar at the entrance and 10 feet inside for 0.7 mile. It is principally used as a harbor for small boats. The best water favors the eastern side in entering.

St. Leonard Creek, on the northeast side 7.5 miles above Drum Point, has a depth of 15 feet into the entrance and 10 feet for 2.5 miles above. The lower end of the creek forms a safe anchorage in any weather in depths of 16 to 23 feet. **Petersons**

Point Light, on the shoal 0.3 mile south of **Petersons Point,** is the principal guide to the entrance. In entering pass 600 yards eastward of the light and follow a mid-channel course through the mouth. The mid-channel is clear for 2.5 miles above.

Sotterley Wharf is on the southwest side of the river westward of the entrance to St. Leonard Creek.

Broome Island is a low bare point marked by **Broome Island Light,** on the end of the shoal south of the point. **Broome Island** is a small village with a post office northward of the point.

Island Creek, on the east side of Broome Island, is marked by **Island Creek Light** at the eastern entrance point. It has a depth of 10 feet for 0.7 mile above the entrance, but there are unmarked shoals close to the channel. It is little used except by small local craft. There is a marine railway capable of hauling out a boat 40 feet long with 3 feet draft. Provisions, ice, and gasoline are available in small quantity. Repairs can be made. The cannery landing has a controlling depth of 5 feet alongside.

Parkers Wharf is on the north side 1.5 miles north-northwestward of Broome Island Light. It is in ruins except for the inner end which is used as a landing by small local boats. The best water in approaching Parkers Wharf is from south-southeastward. Give the western side of Broome Island a berth of 0.4 mile.

Battle Creek, on the north side 3 miles above Broome Island Light, is marked by **Battle Creek Shoal Light (lat. 38°26′, long. 76°36′)** off the southeastern entrance point. It has a depth of 10 feet for approximately 1 mile above **Prison Point,** and is navigable for small boats for a farther distance of about 1 mile. The deepest draft entering are schooners drawing 10 feet. The entrance should be approached on a northeasterly course to avoid unmarked shoal spots on either side. It is approximately 50 yards wide and should not be used by boats drawing more than 6 feet. Local knowledge is required.

Sheridan Point is 6 miles above Broome Island Light. Directly opposite on the southwest side are ***Washington*** and ***Persimmon Creeks,*** both shoal and little used.

Trent Hall Creek and ***Indian Creek,*** on the west side just below Benedict, have depths of 5 feet in the entrances and 3 feet to near the heads.

Benedict is a village on the western side of Patuxent River 18.5 miles above the entrance. It is the present head of commercial navigation. Schooners of 10- to 17-foot draft sometimes ascend the river to this point. There is a 6-foot shoal off the wharves which should be guarded against in approaching them. A year around vehicular ferry connects with Hallowing Point. Gasoline and supplies can be obtained. There is a depth of 9 feet at the upper (cannery) wharf and 5 feet at the landing below the ferry. There is a small marine railway capable of hauling vessels 40 feet in length with 3 feet draft.

Hallowing (Holland) Point is a vehicular ferry landing directly opposite Benedict. There are numerous landings on both sides of Patuxent River between Benedict and the head but most of them are in ruins. The only villages are Lower Marlboro on the east side and **Nottingham** on the west side, distance 10 and 15 miles, respectively, above Benedict.

Above Benedict numerous fish traps and stakes make navigation difficult. The channel is marked by buoys for 3 miles above the town, and also between Lower Marlboro and Nottingham.

Swanson Creek, on the west side 1.5 miles above Benedict, has depths of 2 to 4 feet and is little used.

Hunting Creek, just above on the east side, has a depth of 3 feet across the flats at the entrance and for a distance of 3 miles above. It is frequented by motor boats and lighters.

Lower Marlboro is a post village on the eastern shore 10 miles above Benedict. The state landing there has 12 feet of water alongside and is in good condition. Gasoline and provisions can be obtained nearby.

Nottingham landing is in ruins.

An abandoned railroad bridge having a horizontal clearance of 77.8 feet and with superstructure removed, crosses the river 0.2 mile below Western Branch. The west channel span only is used.

Western Branch, entering the river just above the bridge, is not navigable except for a short distance above the mouth.

Upper Marlboro is a village on the railroad, 1.8 miles westward of **Hills Bridge,** at the head of navigation on the Patuxent River. The bridge is fixed and has a high water clearance of 7.7 feet; the single span bridges the river.

CHAPTER 11

Chesapeake Bay, Cove Point to Head of Bay

CHARTS 1225, 1226

Cove Point to Sandy Point

CHART 1225

THE western side of Chesapeake Bay is generally high and wooded and unbroken by tributaries from Cove Point to Holland Point, 22 miles to the northward, and the 30-foot curve is nowhere more than 1.8 miles from the shore. Between Holland Point and Sandy Point the shoreline is irregular and is indented by many tributaries, the most prominent being Rockhold Creek, West River, Rhode River, South River, and Severn River.

The channel in the bay is unobstructed, with widths of from 2.5 to 5 miles, has depths of 40 feet or more available and is well marked by lights and buoys. No difficulties should be experienced in navigating it in clear weather.

Fish-trap areas cover all the shoals on the west side of the bay and are shown on the chart. Black and white horizontal-banded buoys mark the outer limits of the areas

Cove Point to Plum Point

CHART 553

Measured mile.—Between Cove Point and **Rocky Point** is a measured course 1 nautical mile in length on a bearing of 322°. The ranges marking the ends of the course consist of targets 4 feet square, with a black circle 2 feet in diameter, set on piling. The front targets are located about 430 yards and the rear targets about 230 yards from shore. No lights are on these structures and boats are advised to proceed with caution in this area.

Kenwood Beach, 9 miles above Cove Point Light, has a landing which is now in ruins.

Dares Beach, 4 miles north of Kenwood Beach, has a pier in ruins. A number of

dolphins, placed in a north-south line 650 yards long, is 0.7 mile off the beach. The end dolphins are lighted.

At **Plum Point** are the ruins of a pier. About 0.4 mile north of the pier is a small yacht basin which is entered from the bay between bulkheads. The entrance is unmarked and no dredged channel leads to it. It is reported that only about 2 feet can be taken between the bulkheads.

Plum Point to Holland Point

CHART 1225

At **Randle Cliff,** 18 miles above Cove Point Light, is a one-story brick building with a white octagonal wooden tower at the southern end. The top of the tower is 167 feet above the water.

Restricted areas.—Danger zones, comprising firing ranges, have been established off Randle Cliff and Chesapeake Beach as follows:

The Areas.—(1) *Area A.* A line drawn 1,000 yards 090° from a point in latitude 38°39′12″ N., longitude 76°31′36″ W., thence in a 000° direction to the parallel of latitude 38°39′40″ N., and thence in a 270° direction to the shore.

(2) *Area B.* The segment of a circle included within a radius of 9,600 yards with center in latitude 38°39′12″ N., longitude 76°31′36″ W., between the bearings 031° and 137°30′.

(3) *Area C.* The segment of a circle inclosing an area within two circles having a radius of 9,600 yards and 13,200 yards, respectively, from a point in latitude 38°39′12″ N., longitude 76°31′36″ W., and between the bearings 031° and 137°30′ from the same point.

The Regulations.—(1) No vessels shall enter or remain in Area A at any time. No vessel shall enter or remain in Area B between the hours of 1:00 p. m. and 5:00 p. m. daily except Sunday. No vessel shall enter or remain in Area C between the hours of 1:00 p. m. and 5:00 p. m. daily except Sunday, except as provided in paragraph (4).

(2) Advance notice shall be given of the date on which the first firing practice is conducted, and such notice shall be published in *Notice to Mariners.* The area will be in use throughout the war, and no further notice is contemplated that firing is continuing.

(3) Prior to the conduct of each firing practice a patrol vessel will patrol the range to warn navigation. "Baker" will be flown from a conspicuous point of the patrol vessel and from a prominent position on shore.

(4) Through navigation of commercial craft will be permitted traverse of Area C at all times. Such vessels shall proceed on their normal course and shall not delay their progress.

(5) These regulations shall be enforced by the Commandant, Fifth Naval District, and such agencies as he may designate.

Chesapeake Beach is a summer resort 20 miles above Cove Point Light. A water tank and several buildings showing against the trees are prominent. Six lighted dolphins are maintained by the U.S. Navy in the approaches, to the northeastward, eastward, and southeastward of Chesapeake Beach. Gasoline and provisions are obtainable and there is bus communication with Washington.

Fishing Creek enters the Bay at Chesapeake Beach. The project for improvement of the creek provides for a channel 7 feet deep with widths of 100 feet and 60 feet from deep water in Chesapeake Bay to an anchorage of the same depth, 120 feet wide and 400 feet long, located in the marsh 500 feet above the mouth of the creek, and for twin stone jetties at the entrance. The project has been completed. In October 1946 the

controlling depth was 6 feet in the channel and anchorage basin. The depth of water at the landing in the basin is 3 feet.

The channel is marked by a buoy on the south side of the entrance, lights on the ends of the jetties and a lighted range bearing 263°. South of the jetties is a wharf with a privately maintained light on the outer end.

Holland Point to Thomas Point

CHART 550

Holland Point, 2.3 miles north of Chesapeake Beach, has extensive shoal areas extending in all directions from it, with as little as 11 feet 1.3 miles from shore. The edge of the shoals is marked by buoys to the northeastward and eastward.

Herring Bay, to the north of Holland Point, is extensively used as an anchorage. ***Long Bar Shoal,*** having depths of from 2 to 5 feet, extends south-southwestward from the north side nearly across the bay, and is marked at its south end by **Parkers Island Shoal Light (lat. 38°44′, long. 76°33′).** There is a depth of 12 feet around the south end. There is good anchorage in westerly weather eastward of the shoal in depths of 15 to 20 feet. Small vessels usually anchor westward of the shoal, where there are depths of 7 to 12 feet, protected against easterly winds to a considerable extent by the shoal outside.

Rockhold Creek, flowing into Herring Bay at the northwest end, provides shelter for small boats. The project for improvement of the creek provides for a channel 7 feet deep and 60 feet wide from that depth in Herring Bay to the vicinity of the county wharf in the creek, with a turning basin of the same depth, 100 feet wide and 150 feet long at the head of the channel, and a stone breakwater approximately 900 feet long on the east side of the entrance channel. The project has been completed and in October 1946 there was a controlling depth of 6 feet from the entrance to the county wharf. A fixed highway bridge crosses the creek 1 mile above the mouth and just above the county wharf. This bridge and the one crossing ***Tracy Creek*** have horizontal clearances of 19 feet and vertical clearances of 10 feet at MHW.

The channel into Rockhold Creek is marked by three lights and two daybeacons. Gasoline and provisions are obtainable in the creek. There are four marine railways capable of hauling out boats up to 50 feet in length with 3 feet draft. All kinds of repairs can be made. There are post offices at **Deale, Nutwell** and **Fairhaven.** The wharves have a depth of 6 feet at the ends.

Tides.—The mean range of the tide is about 1 foot.

To enter Herring Bay, pass northward of Holland Point Bar buoy and head for Parkers Island Shoal Light on a 245° course. Pass 200 yards southward and westward of the light and head for the end of Fairhaven wharf (in ruins) on a north-northwesterly course. Anchorage can be had 100 to 500 yards eastward of the wharf in depths of 10 to 11 feet.

West River, 31 miles below Baltimore and 3 miles southwestward of Thomas Point Shoal Light, has a depth of 15 feet in the entrance, gradually decreasing to 7 feet 3.8 miles above. The entrance is marked by buoys, one of which is lighted. Shoals

extend nearly to mid-channel off many of the points. Those near the entrance are marked by buoys, and those above the entrance by buoys and a light.

Parish Creek, on the east side of the entrance to West River, has been improved by dredging. The project provides for a channel 8 feet deep and 50 feet wide, widened at the ends, from deep water in West River to the head of the south fork off **Shadyside,** and an anchorage basin at the junction of the north fork having a depth of 6 feet and an area not exceeding 1½ acres. The entrance channel had a controlling depth of 7 feet in October 1946.

The channel is marked by lights at the entrance and on the east side at the first turn, and by two daybeacons at the anchorage basin.

Gasoline can be obtained at two landings at Shadyside; the least depth alongside is 5½ feet. There is a small marine railway which can accommodate a vessel 40 feet in length with 4 feet draft. There is another in Parish Creek which can haul a vessel 50 feet in length with 3 feet draft. The oyster dock on the point between the two arms of the creek has a depth of 8 feet at the end.

Tides.—The mean range of tide is about 1 foot.

Gasoline and provisions are obtainable at **Galesville** and there are three marine railways capable of hauling out vessels 80 feet in length with 6 feet draft. Repairs can be made. The Corinthian Yacht Club is located at Galesville. The wharves at Galesville have depths of from 7½ to 10 feet alongside. Gasoline and fresh water can also be secured at the oyster wharf at the entrance to ***Tenthouse Creek.*** The depth of water here is 8 feet.

Directions, West River.—Approach a position 200 yards north-northwest of buoy 1 on any course between **240°** and **284°**, round the buoy at a distance of 200 yards, steer **221°** to southeast of lighted buoy 2, distant about 100 yards, then steer **253°** for Light 4 to 250 yards northwestward of buoy 3. From this point be guided by the buoys and the chart.

Rhode River, on the north side of West River, has a depth of 10 feet for 1.7 miles above the entrance. A shoal, marked at its end by a light, extends 400 yards southwestward from **Dutchman Point,** on the northeast side at the entrance to Rhode River, and vessels should favor the southwest side in entering. Above the entrance the mid-channel is clear if the points be given a good berth. They are marked by daybeacons.

Cadle Creek, on the north side, has a depth of 4 feet to the post village of **Mayo** near the head, where gasoline and provisions are obtainable. There are two railways capable of hauling out boats 40 feet in length with 3 feet draft.

Carr Wharf, on the east side of the entrance to ***Bear Creek,*** has a depth of 10 feet at the end and is in excellent condition. Within Bear Creek is a marine railway capable of hauling out boats of 4 feet draft and 40 feet in length.

Contees Wharf is in poor condition but there is an excellent wharf about 200 yards westward with about 7 feet at the end.

South River, just westward of Thomas Point Shoal Light, has a narrow channel with a depth of about 14 feet for 6.3 miles above the entrance and 9 to 12 feet into the tributaries. The principal shoals for a distance of 4 miles above the entrance are marked by buoys.

A highway swing drawbridge, with openings 70 feet wide and a vertical clearance at MHW when closed of 13.7 feet, crosses the river 6 miles above the entrance. A mile above, another swing drawbridge has openings 40 feet wide and a vertical clearance at MHW of 8 feet when closed.

Speed regulations.—No boat shall proceed at a greater speed than 8 miles per hour at any time between May 1 and September 15, inclusive, on the South River from the State Highway bridge on State Route No. 2 at Edgewater, Maryland, to its head, or on the tributaries emptying therein, including Beards Creek, Broad Creek, Gingerville Creek and Warehouse Creek.

Numerous small creeks enter into the river. Many of these have good water in their channels and are extensively used by local yachts and motor boats.

In the southern end of ***Selby Bay*** is a small landing, depth at end 5 feet, where gasoline and fresh water can be obtained. A small marine railway is here.

Just inside the north entrance point of ***Glebe Creek*** is a marine railway capable of hauling a vessel 40 feet in length with 5 feet draft. Gasoline can be obtained here.

Gasoline is also obtainable at the two wharves just eastward of the south end of the first bridge. The western landing has 12 feet at its end.

Another marine railway is located on the western shore of ***Beards Creek,*** about 0.5 mile above the entrance. It can accommodate a vessel 50 feet in length with 6 feet draft.

Directions, South River.—To approach and enter make good a course of **315°** to about 30 yards southwest of Marshy Point lighted buoy 4, with Bloody Point Bar Light directly astern. From here be guided by the buoys and the chart.

Thomas Point Shoal, to the northward of the entrance to South River, extends 1.3 miles southeastward from **Thomas Point,** and is marked by **Thomas Point Shoal Light (lat. 38°54′, long. 76°26′)** and a buoy off the end of the shoal. The light, shown from a white structure on brown piles, is 43 feet above the water and visible 12 miles. An air-diaphone fog signal is at the light and a bell is sounded if the diaphone is disabled. Red sectors of the light cover the shoals to the northward and southward of the light.

Thomas Point to Sandy Point

CHART 566

Tolly Point, 2 miles north of Thomas Point and on the south side of the entrance to the Severn River, is wooded and has a group of cottages on it. ***Tolly Point Shoal*** extends 1 mile southeastward from the point and is marked by a lighted bell buoy on the end. There is a slough through the shoal 0.6 mile west-northwestward of the buoy, through which boats of 6 feet draft pass, but it is unmarked and strangers should not attempt to use it.

Lake Ogleton, 0.5 mile westward of Tolly Point, has 8 to 9 feet of water in it but only about 2 feet in the entrance.

The wharf of the **Annapolis Roads Club** is about 0.2 mile northwestward of the entrance to Lake Ogleton. There is a depth of 10 feet at the end of the wharf. The club building halfway up the steep wooded shore is prominent.

The ***Severn River*** enters Chesapeake Bay north of Tolly Point, 124 miles above the entrance to the Bay and 26 miles below Baltimore. The Severn River is the approach to Annapolis, the capital of Maryland, and is frequented by many small local craft and by small naval craft as far as Annapolis, the usual draft not exceeding 12

feet. There is little traffic by water above Annapolis except in small pleasure boats seldom exceeding 6 feet in draft.

A channel has been dredged and buoyed from deep water in Chesapeake Bay to abreast the docks of the Naval Academy. In November 1946 there was a controlling depth of 18½ feet in this channel.

The 12-foot curve on the southwest side of the river is marked by buoys as far as Annapolis.

The river has a natural channel with a depth of 18 feet for 7 miles above Annapolis and 6 feet for 2 miles farther. The channel above Annapolis is only partially marked, but is broad and easily followed with the aid of the chart.

Annapolis Harbor, Anchorage areas.—The following anchorage areas, together with governing regulations, have been established for Annapolis Harbor, Md.:

1. *Naval anchorage (small craft).*—Beginning at a point on the prolongation of the line of the northeast seawall at the Naval Academy ground 80 feet from the face of the southeast seawall; thence 1,410 feet 080°49′ to black can buoy 15; thence 1,815 feet 123°49′; thence 3,558 feet 259°32′; thence 465 feet 307°40′; thence 1,500 feet 010°09′ parallel to the southeast seawall to the point of beginning.

Note.—The following described portion of the Naval Anchorage (small craft) is designated as a Yacht anchorage, to accommodate, simultaneously, five large yachts and twelve 30-foot WL Yawls: From the mast on Naval Academy seawall 250 yards 081°; thence 260 yards 119°; thence 28 yards 205°; thence 675 yards 263°; thence 252 yards 039° to the point of beginning. Anchor lights are not required.

2. *Naval anchorage (deep-draft naval vessels).*—An area bounded on the north by latitude 38°58′ N., on the east by longitude 76°24′ W., on the south by latitude 38°56′30″ N., and on the west by a line drawn in a 139° direction from Greenbury Point Light to latitude 38°56′30″ N. Berths in the above described anchorage will be assigned on application to the Commandant, Severn River Naval Command.

3. *South anchorage.*—Beginning at a wharf piling at Eastport in, approximately, latitude 38°58′32″ N., longitude 76°28′50″ W.; thence 250 feet 000°; thence 2,130 feet 079°32′; thence 3,240 feet 133°47′ to black can buoy 5.

4. *Inner anchorage.*—In general, a small area in Spa Creek extending, approximately, 150 yards northeastward from a line parallel to and 30 yards (approx.) northeastward from Spa Creek Drawbridge.

Note.—Except in cases of great emergency, no vessel shall be anchored in Annapolis Harbor westward of the dredged channel and northward of black can buoy 5, outside of the areas herein defined and established. Anchoring within 1,000 yards of the naval reservation on the west side of the Severn River, except in the South Anchorage or in Annapolis Harbor, without special authority of the Commandant, Severn River Naval Command, is prohibited.

Supplies.—Gasoline, provisions, ice, coal, and water can be obtained at Annapolis, and there are machine shops for ordinary repairs to motors.

Pilots.—Local boatmen who are competent pilots will be found near the entrance if a pilot is desired.

Storm warnings are displayed at Annapolis.

Bridges.—Two bridges cross the Severn River just above Annapolis. The lower, a highway bridge, has a bascule span with an opening 75 feet wide and a vertical clearance of 16.5 feet at MHW, when closed; the other is a railway bridge with a swing span 62 feet wide in either opening and a vertical clearance of 6.2 feet at MHW, when closed. Both bridges are opened at any time of day or night on a signal of three blasts.

Greenbury Point Shoal extends southward and southeastward from **Greenbury Point,** and is marked by **Greenbury Point Shoal Light (lat. 38°58′, long. 76°27′),** shown from a red skeleton tower on piles, and a row of buoys on the southwest side. The light is 40 feet above the water, visible 10 miles, and has a bell fog signal which is in operation from September 15 to June 15. The 18-foot curve lies 250 yards southwestward of the light, and there is abrupt shoaling to the 3-foot curve about 250 yards

westward of the light. A naval radio station is on Greenbury Point. The nine tall towers are prominent over a large area up and down the bay.

Back Creek, a tributary of the Severn River, is on the southeast side of Eastport. The project for improvement of the creek provides for a channel 100 feet wide and 8 feet deep from that depth in the Severn River into Back Creek, protected by a suitable stone jetty on the south side of the entrance. The project has been completed and in October 1946 project depth obtained in the entrance channel and there was 9 feet inside, shoaling to 7 feet near the head.

The outer end of the breakwater and the south side of the entrance channel are marked by lights. A daybeacon marks the south side of the inner end of the dredged channel.

To enter pass northward of buoy 3 and bring the two lights on range. Follow this range until about 100 yards from the breakwater light. Then pass eastward of the light.

The creek is used as a harbor for small fishing boats. The largest of the three marine railways is capable of hauling out boats 45 feet in length with 4 feet draft. Repairs can be made, and gasoline and supplies are available.

Eastport is a small town just southward of Annapolis, with which it is connected by a bridge. There are several marine railways here, the largest being capable of hauling out vessels of 150 tons, 125 feet in length with 11 feet draft. Repairs can be made and supplies are available.

Annapolis is the site of the **United States Naval Academy,** which occupies the entire northeastern part of the city between Spa and Dorseys Creeks. The two inclosed basins and the entire water front on the northeast side and for a distance of 0.4 mile on the southeast side are a part of the Naval Academy. The wharves are on the northwest side of Spa Creek, between the Naval Academy grounds and the bridge across the creek. These wharves have depths alongside of from 10 to 12 feet.

The project for improvement of Annapolis Harbor provides for a channel 15 feet deep and 100 feet wide from deep water in the Severn River to a point in Spa Creek opposite the city slip and an anchorage basin of 12 feet depth below the county highway bridge over the creek. The project has been completed and in 1946 project depths were reported to exist.

Market Slip, 250 yards below the bridge over Spa Creek, is 250 yards long and 40 yards wide and has a depth of 8 feet to near the head. It is open to the public and is extensively used by small craft.

Spa Creek is crossed by a highway swing drawbridge just above the wharves. Each opening has a horizontal clearance of 40 feet and a vertical clearance of 5.1 feet at MHW, when closed. A new bridge was under construction, just above the highway bridge, in October 1946. Favor the southeast side in approaching the draw to avoid a shoal on the northwest side. The creek has a depth of 9 feet for 0.6 mile above the bridge and the mid-channel is clear. The mouth of the Spa Creek below the bridge has depths of 10 to 13 feet and is extensively used as an anchorage.

A channel dredged to 20 feet leads from the Severn River channel to a Government wharf on **Carr Point,** which has 20 feet alongside. A small-craft basin 0.6 mile to the westward has a controlling depth of 12 feet in the entrance channel and in the basin.

Dorseys Creek, known locally as ***College Creek,*** on the northwest side of Annapolis, has a depth of 11 feet in the entrance and 8 feet to near the head. It is crossed by four bridges, all having draw openings, the least width of opening being 40 feet, with vertical clearances at MHW when closed of 5.2 feet, 5 feet, 6 feet, and 11.2 feet,

respectively. The first bridge is a swing bridge, and the others bascule type. The State Highway bridge and the railroad bridge are opened only after 5 hours advance notice has been given. The best water in entering leads along the south side to near the lower bridge.

Weems Creek (Chart 550), 1.5 miles above Annapolis, has a depth of 12 feet for 1 mile above the entrance and 6 feet to the head. It is crossed by a highway swing drawbridge, each opening 28 feet wide and with a vertical clearance of 6 feet at MHW when closed.

Round Bay, an expansion of Severn River 4 miles above Annapolis, has depths of 17 to 23 feet and is frequented by motor boats.

There are two small marine railways in ***Forked Creek.*** The largest can accommodate a vessel 50 feet in length with 5 feet draft.

A wreck awash lies off the mouth of ***Yantz Creek.***

Ice seldom interferes with navigation, except in severe winters, and then only for a limited time.

Tides.—The mean range of tide is about 1 foot and is greatly influenced by winds. The tidal-current velocity seldom exceeds ½ knot.

Directions, Severn River.—The following directions are for vessels of not over 16-foot draft to Annapolis in the daytime. Strangers, unless of light draft, should use caution in entering at night.

From southward.—From the outer end of the dredged channel, lying 0.5 mile northeastward of Tolly Point Shoal lighted bell buoy, steer **316°** in the dredged channel, leaving the buoys at a distance of 30 yards, until westward of Greenbury Point Shoal Light and 50 yards northeastward of buoy 9. Then steer **333°** for 0.75 mile until southwestward of buoy 14; on this course the wharf, in front of a group of white houses, will be a little on the starboard bow and the United States Naval Experiment Station building on the port bow. From buoy 14 a **306°** course will lead to the dredged anchorage basin off the Naval Academy.

From northward.—Vessels of suitable draft may steer course **237°** from buoy 35 to buoys 5 and 6 on the dredged channel, picking their way through the fish traps. Thence up the channel as above.

Whitehall Bay (Chart 566), an indentation on the west side of Chesapeake Bay, is 1 mile north of the mouth of the Severn River and between Greenbury Point and **Hackett Point.** It has depths of 7 to 13 feet in the north end. The channel at the entrance is narrow, leading between ***North Shoal*** and ***Whitehall Flats,*** and is marked at its narrowest part by a lighted buoy on the east side, which is maintained from May 1 to September 30.

Mill Creek is a small tidal inlet entering Whitehall Bay at the northwest end. The project for improvement of the creek provides for a channel 6 feet deep and 60 feet wide from that depth in Whitehall Bay to the same depth inside the mouth of the creek. No work has been done on the project and the depth across the bar is about 3 feet, thence 8 feet to near the head. Gasoline can be obtained at a small landing near the head of navigation.

Whitehall Creek and ***Meredith Creek*** enter Whitehall Bay at the north end. Whitehall Creek has a depth of 12 feet at the entrance and 7 feet to near the head. The channel at the entrance is narrow and crooked and is marked by two daybeacons. On the eastern shore about 1 mile above the mouth is a small marine railway capable of hauling a vessel 40 feet in length with 4 feet draft. Gasoline and fresh water are

obtainable at the landing. Meredith Creek has a very narrow entrance, with a depth of about 2 feet and deeper water inside.

The Sandy Point-Matapeake Ferry has its western terminus about 0.5 mile southwestward of **Sandy Point.** The slips are protected by two stone jetties whose outer ends are marked by lights. The channel leading to the wharf has been dredged to a controlling depth of 15 feet. The entrance to the channel is marked by buoys, one of which is a lighted bell buoy.

Sandy Point to Head of Bay

CHART 1226

Above Sandy Point the shores of Chesapeake Bay are very irregular and indented by many tributaries, the most important being the Patapsco, Elk, Northeast, and Susquehanna Rivers.

The Patapsco River enters the bay on the west side, about 10 miles northward of Sandy Point Light, and is the approach to and also forms the harbor of Baltimore.

Upper Chesapeake Bay extends about 30 miles in a general north-northeasterly direction from the entrance to Pataspco River to the mouth of the Northeast and Susquehanna Rivers. It is frequented by freight steamers and tugboats and barges from Baltimore to landings on the tributaries, besides many vessels bound through the Chesapeake and Delaware Canal, the approach to which is through Elk River and Back Creek. Large ocean-going steamers frequent the Patapsco River and vessels of up to 25 feet draft transit the Chesapeake and Delaware Canal but the usual draft of vessels frequenting the other tributaries is from 5 to 12 feet.

All of the tributaries in the upper end of the bay are usually closed to navigation by ice for extended periods during the winter. There are no regular pilots, but local boatmen who are competent to act as pilots can usually be obtained at the entrances of the tributaries. Towboats can be obtained from Baltimore.

There are extensive shoal areas in the northern part of the bay, many of them having fish weirs on them in season. Many of the shoals northward of Pooles Island are rocky and should be avoided even by small craft. A foul area about 1.5 miles long and 0.5 mile wide, with its axis in a northeast-southwest direction, is about halfway between Worton Point and the entrance to Bush River.

The upper Chesapeake Bay from a point about 1.7 miles southeastward of Pooles Island to the entrance to the Chesapeake and Delaware Canal is included in a Federal improvement project which provides for a channel 27 feet deep and 400 feet wide. The controlling depth in the channel is given in Chapter 6. The channel is well marked by buoys and lighted ranges.

Fish weirs are prohibited at a greater distance from shore than 800 yards northward of Gunpowder River on the western side and Sassafras River on the eastern side. Between Gunpowder River and the channel leading to Baltimore on the western side, and between Sassafras River and Tolchester Beach on the eastern side, they are prohibited in water exceeding 20 feet in depth. The limits of fish-trap areas are shown on Chart 1226 by broken lines.

A large portion of the western side of upper Chesapeake Bay and its tributaries is included in a **restricted area for firing** in connection with the Aberdeen Proving Ground. This area is indicated on the chart by a broken line.

The Area.—Beginning at a point on the westerly side of Chesapeake Bay, at the south side of the mouth of Swan Creek, Harford County, Maryland, the most northerly point of the reservation known as Plum Point, thence southeasterly along the low water mark on the shore of Chesapeake Bay to and across the north entrance of Spesutie Narrows and thence along the low water mark on the north shore of Spesutie Island to Locust Point, thence along a straight line from Locust Point to Turkey Point for a distance of approximately 1,400 yards, thence following a line parallel to and 1,000 yards from the low water mark on the easterly shore of Spesutie Island to a point 1,000 yards due southeast of Sandy Point, thence approximately southwest in a straight line to a point approximately 1,250 yards 190°30′ from Bear Point, thence approximately 9,275 yards 231°04′ to a point in Chesapeake Bay about 1,700 yards due east from Taylor Island Point, thence southwesterly in a straight course, except such variations as may be necessary to include all of Pooles Island to the southwesterly point of Pooles Island, thence in a northwesterly direction to the most southwesterly point of Spry Island, including all of Spry Island, thence northwesterly in a straight line to extreme southerly island off Lower Island Point, thence northwesterly in a straight line through Brier Point to a point in Seneca Creek where this line intersects a straight line which passes through monuments No. 124 and 125 on westerly part of Carroll Island, thence northeasterly in a straight line passing through Marshy Point, at the junction of Dundee Creek and Saltpeter Creek, to the intersection of the center line of Reardon Inlet with Gunpowder River, except such variations as may be necessary to exclude any and all parts of the point of land on the westerly side of Gunpowder River about one mile south of Oliver Point, thence northerly along the center line of Reardon Inlet to its intersection with the southeasterly line of the right of way of the Pennsylvania Railroad, thence northeast along the Pennsylvania Railroad following the reservation boundary line to shore of Bush River, and along its western shore to Fairview Point, thence northeast in a straight line across Bush River to concrete monument No. 64 located on the eastern shore of Bush River, south of Chelsea, thence along the eastern shore of Bush River northerly to the mouth of Sod Run, thence by a broken line along the boundary of the reservation to Swan Creek, and thence in a straight line to Plum Point.

The Regulations.—All craft shall keep clear of this restricted area.

Approach to Baltimore

CHART 549

Sandy Point Light (lat. 39°01′, long. 76°23′) is near the end of the shoal 0.5 mile northeastward of Sandy Point. The light, shown from a red dwelling with white roof on a brown cylindrical foundation, is 51 feet above the water and visible 13 miles. A red sector of the light covers the shoal to the westward of the light. An air-diaphragm horn fog signal and a radiobeacon equipped for distance finding are at the light. A bell is sounded if the horn is disabled. Deep-draft vessels should pass 0.2 mile or more to the eastward of the light.

Magothy River enters the bay 3 miles northwestward of Sandy Point Light and 1.3 miles westward of Baltimore Light. It has a depth of 12½ feet at the entrance and for a distance of 5.5 miles above, but has many shoal spits and middle grounds of less depth close to the channel. The entrance is marked by a light and a lighted buoy, and buoys mark the most dangerous shoals for 3.5 miles above the entrance. The usual draft of boats using it is 3 to 5 feet and deepest draft 10 feet. There are no wharves except for small craft. Many excellent anchorages for small boats are in the numerous tributaries to Magothy River, and this locality is a favorite cruising ground for local

yachts. The wreck about 220 yards southeastward of **Magothy River Light** is covered at low water, and caution is necessary.

Mountain Point, on the north side of the entrance, is a high wooded bluff with a bare sandy point outside it. A pavilion peak is prominent.

Deep Creek, on the south side just inside the entrance, has a depth of 7 to 9 feet in mid-channel and is sometimes used as an anchorage for small craft. Gasoline can be secured about 0.5 mile above the mouth.

Magothy Narrows is entered through a privately marked channel with 11 feet of water east of the middle ground in ***Tar Cove.*** Eastward of **Holland Point** there is a speed limit of 8 miles per hour. The Gibson Island Yacht Club on the north side of **Gibson Island** is reached through the above channel. Within the harbor, southwest of **Purdy Point,** is a wharf with 9 feet of water at its end where gasoline, fresh water and ice can be obtained. The two marine railways here can haul vessels 40 feet in length with 7 feet draft.

Gasoline and fresh water can also be obtained in ***Cornfield Creek*** on the east side of **Long Point.** The depth of water at the landing is 6 feet.

Cypress Creek, near the upper end of the river, has been improved by a dredged channel, project depth 7 feet, width 75 feet, through the entrance bar and widened to approximately 125 feet at the easterly end. The channel is marked by two daybeacons. In October 1946 there was a controlling depth of 7 feet. A marine railway for small boat repairs is in Cypress Creek.

The entrance to Magothy River is narrow, but is marked. Approaching the entrance from northward, a **243°** course from buoy 5 on the Craighill Channel will lead 0.5 mile northwestward of Baltimore Light and to the buoy at the entrance. Approaching from southward, strangers should pass eastward of Sandy Point Light and give the shore on the southwest side a berth of 0.5 mile until up to the lighted buoy at the entrance. Either course leads through an area of possible fish traps. Pass 100 yards southward of the lighted buoy and steer northwestward into the river, passing northward of Magothy River Light.

There are three buoys between **Ulmsteads Point** and **South Ferry Point,** and daybeacons in the Cypress Creek entrance.

Baltimore Light, on the western side at the entrance of the dredged channel leading to Baltimore, is shown from a white octagonal house on a brown cylindrical pier. The light is 52 feet above the water and is visible 12 miles.

The ***Patapsco River,*** on the west side of Chesapeake Bay 136 miles above the entrance, is the approach to the city of Baltimore. The river is 3.8 miles wide at the mouth but the entrance is obstructed by extensive shoals.

Craighill and ***Cutoff Channels,*** sections of the main channel, lead through the shoals southward of the entrance to the river, and ***Brewerton*** and ***Fort McHenry Channels*** lead from the mouth of the river to Fort McHenry. The channels are all well marked by lighted ranges and by buoys, some of which are lighted. The Federal project provides for an extension of Brewerton Channel 400 feet wide and 27 feet deep from the Brewerton-Cutoff Angle southeastward to a depth of 27 feet in Chesapeake Bay as a connection with the inland waterway from Chesapeake to Delaware Bay. Dredging is scheduled to begin in June 1947 and should be completed in about 6 months.

Sevenfoot Knoll Light, shown from a red cylindrical pile structure, is on ***Sevenfoot***

Knoll, a shoal off the mouth of Patapsco River 5.9 miles north of Baltimore Light. The light, 600 yards eastward of the main channel, is 42 feet above the water and visible 9 miles.

Directions, Patapsco River.—A table of courses leading from Chesapeake Bay entrance to Baltimore is given in Chapter 3.

Bodkin Point, on the south side at the entrance, is low and covered with scattered trees. A shoal extends northward from the point to the edge of the dredged channel.

Bodkin Creek, just westward of Bodkin Point, has a controlling depth of 10 feet at the entrance and 7 to 9 feet inside for a considerable distance into all of its three branches. The channel at the entrance is very narrow and leads between extensive shoals. It is marked by buoys as far as the fork, and the narrowest part of the channel at the entrance is also usually marked by bush stakes.

Directions, Bodkin Creek.—The draft of boats using the creek does not usually exceed 6 feet, and strangers entering should be cautious with a greater draft. From the buoy at the outer end of ***Rock Point Shoal*** a **137°** course for 2.5 miles will lead to the outer buoy. In entering, be guided by the buoys and bush stakes, leaving them at a distance of about 25 yards.

Gasoline, supplies, and fresh water can be secured at the landing on **Graveyard Point** at the entrance to ***Main Creek.*** The depth of water at the wharf is 10 feet. The marine railway here can accommodate a vessel 65 feet in length with 4 feet draft. There are small railways near the heads of both Main Creek and ***Back Creek.***

Rock Creek, on the south side of Patapsco River 4 miles above Bodkin Point, has a depth of 11 feet to near the head, except at the narrows westward of Fairview, where the channel has a depth of 8 feet and width of only 75 to 100 feet. The channel at this point is marked by buoys, and the mid-channel is clear above. There is a wreck just west of buoy 2 A. A rock with 5 feet over it lies just west of buoy 4 at the narrows. A prominent black water tank is located near **Rock Point.** The creek is frequented by many pleasure boats in summer.

White Rocks, marked by **White Rocks Light (lat. 39°10′,** long. **76°29′),** on the eastern side of the entrance to the creek, show about 15 feet above high water, and are prominent when entering from eastward. Boats of 6 feet or more draft should pass northward of them.

The Government pier at Rock Point had a depth of 9 feet at the end in October 1946.

The Maryland Yacht Club piers at **Fairview** have a depth of 13½ feet at the end. Gasoline, fresh water, and supplies are available here.

A boatyard is located in ***Wall Cove.*** It has two marine railways; the larger can haul a vessel 85 feet in length with 7 feet draft. All kinds of hull and engine repairs can be made and there is a lathe capable of turning spars 120 feet long. Gasoline, fresh water, Diesel oil, ice, and supplies are obtainable.

Another marine railway is located on the north side of Rock Creek near buoy 6. It can accommodate a vessel 40 feet in length with 4 feet draft. The landing has a depth of 14 feet at the end. Gasoline and fresh water can be obtained. Another small railway is about 0.7 mile from the head of the creek.

To enter Rock Creek from northwestward, a **160°** course from buoy 1 at the intersection of Brewerton and Fort McHenry Channels will lead to the lighted buoy on the western side at the entrance. From there favor the western shore to the narrows and be guided by the buoys, leaving them close-to.

Stony Creek, 1 mile northwestward of Rock Creek, has a depth of 10 to 14 feet to near the head, and the same depth to near the head of ***Nabbs Creek,*** the principal tributary. The entrance is obstructed by shoals, the one extending westward from **Stony Point** having several rocks bare at all times, and due to shoaling the west side of the channel should be favored here. The channel around the western end of this shoal has a depth of 15 feet and width of 70 yards and is marked by buoys and by two lights. Above this point the mid-channel is clear to the head. A barge, beached just inside the entrance point, west side, extends about 40 feet offshore into deep water.

A highway swing drawbridge, each opening 51.3 feet wide, with a vertical clearance of 6 feet at MHW when closed, crosses Stony Creek 0.8 mile above the entrance.

The creek has several landings and summer resorts and is frequented by many pleasure boats in summer. Gasoline and supplies can be obtained at the marine railways in both Nabbs Creek and ***Back Cove.*** The first railway can haul a vessel 60 feet in length with 6 feet draft; the second, 45 feet in length with 6 feet draft. Repairs can be made.

North Point, on the north side of the Patapsco River at the entrance, is wooded and marked by a large and a small water tank on the point and by **Cutoff Channel Range Front Light** off the west side of the point. The light, shown from a red, octagonal tower with a white horizontal band at the middle, is 15 feet above the water, visible 9 miles, and is lighted throughout 24 hours. A recreation park just eastward of the entrance to ***Shallow Creek*** is marked by a pier with a pavilion at the end. The railway crossing the creek is in ruins.

Old Road Bay, just westward of North Point, has a depth of 7 to 14 feet. A rock, nearly bare at low water, near the middle of the entrance, is marked by a horizontal-banded buoy. A buoy also marks the edge of the shoal west of North Point. Above this point the only mark is a lighted buoy on the point of shoal to the eastward of **Cutoff Channel Range Rear Light (lat. 39°13′, long. 76°28′).**

North Point Creek and ***Jones Creek,*** emptying into the bay from northward, have depths of 6 to 8 feet, but are unmarked and are frequented only by small pleasure boats. The swing drawbridges crossing both creeks near their entrances have horizontal clearances of 40 feet and vertical clearances of 3.5 feet at MHW when closed. There is a marine railway for small boat repairs in the latter creek.

Port of Baltimore

CHART 545

Baltimore, one of the major ports of the United States, is situated at the head of tidewater navigation on the Patapsco River, about 11 miles from Chesapeake Bay and 149 miles from the Virginia capes. The harbor consists of the Patapsco River and its tributaries. A portion of the water front thus included lies outside of the municipal limits, but the State legislature has by law extended the jurisdiction of the Bureau of Harbors of Baltimore city to include the entire river and its tributaries.

The Patapsco River above Baltimore is of little commercial importance, but in the

city it empties into the tidal estuary of the same name and forms the harbor of the city. This is from 0.5 to 3 miles wide and has been improved by dredging to accommodate the deepest-draft vessels. There are three principal arms or branches of the lower river, called the Northwest Branch, Middle Branch, and Curtis Bay, which form important sections of Baltimore Harbor. The Northwest Branch, or inner harbor, lies inside of Fort McHenry and Lazaretto Point and penetrates into the center of the city at the Light Street wharves. It is about 2.5 miles long and varies in width from 275 to 1,000 yards. The Middle Branch, also called Spring Garden, extends from Ferry Bar to the foot of Eutaw Street and is about 1.5 miles long and from 400 to 800 yards wide. Curtis Bay is on the south side of the river 7 miles above the mouth and is 1.5 miles long and averages about 0.5 mile in width. There are several other branches of the river of lesser importance.

The Federal project for improvement of the harbor provides for a channel 39 feet deep and a general width of 600 feet from that depth in Chesapeake Bay to Fort McHenry on the Patapsco River. It provides for branch channels with dimensions as follows: 35 feet deep and 400 feet wide from the main channel to the head of Curtis Bay; 35 feet deep and 400 feet wide from the main channel at Fort McHenry to Ferry Bar, and thence 27 feet deep and 250 feet wide to the Western Maryland Railway Bridge. It further provides for widening at the approaches and bends and at the angle between the Fort McHenry and Ferry Bar sections and for the following anchorages: Fort McHenry Anchorage, 3,500 feet long, 400 feet wide and 35 feet deep; Riverview Anchorage No. 1, 4,500 feet long, 1,500 feet wide and 35 feet deep; Riverview Anchorage No. 2, 2,400 feet long, 1,200 feet wide, and 30 feet deep; Quarantine Anchorage, 3,500 feet long, 600 feet wide, and 35 feet deep.

The project also provides that as rapidly as the city of Baltimore, at its own expense, extends the 35-foot depth into the Northwest Branch, the United States shall take over the maintenance of that depth; for a channel with a depth of 27 feet and a width of 400 feet from Cutoff-Brewerton angle in the main channel to the Chesapeake Bay as a connection to the inland waterway from Delaware River to Chesapeake Bay; for a channel in Curtis Creek with a depth of 35 feet and width of 200 feet from the head of Curtis Bay to a point in the creek about 750 feet below the Pennington Avenue Bridge; for a channel 22 feet deep and generally 200 feet wide from immediately below the Pennington Avenue bridge to the United States Ordnance Depot, with 18 feet over an irregular area at the head and adjacent to the channel and a depth of 15 feet for a general width of 450 feet from the head of the 22-foot channel to the upper end of the marginal wharf of the United States Ordnance Depot and for a channel 22 feet deep and 200 feet wide from the 22-foot depth curve south of the Baltimore and Ohio Railroad Bridge to the vicinity of Arundel Cove, a distance of about 2,800 feet, thence 100 feet wide in Arundel Cove for a distance of about 2,100 feet with an anchorage basin approximately 700 feet square adjacent to the channel southwestward of the Coast Guard wharf.

Riverview Anchorage No. 2 has not been dredged to project dimensions and no work has been done on the 35-foot channel in Curtis Creek. The Ferry Bar channel from Port Covington entrance channel to Western Maryland Railroad Bridge has not been completed.

The controlling depths in the channels and anchorage areas, when last ascertained, were as follows:

Section	Mid-channel controlling depth	Date ascertained
	Feet	
Craighill Entrance	37. 0	July 1943.
Craighill	36. 8	May 1945.
Craighill-Cutoff angle	37. 0	May 1945.
Cutoff	38. 0	May 1945.
Cutoff-Brewerton angle	34. 0	July 1946.
Brewerton, to Sparrows Point entrance channel	36. 8	July 1946.
Brewerton, above Sparrows Point	36. 5	July 1946.
Brewerton-Fort McHenry angle	33. 0	July 1946.
Fort McHenry	34. 7	July 1946.
Angle at Fort McHenry	32. 1	July 1946.
Curtis Bay	30. 0	June 1946.
Ferry Bar, to opposite Western Maryland R. R. Piers	33. 8	July 1946.
Ferry Bar, opposite Western Maryland R. R. Piers to Ferry Bar	11. 0	July 1946.
Spring Garden, to Hanover Street Bridge	17. 0	July 1946.
Spring Garden, to old Southwest Baltimore Channel (Project channel)	9. 5	August 1938.
Spring Garden, to old Southwest Baltimore Channel (Natural channel)	20. 0	August 1938.
Connecting channel to Chesapeake and Delaware Canal approach channel	16. 2	June 1946.
Quarantine Anchorage—100-foot strip around sides	31. 3	July 1946.
Quarantine Anchorage—Remainder of anchorage	32. 8	July 1946.
Riverview Anchorage No. 1—100-foot strip around sides	25. 0	July 1946.
Riverview Anchorage No. 1—Remainder of anchorage	35. 0	July 1946.
Fort McHenry Anchorage—100-foot strip around sides	33. 7	July 1946.
Fort McHenry Anchorage—Remainder of anchorage	34. 0	July 1946.
Riverview Anchorage No. 2	20. 9	May 1938.
Curtis Creek:		
Main Channel, to 750 feet below Pennington Ave. Bridge	26. 0	June 1938.
Main Channel, from below Pennington Ave. Bridge to channel to ordnance depot.	19. 2	February–April 1946.
Channel into Curtis Bay Ordnance Depot	22. 0	July 1941.
Southerly anchorage area	15. 0	July 1941.
Easterly anchorage area	18. 0	July 1941.
Channel to Arundel Cove	19. 4	April 1946.
Channel in Arundel Cove	21. 1	April 1946.
Anchorage Basin in front of Coast Guard yard	20. 5	April 1946.

Sparrows Point, a town on the north side of the Patapsco River 2 miles northwestward of North Point and 7 miles southeastward of Baltimore, is the site of large iron and steel works and a shipbuilding plant. Several factory buildings and many chimneys and tanks are prominent. Sparrows Point is the terminus of a railroad.

A privately maintained dredged channel, which had a controlling depth of 35 feet in November 1946, marked by a lighted range and buoys, leads to the wharves on the south side on a course of **354°**. Privately maintained channels have also been dredged to several wharves on the west side. The controlling depths in these are from 20 to 23 feet and they are well marked.

Bear Creek, just westward of Sparrows Point, has a depth outside of the dredged channels leading to the docks at Sparrows Point of 12 feet for 3.5 miles above the entrance. The principal shoals for a distance of 1.2 miles above the entrance are marked by buoys. There are no aids above, and the shoals extend for a considerable distance from many of the points. The creek is frequented principally by small pleasure boats. A measured statute mile on course **019°53′** is inside the mouth of the creek and is marked by ranges at each end.

Bridges.—Two railway swing drawbridges, close together, cross the creek just above the entrance; the least horizontal clearance is 81.5 feet and the least vertical clearance is 6.5 feet at MHW, when the draws are closed. Three additional drawbridges cross the creek as follows: South of **Long Point,** highway bascule, horizontal clearance

129 feet and vertical clearance at MHW of 25 feet in center and 15 feet at side when bridge is closed; ***Lynch Cove,*** railway swing, horizontal clearance 80 feet and vertical clearance 8.9 feet at MHW, when bridge is closed; and ***Schoolhouse Cove,*** highway swing, horizontal clearance 68 feet and vertical clearance 5.9 feet at MHW, when draw is closed

Facilities.—There is a marine railway and repair yard in ***Peachorchard Cove*** capable of hauling out boats 80 feet in length with 9 feet draft. Gasoline, Diesel oil, and supplies are available. The wharf has a depth of 8 feet at the end. The Corinthian Yacht Club is located in Lynch Cove. Gasoline is also obtainable in the cove on the eastern side of Bear Creek just below the last bridge. There is a depth of 7 feet at the landing; the marine railway can accommodate a vessel 40 feet in length with 3 feet draft.

Directions.—The main entrance to the creek is just north of lighted bell buoy 4M in the dredged channel. Proceed up the channel on the lighted range, course **038°**, to buoys 5 and 6, thence either to the docks at the north end of Sparrows Point or to the draw span of the first bridge.

Humphrey Creek, a tributary of Bear Creek just above the lower bridges, had a depth of 13 feet in the entrance and 7 feet in mid-channel for 1.2 miles. It is now closed to navigation by a sheet piling bulkhead across the mouth and a fixed trestle bridge at the highway.

Fort Carroll, a stone and concrete structure 1 mile west of Sparrows Point, is marked on the southwest side by **Fort Carroll Light (lat. 39°13′, long. 76°31′).** The light, shown from a white structure, is 45 feet above the water. A bell fog signal is maintained at the light from September 15 to June 15. The center of Fort McHenry Channel leads 400 yards southwestward of the light.

Hawkins Point, on the southwest side of the river, about 0.7 mile southwest of Fort Carroll, is marked on the east side by a wharf and by **Brewerton Channel Range Front Light** on a shoal off the east side. The light, shown from a white square daymark, with round black center, on a brown pile structure, is 38 feet above the water and lighted throughout 24 hours.

A pier has been constructed in the southern part of ***Thoms Cove*** to the northwestward of Hawkins Point. Lighted ranges on the pier mark the axis of the approach channel, 230°. The front light, at the end of the pier, is 18 feet above the water on a white house with a white daymark with black diamond center; the rear light is 26 feet above the water on a white skeleton tower with white daymark with round black center. A horizontal-banded buoy lies 46 yards 051° from the front range light; vessels with a draft of more than 20 feet are warned not to manuever between the buoy and the pier. The approach channel has been dredged and has a controlling depth of 33 feet and there is 29 to 36 feet alongside the pier.

Leading Point, on the northwest side of Thoms Cove, is marked by a water tank and by **Brewerton Channel Range Rear Light,** and is the site of the quarantine station. A buoyed channel leads to the quarantine wharf in Thoms Cove where there is from 7 to 10 feet alongside. The quarantine anchorage is 0.8 mile east of Leading Point.

Curtis Bay, the entrance to which is 1 mile northwestward of Fort Carroll, is the approach to large coal and oil wharves and several industrial plants at **Curtis Bay** and to Curtis Creek, which enters the bay at the west end. ***Curtis Bay Channel,*** a branch channel from Fort McHenry Channel to the piers at Curtis Bay, is part of the Federal improvement project. The channel is marked by buoys and a lighted range, which is difficult to see in daytime, and leads to the coal terminal of the Baltimore

and Ohio Railroad, a pier 680 feet long which has 27 to 37 feet alongside, and to several other piers with 22 to 28 feet alongside. For anchorage in Curtis Bay, see page 284

Curtis Creek flows northward and enters Curtis Bay between **Ferry Point** and **Sledds Point.** The uncompleted Federal improvement project provides for a channel to the United States Ordnance Depot. With local knowledge a depth of 29 feet can be carried to the docks on the west side of the creek south of Cabin Branch. Above the ordnance depot 16 feet can be carried for about 1 mile, into ***Morley Creek.***

Shoals extend southeastward from Ferry Point and northwestward from **Walnut Point** and the ends of the shoals are marked by lighted buoys.

Bridges.—Bridges cross Curtis Creek 0.7 mile and 1.1 miles above the mouth. The first, a highway bascule drawbridge, has a horizontal clearance of 150 feet and a vertical clearance of 17.8 feet at MHW when closed. The second, a railroad swing drawbridge, has a horizontal clearance of 150 feet and a vertical clearance of 13.8 feet at MHW when closed.

Arundel Cove is the site of the Coast Guard depot. The Federal project provides for a channel to the Coast Guard Wharf. The cove is crossed by a fixed highway bridge 0.6 mile above the entrance. The bridge has a horizontal clearance of 28.7 feet and a vertical clearance of 6.4 feet at MHW.

Cabin Branch, on the west side of Curtis Creek just above Curtis Bay, has a depth of 14 feet to just below a fixed bridge with a horizontal clearance of 20 feet and a vertical clearance of 6.8 feet at MHW, 0.4 mile above the entrance. There are depths of 14 to 23 feet at the industrial wharves on the north side. In entering, vessels should pass southward of the lighted bell buoy marking the end of the shoal extending southeastward from Ferry Point and head in on a **296°** course through the privately maintained dredged channel to the wharves, thence favoring the northern side to the bridge.

Directions, Curtis Bay.—Leave Fort McHenry Channel when to westward of lighted buoy 8M and head into Curtis Bay Channel on course **268°**. Buoys mark both sides of the channel and there is a lighted range, which is difficult to see in the daytime. If bound up Curtis Creek, leave Curtis Bay Channel 100 yards west of buoy 11 and steer a course of **200°** to abeam of Curtis Creek lighted bell buoy 16, thence favoring the west side of the channel pass close to westward of Curtis Creek lighted buoy 17 and proceed in mid-channel.

Colgate Creek, on the north side of the Patapsco River, northeastward of Curtis Bay, has a privately maintained dredged channel through the bar at the mouth. This channel is unmarked and had a controlling depth of 20 feet in April 1937 to about 100 yards below the first bridge, thence 13 feet in a narrow channel to the second bridge at Sutton, a distance of about 1 mile. The creek is crossed by two drawbridges in this distance. The first, a highway swing bridge, has a horizontal clearance of 40 feet and a vertical clearance of 4.2 feet at MHW when closed. The draw will be opened on a signal of 3 blasts at any time between 6 a. m. and 6 p. m. from December to March, inclusive, and at any time between 6 a. m. and 10 p. m. during the remainder of the year. The second bridge, at **Sutton,** is a railway swing bridge with a horizontal clearance of 31.5 feet and a vertical clearance of 5.6 feet at MHW when closed. The draw is opened at any time.

The **Baltimore Municipal Airport,** on the east side of the entrance to Colgate Creek, has been formed by filling an extensive area of shoal river bed. It is a terminus for both domestic and international air lines. An aerobeacon is at the eastern end of the airport. Restricted anchorage No. 4, to the southward of the airport, is used as a

runway for planes from the airport and shall not be used as an anchorage by any vessel except on special permit from the Captain of the Port. For limits of the area, see page 284.

Point Breeze, on the west side of the entrance, is the site of a manufacturing plant. Two large brick factory buildings, a large brick stack and a crane on the end of the bulkhead wharf are prominent. The bulkhead wharf on the west side of the creek, inside the entrance, has depths of 21 to 25 feet alongside.

The **Lower Canton** section of Baltimore, 1 mile westward of Colgate Creek, has a number of piers which can accommodate the deepest-draft vessels. One of the world's largest grain elevators is located here, the grain gallery extending over a pier 1,418 feet long which provides berthing for six vessels simultaneously. Other piers of the Pennsylvania Railroad and Canton Railroad Companies have accommodations for handling ore cargoes and heavy lifts and are equipped with facilities to handle all types of cargo in the foreign and domestic trade. Buoyed dredged channels lead from Fort McHenry Channel to the piers.

Northwest Harbor of the Patapsco River, also known as ***The Basin,*** forms the main part of Baltimore Harbor. The entrance leads between Fort McHenry on the west and Lazaretto Point on the east. **Fort McHenry (lat. 39°16′, long. 76°35′)** is on a point, marked on the east side by **Fort McHenry Range Front Light,** shown from a black skeleton tower with a white, circular daymark. **Lazaretto Point** is marked by **Lazaretto Point Light,** exhibited from a red skeleton tower. Northwest Harbor has been dredged by the city of Baltimore along the eastern side to a depth of 35 feet from Lazaretto Point northward 1,500 yards, and along the southwest side to the same depth to **Locust Point** and **Fells Point.** A channel, which had a controlling depth of 30 feet in November 1941, has been dredged from Locust Point to the shipyard wharves at Key Highway, in the western part of the harbor. The remainder of the eastern part of the harbor has depths of 16 to 30 feet, and the western part carries 21 feet to the head. There are depths of 12 to 35 feet at the principal wharves.

The principal general cargo handling piers, other than those in the Lower Canton section, are those of the Baltimore and Ohio Railroad Company which extend from Fort McHenry to Locust Point and have depths of 20 to 35 feet alongside, and those of the Pennsylvania Railroad Company, northward of Lazaretto Point, which have depths of 25 to 35 feet alongside. The wharves along the western side at the head of the harbor are used by passenger and freight steamers in the inland trade. The municipal piers include a group of seven on Pratt Street, east of Light Street. They are occupied largely as terminals by steamship lines in coastwise and inland waterway services. The piers have 19 to 24 feet of water alongside.

On the south side of the Patapsco River, southward of Fort McHenry and westward of the Baltimore Municipal Airport, near the town of **Fairfield,** are the piers of a ship-repair yard, a ship-building yard, a lumber company and several oil companies. Dredged channels marked by ranges lead to the larger piers, which have from 20 to 32 feet alongside.

Ferry Bar Channel and ***Middle Branch*** (***Spring Garden Channel***) extend from southward of Fort McHenry westward and northward for a distance of 3 miles. Ferry Bar Channel has been improved by dredging through a Federal project. A privately maintained dredged channel, marked by buoys, leads from just above the Hanover Street bridge to a dock in ***Smith Cove*** and has a controlling depth of 19 feet. Another privately maintained channel with a controlling depth of 18 feet leads southeastward from Hanover Street bridge to the slips and basin of the Maryland

Yacht Club, located on the east side of the point south of the bridge. It is marked by the clubhouse and **Ferry Bar Channel Range Rear Light,** on a white pole, to the northward of the clubhouse. A yacht anchorage has been established to the eastward of the slips and basin. For limits of the area and regulations governing it, see page 284.

The principal wharves in the Ferry Bar and Middle Branch section have depths of 10 to 35 feet, the Western Maryland Railway wharves all having 35 feet alongside. The Western Maryland Railway wharves at **Port Covington** include four general cargo piers, one ore pier, one coal pier and one grain pier. The privately maintained channel leading from Ferry Bar Channel to the piers has a controlling depth of 33 feet and is marked by buoys. A siren fog signal is on the end of Pier 8.

Directions, Ferry Bar Channel.—Enter to the northward of Ferry Bar Channel lighted buoy 5, passing up the channel on course **270°,** between the buoys with range ahead, to a position 150 yards east of Ferry Bar Channel Range Front Light, then **298°** to the draw span of Hanover Street bridge. Then with aid of the chart follow the buoyed channel to the head of navigation.

To go to the wharves of the Western Maryland Railway Company, Port Covington, leave Ferry Bar Channel between lighted buoys 16 and 17 and steer northwestward, being guided by the buoys.

Middle Branch is crossed by two drawbridges. Hanover Street bridge, a highway bascule 0.3 mile above **Ferry Bar Point,** has a horizontal clearance of 150 feet and a vertical clearance of 32.8 feet at MHW when closed. The Western Maryland Railway bridge 0.6 mile above Hanover Street bridge is a swing drawbridge with a horizontal clearance of 85 feet and a vertical clearance of 9.3 feet at MHW when closed.

Bridge Regulations.—When at any time between the hours of 5 a. m. and 6:30 a. m., 9:30 a. m. and 4 p. m., and 6 p. m., and 9 p. m., a vessel, tug, or any watercraft unable to pass under the Hanover Street bridge, approaches; the signal of intention to pass through the draw and for the draw to be opened shall be three blasts of a whistle or horn blown on the craft.

If the draw is ready to be opened immediately, the draw operator shall answer immediately by three blasts of a whistle or horn blown on the bridge; and if the draw is not ready to be opened immediately, he shall answer by one short blast of a whistle or horn blown on the bridge.

The draw shall not be required to open to vessels between 6:30 a. m. and 9:30 a. m. and between 4 p. m. and 6 p. m., except in cases involving the passage of fire boats, police boats, and craft similarly engaged in emergency operations.

When a vessel, tug, or any water craft unable to pass under the bridge desires to pass through the draw at a time between the hours of 9 p. m. and 5 a. m., notice of such intention shall be given to the superintendent of the bridge by telephone or otherwise, either at the bridge before 9 p. m. or at his residence thereafter. If the notice is given between the hours of 5 a. m. and 9 p. m., or if at least one-half hour has elapsed since it was given, the draw shall be promptly opened at the time specified in the notice on signal given and answered as hereinbefore prescribed.

A notice stating how the superintendent may be reached between 9 p. m. and 5 a. m. is posted on the bridge.

Pilotage is compulsory for foreign vessels, vessels from a foreign port, and all vessels under register bound to and from Baltimore, except those employed in and licensed for the coasting trade and American vessels laden either in whole or in part with coal or coke mined in the United States. Pilotage fees to and from Baltimore are given in Chapter 8. No pilotage is required within the harbor. Shift piloting is sometimes

done in the event of vessels proceeding from the quarantine anchorage to points within the harbor. Work of this nature is usually undertaken by local towboat companies, and occasionally licensed pilots are employed and a charge of $15 is made for their services.

Towage.—Towboats may be had in Baltimore. Towage rates are formulated by the towboat companies operating at the port and, with one or two exceptions in the case of smaller companies, the rates are standard.

Quarantine.—The United States Quarantine Station is at Leading Point on the west shore of the Patapsco River at the mouth of Curtis Bay, about 6 miles below the center of the city. The station is modern and equipped with facilities for handling cases of the quarantinable diseases. The quarantine anchorage, 0.8 mile eastward of Leading Point, is off the west side of Fort McHenry Channel and has ample deep-water anchorage space available. For limits of the area and regulations governing it see page 285.

Customs.—Baltimore is headquarters for the customs district of Maryland which includes all of the State of Maryland and the District of Columbia. The customhouse is located at the corner of Lombard and Gay streets, less than 500 feet from the north shore of the basin, where, however, there is but little foreign shipping. The majority of foreign commerce is carried on at Locust Point, Port Covington, Canton, Lower Canton, Curtis Bay, and Sparrows Point, where the principal overseas terminals are situated. The customhouse may be reached from any of these sections by streetcar or bus. The customhouse is open for entry and clearance of vessels, issuance of marine documents, entry of cargo, etc., from 8:30 a. m. to 5:00 p. m. on all week days except Saturday, when office hours are from 8:30 a. m. to 1:00 p. m. If business demands an extension of these hours for the benefit of the shippers and merchants, it is granted. The working hours established for customs inspectors are from 8:00 a. m. to 5:00 p. m. These hours may be extended by special request and upon payment by vessel of the cost of overtime labor.

Immigration.—Inbound vessels bearing aliens will be boarded, immediately after quarantine inspection, by an immigration inspector who will examine them and either grant them entry or direct the vessel to hold them for further examination by a special board of inquiry. Vessels are responsible for all aliens until they are granted entry and in case this is refused the vessel is responsible for their return to port of embarkation.

Offices of the Immigration and Naturalization Service at Baltimore are located in the Post Office Building. All business relative to examination and entry of aliens will be conducted at this office between 8:30 a. m. and 5:00 p. m. on all week days except Saturday, when the office will close at 1:00 p. m.

Hospitals.—In addition to the quarantine station, the Public Health Service operates a marine hospital and an out-patient office. The former is United States Marine Hospital No. 1 and is located at Wyman Park Drive and Thirty-first Street, about 3 miles from the water front. The out-patient office is located in the basement of the customhouse, one block from the water front. The city of Baltimore is amply provided with public and private hospitals.

Anchorage areas.—The following anchorage areas, together with governing regulations, have been established for Baltimore, Md.:

(1) *Anchorage A.* Located in Northwest Harbor between Fells Point and Youngs Pier.

Note.—This anchorage is intended for fishing and other small vessels having business in the inner harbor of Baltimore.

(2) *Anchorage B. (Canton Hollow)*. Located in Northwest Harbor, and included within the following points:

(*a*) 640 yards 040° from Fort McHenry Channel Rear Range Light and marked by a white spar buoy;

(*b*) 1,020 yards 067° from Fort McHenry Channel Rear Range Light and marked by a white spar buoy;

(*c*) 650 yards 025° from Fort McHenry Channel Front Range Light.

Note.—This is to be an anchorage for vessels awaiting berths at piers and no vessel may remain more than 12 hours without a permit from the Captain of the Port.

(3) *Anchorage C.* This anchorage is located east of the Maryland Yacht Club and is bounded by the following:

(*a*) On the north by Ferry Bar Channel Range.

(*b*) On the west by a line 225 feet from and parallel to pierhead line.

(*c*) On the south by a line between buoy S2 and a point 900 feet 190° from Ferry Bar Channel Front Range Light.

(*d*) On the east by a line between buoy S2 and a point 250 yards 270° from Ferry Bar Channel Front Range Light.

Note.—This anchorage shall be restricted to yachts. Vessels must anchor in such a way as not to block entrance to the slips of the nearby yacht club.

(4) *Anchorage No. 1 (Fort McHenry)*. This anchorage is in the area bounded by lines drawn through the following points:

(*a*) 1,100 yards 164° from Lazaretto Point Light.

(*b*) 1,175 yards 170° from Lazaretto Point Light.

(*c*) White spar buoy B, 1,900 yards 158° from Lazaretto Point Light.

(*d*) Fort McHenry Channel buoy 15M, 2,275 yards 152° from Lazaretto Point Light.

Note.—This anchorage is to be used only as an overnight anchorage for vessels waiting to go to piers. No vessel may remain more than 12 hours without a permit from the Captain of the Port.

(5) *Anchorage No. 2 (General anchorage)*. Located between Lazaretto Point and Airport, bounded by:

(*a*) White spar buoy B, 3,200 yards 125° from Lazaretto Point Light.

(*b*) White spar buoy O, 1,950 yards 113° from Lazaretto Point Light.

(*c*) Point N, 1,775 yards 148° from Lazaretto Point Light.

(*d*) Buoy 12M, 2,300 yards, 146° from Lazaretto Point Light.

(*e*) White spar buoy C, 2,310 yards 134° from Lazaretto Point Light.

(*f*) Point F, 3,125 yards 136° from tank at Lazaretto Point Light.

Note.—No vessel shall remain longer than four days without obtaining a permit from the Captain of the Port. This is to be a general anchorage for vessels with a draft of 24 feet and under.

(6) *Anchorage No. 3. (Riverview), (General anchorage)*. Located between Fort McHenry Channel and Airport, bounded by:

(*a*) White spar buoy A, 3,800 yards 136° from Lazaretto Point Light.

(*b*) White spar buoy C, 2,300 yards 134° from Lazaretto Point Light.

(*c*) Buoy 12M. 2,300 yards 146° from Lazaretto Point Light.

(*d*) Buoy 10M, 3,800 yards 144° from Lazaretto Point Light.

Note.—This anchorage shall be restricted to vessels of over 24 feet draft. No vessel shall remain in this anchorage longer than four days without obtaining a permit from the Captain of the Port. If, by reason of their draft, barges must anchor here, they must anchor in the lower third of this anchorage, as close together as the interests of safety will permit under the circumstances.

(7) *Anchorage No. 4 (Restricted anchorage)*. Located between Sollers Point and Airport, bounded by points:

(*a*) 1,700 yards 317° from Fort Carroll Light.

(*b*) 3,500 yards 317° from Fort Carroll Light.

(*c*) 3,600 yards 327° from Fort Carroll Light.

(*d*) 2,600 yards 344° from Fort Carroll Light.

(*e*) 1,940 yards 342° from Fort Carroll Light.

Note.—This anchorage shall not be used except on special permit from the Captain of the Port. The area is used by planes from the airport as a runway.

(8) *Anchorage No. 5. (General anchorage)*. Located between Fort McHenry Channel and Curtis Bay Channel, and bounded by the following points:

(*a*) 1,250 yards 343° from Brewerton Channel Rear Range Light.

(*b*) 2,375 yards 007°30′ from Brewerton Channel Rear Range Light.

(*c*) 1,700 yards 042° from Brewerton Channel Rear Range Light.

Note.—No vessel shall remain in this anchorage longer than four days without obtaining a permit from the Captain of the Port. This anchorage is to be used as a light anchorage for barges. It may also be used by other vessels during such time as other anchorages are not available.

(9) *Anchorage No. 6* (*Explosive*). Located northeast of Fort McHenry Channel and just northwest of Fort Carroll, and bounded by the following points:

(*a*) White spar buoy A, 350 yards 347° from Fort Carroll Light.

(*b*) White spar buoy B, 1,455 yards 326° from Fort Carroll Light.

(*c*) Buoy 8M, 1,500 yards 309° from Fort Carroll Light.

(*d*) Buoy M, 440 yards 276°30′ from Fort Carroll Light.

(10) *Anchorage No. 7* (*Quarantine anchorage*). Located in the area west of Fort McHenry Channel and south of Curtis Bay Channel, and bounded by the southern and westerly edges of those channels and lines between the following points:

(*a*) Buoy C1, 1,680 yards 236° from Brewerton Channel Rear Range Light.

(*b*) White spar buoy A, 870 yards 262°30′ from Fort Carroll Light.

Note.—This anchorage is to be used only by vessels awaiting quarantine inspection. Special permits for use of the lower part of the anchorage for explosive loading of vessels exceeding 20 feet in draft may be issued in extraordinary cases.

(11) *Anchorage No. 8* (*Dead anchorage*). Located in Curtis Bay south of Curtis Bay Channel, bounded by:

(*a*) The shoreline and channel buoys C9, 660 yards 002° from stack on Sledds Point.

(*b*) Buoy C7, 1,640 yards 064° from stack on Sledds Point.

Note.—Vessels shall not anchor so as to swing within 100 yards of the channel. No vessel may occupy this area without obtaining a permit from the Captain of the Port. When the Captain of the Port finds such action necessary to conserve space, he may require vessels in this anchorage to moor bow and stern, or to one another.

(12) *Anchorage No. 9*. Located in area between Stonehouse Cove and Fishing Point, bounded by:

(*a*) B & O RR Dock and Buoy N8.

(*b*) Curtis Bay Channel Line.

Note.—This anchorage is to be used only by vessels using nearby docks, while awaiting berths at piers. No vessel may remain in this ancorage more than twelve hours without obtaining a permit from the Captain of the Port.

Harbor regulations.—Baltimore city charter and city ordinances provide for the regulation of the harbor and water front of the port of Baltimore. The Bureau of Harbors, under the direct supervision of a harbor engineer, and the harbor master, who is under the supervision of the city comptroller, also promulgate rules and regulations which are enforced by the Police Department.

Tides.—The mean range of tide is about 1 foot. Daily predictions for Baltimore are given in *Tide Tables, Atlantic Ocean* published by the Coast and Geodetic Survey. Prolonged winds of constant direction may cause substantial variation in the tide.

Currents.—Information on currents is given in *Current Tables, Atlantic Coast* published by the Coast and Geodetic Survey.

Ice.—Baltimore Harbor and Patapsco River are frozen over during severe winters, but steamers and ice boats keep the dredged channels open so that self-propelled vessels rarely are unable to enter the harbor. The smaller tributaries of the Patapsco River are often closed by ice for extended periods. Ice in the main channel is most often met with in the vicinity of Sevenfoot Knoll Light, where ice packs are of frequent occurrence. At such times lighted buoys may be replaced by lighted ice buoys or unlighted buoys, or may be extinguished. Buoys may also be dragged off station or may be submerged.

Dockage charges are not assessed at railroad-owned terminals, piers connected with storage warehouses, except Belt's Wharf warehouses, or at privately owned facilities of industrial concerns when the latter are used for handling owner's materials. At Belt's Wharf warehouse a charge of 1 cent per net ton per day is assessed against all

vessels; at Atlantic Terminals a flat charge of $50 per day or fraction thereof is assessed against all vessels; and at the municipal wharves, when no wharfage is assessed, the dockage is from $0.50 to $1.50 per day or fraction thereof for vessels of up to 150 tons, and 1 cent per ton for vessels of over 150 tons.

Wharfage is charged at railroad-owned piers against goods passing over the piers on which the railroad receives no revenue haul, and against goods discharged to or loaded from lighters over side of vessel docked at pier. At municipal and private piers wharfage is charged at various rates depending on commodity.

Facilities.—Baltimore has 289 piers, wharves and other types of terminals with depths of water alongside ranging up to 35 feet. Most of the terminals are within areas close to the center of the city, and are provided with transit sheds and trackage connecting with the railroads serving the city. Equipment is available for handling any type of cargo.

Supplies.—All kinds of supplies are available in Baltimore Harbor. Coal in unlimited quantities can be obtained from wharves equipped for rapid coaling or from lighters, and water can be obtained from the wharves or from water boats.

Lighterage.—The greater portion of lighterage traffic in Baltimore Harbor is performed either by the railroads with their own equipment or by equipment under contract to them. Private lighterage is available at rates depending on type of cargo.

Salvage and wrecking gear.—The facilities for wrecking and salvage operations available at Baltimore are more extensive than those to be found at most Atlantic coast ports. In addition to equipment especially designed for salvage and emergency repair, there are a number of heavy hoisting facilities which, though primarily maintained for private industrial purposes, are available in case of need.

Repairs.—Baltimore has extensive facilities for drydocking and hauling out vessels for repair. These facilities include two graving docks, 460 and 557 feet in length on the bottom, with 20 and 21 feet of water, respectively, over the keelblocks at MHW. Both are operated by the shipbuilding division of the Bethlehem Steel Company and are situated on the south side of Northwest Branch in Inner Harbor.

Seven floating docks range from 6,000 to 20,000 tons lifting capacity. The largest of these, the 20,000-ton dock, is 600 feet long with 22.5 feet of water over the keelblocks at MHW. This dock is also operated by the Bethlehem Steel Company and is located at their yard on Northwest Branch. The Maryland Drydock Company at Fairfield has 4 floating docks, the largest being of 18,000 tons lifting capacity, is 618 feet long and has 28 feet of water over the keelblocks at MHW.

Of the numerous marine railways at the port, 10 have lifting capacities ranging from 100 to 1,800 tons and are equipped to undertake general wood and metal work, and bottom painting, scraping, and caulking. In addition to these there are a number of boatyards with marine railways of capacities of less than 100 tons which cater to repair of small craft.

There are ample marine repair plants to meet the needs of shipping at Baltimore. Of the 19 individual repair yards, 9 are equipped with marine railways, 3 with drydocks, and 2 with floating plant equipped for limited repair work on vessels while at berth.

Commerce.—A large quantity of ore, petroleum products, and molasses form the bulk of the imports. Exports consist mainly of grain, flour, coal, coke, iron, steel, copper, lumber, tobacco, and petroleum products. In the coastwise trade petroleum products, iron and steel products and coal and coke are the leading items. The products involved in internal traffic with Chesapeake Bay ports are mainly petroleum products, sand and gravel, coal and coke, fertilizer and sea food.

Communications of all kinds are available.

A United States Branch Hydrographic Office is at Room 15, Customhouse. Bulletins are posted here giving information of value to seamen, who are also enabled to avail themselves of publications pertaining to navigation and to correct their charts from standards. No charge is made for this service.

Fogs occur chiefly from October to March, inclusive. During that period there are 12 days, on the average, with dense fogs. During the period from April to September, inclusive, there are only 2 days, on the average, with dense fogs. Very light winds clear them away.

Storm warnings of the United States Weather Bureau, both day and night, are displayed from the American Building and from the Anchorage Building, corner of Broadway and Thames Streets. Daytime storm warnings are displayed at the Maryland Yacht Club, on Middle Branch.

Speed regulations.—No vessel shall move in the harbor at a greater rate of speed than 7 nautical miles an hour westward of a line from Henderson's wharf (Fells Point) to the foot of Hull Street (Locust Point), and 9 nautical miles an hour eastward of said line, and no vessel shall move in the Patapsco River or tributaries within a distance of 300 feet from any pier or bulkhead at a greater rate of speed than 8 nautical miles an hour. The master of any vessel violating this shall pay a fine of not exceeding $100 for the first offense and not less than $50 nor more than $200 for each subsequent offense.

Yacht Clubs.—A list of the larger yacht clubs is given in the Appendix.

Patapsco River Neck to Worton Point

CHART 549

An unmarked natural channel, leading east-northeastward across the shoals from the east end of Brewerton Channel, in the Patapsco River, to the northward of **Craighill Channel Range Front Light (lat. 39°11′, long. 76°24′)** joins a natural channel, marked by buoys and by Pooles Island Bar Light, which in turn joins the main channel to the eastward of Pooles Island. The least depth by this route is 12 feet, but it leads close to 10- and 11-foot spots.

The southeast side of **Patapsco River Neck** is low and marshy, the only prominent marks being the pier and pavilion at the recreation park at the south end.

Hart Island, separated from Patapsco River Neck by a shallow channel, is marshy and marked by a thick clump of trees in the center and scattered trees near the northeast end. The channel between the island and mainland has a depth of 1½ feet. **Craighill Channel Range Rear Light** is on the east side. A wooden trestle bridge has been built from the southwest end of the island to the mainland at **Black Marsh.** This bridge obstructs all traffic except rowboats, as the clearance is less than 3 feet at high water and the passage has not sufficient depth at low water.

Miller Island, just to the northeastward of Hart Island, is a bare marsh with no prominent marks. A shoal extending northeastward from the island is marked by a lighted buoy off its end.

Hawk Cove, northwestward of Miller and Hart Islands, is the main approach to

Back River and affords secure anchorage in depths of 8 to 10 feet. A shoal extends halfway across the entrance from the northwest side.

Back River has a depth of 6 feet for a distance of 5.5 miles above the entrance and 5 feet for a farther distance of 1 mile to the highway bridge. This bridge is fixed, with a horizontal clearance of 44 feet and a vertical clearance of 14 feet at MHW. Small boats can go about 1 mile above in either branch at high water, but seldom go above the bridge. A fixed railway bridge, 1 mile above, has a horizontal clearance of 72.3 feet and a vertical clearance of 10.2 feet at MHW.

The river is unmarked, but above the entrance the mid-channel is clear for vessels of 4 feet draft to the first bridge, except for a 1-foot spot on the unmarked middle ground off **Witchcoat Point.** The best water leads westward of the middle ground.

A boatyard is located on the western shore of Back River 0.5 mile north of **Todd Point.** A marine railway there can accommodate a vessel 58 feet in length with 4½ feet draft. A 10-ton crane is available and engine repairs are made. Gasoline can be secured at the landing, which has a depth of 4 feet alongside. Another marine railway and landing is located just below the western end of the bridge. This railway can accommodate a vessel 30 feet in length with 3 feet draft.

Middle River (Charts 549 and 1226), 2 miles northwestward of Miller Island, enters Chesapeake Bay between **Booby Point** and **Bowley Point.** Shoals extend off both sides of the entrance, the point of the shoal off Bowley Point being marked by Middle River Light 2, shown from a single red pile. The river has been improved by Federal project, which provides for a channel 10 feet deep and 200 feet wide from that depth in Chesapeake Bay to the head of ***Dark Head Creek,*** with an anchorage basin in an arm of Dark Head Creek 2,000 feet long and 400 feet wide. The project has been completed and in October 1946 the controlling depth was 9½ feet. The channel is marked by a light off **Wilson Point** and a buoy off **Clark Point.**

The village of **Middle River** is a summer resort at the head of navigation. It is on the railroad and has autobus connection with Baltimore. The Glenn L. Martin aircraft factory is located at the head of Dark Head Creek.

The river has many tributaries, the most important being ***Frog Mortar Creek,*** which has a depth of 6 feet to near its head. A privately maintained dredged channel leads northward from the Middle River channel to the seaplane base of the Glenn L. Martin Company on the west side inside the mouth of the creek. In October 1946 there was a controlling depth of 15 feet in the channel and 13 feet at the landing. There are four small marine railways in ***Hopkins Creek*** and one in the creek northwest of Clark Point. The largest can haul a boat 35 feet in length with a draft of 3 feet. Gasoline and water can be obtained at a landing, with 6 feet of water at the face, on the south side of Hopkins Creek. Gasoline can also be obtained at a landing on the east side of Clark Point. The depth of water here is 4 feet.

Seneca Creek, 2.5 miles northward of Miller Island, has a depth of 8 feet in the entrance and 5 feet in mid-channel to near the head. It is frequented only by small craft. **Seneca Creek Light,** exhibited from a black single-pile structure, is on the end of the shoal on the east side of the entrance to the creek.

Gunpowder River, to the westward of **Gunpowder Neck,** has a depth of 11 feet, for 2.2 miles above Spry Island, in the mouth, 6 feet to within 1 mile of a railroad bridge 6.5 miles above Spry Island, and 4 feet to the bridge. The bridge is a bascule draw with a horizontal clearance of 35 feet and a vertical clearance of 12.5 feet at high water when closed. The river above the bridge is shoal and there is no navigation.

Spry Island is a bare marsh. The main entrance to Gunpowder River leads south-

ward and westward of the island, and is narrow as far as **Carroll Point,** 1 mile above, with shoals of 3 to 6 feet depth close to the channel. Buoys mark the points of shoals from eastward of Miller Island to Carroll Point. Navigation to this point is difficult without local knowledge for anything except small craft. Above this point the mid-channel is clear to the bridge if the points be given a good berth.

A draft of 2 feet at low water can be carried into the river from northward, close around Rickett Point.

Harewood Park is a railroad station at the western end of the bridge across Gunpowder River. **Magnolia** is a post village and railroad station 1 mile eastward of the bridge.

The common entrance to Gunpowder River, Middle River, and Back River is to the westward of Pooles Island, leading between Spry Island on the north and Miller Island on the south. The rivers are frequented mostly by small produce and pleasure boats and an occasional small tugboat, the deepest draft being 7 feet and the usual draft 2 to 4 feet.

Tides.—The mean range of tide is about 1 foot.

Pooles Island, on the western side of Chesapeake Bay, 10 miles above the mouth of the Patapsco River is low and covered with trees. **Pooles Island Light (lat. 39°17′, long. 76°16′),** shown from a white tower, is on the northwest corner of the island. Two lighted ranges, **Pooles Island South Range** and **Pooles Island North Range,** the rear range being common to both, are shown from white skeleton towers on the island. The south range is a guide for crossing the middle ground eastward of the island and is used by vessels northbound from Baltimore. The north range leads across the middle ground northeastward of the island.

The shoal to the southwestward of the island is marked at the end by **Pooles Island Bar Light,** shown from a black skeleton tower on a cylindrical base. The light has red sectors covering the shoals to the north and south of the light.

The channel westward of Pooles Island is marked by buoys and has a least depth of 8 feet although there is an unmarked 7-foot spot 800 yards northwestward of the light and a 6-foot spot 0.6 mile southwestward of the light. It is used only by small craft from the tributaries on the western side or boats seeking shelter from westerly winds.

Tolchester Beach is a recreation park on the eastern side of Chesapeake Bay, 4.5 miles north-northeastward of **Swan Point** and 7.2 miles 077° from Craighill Channel Range Front Light. It is connected with Baltimore by steamer in summer. With local knowledge a draft of 10 feet can be taken across the shoals from the eastern end of Brewerton Channel northward of Craighill Channel Range Front Light to the wharf where there are depths of 10 to 13 feet at the long face. Strangers should not follow this route with a greater draft than 6 feet. It leads across an area of possible fish traps. **Tolchester Beach Light** is on the end of Tolchester wharf. The light, shown from a white skeleton tower, has a bell fog signal. Red sectors cover the shoals above and below Tolchester Beach.

Fairlee Creek, on the eastern side of Chesapeake Bay, 2.8 miles east-southeastward of Pooles Island, is reported to have shoaled to 2 feet across the bar at the entrance. There are depths of 6 feet for about 1 mile above. The entrance is very narrow and has very strong tidal currents. There are no marks for entering. It is frequented only by pleasure boats of 3- to 5-foot draft.

Worton Creek, on the eastern side of Chesapeake Bay, 3.8 miles eastward of Pooles Island, has a depth of 9 to 12 feet in the broad bight at the mouth and 7 feet in the creek to **Buck Neck Landing** (in ruins), 1.5 miles above the entrance. The channel

is narrow in the upper part of the creek and is unmarked. **Worton Point Light,** located on the north side of the entrance, is operated only during the ice season.

Just inside the entrance, on each side, are private landings. The marine railway at **Green Point Wharf** can haul a vessel 45 feet in length with 5 feet draft. Ice, gasoline, and supplies are available at the boat club on the western shore opposite Buck Neck Landing.

The channel northeast of **Handys Point** affords good anchorage in easterly winds for vessels of 10-foot draft.

Worton Point to Head of Bay

CHART 572

Still Pond, a bight on the eastern side of Chesapeake Bay, 6 miles above Pooles Island, has depths of 8 to 11 feet and is a safe anchorage for small craft in easterly winds. A rock pile with 3 feet depth in 8 feet of water is about 0.3 mile north of **Kinnaird Point,** about due east of **Rocky Point.** ***Stillpond Creek,*** emptying into the bight from eastward, has a depth of 2 feet across the bar at the entrance and 6 feet inside for some distance. ***Churn Creek,*** emptying into the bight from southward, has a depth of 2 feet in the entrance and deeper water inside. Both creeks are used by small produce boats.

Two landings are on the Chesapeake Bay shore about 1.5 miles northeastward of Still Pond. The southern one is in ruins.

Sassafras River, on the eastern side of Chesapeake Bay, 10 miles above Pooles Island, is the approach to the towns of Betterton, Fredericktown, and Georgetown, and has some trade in steamers, schooners, and barges, the deepest draft being 10 feet. It has a depth of 12 feet to Fredericktown, 8 miles above **Grove Point** on the north side at the mouth, 7 feet for a farther distance of 1.8 miles to **Wilson Point,** and 4 feet to a point 0.8 mile above. The south side of the entrance is marked by **Howell Point Light** (**lat. 39°22′, long. 76°07′**), shown from a white skeleton tower.

The channel is broad and straight for a distance of 3 miles above Betterton, above which it is crooked and narrow in places, but the principal shoals are marked by buoys as far as Fredericktown, and strangers of 6 feet or less draft should have no trouble in following the channel with the aid of the chart. The channel above Fredericktown is narrow in places and unmarked and is difficult without local knowledge.

Tides.—The mean range of tides is about 1½ feet at Betterton and 2 feet at Georgetown.

Betterton is a summer resort on the south side of Sassafras River, 2.3 miles eastward of **Howell Point.** In the summer months it is connected with Baltimore by steamer. There are depths of 9 feet at the outer ends of the two steamboat wharves and the approach is clear. The buildings on the shore and wharves are prominent. Gasoline and provisions are obtainable.

Lloyd Creek, on the south side of Sassafras River, 1.9 miles east-southeastward of Betterton, has depths of 1 to 3 feet inside and is seldom entered. It is separated from Sassafras River by a low sandspit.

Turner Creek, on the south side of Sassafras River, 4 miles above Betterton,

has a depth of 7 feet to a landing at the foot of a road just inside the mouth and 6 feet in a narrow channel for 0.5 mile above. The entrance is narrow and unmarked. The creek is much frequented by local pleasure boats and there are a number of small private landings.

Kentmore Park has an excellent wharf with a depth of 6 feet at the end. Cassidy Wharf is private. The southeast corner bares at low water.

Back Creek, on the north side of Sassafras River, 5.5 miles above Betterton, has a depth of 7 feet in the entrance and 5 feet in a narrow unmarked channel for 1.5 miles above. It is little used.

Island Creek, on the south side of Sassafras River, 7.5 miles above Betterton, has a depth of 6 feet in a narrow unmarked channel for 0.5 mile above the entrance. There are no wharves.

Fredericktown and **Georgetown** are towns on opposite sides of Sassafras River, 9 miles above Betterton. They are connected by a highway bridge having a double-leaf bascule span with an opening 40 feet wide and a vertical clearance of 4.5 feet at MHW when closed. Gasoline, water, and provisions are obtainable at both places. Tockwogh Yacht Club is located at Fredericktown. The depths are 5 to 9 feet at the wharves at Fredericktown and 10 to 18 feet at Georgetown. There are two marine railways for small-boat repairs. The one below the bridge at Fredericktown can haul a vessel 85 feet in length with 7 feet draft; the other railway just above the bridge can haul a vessel 60 in length with 7 feet draft, and a 5-ton crane is on the dock.

Bush River, on the western side of Chesapeake Bay, 3 miles north-northeastward of Pooles Island, has a depth of 6 feet to a railroad bridge 6.5 miles above the entrance and is frequented only by small pleasure boats. The principal shoals inside the entrance are marked by buoys, and above these the mid-channel is clear and easy of navigation to the bridge. The bridge has a bascule draw with a horizontal clearance of 35 feet and a vertical clearance of 13.3 feet at MHW when closed. Until changed by the Secretary of War the bridge shall be opened on 10 days' advance notice in writing from the District Engineer whenever, in his judgment, such action is necessary by reason of an emergency. The river is shoal and little used above.

The approach to Bush River from the direction of Worton Point is obstructed by a **foul area** bounded by a line drawn from a point 2,660 yards 291° from Worton Point Light, 1,950 yards 239°, thence 650 yards 369°, thence 2,550 yards 038°30′, thence 600 yards 101°, and thence 1,660 yards 198° to the point of beginning.

The Government wharf at **Tapler Point** has a depth of 12 feet at the outer end. The approach is marked by two buoys.

Bush River is a railroad station at the east end of the bridge. There is a marine railway at Bush River, near the bridge, for hauling out small boats. Gasoline and fresh water can be obtained at the boat club landing one mile above the railroad bridge.

Tides.—The mean range of tide is about 1½ feet.

Romney Creek, on the west side of Chesapeake Bay, 6 miles northeastward of Pooles Island, has a depth of 6 feet in a narrow unmarked channel for 3 miles above the mouth and 2 feet for a farther distance of 1.6 miles. It is closed to the public at all times.

Aberdeen Proving Ground, Restricted area.—For the protection of life and property during target practice in the waters adjacent to Aberdeen Proving Ground, navigation is prohibited in some areas on the western side of upper Chesapeake Bay. The areas have been established by Federal Regulation and are marked on the charts by broken

lines. For details on the limits of the areas and regulations governing them, see page 273.

Spesutie Narrows, between **Spesutie Island** and the mainland westward, is closed to traffic by a fixed trestle at its northern end. A dredged channel leads into the southern entrance to the U. S. Army landings inside the narrows. The entrance channel is marked at its outer end by **Aberdeen Proving Ground Light 2,** on the east side, shown from a red pile with cagework at top, by buoys and by lighted ranges on each of the two reaches of the channel. In October 1946 the controlling depth in the entrance channel was 12 feet and there was 12 feet at the landing at **Mulberry Point.**

Swan Creek, on the western side of Chesapeake Bay 1.5 miles northwestward of Spesutie Island, has a depth of about 5 feet in a narrow, unmarked channel to near the head. It is little used except for vessels going to the U. S. Army landing about 800 yards southward of **Swan Creek Point.** The wharf has a depth of 5 feet at the end, which is marked by a light.

Susquehanna River, emptying into the head of the Chesapeake Bay from northwestward, is the approach to the towns of Havre de Grace and Port Deposit.

The approach from southward had a controlling depth of 11 feet in October 1946, in a dredged channel above **Locust Point.** Above Havre de Grace this depth holds to Port Deposit. Above Havre de Grace are no marks, but the channel is easily followed with the aid of the chart. The project provides for a channel 200 feet wide and 15 feet deep from Chesapeake Bay to Havre de Grace, and for the maintenance of the small boat harbor below **Concord Point** at a depth of 10 feet, with an approach channel of the same depth and 100 feet wide from deep water off Concord Point.

Ice gorges and **freshets** were formerly of frequent occurrence in Susquehanna River during the breaking up of the ice in the spring, the water at Port Deposit sometimes rising to a height of 15 to 18 feet above the normal high water and causing considerable damage. The Conowingo Dam (a few miles above Port Deposit) and other dams in the river higher up now modify these conditions. The river is usually entirely closed to navigation for about three months in winter.

Tides.—The mean range of tide is about 1½ feet at the entrance and 2 feet at Port Deposit.

Fishing Battery Light (lat. 39°30′, long. 76°05′), 350 yards eastward of the dredged channel near the lower end, is on a black skeleton tower near a white dwelling, with another building and a few trees near it and a large area of shrubs around it. A shallow dredged basin leads in toward the light from the west side.

Havre de Grace, on the western side at the entrance to the Susquehanna River, is on the main line of the Pennsylvania, and Baltimore and Ohio Railroads. There is now little business by water and the wharves, with the exception of that of the oil company just above the first bridge, are in very poor condition. The oil company wharf has a depth of 11 feet alongside and the bulkhead just upstream from it has 7 feet. A gasoline tanker drawing about 10 feet makes regular trips to the landing.

Gasoline, Diesel oil, provisions, water, and coal in limited quantities are obtainable. There are two small marine railways for repairing motorboats at Havre de Grace, the larger one capable of hauling out boats up to 60 feet in length with 5 feet draft. They are in poor condition and little used.

A dredged yacht basin protected by a breakwater is located at the southern end of the water front southwest of Concord Point. There are several landings; fresh water is piped to them. In October 1946 there was a depth of about 7 feet in the basin but

the approach channel had shoaled to a controlling depth of 3 feet in an extremely narrow channel.

A rock, with a depth of 5½ feet over it and marked by a buoy at its western end, lies 200 yards off the wharves at Havre de Grace and about 500 yards below the lower bridge. There are said to be several rocks between this rock and the wharves westward which require local knowledge to avoid. A rock with a reported depth of 10 feet about 130 yards easterly from the above-mentioned rock is marked by a buoy on its eastern side.

Bridges.—Three bridges cross Susquehanna River in the vicinity of Havre de Grace. The Pennsylvania Railroad bridge has a swing draw across the channel, each opening 100 feet wide with a vertical clearance of 52.1 feet at MHW when closed. The fixed highway bridge, midway between the two railroad bridges, straddles the lower end of Garrett Island and has a vertical clearance of 87 feet at MHW. The Baltimore and Ohio Railroad bridge, 0.8 mile above the Pennsylvania Railroad bridge, is fixed on both sides of Garrett Island and has a vertical clearance of 87 feet at MHW. The main channel leads through the second opening from the western side of Garrett Island.

Fourteen piers mark the position of the highway bridge which crossed the river just below the Pennsylvania Railroad bridge. The tops of the piers are about 15 feet above MHW and in the same relative position as those of the railroad bridge.

Perryville is a town on the eastern side of Susquehanna River, opposite Havre de Grace. A draft of about 10 feet at low water can be carried from the main channel off Havre de Grace, across the middle ground anywhere south of East Rock buoy from 500 yards to 0.5 mile southward of the lower bridge, into the channel leading to Perryville, and this is the course usually followed by all vessels bound to Perryville that can pass under the lower bridges.

Buildings of the United States Veterans Hospital, with two water tanks and the twin stacks of a power house, are prominent near the southern point of the town. A short dredged channel leads to a Government landing 500 yards below the highway bridge.

The fish wharf just above the first bridge has 7 feet of water alongside; the oil company wharf 9 to 12 feet; and the shipyard bulkhead, in poor condition, 12 to 15 feet.

Garrett Island, just above Havre de Grace, is high and wooded, with no prominent marks.

Port Deposit is a town on the northeast side of Susquehanna River, 3.5 miles above Havre de Grace. It has railroad communication with Baltimore. There is a depth of 12 feet to abreast the town. The only landings are at the Navy Depot and at the shipyard. The Navy landing has a depth of 12 feet along its outer face and is marked at the lower end by a light 5 feet above water. The boatyard bulkhead has 6 feet alongside but is in poor condition. The largest vessels going to Port Deposit are tugboats and barges up to 12-foot draft.

Small boats can go a short distance above Port Deposit, but the channel is obstructed by rocks and passage should not be attempted by a stranger. **Conowingo Dam** is about 6 miles above this town.

Directions, Susquehanna River.—The channel to Havre de Grace is well marked by lights and buoys. Having come to the horizontal-banded buoy marking the southern end of the middle ground west of Turkey Point a stranger with not over 10 feet draft should experience no difficulty in following the buoys with the aid of the chart.

Northeast River empties into the northern end of Chesapeake Bay 5 miles north-

northeastward of Turkey Point. It is extensively used by yachtsmen and there are a number of boat-storage yards in the area. The approach to the river leads westward of Turkey Point and between the western side of **Elk Neck**, which is high and thickly wooded, and the extensive flats westward. There is a depth of 12 feet to the mouth of the river and 9 feet in a dredged channel to a long wharf one mile west of the town of Northeast.

The Federal project for improvement of the river provides for a channel 60 feet wide and 7 feet deep from that depth in the river to the foot of Church Street in the town of Northeast, enlarged at the upper end to form a basin 120 feet wide and 300 feet long. The channel from buoy 20 favors the eastern shore to the narrow part of the river off the gravel pit. Above there local knowledge is necessary. The controlling depth to the town was about 5 feet in October 1946.

Tides.—The mean range of the tide is about 2 feet.

Charlestown is a village and railroad station on the western side of Northeast River, 2.5 miles above the entrance. Gasoline, water, provisions, and ice may be obtained from the wharf. A marine railway and general repair yard located here are capable of hauling out boats about 60 feet long and with a draft of 6 feet. The depth of water at the boatyard landing is 4 feet.

There are small marine railways at **Hance Point, Northeast Heights** and at Northeast capable of hauling out boats about 40 to 60 feet long with 4 to 6 feet draft. Gasoline, water, and ice can be obtained. The depth of water at the landings is 5 feet.

Northeast is a town with railroad communication at the head of navigation on Northeast River, 4.5 miles above the entrance. Gasoline and provisions are obtainable.

To enter Northeast River, pass 0.5 mile westward of Turkey Point and favor the curve of the eastern shore of the river at a distance of 0.3 mile to buoy 2. Thence follow the buoys closely to the upper part of the river.

Pond Creek and ***Pearce Creek,*** 3.5 and 5 miles, respectively, northeastward of the entrance to Sassafras River, can be entered only by small boats at high water and are not used.

A wooden bulkhead marks the western side of a dredged basin off the mouth of Pearce Creek.

Elk River, emptying into the head of Chesapeake Bay from northeastward, 16 miles above Pooles Island, is important as the approach to the western end of the Chesapeake and Delaware Canal. It has depths of over 20 feet in the dredged channel for 7 miles to the mouth of Back Creek and 6 feet for a farther distance of 5 miles to Whitehall Point 3 miles below Elkton. Above this point there is a depth of 5 feet to the junction of ***Big Elk*** and ***Little Elk Creeks*** and thence 3 feet in Big Elk Creek to a point 0.2 mile below the lower bridge at Elkton. Above Elkton the river is shoal with very little water. Little Elk Creek has a controlling depth of about 3 feet to the fixed bridge at the head of navigation.

The channel in Elk River from the mouth to Back Creek is broad and easily followed. Above Back Creek it is crooked and narrow in places. It is marked by buoys for a distance of 5 miles above the mouth of Back Creek, above which it leads between flats, bare at low water and covered by marsh grass in summer.

The Federal project for improvement of Elk River and Big Elk Creek provides for a channel 7 feet deep and 80 feet wide from deep water to a point about 1,200 feet above the mouth of Little Elk Creek at **Cedar Point,** and thence 7 feet deep and 40 feet wide to Elkton, and for a channel 7 feet deep and 80 feet wide in Little Elk Creek for a distance 2,000 feet above the mouth.

Strangers should have no trouble in taking a draft of 3 feet at low water to the junction of Big Elk and Little Elk Creeks with the aid of the chart. Above that point local knowledge is necessary. In 1946 there was little traffic in the upper reaches of the river.

Elkton, at the head of navigation on Elk River, is on the main line of the Pennsylvania Railroad. It has several industrial plants. Three fixed highway bridges cross the river at Elkton. The first has a horizontal clearance of 100 feet and a vertical clearance of 18.5 feet at MHW. The second has clearances of 100 feet and 18.5 feet; the third, clearances of 37 feet and 8 feet.

Tides.—The mean range of tide is about 2 feet at the entrance and 2½ feet at the head of Elk River.

Turkey Point, on the west side, at the entrance to Elk River, is a sparsely wooded bluff with abrupt slopes on the south end. The most prominent mark is **Turkey Point Light (lat. 39°27′, long. 76°00′),** shown from a white tower on the highest part of the bluff. A convenient anchorage for vessels using the Chesapeake and Delaware Canal will be found near the west shore about 1.5 miles northeast from Turkey Point.

Bohemia River, on the east side of Elk River, 4 miles above the entrance, has a depth of 7 feet for 3.8 miles to the junction of ***Little Bohemia*** and ***Great Bohemia Creeks,*** 6 feet for a distance of 1.2 miles in Little Bohemia Creek, and 5 feet for 2.5 miles in Great Bohemia Creek. A highway bascule drawbridge, crossing the river 0.5 mile below the fork, has a span 40 feet wide and a vertical clearance at MHW when closed of 12 feet. The channel is broad and easily followed for a distance of 2 miles above the entrance, above which it is narrow and crooked, and local knowledge may be necessary.

The river and the creeks are frequented by pleasure boats and some local fishermen, the usual draft being 3 to 6 feet.

The cove northwestward of **Old Hack Point** is much used as a small-boat anchorage. Gasoline and fresh water can be obtained at the landing but the controlling depth is 2 feet at the outer end. The village of **Hack Point** has a post office and provisions can be obtained.

Old Town Point Wharf is on the eastern side of Elk River, 5.4 miles above the entrance. There is a depth of 10 feet at the end. It is the reporting station for the western end of the Chesapeake and Delaware Canal.

Back Creek (Chart 570) is the approach to the western end of the Chesapeake and Delaware Canal at Chesapeake City. It has a length of 3.2 miles from Chesapeake City to Elk River. A deep channel has been dredged through this creek from Chesapeake City to deep water in Chesapeake Bay. See Chapter 6 for discussion of the canal and its controlling depth.

CHAPTER 12

Chesapeake Bay, Eastern Shore

CHARTS 77, 78

Cape Charles to Mattawoman Creek

CHART 1222

THE eastern side of Chesapeake Bay from the entrance northward to the south end of Pocomoke Sound is indented by numerous small creeks, most of them obstructed by bars at the entrances. The creeks are frequented by many small craft engaged in oystering and fishing and the transportation of produce, and a few of them by passenger steamers engaged in the bay trade. Strangers seldom enter except in small boats.

The shore is low and without prominent natural landmarks except **Butlers Bluff** about midway between Fisherman Island and Old Plantation Flats Light, which shows bare, bluff faces when viewed from the bay.

Cape Charles, Harborton, and Onancock are the principal towns, and there are numerous other post villages and landings.

Fish weirs are numerous in season. Fish-trap limits are shown on the charts.

Cape Charles and the entrance to Chesapeake Bay are described in Chapters 7 and 8.

Old Plantation Creek, 2.5 miles southward of the town of Cape Charles and 1.5 miles eastward of Old Plantation Flats Light, has a depth of 1½ feet across the bar at the entrance and for a distance of 2 miles above, and is frequented by local boats of 3½-foot draft at high water. The channel is narrow, and many of the bars and middle grounds show discolored. This channel is usually marked by bush stakes, but it is difficult to navigate without local knowledge. The best water across the flats is about 0.4 mile southward of the mouth. The opening in the thick woods at the mouth and a shanty on an island inside the mouth are the only marks visible from outside. No supplies are available in the creek.

Old Plantation Flats Light (lat. 37°14′, long. 76°03′) is a square white structure on brown piles, 39 feet above the water, visible 11 miles, with a red sector covering middle ground, and an air diaphone. Several other lights and buoys mark the entrance to Cherrystone Channel. A lighted bell buoy, 0.7 mile 251½° from the light, marks the outer end of the channel.

Cherrystone Channel, on the eastern side of Chesapeake Bay 9 miles northward of Fisherman Island, is the approach to the town of Cape Charles and to several small creeks farther north.

The Federal improvement project provides for a channel 18 feet deep and 500 feet wide from that depth in Chesapeake Bay through Cherrystone Bar and Channel to the entrance to Cape Charles Harbor, a distance of 2.4 miles, thence a basin in the harbor of the same depth 600 to 1,000 feet wide and 3,000 feet long, thence a channel 10 feet deep, 100 to 180 feet wide and 260 feet long connecting a basin of the same depth 180 feet long and 420 feet long at the head of Mud Creek. The project also provides for a protective works in the form of a stone jetty on the north side of the harbor entrance and a sand mole 1,350 feet long south of the harbor entrance.

In January 1947 the controlling depth in the dredged channels was 15 feet. Within the basin the depth was reported to be about 17½ feet, with about 8 feet in the basin at the head of Mud Creek.

The channel is exposed to westerly winds but is partially protected by the flats westward and is seldom too rough for entrance by motor boats. Owing to the limited space in the channel and harbor small boats are sometimes exposed to injury by steamers and tows.

Tides.—The mean range of tide is 2½ feet.

The tidal currents set across the entrance to the dredged channel, but farther north they follow the general direction of the channel.

Ice does not interfere with navigation.

Cape Charles is the terminus of the New York, Philadelphia & Norfolk Railroad and is connected with Old Point Comfort, Norfolk, and Little Creek by passenger steamers. It has a large trade carried in steamers, car floats, and barges, mostly between Cape Charles and Norfolk or Little Creek, and is also an important shipping point for seafood and produce brought in motor boats and small vessels. Gasoline, Diesel oil, coal and provisions are obtainable, and water is available on the wharf.

Cape Charles Harbor is an artificially dredged basin, 360 yards long and 200 yards wide, on the south side of the town. The harbor is owned by the railroad company, but is open to general navigation.

Steamers and small boats load and discharge at the wharf on the north side, and motor boats make fast to the bulkhead on the south side and at the eastern end. Small craft seeking shelter in the harbor should anchor so as not to interfere with the steamers, tugs, and barges of the railroad company. Depths alongside the wharf range from 14 feet at the western end to 22 feet at the eastern end. The bulkhead on the south side of the inner basin has 11 feet of water alongside. Gasoline is available at several of the small landings in this basin.

Cherrystone Inlet has a depth of 11 feet for about 3 miles above the entrance of Cape Charles Harbor, above which the depths are 2 to 4 feet. It is used by local oyster and pleasure boats, their draft seldom exceeding 6 feet.

The channel is marked by lights and buoys to **Cherrystone Island,** and is sometimes marked by bush stakes above, but it is narrow and difficult without local knowledge. Boats of 3-foot draft can cross the bar at low water into Cherrystone Inlet anywhere between the outer end of the north jetty at Cape Charles Harbor and Cherrystone Island, but the bar between Cherrystone Island and **Westcott Point (lat. 37°18′, long. 76°01′)** is often bare at low water.

Kings Creek, east-southeastward of Cherrystone Island, has a depth of 3½ feet across the bar at the mouth and for 1 mile above, and is frequented by boats of 2- to 5-foot draft. The bridge at the entrance has been removed but some piling below low water is reported. A shoal, bare at low water and sometimes marked by buoys, is on the north side outside the entrance.

The best water, in entering, leads from Cherrystone Island southeastward to within 300 yards of shore, then northeastward toward the wharf on the north side, and then southeast and as guided by the chart. The entrance is usually marked by buoys but local knowledge is required.

The creek is a good small-boat harbor and is used extensively by yachtsmen. A marine railway on the creek is capable of hauling out boats of 40 feet in length and 4 feet in draft. Repairs can be made. Gasoline can be obtained at several of the small landings just inside the entrance.

Directions, Cherrystone Channel.—Cherrystone Channel can be entered from southward, 2 miles below Old Plantation Flats Light, with a depth of 15 feet; from westward through the dredged channel north of the light with the same depth.

The dredged channel across the bar is marked by Cape Charles City lighted range. It leads from Cape Charles City Entrance lighted bell buoy, 520 yards northwestward of Old Plantation Flats Light, to bell buoy 2.

Having crossed the bar on the range, haul northward at bell buoy 2 and follow Cherrystone lighted range. Steer **019°** for the Cherrystone Front Range Light, a red-slatted structure on the south side of the entrance to Cape Charles Harbor, in range with the rear light, on a white skeleton tower off the middle of the north jetty. This course leads between buoys to a position 120 yards eastward of **Cherrystone Bar Light,** a skeleton tower with fog bell.

Then steer **006°,** passing between the buoys and, when past Light 7, haul eastward to pass midway between the two Cherrystone range lights and enter Cape Charles Harbor in mid-channel.

The Gulf, emptying into the channel leading to Hungar Creek, has a depth of about 1 foot to near the head and is little used. There are no wharves.

Mattawoman Creek, emptying into Hungar Creek from eastward, has a depth of about 4 feet for 1 mile in a narrow crooked channel and 2 feet to the head of navigation. The best water for entering the creek is found by following the directions for entering Hungar Creek. When approaching Taylor Wharf on Wilsonia Neck bear southeastward and follow the line of bush stakes into the creek.

Mattawoman Creek to Pocomoke Sound

CHART 1223

The range house of the former degaussing range eastward of Wolf Trap Light is a prominent landmark. It is located in latitude 37°24′12″, longitude 76°03′42″.

Hungar Creek, on the eastern side of Chesapeake Bay 8 miles northward of Cape Charles, has a depth of about 4 feet in a narrow channel for 2 miles above the mouth and then 3 feet to **Floyds Landing** 1.5 miles below **Bridgetown.** The entrance channel is marked by lights.

It is reported that the best water across the flats into Hungar Creek is found by steering **090°** from buoy 10C until a line of stakes marking the channel is reached. Follow the channel marked by these stakes to **Wilsonia Neck.** The inshore flats are covered by marsh grass in summer. Local knowledge is necessary to enter Hungar Creek. Supplies cannot be obtained here.

Nassawadox Creek, on the eastern side of Chesapeake Bay 12 miles northward of the town of Cape Charles, has a depth of 4 feet across the bar at the entrance and deeper water inside for several miles. The channel at the mouth is marked by an entrance buoy and an unwatched light. The channel above the entrance is narrow and unmarked; the flats on each side are nearly bare at low water, are covered by marsh grass in summer, and are usually well defined. The creek is frequented by local craft of 5 feet or less draft. A wharf is at **Bayford,** 1.5 miles above the entrance, and **Stewarts Landing** is about 4 miles above the entrance. The depth to the upper landings is 4 feet. Bayford has a store and post office.

Tides.—The mean range of tide at Nassawadox Creek is about 2 feet.

Church Creek, on the south side of Nassawadox Creek, has a depth of about 2 feet to the head and is little used.

Warehouse Creek, on the south side of Nassawadox Creek, has a depth of 3 feet to within 1 mile of the post village of **Franktown (lat. 37°29′, long. 75°53′).** The best water leads in the middle of the entrance.

Occohannock Creek is 18 miles above the town of Cape Charles. A fixed bridge 6 miles above the entrance is the head of navigation. The bridge has a span of 40 feet and a high-water clearance of 15 feet.

The channel across the bar at the mouth is marked by buoys and bush stakes, but is narrow, circuitous, and difficult without local knowledge, especially in darkness and during inclement weather. The controlling depth is reported to be 6 feet. The channel above the entrance is also narrow and difficult, but the ends of the shoals are marked by buoys to near **Morley Wharf.** Within the creek the depths in 1943 were reported to be 9 feet from the mouth for a distance of 1 mile, thence 6 feet to Morley Wharf.

The project provides for a channel 9 feet deep and 100 feet wide from that depth in Chesapeake Bay to Davis and Morley wharves, a distance of about 4.8 miles, with approach channels of equal dimensions to the wharves and a turning basin 9 feet deep, 200 feet wide, and 300 feet long adjacent to Concord Wharf.

On the north side 4 miles above the entrance is a store and post office at **Davis Wharf,** in ruins. Morley Wharf is directly opposite.

In approaching the creek a bell buoy and a clump of trees, on the north side standing well away from the main woods, are the only conspicuous aids. A grassy islet is on the north side, just outside the mouth.

Tides.—The mean range of tide is about 2 feet.

Craddock Creek, just northward of Occohannock Creek, has a depth of 3 feet across the flats at the entrance and 4 or 5 feet inside to near the head. The best water lies along the south shore in approaching the entrance and along the north side of the creek in entering, then in mid-channel to the head. There are no commercial wharves.

Nandua Creek, 8 miles southward of Watts Island Light, had a reported depth of 9 feet in January 1947, in a dredged channel across the flats at the mouth, the same depth in a natural channel to **Cedar View Wharf** (in ruins), 2.8 miles above, and 6 feet to the post village of **Nandua,** 4 miles above the mouth. It is navigable for a farther distance of 1 mile, but is shoal and little used.

Some provisions are obtainable at Nandua. The marine railway is capable of hauling out a boat 40 feet in length and of 2½-foot draft.

The only aids in approaching the entrance are a bell buoy and a prominent clump of pine trees standing clear on the south side. The channel across the flats at the entrance is narrow and shifting and strangers may need local knowledge to carry the

best water. The flats usually show discolored water. There are a number of buoys marking the channel but they are not charted because of the frequent shifting of the best water.

Tides.—The mean range of tide is about 1½ feet.

Butcher Creek, 2 miles northward of Nandua Creek, has a depth of 2 feet at the entrance and deeper water inside. There are no wharves, and the creek is little used except for crabbing.

Pungoteague Creek, 5 miles southward of Watts Island Light, has a reported depth of 9 feet to the town of **Harborton,** 4 miles above the mouth, and 6 feet to **Boggs Wharf** (in ruins), 5 miles above the mouth, above which it shoals rapidly. Barges load pulpwood at a wharf at Harborton. The depth of water at the face of the wharf is 12 feet. The channel as far as Harborton is crooked, but well marked by lights, buoys and daybeacons. The channel between Harborton and Boggs Wharf is narrow and difficult without local knowledge.

Tides.—The mean range of tide is about 1½ feet.

Directions.—The best water in approaching the entrance is from eastward of the bell buoy off the mouth of Nandua Creek, but a depth of 7 feet can be carried across the flats at the mouth, heading for **Pungoteague Creek Light** on any course eastward of 130°. The light, 17 feet above the water and visible 7 miles, is shown from a black cylindrical structure.

In entering, pass 200 yards southward and eastward of Pungoteague Creek Light and steer northeastward for **Hacks Neck Shoal Light,** a red pile structure, passing 100 yards westward and northward of it.

Then steer mid-channel following the several charted buoys and daybeacons to Harborton.

Underhill Creek, entering Pungoteague Creek west of **Lofland Point Light** is shallow. A wreck, covered at low water, is about 75 yards off the eastern entrance point.

At high water a depth of about 4 feet can be taken through the sloughs from Pungoteague Creek to Onancock Creek, close along shore eastward of the marshy islands. A branch of this thoroughfare follows along the southwest shore of **Parkers Island.** The channels are difficult without local knowledge.

Onancock Creek, 3 miles southward from Watts Island Light, had a controlling depth in 1947 of 12 feet over the bar and 9 feet in the creek to the town of **Onancock,** at the head of navigation 5.5 miles above the mouth.

Pulpwood is loaded on barges at a wharf about 3.5 miles above the entrance light. The depth of water at the face of this wharf is 12 feet. Gasoline, Diesel oil, and provisions are obtainable at Onancock. A marine railway is capable of hauling out a boat 35 feet in length and 4 feet in draft. Minor repairs can be made.

A Federal project for improvement of Onancock Creek provides for a channel 12 feet deep, 200 feet wide across the bar, a distance of 5,200 feet, and generally 100 feet wide in the river to a point roughly 1,200 feet above the mouth of the North Branch, widened at the upper end to form a basin 200 feet square; a turning basin about 2.3 acres in area and 10 feet deep at Onancock; a channel 6 feet deep and 100 feet wide in the lower 500 feet of Joynes Branch and an anchorage basin 6 feet deep and 3.9 acres in area at the mouth of Titlow Creek.

Tides.—The mean range of tide is about 1½ feet.

Directions, Onancock Creek.—The creek is marked by a bell buoy, a light, buoys, and several day beacons. The channel leads from close southward of the light in an east-southeasterly direction, thence southeasterly, thence east-northeasterly in a broad

marked stretch of the creek at the end of which the channel becomes narrow and makes a sharp turn. The daybeacons are so close together at this point that strangers should proceed slowly to avoid being confused. Above here the daybeacons are easily followed to the wharves at Onancock.

Chesconessex Creek, 2 miles eastward from Watts Island Light, has a depth of 12 feet to south of **Tobacco Island,** 5 feet for a farther distance of 1.8 miles to a point 0.8 mile above **Chesconessex (lat. 37°45′, long. 75°46′).** The creek is frequented by many small local boats, and vessels up to 7-foot draft can go to Chesconessex.

The channel has ample width at the entrance, gradually contracting to a narrow slough at Chesconessex, and has extensive flats on each side. It is reported that the shoal on the south is building northward into the channel. The entrance is marked by buoys, and the channel above is sometimes marked by bush stakes at the turn, but is difficult without local knowledge. Strangers should be guided by the chart and the aids.

Tides.—The mean range of tides is about 1½ feet.

Pompco Creek, northwestward of Tobacco Island, has a depth of 7 feet for 2 miles above its junction with Chesconessex Creek; it has no wharves, and is frequented only by small local boats. A draft of 3 feet at high water can be taken from the head around the eastern side of Tobacco Island into Chesconessex Creek.

Pocomoke Sound

CHARTS 1223, 1224

Pocomoke Sound is on the eastern side of Chesapeake Bay, 48 miles northward of the entrance. Extensive flats occupy most of the sound, though a channel, wide and deep at the south end and shoal at the north end, leads from southward to the entrance to Pocomoke River, the most important tributary.

The sound is separated from Tangier Sound on the western side by a string of marshy islands and large shoals, marked at their southern end by **Watts Island Light** 17 feet above the water and visible 9 miles, on a black pile with cagework on top.

The shores of the sound are low, and there are no prominent natural landmarks. The most prominent shoals along the main channel are marked by buoys from the entrance to the mouth of Pocomoke River. The boundary between Maryland and Virginia is indicated by a line of white spar buoys. The sound is frequented by many local oyster and fishing boats, and by a few tugs and barges, the deepest drafts being 9 feet. Small boats can enter through Broad Creek.

Tides.—The mean range of tide is about 2 feet.

Prohibited area.—The following area is declared dangerous and closed to navigation:

The area.—Beginning at a point in latitude 37°52′36″, longitude 75°46′00″, a line drawn due east to a point in latitude 37°52′36″, longitude 75°42′30″, thence due south to a point in latitude 37°51′48″, longitude 75°42′30″, thence southwest to a point in latitude 37°51′12″, longitude 75°43′24″, thence due west to a point in latitude 37°51′12″, longitude 75°46′00″, thence due north to point of beginning.

The regulations.—1. No vessel shall enter the area for other than operations under Naval control and for target maintenance purposes. All shipping is warned to keep out of this area except as provided herein.

2. These regulations shall be enforced by the Commander, Naval Air Bases, Fifth Naval District, and such agencies as he may designate.

Watts Island is marshy and wooded but has no prominent marks. The channel through the flats northward of it has a depth of 3 feet and is difficult without local knowledge. Watts Island Light is 1.5 miles south-southeast of the south end of the island.

Little Fox Islands (lat. 37°52′, long. 75°54′) consist of a group of bare, marshy islands. ***Great Thorofare,*** northward of Little Fox Islands, has a least depth of 4 feet at high water, and is sometimes used by local boats, but is difficult without local knowledge.

Great Fox Island is low and is marked by a large building on the eastern side.

Cedar Straits, northward of Great Fox Island, has a depth of 3½ feet at high water through a narrow unmarked channel, and is little used even by local boats.

Beach Island, 3 miles east of Watts Island, is off the point at the southern end of Pocomoke Sound.

Deep Creek is a shallow, unimportant creek on the southeast side of Pocomoke Sound. The main approach is through a crooked channel, with extensive flats on either side, northeastward of Beach Island. There is a depth of 7 feet for 5 miles above the main channel of Pocomoke Sound to the mouth of the creek, thence 2 feet to the head of the creek. The channel is marked by a light off Beach Island and by buoys for 4 miles above.

The creek is used only by small local boats, many of which come from Hunting Creek through ***The Notch,*** good for a draft of 3 feet at high water.

In the creek is a small wharf. Supplies and provisions are available. A marine railway (in poor condition) is capable of hauling out a boat 30 feet in length and 3 feet in draft. There is little water at the railway.

Hunting Creek, on the southeast side of Pocomoke Sound, has a depth of 7 feet to the mouth of ***Bagwell Creek,*** 2 miles above the mouth, and 4 feet to the wharf at the post village of **Hopkins,** on the southern branch. It is frequented by many small local boats, the deepest draft being 4 feet.

The approach to the creek from the main channel of Pocomoke Sound leads eastward along the south side of ***Guilford Flats*** for 3.5 miles, then southward for 1.5 miles to the mouth, and is marked by a lighted bell buoy and several other buoys.

In entering, approach midway between the channel aids at the outer end of Guilford Flats on a **070°** course, and steer **082°** for 1.6 miles until past buoy 1, then steer **154°** for 1.8 miles to the buoys at the entrance.

Above the entrance the mid-channel is clear for about 1 mile to buoy 5, above which it is narrow and, although usually marked by bush stakes, is difficult without local knowledge.

Guilford Creek is 2.5 miles northeastward of the mouth of Hunting Creek, with which it has a common approach from the main channel of Pocomoke Sound. There is a depth of 7 feet to the entrance and 2 to 5 feet inside. There are no wharves, and it is frequented only by local boats of 2- to 4-foot draft. The channel is marked by a buoy at the entrance.

Messongo Creek, on the eastern side of Pocomoke Sound, southward of Saxis Island, has a depth of 6 feet for 5 miles above its junction with the main channel of Pocomoke Sound, shoaling gradually to about 1 foot at the village of **Marsh Market,** 2.5 miles above. The creek is frequented only by small local boats. It is marked by buoys at the entrance.

To enter, pass 0.5 mile north-northwestward of Guilford Flats lighted bell buoy

and steer **053°** for 3 miles to the first buoy. Above the buoys the mid-channel is clear to the head.

A draft of 2½ to 3 feet at high water can be taken from the mouth of Messongo Creek northwestward through ***Starling Creek*** to the south end of the village of Saxis. Local boats frequently use this passage.

The cove at the northwest end of Starling Creek has a depth of 1 to 2 feet and is much used as an anchorage by small boats. A Federal project for improvement of the cove provides for a channel 7 feet deep and 60 feet wide from that depth in Pocomoke Sound to the mouth of Starling Creek, with a turning basin of the same depth and 1,000 feet long inside the entrance.

In January 1947 the controlling depth in the entrance channel was 4½ feet and about 5 feet in the basin.

The outer end of the dredged channel is marked by a light 14 feet above the water. Small triangular beacons mark the entrance points to the basin.

Saxis, a village on **Saxis Island,** at the northeast end of Pocomoke Sound, is the center of a considerable oystering and fishing industry. There are many prominent white buildings. Gasoline is obtainable at the bulkhead on the north side of the turning basin in Starling Creek. Some provisions can be procured in the town. The depth of water alongside the bulkhead is 5 feet.

Pocomoke River (Chart 1224) at the northeast end of Pocomoke Sound, has general depths of about 4½ feet across the flats at the mouth (called ***The Muds***). The river is navigable for vessels to the town of Snow Hill, 25 miles above the mouth, but has little traffic with the exception of occasional oil boats and fertilizer boats. There are no wharves.

A Federal project for improvement of the river entrance provides for a channel 7 feet deep and 100 feet wide from that depth in Pocomoke Sound through The Muds and across **Williams Point** to deep water in the river; for a channel 9 feet deep and 100 to 130 feet wide from **Shad Landing** to above the bridge at Snow Hill, widened to 150 feet to form a turning basin at the upper end.

The dredged channel from Pocomoke Sound into the river is well marked by lights and beacons. In January 1947 the controlling depth was 6 feet. Within the Pocomoke River the channel has ample depth and width and navigation is easy for a distance of 20 miles. The controlling depth between Shad Landing and Snow Hill is reported to be 9 feet. The channel in the upper end is unmarked, is narrow and crooked, and some local knowledge is required to carry the best water. The water is fresh above Rehobeth.

Tides.—The mean range of tide is about 2½ feet at Shelltown and 3 feet at Pocomoke and Snow Hill, but is considerably affected by the winds. Freshets cause a rise of 1 to 5 feet at Snow Hill but are not dangerous.

Shelltown (lat. 37°59′, long. 75°38′) is a post village on the west bank of Pocomoke River, 1.5 miles above Williams Point. Provisions and gasoline are obtainable. There are several small private landings.

Rehobeth is a post village on the west bank, 8 miles above the entrance. Gasoline and provisions are obtainable.

Pocomoke is a town with railroad communication, 14 miles above the mouth. All kinds of supplies are obtainable. There are no wharves and the bulkhead landings are in poor condition. The railway bridge has a draw span 61 feet wide and a high water clearance when closed of 2½ feet. The best water leads through the western opening.

The highway bridge, 0.5 mile above, is a double bascule with opening 64 feet wide and high water clearance when closed of 2 feet.

Snow Hill is a town with railroad communication. A bascule bridge, with a 40-foot opening and a vertical clearance of 1.5 feet at high water when closed, crosses the river just above the wharves. The river is navigable for 2 miles above. Five-hour notice should be given for opening the bridge. Local knowledge is necessary between Pocomoke and Snow Hill.

The U. S. Engineers have made investigations for a possible canal connecting the Pocomoke River at Snow Hill with Chincoteague Bay about 5 miles distant.

Marumsco Creek, at the northern end of Pocomoke Sound, 2.5 miles north of Saxis, has a depth of 2 feet for 1 mile above the mouth and is little used.

East Creek, 2.5 miles northwestward of Saxis, has a depth of 1 to 2 feet and is little used.

Apes Hole Creek, 4 miles west-northwestward of Saxis, has a depth of 2 feet to the head. There are small wharves on the northwest side at which small boats, from the north end of Pocomoke Sound, make landings for Crisfield, 2 miles northwestward.

Broad Creek, a crooked thoroughfare connecting the north end of Pocomoke Sound with Little Annemessex River, has a dredged entrance channel at each end and is extensively used by local boats. There are lights at each entrance and several buoys in addition at the southern entrance.

The Federal improvement project provides for a channel 6 feet deep at mean low water, 100 feet wide in the straight reaches, and 130 feet wide at the bends, from the 6-foot contour in Pocomoke Sound through Broad Creek to the 6-foot contour in Little Annemessex River, a distance of about 2 miles.

The controlling depth through the thoroughfare is found in the southern entrance channel. In January 1947 the depth here was 4 feet.

Tangier Sound to Honga River

CHARTS 1223, 1224

Tangier Sound, on the eastern side of Chesapeake Bay, with its southern entrance about 45 miles above the entrance to the bay, is 30 miles long and 3 to 5 miles wide. It forms the approach to several important tributaries and is frequented by bay steamers, the deepest draft being 12 feet and usual draft 6 to 8 feet. It is also frequented by a large number of boats engaged in the oystering and fishing industry. The sound is separated from Chesapeake Bay by a row of marshy islands and flats, through which several thoroughfares lead.

The main entrance is from southward and is marked by **Tangier Sound Light,** 39 feet above the water and visible 12 miles, and Watts Island Light.

A broad and deep channel leads from the south end to the tributaries at the north end. It is bordered by extensive flats, but the most prominent dangers are marked by buoys and lights, and the channel is easily followed by day with the aid of the charts. In the tributaries local knowledge is necessary.

The sound is also entered through Hooper and Kedges Straits and by small boats from Pocomoke Sound through Broad Creek and Little Annemessex River.

The islands and thoroughfares on the east side, from Watts Island northward to Cedar Straits, are described under Pocomoke Sound.

Tangier Island is low, sparsely wooded in the center, and bare on the north and south ends. A church spire near the center is prominent. The post village of **Tangier (lat. 37°50′, long. 76°00′)** is in the center of the island. The people of this village and of the several smaller settlements are engaged in oystering and fishing. Gasoline, Diesel oil, and provisions are obtainable, and communication can be had with Crisfield by motorboat and telephone. A marine railway is capable of hauling out boats 35 feet in length and 4 feet in draft. Deck repairs can be made.

A Federal improvement project provides for a channel 8 feet deep at mean low water and 100 feet wide from the 8-foot contour in Tangier Sound to Daybeacon 4, and thence 8 feet deep and 60 feet wide to the town of Tangier, with an anchorage basin adjacent to the town 400 feet square and 7 feet deep. The length of the section included in the project is about 1 mile, its lower end extending into Tangier Sound.

Lights, buoys, and beacons mark the channel. It is entered from east of **Horseshoe Islet,** a small sand cay about awash at high water. In January 1947 the controlling depth in this channel was 5½ feet. With local knowledge 3 feet can be carried at high water from Tangier southwestward to Tangier Sound. This channel shifts with storms but is usually bush-staked.

The flats between Tangier Island and Smith Island are usually bare at low water, and there is no thoroughfare through them except for small boats at high water.

Smith Island (Chart 1224) is the name applied to a large group of marshy islands separated by narrow thoroughfares; none of the islands are connected by bridges, and travel is entirely by boat. **Tylerton, Ewell,** and **Rhodes Point** are three small post villages on the island, all on the interior channels. All of the people are engaged in the oystering and fishing industry. There are stores at all of the villages, and gasoline is obtainable. The supply of provisions is limited. Communication can be had with Crisfield by motorboat and telephone.

Local fishermen in shallow-draft vessels sometimes approach Tylerton from southward at high water, leaving Tangier Sound in the vicinity of **Herring Island** and following the deeper water northward into ***Tyler Creek.*** This approach should not be attempted without local knowledge.

A Federal improvement project provides for a channel 7 feet deep and 60 feet wide from ***Twitch Cove*** on Tangier Sound through ***Big Thorofare,*** thence through the canal at Ewell, thence through ***Levering Creek*** and Big Thorofare to the vicinity of **Swan Point,** thence of the same depth and 100 feet wide through the offshore bar to deep water in Chesapeake Bay, with twin jetties at the entrance; and for a channel 4 feet deep and 25 feet wide around the point between Big Thorofare and Tyler Creek.

In August 1945 the controlling depth was 5 feet from Tangier Sound to Swan Point, thence 7 feet to Chesapeake Bay; around the point between Big Thorofare and Tyler Creek the depth was 3½ feet.

All these channels are well marked by lights, daybeacons and bush stakes. The western end of the main channel is marked by two lights between stone jetties which extend 1,500 feet into Chesapeake Bay.

There are several thoroughfares with about 2½-foot depth, navigable by small boats at high water, leading from the interior of Smith Island westward into Chesapeake Bay. The entrance to the principal channel is marked by **Smith Island Light** and the thoroughfare leads to Rhodes Point. These channels are difficult and local knowledge is necessary.

Little Annemessex River, on the eastern side of Tangier Sound, 11 miles northward of the entrance, is the approach to the town of Crisfield.

James Island Light, 37 feet above the water and visible 11 miles, is shown from a black skeleton tower on a cylindrical base at the entrance to the river. A lone concrete stack, on the north point at the entrance, and the ice plant and other buildings on the Crisfield water front are prominent.

A Federal improvement project provides for a channel 12 feet deep at mean low water, 425 feet wide from the 12-foot contour in Tangier Sound to **Somers Cove Light,** thence 266 feet wide to the bend about 1,800 feet southwest of the railroad pier, thence of irregular width to a point opposite the Consumers Ice Company, a mooring basin 7 feet deep, 160 feet wide, and approximately 875 feet long roughly parallel to Brick Kiln Road, with a channel 7 feet deep and 100 feet wide leading therefrom to the 7-foot project channel connecting Little Annemessex and Big Annemessex Rivers, and a channel 60 feet wide and 7 feet deep from that depth in Little Annemessex River via the Annemessex Canal and Daugherty Creek to Big Annemessex River.

In 1947 the channel had a controlling depth of 10 feet. Off the wharves is a basin with a depth of 12 feet and a channel 100 feet wide and 10 feet deep from there to the wharves at **Hop Point** on the northwest side of the town. The channel is marked by lights and buoys and is easily followed.

Tides.—The mean range of tide is about 2 feet.

Crisfield (lat. 37°59′, long. 75°51′) is a railroad terminus and important shipping point for sea food. It is frequented by a large number of boats of 2- to 6-feet draft engaged in the oystering and fishing industry and by vessels from Baltimore drawing 6 to 8 feet. Gasoline, Diesel oil, fuel oil, ice, water, and provisions are obtainable. Depths at the wharves vary from 5 to 12 feet; the greatest depth is found at the end of the railroad wharf. Crisfield has a third-class medical relief station. Storm warnings are displayed in the daytime.

Two marine railways at Crisfield are capable of hauling out vessels of 125 tons, 6-foot draft, and 100 feet length, and there is a machine shop for ordinary repairs to motors.

Anchorage at Crisfield can be had in a depth of 12 feet in the anchorage basin, the western limit being 150 yards westward of the end of the railroad wharf and 120 yards westward of the end of the ice factory wharf (marked by double stacks). Small boats make fast to the wharves or anchor anywhere outside the channel.

There are depths of 7 to 12 feet in the cove on the south side of the railroad wharf and 4 to 8 feet in the basin eastward of the retractile drawbridge at the eastern end of the cove, which is used to some extent as an anchorage.

The bridge has a draw opening 24 feet wide and a high-water clearance when closed of 3½ feet. The draw will be opened from March 20 to August 31, inclusive, at any time except between 11:30 a. m. and 12 noon. The remainder of the year it will be opened from 1 hour before sunrise to 11:30 a. m. and from 12 noon to 1 hour after sunset.

The river above the wharves at Crisfield, outside of the 100-foot-wide dredged channel, has a depth of 2 to 5 feet and is used only as an anchorage for small craft.

Annemessex Canal is a dredged cut connecting Little and Big Annemessex Rivers. The channel leads from the turning basin off Crisfield to the cut through the marsh connecting the mainland with **James Island,** and thence through ***Daugherty Creek*** to the mouth of ***Jones Creek.*** In January 1947 the controlling depth was 6½ feet. Both entrances are marked by lights and beacons but should be navigated with caution especially on the north end where shoaling has narrowed the channel.

Big Annemessex River, on the eastern side of Tangier Sound, 5 miles northward of James Island Light, has a depth of 8 feet for 5½ miles above the mouth and 4 feet for a farther distance of 2 miles, above which it is shoal. The river is frequented by small oyster and fishing boats.

Tides.—The mean range of tide is about 2 feet.

The entrance to Big Annemessex River is marked by a lighted buoy on the north side. Shoals make off for a long distance from many of the points, but are marked by buoys and a light as far as **Long Point.**

Manokin River, on the eastern side of Tangier Sound, 17 miles northward of Tangier Sound Light and eastward of Kedges Straits, was at one time navigable to **Princess Anne,** a town on the railroad, 14 miles above the main channel of Tangier Sound. The river channel has shoaled to the extent that only small boats of less than 2-foot draft can ascend beyond **Locust Point.**

The entrance is broad, but is obstructed by extensive shoals. The main channel, entering along the southeast side, is narrow and crooked. It is marked by buoys to within 3 miles of Locust Point.

Post offices are at **Fairmount** and **Upper Fairmount** on the south side (inland) of the Manokin River, and at **Oriole,** north of Locust Point, on the north side of the river.

Tides.—The mean range of tide is about 2½ feet.

Little Deal Island Channel, entering Manokin River along the northwest side, is buoyed but is narrow and crooked, and is difficult without local knowledge.

Little Deal Island (lat. 38°07′, long. 75°57′) is low. A lighted range is on the north end.

Deal Island, on the east side of Tangier Sound between Manokin and Wicomico Rivers, has a considerable oystering and fishing industry. A breakwater extends from the north end of Deal Island and converges with another which extends from the mainland. A light marks the western extremity of the 6-foot curve off **Haines Point,** on the mainland.

A Federal improvement project provides for an entrance channel from Tangier Sound 9 feet deep and 100 feet wide, thence of irregular width to and along the south shore of Laws Thorofare, protected by breakwaters at the entrance, with a turning basin at the inner end 9 feet deep on the south side of the channel to within 50 feet of the bulkhead along the south shore, an anchorage area 6 feet deep and 150 feet wide extending across the waterway parallel to the highway bridge to within 50 feet of the bulkhead on the south shore, and an anchorage area 650 feet long, 300 feet wide, and 9 feet deep on the north side of the channel between the breakwater and the 6-foot anchorage.

In 1946 the controlling depth in the entrance channel was 7 feet; in the turning basin on the south side of the channel, 6½ feet; in the anchorage parallel with the highway bridge, 5 feet; and in the anchorage on the north side of the channel, 5½ feet.

The outer channel reach is marked by buoys, a beacon and a lighted range, course **087°.** The island is connected with the mainland by a fixed bridge. The bridge has a horizontal clearance of 15 feet and a vertical clearance of 11 feet at MHW.

Gasoline and provisions are obtainable at **Wenona (lat. 38°08′, long. 75°57′),** on Deal Island, and at **Chance** on the mainland. These villages have post offices.

Lower Thorofare is between Little Deal Island and the south end of Deal Island. The old wharf at Wenona has collapsed. There is a small dock 75 yards south of an oyster house with a gasoline pump on the inshore end.

The project provides for a channel 60 feet wide and 7 feet deep from that depth in

Tangier Sound to and including a mooring basin of the same depth, 100 feet wide and 300 feet long, in the marsh at the head of the cove at Wenona.

In 1946 there was but 2½ feet of water from buoy 3 to Wenona.

From the entrance buoy the channel leads to buoy 3, on a lighted range ahead, course **077°**, then east-northeastward toward the north end of Little Deal Island until 180 yards from it, and then northward. There is a depth of 1 foot around the northeast end of Little Deal Island.

Laws Thorofare, between Deal Island and the mainland, has a depth of 2 feet from the southward as far as the cove eastward of the fixed bridge already described.

Kedges Straits is described under a separate heading on page 313.

South Marsh, on the north side of Kedges Straits, is an uninhabited, low, marshy island, with one house on the northeast side owned by a gun club.

Holland Island is low, marshy, and uninhabited. There are two empty houses owned by gun clubs.

Adam Island, just north of Holland Island, is also low, marshy, and uninhabited. On the south end is a lookout tower.

Holland Straits, leading between Holland and Bloodsworth Islands on the west and north and South Marsh on the south, is seldom used all of the way through, but is considerably used by local oyster and fishing boats from both ends as far as Holland Island. The usual draft using it is 2 to 5 feet and the deepest draft 8 feet. It has a depth of 11 feet from southward to abreast Holland Island and 4 feet from Holland Island northward and eastward into Tangier Sound. The usual course leads between **Deep Banks Island (lat. 38°08′, long. 76°02′)** and South Marsh. The channel is narrow in places and unmarked, and is difficult without local knowledge. **Spring Island** is low and uninhabited.

Bloodsworth Island is a marsh with scattered clumps of trees. There are no prominent marks. The island is used for target practice and should be given a wide berth.

A restricted area has been established in connection with a bombardment and bombing range in the vicinity of Bloodsworth Island as follows:

The Area.—In view of the continuation of shore bombardment, air bombing, air strafing, and rocket firing practices in the vicinity of Bloodsworth Island, a restricted area is established bounded by the following lines:

Parallels through: Latitude 38°08′. Latitude 38°13′.

Meridians through: Longitude 76°00′. Longitude 76°10′.

The Regulations.—1. No vessel or craft shall enter or remain in the restricted area described above or any part thereof when notified by an enforcing authority to keep clear or when firing is in progress except as noted in subparagraph (3) of this paragraph.

2. Warning that firing is or will soon be in progress will be indicated by warning signals: During daylight by a red flag prominently displayed from a tower on Adam Island; and at night by a searchlight beam pointed into the air. All persons and craft will clear the area when these signals are displayed or when warned by patrol vessels or by aircraft employing the "buzzing" method which consists of low flights by an airplane, directly above, repeatedly opening and closing its throttle.

3. During the hours when firing is in progress and warning signals are displayed, no fishing or oystering vessels or other craft not directly connected with the firing are permitted to navigate within the restricted area except that deep draft vessels using dredged channels and propelled by mechanical power at a speed greater than five miles per hour normally will be permitted to proceed across the area. Permission for such deep draft vessels to enter and cross the area will be indicated: In daytime by dipping the red warning flag to half-mast, at night by flashing the warning searchlight.

4. During the hours and days when firing is not in progress and warning signals are not displayed, oystering and fishing boats and other craft may operate within the restricted area.

5. On those days when firing will be conducted, firing will take place normally during the hours between sunrise and sunset except that occasional night firings may be conducted between sunset and twelve midnight.

6. Prior notification of the dates and times of all firings will be made by local Notices to Mariners.

7. Surface and/or air search will be made of the entire restricted area prior to the commencement of each day's firing for the purpose of locating and warning all craft and personnel not connected with the firing, and a patrol will be maintained throughout the duration of firing.

8. All projectiles, bombs, and rockets will be fired to land on Bloodsworth Island and/or Pone Island but Naval activities will not be responsible for damage by such projectiles or by Naval or Coast Guard vessels to nets, traps, buoys, pots, fish pounds, stakes or other equipment which may be located within the restricted area.

9. These regulations will be enforced by the Commander, Fifth Coast Guard District through such officers and enlisted men as may be designated, using all government vessels, planes, and other suitable equipment as may be necessary.

Pone Island, Prohibited area.—Due to underwater obstructions off the western side of Pone Island a prohibited area exists within 0.5 mile of a point in latitude 38°10′, longitude 76°06′.

Wicomico River (Chart 567), emptying into the northeast end of Tangier Sound, is navigable for a distance of 20 miles above the entrance to the town of Salisbury. It is frequented by vessels having a deepest draft of about 10 feet. Local oystermen act as pilots and may be obtained at Whitehaven.

The Federal improvement project provides for a channel 14 feet deep and 150 feet wide from Chesapeake Bay to Salisbury; a depth of 14 feet in the channels and turning basins in the North and South Prongs with channel widths of 100 feet and a basin 6 feet deep, 100 feet wide, and 400 feet long at Webster Cove, with a channel of the same depth and 60 feet wide, extending to the 6-foot contour in Wicomico River.

In November 1941, the controlling depths were: Tangier Sound to Salisbury, 14 feet; North Prong, 14 feet; South Prong, 8 feet.

The entrance to Wicomico River is 1.5 miles wide and is obstructed by extensive shoals, through which a narrow crooked channel leads. It is marked by **Great Shoals Light,** 37 feet above the water and visible 11 miles, and by lights and buoys as far as Salisbury. There are extensive flats bare at low water between Mount Vernon and Salisbury, but they are covered by marsh grass in summer. Strangers may find it necessary to take a pilot. The mean range of tides is about 2½ feet at the entrance, and 3 feet at Salisbury.

The river is crossed by two cable ferries, one at Whitehaven, which is operated by gasoline boat, and the other at Upper Ferry, which is operated by hand. Ferries operate during daylight hours only. Cables drop when the ferry is not in operation. A power line, which crosses the river 600 yards west of Shad Point, has a vertical clearance of 136 feet.

Ice usually forms on the river as far down as Whitehaven. In ordinary winters the channel is open, except for short periods of time, but in severe winters it is often closed to navigation for extended periods. Vessels entering Wicomico River encounter strong tidal currents setting across the channel at the mouth of Monie Bay, and in severe winters heavy ice from it is a source of danger.

Dames Quarter is a post village on the south side of Wicomico River, just inside the mouth.

Monie Bay, a cove on the south side of Wicomico River, just inside the mouth, has a depth of 5 feet in the entrance and 4 feet in mid-channel to the head. It is frequented only by small local boats. ***Monie Creek*** and ***Little Monie Creek*** at the head are unimportant but there is deep water inside the former. The piling of an old bridge partially obstruct the channel 2 miles above the entrance.

A dredged channel in ***Webster Cove,*** on the south side of Wicomico River 3 miles

above Great Shoals Light, leads to a basin dredged in the marsh at **Pine Beach.** In March 1946 the basin was 6 feet deep and the channel from the 6-foot curve in Wicomico River was 6½ feet deep.

Mount Vernon (lat. 38°15′, long. 75°50′) is a village inland from Webster Cove. **Mount Vernon Wharf,** 1.5 miles east-northeastward of the village, is marked "Private Property—Unsafe for Public Use."

Whitehaven is a post village on the north side of Wicomico River 6.5 miles above Great Shoals Light. Gasoline and provisions are obtainable, but docks are in poor condition. There is a marine railway capable of hauling out vessels of 150 tons, 150 feet in length, and 6 feet in draft forward. The shop can make general repairs.

Wicomico Creek, on the south side of Wicomico River, 8.5 miles above Great Shoals Light, is navigable for small craft for several miles. In entering the creek the best water is southward of an islet in the mouth. The entrance channel is usually marked by stakes.

At **Shad Point,** 2 miles below Salisbury, is a marine railway capable of hauling out vessels of 35 tons, 75 feet in length, and 5 feet in draft, with facilities for minor repairs only. Gasoline and provisions can be obtained near here.

Salisbury, at the head of navigation on Wicomico River, has trade in vessels up to about 13-foot draft. The river forks at the south end of the town. The ***North Prong*** has been dredged to a milldam 0.4 mile above the fork, with a turning basin at the head. It is crossed by a double-bascule bridge just above the fork having a clear width of 40 feet and high water clearance when closed of ½ foot. The ***South Prong*** has been dredged to the head of navigation 0.5 mile above the fork with a turning basin at the head. It is crossed by two single-bascule bridges, the first having a span 40 feet wide and high-water clearance when closed of 1 foot, and the second having a span 40 feet wide and similar clearance of 6 feet. All kinds of supplies are obtainable at Salisbury. There is a railway capable of hauling out vessels of 1,000 tons, 160 feet in length and 12 feet in draft, but it is owned by a private company which uses it to repair barges.

Regulations prescribed for the bridges crossing both prongs of the river at Salisbury require that they shall be opened to all vessels unable to pass under them within 3 minutes after a signal of 3 blasts at any time between 6 a. m. and 9:30 p. m., except between 6:30 and 7 a. m., 8:30 to 9 a. m., 12 m. and 1 p. m., and 6 and 6:30 p. m., when they will remain closed.

Nanticoke River, emptying into the northern end of Tangier Sound, has a depth of about 9 feet to the town of Seaford, Delaware, at the head of navigation, 36 miles above the entrance. A draft of about 11½ feet can be taken to Seaford at high water.

Ice forms on the river in winter, but ordinarily there is enough traffic to keep the channel open. Spring freshets do not interfere with navigation.

The river from the mouth to Wetipquin Creek, a distance of 8 miles, is wide and is obstructed by extensive shoals, most of which are marked by lights and buoys, but some local knowledge may be required to keep in the best water. The channel has a least depth of 20 feet for 5 miles to Ragged Point. Between **Ragged Point** and Wetipquin Creek is an extensive middle ground with channels on either side. The main channel is on the western side and has ample width and a least depth of 9 feet and should be used by strangers. The channel eastward of the middle ground has a depth of 6 feet and is used by those having local knowledge.

From the mouth of Wetipquin Creek to Sharptown, 28 miles above the mouth, the river has ample width and depth and is easily followed, the mid-channel being clear.

From Sharptown to Seaford there is a least depth of about 9 feet, and the channel is narrow and unmarked. The water is fresh above Vienna.

The project provides for a channel 12 feet deep and 100 feet wide from the 12-foot contour in Tangier Sound to the highway bridge at Seaford, Delaware. The length of the sections included in the project is 9.5 miles, extending over 28 miles of the river; the lower end of the first section of the project is about 7 miles above the mouth of the river.

Tides.—The mean range of tide is about 2½ feet at the entrance and 3 feet at Vienna.

Sandy Point (lat. 38°15′, long. 75°57′), on the west side at the entrance, is marked by a prominent clump of trees.

Nanticoke is a post village on the east side, 3.5 miles above **Clay Island Shoal Light. Nanticoke Wharf,** on the south side of **Roaring Point,** 0.8 mile from Nanticoke, is in ruins.

A Federal project provides for the construction of a small boat harbor 7 feet deep, 120 feet wide, and 400 feet long in the marsh at Nanticoke, with an entrance channel of the same depth and 60 feet wide, protected on either side by stone jetties in the river.

The channel had a controlling depth of 4 feet in June 1944, from the main channel in the Nanticoke River to the turning basin at Nanticoke. It is marked by a buoy, lights, and a lighted range. The basin is used for tying up small boats. Several packing plants are located here. Gasoline and provisions are obtainable in a limited quantity.

Bivalve (Chart 1224) is a post village on the east side of the river, 6.5 miles above Clay Island Shoal Light. Bivalve has a boat basin for skiffs and oyster boats.

Wetipquin Creek (Tyaskin Creek), on the east side 8 miles above Clay Island Shoal Light, has a channel with a present depth of about 9 feet and 120 feet wide from Nanticoke River to the wharf at the post village of **Tyaskin,** on the south side just inside the mouth. Gasoline and provisions are obtainable. The course in the channel is **135°,** heading for the tin buildings on the wharf, but local knowledge is required. A hand-operated ferry 0.5 mile above the wharf, has a capacity of 10,000 pounds.

Nanticoke River Upper Light marks the shoal spit north of the entrance to the creek.

Wetipquin is a post village on the east side of Nanticoke River, 1.5 miles above Wetipquin Creek. **Sandy Hill Landing,** in ruins, is at the foot of the road 0.5 mile from Wetipquin.

Quantico Creek, on the east side, 13 miles above Clay Island Shoal Light, has 4 feet at the entrance, but 7 feet at high water for 10 miles.

Rewastico Creek, on the east side just above Quantico Creek, has a controlling depth of 6 feet at high water for several miles, but is little used.

Vienna is a village on the west side of Nanticoke River, 22 miles above the mouth. A highway double-bascule bridge, with span of 80 feet between fenders and high-water clearance of 18 feet when closed, crosses the river. The bridge tender is on duty 24 hours a day.

One dock, just downstream from the bridge, is in poor condition but usable. All other docks are in a state of collapse. Supplies can be obtained in the village.

A power line crosses the river 295 feet above the highway bridge. The vertical clearance of the cables is 135 feet.

Riverton is a post village on the east side, just below the junction of Nanticoke River and Marshyhope Creek.

Marshyhope Creek, the northwest fork of Nanticoke River, empties into the river 26 miles above the mouth.

The Federal project provides for dredging a channel 6 feet deep and 60 feet wide at mean low water from upper Browns wharf to within one-half mile of the southern boundary of the town of Federalsburg, with a turning basin at the upper end. The length of the section included in the project is about 4.6 miles, and its lower end is 10 miles above the mouth of the creek.

The creek has a depth of about 5 feet for 14 miles above the mouth to within 0.5 mile of the town of **Federalsburg.** The lower part is easily navigated, but the upper end is difficult without local knowledge. **Brookview** is 5 miles above the mouth, and there are several other small villages. There is a post office at Federalsburg and all kinds of supplies can be obtained. Repairs can be made to boats. Four bridges cross this creek. One is at Brookview with a double-bascule span 60 feet wide and high water clearance of 11 feet when closed; it is opened only from sunrise to sunset except by notice. The bridge tender is usually in a nearby house. Another bridge is at **Harrisons Ferry,** with a swing span 52 feet wide and high-water clearance of about 1 foot when closed. The span is in poor condition and it is doubtful if it can be opened. Two fixed bridges, railroad and highway, are at Federalsburg.

Sharptown is on the east side of Nanticoke River, 28 miles above the mouth. It has several mills and canneries and some river trade. Gasoline and provisions are obtainable. A bridge having a center-pier draw, each opening 75 feet wide with head-room of 7 feet at high water when closed, crosses the river at Sharptown. The bridge tender is on 24-hour duty.

Broad Creek, emptying into Nanticoke River from eastward 3.5 miles above Sharptown, has been improved by dredging.

The project provides for dredging a channel 70 feet wide and 8 feet deep at mean low water from Portsville Landing to Laurel; for straightening several sharp bends in the river; and for widening the channel below the railroad bridge at Laurel so as to provide a suitable turning basin. The length of the section included in the project is 4 miles, and its lower end is about 3 miles above the mouth of the creek.

The controlling depth in November 1944 was 7 feet. The dredged channel extends 230 yards above the railroad bridge, and small boats can go to a milldam 0.4 mile above.

Laurel, a town on the railroad 6.5 miles above the mouth, has a fertilizer plant and several mills. It has a little trade in vessels, the deepest draft being 9 feet. A railroad bridge, having a draw opening 40 feet wide and a height of 15 feet when closed, crosses the creek at the lower end of the town. Three other bridges cross at this town with draw spans respectively, 29, 37, and 40 feet wide, all with high-water clearances of about 3½ feet, when closed. Gasoline and provisions can be obtained.

Bethel is a village on Broad Creek, 2.5 miles below Laurel. A highway bridge, having a draw opening 52 feet wide and high water clearance, when closed, of 1 foot, crosses the river at Bethel. The bridge tender is on duty 24 hours a day.

A vehicular ferry crosses the river at **Woodland**, Delaware, about 3.5 miles below Seaford. It operates during daylight only. The cable drops when not in use.

Seaford is a town on Nanticoke River, 36 miles above the mouth. It has several mills and canneries and considerable trade in vessels. A railroad drawbridge, having a center-pier draw with one opening 47 feet wide and a vertical clearance of 1 foot at high water when closed, crosses the river near the lower end of the town. There is a strong cross current through the bridge. The dredged channel extends for 600 yards above the railroad bridge to a highway drawbridge having a single opening 40 feet wide and a vertical clearance of 3 feet at high water when closed. The horizontal clearances given are between fenders. There is a depth of about 7 feet for 1.5 miles above the

highway bridge, and small boats can go to a milldam about 5 miles above the bridge, but there is little business above Seaford. One plant is in operation building yachts. Repairs can be made and boats up to 60 feet in length can be hauled out on the marine railway. Gasoline, provisions, and water are obtainable.

Fishing Bay (Chart 1224) at the north end of Tangier Sound, has a depth of 11½ feet in a narrow partially marked channel to Fishing Point, 6 miles above the entrance, and 7 feet can be carried without difficulty to this point. Above **Fishing Point (lat. 38°18′, long. 76°01′)** the bay shoals rapidly to 3 feet in the upper end. **Elliott** is a post village on Fishing Point. **Crocheron,** on the southwest side of the bay in ***Tedious Creek,*** is a small village with oystering and crabbing industry. A white house on **Bishops Head Point** is prominent. Three channels each with an effective depth of 6 feet have been dredged from the main channel in Fishing Bay to: (1) ***McCreadys Creek,*** marked by a buoy and lighted range; (2) ***Goose Creek,*** marked by a light and daybeacon; (3) ***Farm Creek*** off **Toddville,** marked by a buoy, daybeacons, and a lighted range.

The project provides for channels 6 feet deep and generally 60 feet wide at mean low water, suitably widened where necessary to offer adequate sheltered anchorage space from deep water in Fishing Bay to the vicinity of the county or packing house wharves in McCreadys Creek, Farm Creek, and Goose Creek.

Blackwater River, at the northern end of Fishing Bay, has a depth of about 2 feet at the mouth and deeper water inside. It is navigable for 15 miles or more, and is used by local residents. There are two sawmills up the river.

Transquaking River, emptying into the northern end of Fishing Bay, has a depth of about 2 feet at the entrance and deeper water inside for about 6 miles to a fork. The northern branch is called Transquaking River and the eastern branch ***Chicamacomico River;*** both are said to be navigable for several miles and are frequented by local boats.

Kedges Straits, connecting Tangier Sound and Chesapeake Bay between Smith Island and South Marsh, has a least depth of 10 feet, and is used by vessels of 6- to 9-foot draft bound from northward to points on Tangier Sound southward of Manokin River. It is marked by **Holland Island Bar Light,** 42 feet above the water and visible 12 miles, white house on piles, with a fog signal which is an air diaphone; South Marsh Spit lighted bell buoy 1; and **Solomons Lump Light,** 47 feet high and visible 11 miles, white octagonal house on brown cylinder, fog signal bell; and by unlighted buoys.

It is easy of navigation by day with the aid of the chart though the islands adjacent to it are low and present no prominent marks. The mean range of tide is about 1½ feet, but the range is considerably affected by winds, easterly winds raising the water, and northwesterly winds lowering it sometimes as much as 2 feet below the normal. Floating ice in severe winters makes the navigation of the straits dangerous.

Hooper Strait, the most northerly entrance to Tangier Sound, leads between Hooper Island and **Bishops Head** on the north and Bloodsworth Island on the south. It is used by all of the vessels from northward to the tributaries in the north end of Tangier Sound. It has a depth of 12 feet in a narrow, crooked channel, but there are shoals with little depth close to it, and it is seldom used by vessels of a greater draft than 9 feet, the deepest draft usually passing through at high water.

It is marked by Richland Point lighted bell buoy; **Honga River Light,** 16 feet above the water and visible 6 miles, black slatted pile structure; **Hooper Strait Light,** 41 feet above the water and visible 12 miles, white house on piles, fog signal an air diaphragm horn; and **Sharkfin Shoal Light** 44 feet above the water and visible 12 miles, white hexagonal house on piles, fog signal on bell; and by unlighted buoys.

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Strangers should be able to enter in the daytime by following the directions closely. The mean range of tide is about 1½ feet at Hooper Strait Light and 2 feet at Sharkfin Shoal Light. The tidal currents have considerable velocity, and in winter sailing vessels are in danger from running ice.

In Tangier Sound the general direction of the tidal currents is north and south, following the channel and diverging slightly off the entrances of the tributaries and straits. The velocity is greatly influenced by the force and direction of the wind. In the fall and winter long-continued northerly winds may lower the water as much as 2 feet below the normal and this is important to vessels passing through Kedges and Hooper Straits and into Crisfield Harbor. Current information for a number of locations in Tangier Sound and vicinity is given in the *Atlantic Coast Current Tables*.

Honga River, on the eastern side of Chesapeake Bay, north of the western end of Hooper Strait, has depths of 10 to 11 feet in a narrow crooked channel marked by lights and buoys for 11 miles above the mouth to **Hunting Ridge Point Light (lat. 38°20′ long. 76°12′)**, just north of **Wroten Island.** From here a channel leads northwesterly to **Honga River Upper Light,** then southwesterly through Fishing Creek drawbridge, and continues through ***Tar Bay*** and ***Barren Island Gaps Channel*** to Chesapeake Bay. The entire dredged channel is marked by lights.

The project provides for a channel 60 feet wide and 7 feet deep at mean low water from the 7-foot contour in Chesapeake Bay through Tar Bay and Fishing Creek to the 7-foot contour in Honga River.

In 1946 the controlling depth in the channel from Hunting Ridge Point Light to Honga River Upper Light was 5 feet and in the Barren Island Gaps Channel from Tar Bay Light 3 to Tar Bay Light 4 the depth was 4 feet.

Above the dredged channel in Honga River it shoals rapidly to a depth of 2 to 4 feet at the head. There is a strong current through ***Fishing Creek*** except a few minutes at each turn of the current. The maximum is estimated to be 3 knots. Honga River is frequented by local oyster and produce boats in the upper end. The mean range of tide is about 1½ feet.

The Honga River, Fishing Creek, Tar Bay, and Barren Island Gaps Channel makes possible a direct sheltered inside route from Tangier Sound to upper Chesapeake Bay for vessels of moderate draft.

Fox Creek, on the eastern side of Honga River, 3 miles above the mouth, has a depth of 8 feet to **Wingate Point.** The channel is marked by a light at the entrance, a daybeacon on the point of shoal off **Paul Point,** and sometimes by bush stakes. **Wingate** is a post village 1.5 miles east of Wingate Point. Gasoline may be obtained in small quantities. There are three oyster packing plants with small wharves accommodating oyster boats of 3- to 4-foot draft. A small channel, marked by stakes, leads to the oyster plants at the head of ***Duck Point Cove.***

A project provides for a channel into Duck Point Cove 60 feet wide and 6 feet deep, from that depth in Fox Creek to a mooring basin of the same depth, 100 feet wide and 300 feet long, roughly parallel to the county road at the head of the waterway.

In 1947 no work had been done on the project.

Hooper Islands are three low islands separating Honga River from Chesapeake Bay. The northern two islands are connected with the mainland and with each other by Fishing Creek swing bridge with two spans about 27 feet wide and high water clearance of 6 feet when closed; and by Narrows Ferry bridge with spans about 23 feet wide and high water clearance of 5 feet when closed. About 3 feet could be carried in 1946 from Honga River to Chesapeake Bay through Narrows Ferry bridge. Bridges

are opened from sunrise to sunset. The bridge connecting the southern island has been washed out.

The two villages on the islands are **Fishing Creek** on the northern island and **Hoopersville** on the middle island. A ruined wharf at Hoopersville has a depth alongside of 9 feet. There are several packing plants, general stores, churches, schools at Hoopersville. A marine railway capable of hauling out and repairing a boat 100 feet in length and 5 feet in draft is on ***Back Creek,*** a small estuary west of **Old House Point,** which can be entered with local knowledge. There are usually bush stakes. The controlling depth is 2 feet. Gasoline, oil, provisions, and some ship chandlery may be obtained on the island. Hoopersville is connected with Cambridge (on the railroad) by a good road. **Honga** post office is near Fishing Creek bridge; another post office is in the village of Fishing Creek.

Honga River to Chester River

CHART 1225

Golden Hill (lat. 38°24′, long. 76°13′) is a post village at the northern end of Honga River, and can be reached by boats of 2-foot draft at low water.

A draft of 3 or 4 feet at high water can be carried from the northern end of Honga River through ***Great Marsh Creek, Lower Keene Broad,*** east of **Dunnock Island,** and ***Upper Keene Broad*** into Slaughter Creek, a tributary of Little Choptank River, but the passage should not be attempted by strangers. It is crossed by a fixed bridge near Golden Hill, having a headroom of about 6 feet at high water and span of about 24 feet.

This thoroughfare can be entered from Chesapeake Bay through ***Punch Island Creek,*** a narrow thoroughfare about 3 miles northward of the northern end of Tar Bay; the entrance has a depth of about 3 feet at high water.

Little Choptank River, on the eastern side of Chesapeake Bay, 4.5 miles southward of Sharps Island, is frequented by local boats, the deepest draft being 9 feet. The river is obstructed by shoals, but has a depth of 14 feet in a narrow, crooked channel for 8 miles above the mouth and 6 feet for a considerable distance into most of the tributaries. Some of the shoals are marked by buoys. The channels in the principal tributaries are usually marked by bush stakes, but are narrow and crooked and difficult without local knowledge.

Oyster Cove, on the south side of Little Choptank River, just inside the entrance, has a depth of 3 feet in mid-channel to near the head, but is little used. There is a depth of 1 foot at low water through the thoroughfare between **James Island** and the mainland. James Island is subject to rapid erosion.

Slaughter Creek, on the south side of Little Choptank River, has a bar across the mouth with a depth of 4 feet. The old dredged channel has shoaled to about 2 feet and the best water is about 165 yards eastward of the lights marking the old channel. The channel above the bar has a depth of about 6 feet in mid-stream to the village of **Taylors Island,** 2.5 miles above the entrance. It is used by oyster tongers and crab fishermen. The drawbridge at Taylors Island is out of repair and will probably

not be opened until the completion of a new bridge, the construction of which has been authorized.

The present bridge has a vertical clearance of 3 feet above mean high water. The creek shoals rapidly above the bridge, though small boats can pass through into Honga River or Chesapeake Bay at high water. Gasoline, water, and provisions are obtainable at Taylors Island which also has a telegraph station, post office, and general store.

Brooks Creek, on the north side of Little Choptank River, has a depth of 6 feet in a narrow, unmarked channel to within 0.8 mile of the head. It is frequented only by small local craft.

Hudson Creek, on the north side of Little Choptank River, 6.5 miles above the entrance, has a depth of 6 feet to near the head.

Vessels drawing 6 feet may go to **Speddens Wharf,** in bad condition, near the head, 0.5 mile from the post village of **Hudson.** The channel is generally marked by bush stakes but is difficult without local knowledge. Gasoline, water, and provisions may be obtained at Hudson.

Madison Bay, on the southeast side, opposite Hudson Creek, has an entrance depth of 6 feet and a general depth of 6 to 8 feet. The wharf at the village of **Madison** is in ruins and the water is very shoal, about 1 to 2 feet.

Fishing Creek, on the south side of Little Choptank River, 8 miles above the entrance, has a depth of 6 feet in a narrow channel for 4 miles above the mouth. There are no wharves on the creek, but it is extensively used by boats bound to Church Creek, the principal tributary. The channel is marked by buoys and bush stakes.

Church Creek, emptying into Fishing Creek, 2.5 miles above the entrance, has a depth of 5 feet to **Milton Wharf,** near the post village of **Woolford (lat. 38°30′, long. 76°11′)** 1.5 miles above the mouth, and 3 feet for a farther distance of 0.5 mile to the foot of a road 0.5 mile from the post village of **Church Creek.** Milton Wharf is in ruins and is little used. Gasoline and provisions may be obtained at Church Creek.

Phillips, Beckwith, Gary, and ***Lee Creeks,*** tributaries of Little Choptank River above the entrance of Fishing Creek, have no commercial wharves and little business by water except in small local boats.

Anchorage.—There is good anchorage in a depth of 12 to 18 feet in the bight between James Island and **Hooper Point** if the shores be given a berth of 0.5 mile or more.

Tides.—The mean range of tide in Little Choptank River is about 1½ feet.

Directions, Little Choptank River.—Keep clear of the fish-trap area along the east shore of Chesapeake Bay, shown on Chart 1225, proceeding to a position 2 miles 074° from Sharps Island lighted bell buoy 18A. Then steer **105°** toward the north end of **Ragged Island** passing 0.2 mile southward of lighted bell buoy 1A, and 0.4 mile northward of buoy 4 to a position 0.7 mile beyond it, the buoy and the little island off **James Point** on range. Then steer **209°** passing 0.3 mile northwestward of buoy 3, to an anchorage east of James Island or round the buoy to the southward, being guided up the river by the chart.

Choptank River, on the eastern side of Chesapeake Bay, 102 miles above the entrance and 43 miles below Baltimore, is navigable for a distance of 55 miles above the entrance to the town of Greensboro. The river and its tributaries are frequented by many oyster and fishing boats, and steamers and schooners engaged in the bay trade, the usual draft of boats being 5 to 8 feet and the deepest draft 15 feet. Fish-trap areas are shown on the chart.

Pilots.—There are no regular pilots for Choptank River, but a pilot for the lower end of the river or the tributaries can be obtained from Tilghman Island, and for the

upper end from Cambridge. Pilots for the tributaries can also usually be obtained near their entrances.

Supplies.—Coal and water can be obtained on the wharves at Cambridge, and coal in limited quantities at Oxford and Denton. Gasoline and provisions are obtainable at Tilghman Island, Oxford, Secretary, Cambridge, Choptank, Denton, and Greensboro. Several other places have stores where supplies are available.

Tides.—The mean range of tide is about 1½ feet at Cambridge, 2 feet at Denton, and 2½ feet at Greensboro. The water above Choptank is fresh.

Channels.—The main entrance to Choptank River leads southward and eastward of Sharps Island. It has a least depth of 24 feet and is broad and easy of access. The channel, clear of fish traps, northward of Sharps Island Light has a least depth of 12 feet, and is used by vessels of 10-foot draft from northward bound to or from Choptank and Little Choptank Rivers. To keep clear of fish traps, pass just southward of fish-net-stake buoy 8B (white and black horizontal bands), 2.5 miles west of Tilghman Island, and steer **137°** to a position between lighted bell buoy 7 and the horizontally banded buoy 0.4 mile southward of it, then **070°** to 0.3 mile north of lighted bell buoy 10.

The channel is marked by lights and buoys from the mouth to Denton, 30 miles above Cambridge, and is easily followed with the aid of the chart. The mid-channel is clear to the mouth of Tuckahoe Creek, and the channel is easily followed if the points be given a good berth. Between the mouth of Tuckahoe Creek and Greensboro the channel is narrow and crooked and is difficult without local knowledge.

There is railroad communication at Oxford, Easton, Cambridge, Denton, Greensboro, and Hillsboro.

Sharps Island, a low island marked by a bombing target, is in Chesapeake Bay off the entrance to Choptank River. **Sharps Island Light,** 54 feet above the water and visible 13 miles, has a red sector and an obscured sector. The red sector covers the shoals off Poplar Island and Blackwalnut Point. The light is shown from a brown tower on cylindrical pier, 1.3 miles north-northwestward of Sharps Island, and is the principal guide to the entrance. The island is subject to rapid erosion. An ice breaker is about 0.5 mile south by east of Sharps Island Light.

Restricted area.—The following restricted area has been established in the vicinity of Sharps Island with boundaries as follows:

The Area.—An area bounded by the circumference of a circle of 200 yards radius centered approximately 300 yards south of Sharps Island in latitude 38°36′53″, longitude 76°21′56″.

The Regulations.—(1) No vessel shall enter or remain in the foregoing area at any time except as authorized by the enforcing agency.

(2) These regulations shall be enforced by the Commanding Officer, U. S. Naval Air Station, Patuxent River, Maryland, and such agencies as he may designate.

Tilghman Island, on the north side of the entrance to Choptank River, has a large oystering, crabbing, and fishing industry. There are three post villages on the island—**Fairbank,** near the southern end, and **Avalon** and **Tilghman,** near the northern end. The western side is subject to rapid erosion.

Blackwalnut Cove, at the southern end of Tilghman Island, is marked by a light and is extensively used as an anchorage by small craft. A buoy marks a wreck in the entrance. **Bar Neck,** on the east side of Blackwalnut Cove, displays storm warnings day and night.

A project provides for a channel 6 feet deep and 60 feet wide to and including an anchorage basin of the same depth 400 feet square.

In 1946 there was a general depth of 2 feet to Fairbank at the head of the cove.

Dogwood Harbor (***Tilghman Island Harbor***), on the eastern side of the island, has a depth of 10 feet to the wharf of the packing plant at Avalon. The harbor is frequented by many local boats of 3- to 7-foot draft. The channel is marked by lights. Gasoline, water, and provisions may be obtained.

Knapps Narrows, at the northern end of Tilghman Island, has been improved by dredging a channel between Harris Creek and Chesapeake Bay 9-foot depth curves.

A project provides for a channel 9 feet deep, 75 feet wide, widened at the bends from deep water in Chesapeake Bay to deep water in Harris Creek, Maryland.

In December 1946 the controlling depth in the improved channel was 5 feet.

The channel and both entrances are marked by lights. **Caution**—after passing the bridge the system of marking the channel is reversed. On both sides of the bridge the aids to navigation lead from each entrance of the narrows toward the bridge. There is an anchorage basin, 120 by 320 feet, and 9 feet deep just southwest of the bridge. The bascule bridge has a span of 50 feet and a 7-foot high-water clearance when closed. Gasoline is available. A marine railway is capable of hauling out a boat 50 feet in length and 3½ feet in draft. Repairs, including engine repairs, can be made.

Harris Creek, on the north side of Choptank River, just inside the entrance, has a depth of 10 feet in a narrow, crooked channel for 5½ miles above the mouth, 5 feet for a farther distance of 2 miles, and 1 foot to **McDaniel** railroad station at the head. About 5 feet can be carried up ***Cummings Creek*** to the county wharf at **Wittman** (**lat. 38°47′, long.76°17′**). A 100-ton vessel can lay alongside this public wharf. No wharfage fees are charged. The wharf has a 55-foot face with 4½- to 6-foot depth alongside.

Two marine railways, each capable of hauling a vessel 46 feet in length and 4 feet in draft, are in the prongs just east of Cummings Creek.

The channel is marked by buoys for 3 miles above the mouth, above which the mid-channel is clear if the points be given a good berth. **Sherwood** is a post village on the west side, 4 miles above the entrance. A county wharf is available to the public.

Trippe Bay, on the south side of the entrance to Choptank River, 4½ miles east-southeastward of Sharps Island, is shoal and little used except by small oyster and fishing boats. The channel to ***Brannock Bay*** at the head is buoyed.

Broad Creek, on the north side of Choptank River, 7 miles northeastward of Sharps Island, has a depth of 18 feet for 5 miles above the mouth and 6 feet to near the heads of most of the tributaries. There is a depth of 3 feet in ***San Domingo Creek*** to **St. Michaels,** a town with railroad communication and with its main waterfront on Miles River. The creek is frequented only by local oyster and produce boats and boats bound to St. Michaels. The channel is marked by buoys at the entrance, and some local knowledge is required to keep in the best water above. ***Balls Creek,*** on the west side, just inside the entrance, has a depth of 6 feet to the head; the entrance is narrow and is marked by a light. **Neavitt Wharf** is on the south side, just inside the entrance, and **Neavitt** is a post village at the head.

Irish Creek, just eastward of the entrance to Broad Creek, has a depth of 10 feet in the entrance and 6 feet to near the head. The entrance is narrow and is marked by buoys. The creek is frequented only by small local craft.

Tred Avon River, on the north side of Choptank River, 9 miles above Sharps Island, has a depth of 16 feet for 5 miles above the mouth and 12 feet for a farther distance of 2 miles, above which it has been improved by dredging a channel 8 feet deep and 150 feet wide to **Easton Point,** 1 mile from the town of **Easton.** The project

further provides for a widening out of the channel at Easton and an extension 2,100 feet up the North Fork with a turning basin at the upper end, but this has not been completed. A survey in 1944 showed no sign of shoaling in the dredged channel below Easton Point and that 8 feet can be carried to the wharves at MLW. The turning basin directly southwest of Easton Point is limited.

Two bulkheads are at Easton Point; one is on the southwestern side and the other is on the northwestern side. There is 10 feet of water along the faces of these piers. Considerable freight is shipped from these piers during the summer and fall. Gasoline and oil are inbound by small tankers, and fresh and canned vegetables, wheat, and grains are outbound by small freighters. Fresh water in small amounts can be obtained at the piers.

Mid-channel courses can be steered with safety by craft drawing 5 to 6 feet of water. The only shoal approaching mid-channel is the one extending southwest from **Watermelon Point.** This shoal has a least depth of about 5 feet. The north bank of the river should be favored when passing this point. Anchorage for small motor boats and pleasure craft is found near mid-channel in any of the larger streams. The bottom of the river is quite firm but is mostly soft mud in the side streams. Excellent protection is obtained from the wind except when blowing up or down stream. In general the banks are lined with brush and trees which helps to give further protection from the wind.

Choptank River Light (lat. 38°39′, long. 76°11′), 35 feet above the water, visible 11 miles, white house on piles, is on a shoal off the entrance to Tred Avon River. A draft of 12 feet at low water can be taken into the entrance on either side of the light by giving it a berth of 0.4 mile; however, the channel to the eastward is the wider. Buoys mark a channel to **Long Point,** thence a mid-channel course is clear to Easton Point.

Oxford is a town on the east side of Tred Avon River, 1.5 miles above the entrance. The only docking facilities at Oxford are at the ferry dock landing in the Tred Avon River north of Oxford. A depth of 15 feet of water can be found alongside the outer face of this dock and can be carried all the way in from the Choptank River at MLW. Gasoline may be obtained at this dock and at the boatyards. Telephone and telegraph service is available and limited supplies can be obtained. Ferry service is maintained with Bellevue.

Oxford has railroad communication. Storm warnings are displayed both day and night from a mast. A tall silver water tank stands well above the trees and can be seen for a considerable distance.

Town Creek, on the east side of Oxford, has a light at the entrance and is used extensively as an anchorage by local craft. Three shipyards are in Town Creek. The largest can handle wooden craft up to about 125 feet in length and 8 feet in draft. Machine shops are available at all three yards but there are no facilities for repairing metal hulls. About 8 feet of water can be carried to the largest yard and about 5 feet to the two smaller yards.

A project provides for a channel 10 feet deep and 100 feet wide in Town Creek opposite Shipyard Cove; thence 8 feet deep and 100 feet wide to a point about 2,700 feet above the mouth; thence 7 feet deep and 60 feet wide to and including a turning basin of the same depth, 100 feet wide and 200 feet long, at the head of the creek; together with anchorage basins approximately 300 feet square adjacent to the channel in Shipyard Cove and in Crocketts Cove, with depths of 10 and 8 feet, respectively.

No work has been done on this project.

Bellevue is a village on the west side of Tred Avon River, 0.8 mile northward of Oxford. Several oyster-packing houses are prominent. About 6 feet of water at MLW can be found alongside the largest of the several fishing wharves at Bellevue.

Double Mills is a landing on the western side, 3 miles above Oxford.

Island Creek is 1.3 miles eastward of Choptank River Light. A Federal project provides for a channel 8 feet deep and 75 feet wide through the entrance bar. In 1944 the controlling depth was 8 feet. Two lights mark the narrow entrance. The channel should not be used without local knowledge; the sides are hard sand and shell. To enter keep the first light 30 yards to port on a course of **046°** and pass the second light 10 yards to starboard.

Several large buildings at **Castle Haven** on the south side of the Choptank are prominent. The long wharf, with a short T at the end, and the boathouse are privately owned and are not open to the public.

Lecompte Bay, on the south side of Choptank River, 3 miles above Choptank River Light, has a depth of 8 feet.

La Trappe Creek, on the north side of Choptank River, 3.5 miles above Choptank River Light, has been improved by dredging a channel 11 feet deep and 150 feet wide across the bar at the entrance and 8 feet deep and 75 feet wide to the head of navigation at **Trappe Landing,** 3 miles above the mouth, with a turning basin at the head. In 1944 the depth across the bar was 10 feet, and 7 feet could be carried to within 0.5 mile of the landing. The creek is frequented by grain vessels up to 8-foot draft. The channel is marked by two lights at the entrance. In entering, leave the outer light 100 feet on the port side, the inner light 100 feet on the starboard side, then follow a mid-channel course to the head. **Trappe** is a post village 1.5 miles from Trappe Landing. The landing has a depth of 4 feet at the face of the bulkhead.

Dickinson Bay, just eastward of **Howell Point,** which is marked by a light on a single pile, has depths of 3 to 5 feet and is little used.

Off ***Hambrooks Bar*** is a light with red sector shown from a white cylindrical tank on a red caisson.

Cambridge (lat. 38°34′, long. 76°05′), a town with railroad connections, on the south side of Choptank River, 17 miles above the mouth, has considerable trade by freight boats and is the center of a large oystering and fishing industry. The deepest draft going to the town is 13 feet. Cambridge is a port of entry and has a customhouse from which marine documents are issued. The town has a third-class medical relief station.

Cambridge Harbor is a creek 0.6 mile long on the eastern side of the town. A channel has been dredged from Choptank River to the head of the harbor, with a turning basin at that point. Speed in the harbor is limited to 5 miles per hour.

The project provides for a channel 14 feet deep from that depth in Choptank River to the head of the harbor with widths of 150 feet below the Market Street Bridge in Cambridge and 100 feet above, and a turning basin of the same depth at the head of the channel; for an anchorage basin 10 feet deep, 400 feet long, and 175 feet wide on the west side of the channel and a second basin of the same depth 225 feet long and 200 feet wide on the east side of the channel; and a channel 60 feet wide and 7 feet deep from that depth in Choptank River to the municipal boat basin north of the entrance to the harbor.

In December 1946, the controlling depths in the channel were 12 feet to the bridge and 10 feet beyond.

The bridge is a double-bascule span with opening 50 feet wide between fenders

and a clearance of 8 feet at high water when closed. The draw is in operation 24 hours a day. The entire harbor is congested with small boats during the oyster season. Three repair yards with marine railways are located at Cambridge, the largest having a capacity for vessels up to 100 feet in length, 9 feet in draft, and 150 tons. Gasoline, Diesel oil, and provisions can be purchased.

The channel into Cambridge Harbor is marked by buoys and a lighted range. The front range is on a white box and is plainly visible by day a little to the left of the steamboat wharf, but the rear range is not conspicuous by day.

At the north side below the entrance is a yacht basin having 4½ feet in the entrance and 5 to 6 feet inside. The basin entrace has two lights which are not shown on the chart. Permission must be obtained from the harbormaster before anchoring or docking in the basin or at the property of the city of Cambridge. A wharfage fee is charged for use of the yacht basin but vessels may tie up at the steamer wharf if permission is obtained from the harbormaster.

The yacht club at the basin, from which storm warnings are displayed by day only, has the appearance of the bridge of a ship.

A swing bridge, with both draw openings 100 feet wide between fenders and a vertical clearance at high water when closed of 18 feet, crosses the Choptank River at the east side of Cambridge.

Bolingbroke Creek, on the north side of Choptank River, 1.8 miles eastward of Cambridge, has a depth of 3 feet across the bar at the mouth and 6 feet inside to the head. There are no wharves except for small boats.

Warwick River (***Secretary Creek***), on the east side of Choptank River, 5 miles above Cambridge, has been improved by dredging a channel from Choptank River to **Secretary** including a turning basin at the latter point 1 mile above the mouth.

The project provides for a channel 10 feet deep and 100 feet wide at mean low water from the 10-foot contour in Choptank River to Secretary Landing and a turning basin at the latter point. The length of the section included in the project is about 1½ miles, the lower half mile extending into Choptank River.

The controlling depth reported in the dredged channel in June 1946 was 6 feet. The river is frequented by many local craft of 6-foot draft. Three buoys mark the channel for 0.5 mile, but the channel may be difficult without local knowledge. Secretary has a post office. The stream west of Secretary Landing is crossed by a fixed bridge near its mouth. The bridge has a horizontal clearance of 19 feet and a vertical clearance at MHW of 4 feet. The bulkhead wharf is used by tankers, fertilizer boats, and barges.

Cabin Creek, on the east side of Choptank River, 7 miles above Cambridge, has a depth of 5 feet for 0.8 mile above the mouth and 2 feet for a farther distance of 0.8 mile. There are no wharves, and it is frequented only by a few grain schooners and small local craft.

A fixed highway bridge which crosses the creek has a horizontal clearance of 17½ feet and a vertical clearance of 7 feet at MHW. The pilings of a former bridge, cut off just below the water line, are downstream of, and parallel to, the present bridge.

Hunting Creek, on the east side of Choptank River, just below the village of Choptank, has a depth of 4 feet in the entrance and to the head of navigation at **Back Landing** bridge, a highway bridge 0.3 mile above the entrance. The bridge has a hand-operated retractile span with a horizontal clearance of 24 feet and a vertical clearance when closed of 2½ feet above MHW. In 1947 it was necessary to give a 24-hour notice

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to have the bridge opened. The creek is little used. The bridge tender's telephone number is on a sign at the bridge.

Choptank (lat. 38°41′, long. 75°56′) is a village on the east side of Choptank River, 10.5 miles above Cambridge. There is a small yacht harbor with wooden breakwaters and a depth of from 2 to 3 feet inside. The old wharf to the north of the yacht harbor is in ruins.

Dover Bridge, a highway swing bridge with openings 79 feet wide and a vertical clearance of 10 feet above MHW when closed, crosses the river about 8 miles above Choptank.

Tuckahoe Creek, on the west side of Choptank River, 41 miles above the mouth, has a depth of 6 feet to the wide place in the creek 1 mile north of Tuckahoe Bridge. At this point the controlling depth is 5 feet and the best water is nearer the northern shore. Above this point the controlling depth is 7 feet to 0.3 mile below Stony Point, where it shoals to 3 feet. The controlling depth from here to **Hillsboro** and **Queen Anne,** towns on the railroad, is 2 feet. Pleasure and fishing boats are the only traffic on the river. The channel is not marked and is crooked and difficult in places without local knowledge. The flats are covered with tuckahoes or marsh grass in the summer. **Tuckahoe Bridge,** a highway bridge 1 mile above the entrance, has a single draw opening 37 feet wide between fenders and a vertical clearance when closed of 3 feet at MHW. In 1947 a bridge tender was on duty at all times but must be contacted at his farm about 2 miles distant from the bridge. No telephone service is available at the bridge. A new highway bridge will be built just downstream of the present bridge.

Tides.—The mean range of tide at **Wayman Wharf,** 3.5 miles above Tuckahoe Bridge, is 2.5 feet.

The water is fresh above Choptank.

When proceeding up the Choptank River opposite the mouth of Tuckahoe Creek pass near buoy 52 and steer **106°** for 0.3 mile, then bear left and continue a mid-channel course.

Williston is a small settlement and cannery on the east side of Choptank River 2.5 miles above Tuckahoe Creek. The bulkhead is now in poor condition but has deep water alongside. A store is on the highway 0.5 mile to the east.

Denton is a town on the east side of Choptank River, 48 miles above the mouth.

A Federal project provides for a channel 75 feet wide and 8 feet deep at mean low water from Denton to Greensboro, a distance of 7 miles, and for a channel through Pealiquor Shoal (about 2 miles below Denton) 8 feet deep and 100 feet wide.

In 1946 the controlling depth was 6 feet through ***Pealiquor Shoal,*** opposite Daybeacon 57, and 8 feet south of Daybeacon 56. The deepest draft going to Denton is 8 feet. **West Denton** is on the west side of the river opposite Denton. All the wharves are at West Denton. Two drawbridges cross the river at Denton; the lower, a bascule highway bridge, has a single opening 48 feet wide and 3½ feet vertical clearance at MHW when closed, and the upper, a swing railroad bridge, has 2 openings, each 49 feet wide, and 6 feet vertical clearance at MHW when closed. The bridge tender for the highway bridge will contact the tender for the railroad bridge by telephone.

There is considerable tanker traffic to Denton, from which point oil is distributed to the surrounding country. Fertilizer is a seasonal business.

Greensboro is a town at the head of navigation 7 miles above Denton. The controlling depth to Greensboro was 3½ feet in December 1946. There is a bulkhead about 0.3 mile south of town. The fixed highway bridge 0.5 mile above the bulkhead has a horizontal clearance of 38 feet and a vertical clearance of 9 feet at MHW.

Eastern Bay, on the eastern side of Chesapeake Bay, 34 miles below Baltimore, is the approach to Miles River and several less important tributaries and to the towns of Claiborne and St. Michaels. It is frequented by a large number of oyster and fishing boats. The deepest draft of boats entering the bay is 13 feet and this draft is taken above St. Michaels.

The bay is obstructed by extensive shoals, but a broad channel with a least depth of 30 feet leads through it to the mouths of most of the tributaries. The channel is well marked by buoys and lights through Eastern Bay and Miles River to a drawbridge 5½ miles above St. Michaels, and strangers should have little trouble in following the channel with the aid of the chart to near the bridge. The other tributaries are not well marked and are seldom entered by strangers except in small craft. The shores are low and present few prominent marks.

Pilots for Eastern Bay and tributaries can be obtained from Claiborne, or from local boats which can always be found working in the bay.

The main entrance to Eastern Bay, between the south end of Kent Island and Poplar Island, has a broad and unobstructed channel with ample depth. **Bloody Point Bar Light (lat. 38°50′, long. 76°23′)**, 56 feet above the water, visible 13 miles, brown tower on cylindrical foundation, is the principal guide to the entrance. Vessels of 6-foot draft can also enter through Poplar Island Narrows and boats of 7-foot draft through Kent Island Narrows.

Poplar Island, on the south side of the main entrance to Eastern Bay, is low and wooded. At one time Poplar Island included the land of the present **Jefferson Island** and **Coaches Island.** ***Poplar Harbor,*** on the eastern side, has a depth of 5 feet in the entrance, and a secure anchorage inside has a depth of 3 to 6 feet. A long private wharf at the southern end of Jefferson Island has a depth at the face of 4 feet.

Poplar Island Narrows, between Poplar Island and the mainland, has a depth of 9 feet, but there are unmarked shoals with little depth close to the channel, and 6 feet is the deepest draft using it.

To pass through the narrows, follow the charted light and buoys. It should be noted that black buoys are on the west side and red buoys on the east side of the channel.

Ferry (Haddaway) Cove, 2 miles eastward of Poplar Island, has a depth of 6½ feet in mid-channel to **Lowes Wharf** at the head. This wharf is the property of a fish-cutting plant and is not for public use. The depth at the face is 4 feet. The cove is used extensively as an anchorage by local craft.

To enter, pass 100 yards southward of the light on the north side at the entrance and steer for the end of the wharf on a **096°** course. **Sherwood** is a post village 0.5 mile from the wharf.

Claiborne is a village and summer resort on the southeast side of Eastern Bay, 5 miles eastward of Bloody Point Bar Light. A railroad pier extends 800 feet west-southwestward from the shore and a jetty extends 750 feet west-southwestward from the end of the pier. The pier is in ruins. Buses have superseded the trains. An automobile and passenger ferry operates between Romancoke and Claiborne. The ferry landing is just south of the old railroad pier. A white sanatorium and the ferry building are prominent objects at Claiborne.

Gasoline and provisions are obtainable at the village which is about 0.2 mile from the ferry landing. The village has a post office.

The existing project provides for a channel 14 feet deep from the vicinity of the harbor piers to deep water in Eastern Bay. The channel is marked on the west and

south sides by spar buoys, and by a light on the north side at a turn in the channel. In October 1946 the channel had a controlling depth of 14 feet.

In entering, pass northward and eastward of lighted bell buoy 2A and steer **127°**, with the buoy astern, to southwestward of the light 300 yards from the end of the jetty, then head for the end of the pier.

Cox Creek, on the north side of Eastern Bay and the southeast side of Kent Island, has a depth of 10 feet for 3.8 miles above **Long Point** on the western side at the entrance and 6 feet for some distance into the three tributaries at the head. It is frequented by oyster boats, the deepest draft being 8 feet. There are several farm landings but no villages. The shoals are unmarked and local knowledge is required to avoid them.

The channel through the narrow part of Cox Creek, about 1.8 miles above **Turkey Point,** is very narrow and hazardous for craft drawing 6 feet or more. Shoal water borders close to the edges of the channel. The Stevensville-Chester highway bridge near the head of Cox Creek is fixed and has a vertical clearance of about 4 feet. The depth of water that can be carried to the bridge is about 1½ feet.

Romancoke ferry landing is about 1.5 miles above Long Point. It consists of a pier with dolphins about 50 yards off its outer end on either side of the approach channel. The channel is marked by two buoys at its entrance and by a lighted range on the axis of the pier. In 1946 the controlling depth in the channel was 17 feet.

Shipping Creek, on the western side of Cox Creek, and the adjacent waters to the east are used only by shallow-draft fishing boats and duck hunters.

Crab Alley Bay, on the north side of Eastern Bay, 2.5 miles northward of **Tilghman Point,** has a depth of 21 feet into the entrance and 6 feet to near the head of navigation in both branches. The shoals, except for the channel leading into the western branch, are unmarked and local knowledge is required to avoid them. About a mile up ***Crab Alley Creek,*** the western branch, is a marine railway capable of hauling out a boat 45 feet in length and 4 feet in draft.

The buoyed channel leading to Crab Alley Creek has a depth of 7 feet. About 6 feet can be carried for 1.3 miles up the creek. The approach to Crab Alley Creek is westward of the larger of two islands lying off its mouth. The channel in the approach is restricted by two shoal areas. The first is very shallow, partly dry at low water, and extends 150 yards into the approach from the southwestern point of the larger island. A course, with the outer end of the western entrance point of the creek bearing 018° and in range with the outer end of a point on the eastern side of the creek about 0.4 mile above the entrance, will clear the extremity of this shoal. The other shoal area makes out from the opposite shore and is marked by a black buoy.

Bodkin Island, on the western side, is thickly wooded and has no buildings visible

Parson Island, on the eastern side, is sparsely wooded, giving it a ragged appearance, and has a white house visible at times.

Kent Island Narrows (Chart 548), a narrow slough connecting the northern end of Eastern Bay with Chester River between **Kent Island** and the mainland, has been dredged and buoyed. It had a depth of 6 feet at low water in October 1946 and is extensively used by local craft. The Federal project for improvement of Kent Island Narrows provides for a channel 7 feet deep and 100 feet wide from Eastern Bay to Chester River.

Bridges.—Two drawbridges cross the narrows. The northerly is a railroad swing bridge having a horizontal clearance of 38½ feet in the west opening (the east opening is narrower and difficult to navigate) and a vertical clearance of 3 feet at MHW when

closed. The other is a highway bascule bridge having a single clear opening 50 feet wide and a vertical clearance of 7 feet at MHW when closed. The signal for both bridges is three blasts of a whistle or horn, to be answered by three blasts from the bridges if they can be opened immediately, or one blast if they cannot be opened immediately. The draws will be opened at all times between one hour before sunrise and one hour after sunset unless a train is approaching or passing.

At the bridges is a railroad station, **Narrows Station (lat. 38°58′, long. 76°15′)**, from which considerable sea food is shipped.

Just southward of the eastern end of the highway bridge is a boatyard where gasoline, fresh water and supplies can be obtained. The marine railway will accommodate a vessel 50 feet in length and 3½ feet in draft.

To enter Kent Island Narrows from Eastern Bay, pass 0.3 mile eastward of Parson Island into ***Prospect Bay,*** then steer **343°**, passing 0.2 mile westward of **Hood Point,** then steer **004°** heading for the pair of channel buoys off ***Marshy Creek.*** In approaching, to pass between these buoys, keep close to buoy 3 and steer about north-northwest. Then follow the chart and aids through the narrows to deep water in Chester River. (See sub-plan on Chart 548.) The spit extending southeast of Hog Island is marked by buoy 1. Buoy 8, about 500 yards south-southeast of the bridge span, should be passed close by to clear the shoal on the south side of the channel.

Note.—In entering Kent Island Narrows from Chester River, it should be noted that the system of buoyage changes; that is, black buoys will be found on the right.

Greenwood Creek (Chart 1225), on the eastern side of Eastern Bay, 2.8 miles east-northeastward of Tilghman Point, has shoaled to 4½ feet in the entrance 0.3 mile southward of **Piney Neck Point,** but 6 feet can be carried for 2 miles above the mouth. The best water leads along the eastern shore in approaching the entrance.

Tilghman Creek, on the eastern side of Tilghman Point, has a depth of 9 feet in the entrance and 7 to 11 feet for the greater part inside, and is extensively used as a harbor for small local vessels. The entrance is very narrow and is marked by a light and a buoy. The outer end of Tilghman Point is heavily wooded.

Danger.—A wreck having a least depth of 4 feet over it, is off the small western arm of Tilghman Creek 0.3 mile from the head of the creek. This wreck is a menace to boats anchoring or turning in the creek.

Miles River, the most important tributary of Eastern Bay, has a depth of 18 feet to abreast the town of St. Michaels 6 miles above Tilghman Point, 9 feet to a drawbridge 5.5 miles above St. Michaels, and 6 feet for a farther distance of 2 miles. The river now has little trade. It is reported that boats can go to the bridge with a depth of 13 feet at MLW with local knowledge. The channel is well marked by lights and buoys as far as the bridge.

The highway drawbridge has a lift opening 40 feet wide, with a headroom of 5 feet at high water underneath the span when closed. The draw is opened only between sunrise and sunset except by special request. For additional regulations see Chapter 2.

Danger.—A rocky patch having a depth of 3 feet over it lies near the edge of the channel approach to Miles River. It is located 1.8 miles 164° from Tilghman Point.

St. Michaels, a town with railroad communication on the southwest side of Miles River, 14 miles above the entrance to Eastern Bay, is the center of a large oystering and fishing industry. The long wharf on the north side of the entrance to the harbor has a depth of 8 feet at the end and is marked by red and gray oyster houses and a brick stack. There is a depth of 10 feet in mid-harbor to near the head. The cove at the head has a depth of about 3 feet.

Gasoline and provisions are obtainable. General repairs can be made. There are two marine railways, the larger capable of hauling out a boat 40 feet in length and 4 feet in draft. A stack, tank, and two church spires are prominent. Many yachts anchor in the inner harbor and it is frequently crowded.

The Miles River Yacht Club is located in ***Long Haul Creek.*** The channel is well marked by finger posts locally maintained.

To enter, pass eastward and southward of the red buoy 0.7 mile northeastward of the wharves, and bring the southern end of **Fairview Point** (thickly wooded) astern on a **240°** course, heading for the red houses on the wharf and passing between the light and the black buoy off the wharf. If entering the inner harbor pass 60 yards southeastward of the ends of the wharves.

Oak Creek, on the south side of the river 3 miles above St. Michaels, has a depth of about 3 feet at the entrance. Two drawbridges, with a least span width of 24 feet and a least headroom when closed of 2 feet at high water, cross the creek at the entrance. From October to May, inclusive, the draws are opened only from sunrise to sunset.

There is a marine railway capable of hauling out a boat 30 feet in length and 4 feet in draft.

Hunting Creek, on the north side of Miles River, 3 miles above St. Michaels, has a depth of 8 feet for 1.5 miles above the entrance but is little used. Mid-channel is clear and private aids have been established to mark the best water. Off the entrance is a buoy marking the river channel.

Leeds Creek, on the northeast side of Miles River, 1 mile eastward of St. Michaels, has a depth of 8 feet in mid-channel to the small village of **Tunis Mills (lat. 38°49′, long. 76°10′)** 2.5 miles above the entrance. Vessels of 6-foot draft go to Tunis Mills. The depth off the village is reported to be 5 feet. The channel at the entrance is marked by buoys, and above the entrance the mid-channel is clear.

A large red Moorish-type dwelling is about 0.7 mile north of the mouth of Leeds Creek and is prominent for vessels coming up Miles River.

Wye River is on the north side of Miles River, 2.5 miles southeastward of Tilghman Point. The river has several branches, which are frequented by small local boats up to 9-foot draft. There are several farm landings on the creek.

The main entrance is eastward of the shoal, awash at low water, 1 mile south-southwestward from **Bennett Point.** The shoal is marked by buoys.

There is also a depth of 9 feet across a second shoal 0.4 mile northward of the first. The entrance is marked by a light and buoys. There are no marks above, but strangers should have no trouble if they keep in mid-channel and give the points a good berth.

The river forks 1 mile above Bennett Point. The north branch (Wye River) has a depth of 14½ feet from the entrance to the western end of Wye Narrows; thence 10 feet for about 1.8 miles and thence 6 feet to a point about 4 miles northward of the Narrows. Oyster bars are found along the edges of the channel in the vicinity of Wye Island. It is reported that gasoline can be secured at **Town Landing,** about 0.8 mile above the western entrance to Wye Narrows.

The eastern branch (***Wye East River***) has a depth of 12 feet for 5 miles above the fork to the eastern end of Wye Narrows.

Wye Narrows, connecting Wye East River with Wye River, has a least depth of 6 feet. It is crossed by a retractile highway drawbridge with a single opening 40 feet wide between fenders and a vertical clearance of 3 feet at high water. The highway

drawbridge is not required to be lighted and no special rules and regulations for its operation have been promulgated; however, the law required that the draw shall be opened promptly upon reasonable signal for the passage of boats and other water craft. Boat crews may open the bridge themselves. The bridge in October 1946 was in poor condition and difficult to move.

Note.—In both the Wye River and Wye Narrows local knowledge is required to follow the deepest waters of the circuitous channels.

Woodland Creek, just eastward of the mouth of Wye River, can be entered only by small boats at high water and is not used.

Tides.—The mean range of tide in Eastern Bay and Miles River is about 1 foot.

Kent Island, Western Shore.—From Bloody Point Light, at the northern entrance point of Eastern Bay, to Love Point, a distance of about 12.5 miles, the shore is low and presents a wooded aspect.

Measured Mile.—A measured mile, course **001°30′**, is located off ***Brickhouse Bar,*** 5.5 miles northward of Bloody Point Light. Offshore the course is marked by two nun buoys; inshore by two sets of ranges

Matapeake, 7 miles northward of Bloody Point Light, is the eastern terminus of the Sandy Point-Matapeake Ferry. The landing, at which there is a depth of 14 feet, is reached through a dredged channel marked by buoys and piles. A lighted bell buoy marks the outer end of the channel.

Chester River to Rock Hall Harbor

CHART 548

Chester River, on the east side of Chesapeake Bay 21 miles below Baltimore, is navigable for a distance of 40 miles above the entrance and is the approach to the railroad terminus at Love Point and the towns of Queenstown, Centerville, Chestertown, and Crumpton, and many landings. It is frequented by motor vessels, carrying grain and produce, and by many smaller boats, the deepest draft being 13 feet.

Fish-stake-area limits at the entrance are shown on Chart 1226.

The main entrance to Chester River is from northward and leads between the northern end of Kent Island and Eastern Neck Island. **Love Point Light,** 38 feet above the water, visible 11 miles, white hexagonal house on piles, is the principal guide to the entrance. The fog signal is an air-diaphragm horn; a bell is struck if the horn is disabled. The entrance has a depth of 24 feet in a narrow channel, and the width of the channel with a depth of 18 feet is 1 mile. The river can also be entered through Kent Island Narrows.

Hard bottom, with numerous oyster bars and shoals in the form of mounds, exists along the edges of the narrow deep-water channel of the Chester River, in places rising abruptly from prevailing channel depths to less than 12 feet.

A Federal improvement project provides for a channel 6 feet deep at mean low water and 60 feet wide from Crumpton to Jones Landing, a distance of 5.5 miles.

A survey made in 1940 indicates a controlling depth of 20 feet from the river entrance to about 1 mile above **Melton Point;** thence 13 feet to Chestertown; thence 6½ feet to Crumpton, which occurs about 0.5 mile below Crumpton where the channel is narrow

and winding but extensively buoyed. Upstream from Crumpton the channel continues narrow and lies between shoal areas; the survey indicates a controlling depth of 5 feet to **Kirby Landing,** thence the channel to Millington is of little value. In October 1946 it was reported that these depths were unchanged.

Supplies.—Gasoline and provisions can be obtained at Queenstown, Centerville, Chestertown, and Crumpton. There is water on the wharf at Chestertown, and coal in limited quantities can be obtained.

Pilots.—There are no regular pilots for Chester River or tributaries, but many of the local boatmen are competent pilots.

Ice.—The river is usually closed to navigation for extended periods during ordinary winters. During mild winters the channel is kept clear by power boats most of the time.

Tides.—The mean range of tides is about 1 foot at the entrance, 1½ feet at Queenstown, 2 feet at Chestertown, and 2½ feet at Crumpton. The water is fresh above Chestertown.

Love Point (lat. 39°02′, long. 76°18′), at the north end of **Kent Island,** is a summer resort. It has railway connections, for freight only, with Cape Charles, Wilmington, and Lewes, Delaware. The wharf is the landing for the vehicular and passenger ferry from Baltimore. There is a depth of 18 feet in the ferry slip and 6 feet along the northern face of the pier.

A wreck, showing prominently at all stages of the tide, lies on the northwest side of the shoal extending off Love Point. The wreck is about midway between the point and the light.

There is a dumping ground area about 0.5 mile wide and 2.5 miles long in a north-northeast direction outside the 20-foot curve just west of Love Point.

Stevensville is a town on the railroad 3 miles southward of Love Point, and **Chester** is a village and railroad station 1.5 miles eastward of Stevensville.

Macum and ***Piney Creeks,*** on the northeast side of Kent Island, are shoal and used only as anchorages for small local craft.

Kent Island Narrows is described on page 324.

Jackson Creek, on the south side of Chester River, 1.3 miles eastward of Kent Island Narrows, has a depth of 4 feet to the wharf at the south end and is used as an anchorage by oyster boats. The channel is marked by buoys.

Winchester Creek, 1.3 miles eastward of **Long Point** has a very narrow entrance nearly bare at low water, and a depth of 5 to 8 feet inside. It is used as an anchorage by local craft. **Grasonville** is a village and railroad station 0.3 mile from the head of the creek.

Eastern Neck Island, on the east side of Chester River at the entrance, is sparsely wooded, the only prominent mark being a clump of trees on the end of **Hail Point** at the southeast end. This clump of trees consists of two growths, one sparse and towering, the other low and dense. Extensive grassy flats are found along the south shore of the island. ***Eastern Neck Narrows,*** at the northern end, has a depth of about 1 foot, is crossed by a fixed bridge and is little used.

Queenstown Harbor, on the southeast side of Chester River, 7.5 miles above Love Point Light, has been improved by dredging a channel with a depth of 10 feet and a width of 200 feet across the bar at the entrance. In October 1946 there was a depth of about 9 feet to the freight wharf (in ruins). The railroad wharf north of it has fallen in. The dredged channel is marked by a buoy and two lighted beacons. It is about 150 feet wide with very shoal grassy flats on either side. The chart and aids

are the best guide for entering. An elevated tank at **Queenstown** forms an excellent landmark.

Tilghman Creek, on the eastern side of Chester River, 1 mile northward of Queenstown Harbor, has a depth of 1½ feet across the bar, close along the western end of the island in the mouth, and 6 to 8 feet inside. It is seldom entered.

Reed Creek and ***Grove Creek*** have a common entrance on the eastern side of Chester River, 12 miles above Love Point Light. There is a least depth of 7 feet in the common channel to the forks. This channel is buoyed by local boatmen during the summer months. At other times local knowledge is necessary. The entrance channel at the mouth of Grove Creek is only about 60 feet wide and has a controlling depth of about 5 feet. These creeks are used mostly by pleasure boats. A black water tank to the eastward of the common channel is a prominent landmark. There are a number of houses along the south shore of Reed Creek and along the north shore of Grove Creek.

Corsica River, on the east side of Chester River, 13 miles above Love Point Light, had a depth of 7 feet in October 1946 to **Centerville Landing,** 5 miles above the entrance and 0.8 mile from the town of Centerville. Off **Town Point,** just inside the entrance, the channel is narrow and has a depth of 8 feet. The river for a distance of 1.3 miles below Centerville Landing has been improved by dredging a channel. The project calls for a channel 100 feet wide with a depth of 8 feet from the Chester River to the wharf at Centerville with a turning basin at the upper end.

There are buoys to mark the principal shoals, and the river is easy of navigation as far as the beginning of the dredged channel, above which there are no marks and navigation is difficult without local knowledge.

Directions.—Enter on a course **117°** heading for the extremity of Town Point until the red buoy off Town Point bears 103°. Then head for the buoy on this bearing until Town Point is abeam and veer to the northward to pass northward of the buoy and ***Town Point Bar.*** Pass close northward of the buoy and follow a general mid-channel course, giving the points a good berth, to the beginning of the dredged channel just above **Fort Point.** From here the best water leads 200 feet off the end of Sycamore Point and the same distance off the ends of the two points on the south side above **Sycamore Point,** then southward along the wharves.

Centerville, 0.8 mile from Centerville Landing, has railroad communication. Gasoline is available at the wharf, and provisions can be obtained at the town. In October 1946 there was a depth of 11 feet at the main landing but only 3 feet some 20 feet offshore from it.

Church Creek, on the west side of Chester River, at the eastern end of Eastern Neck Narrows, has a depth of 4 feet in the entrance and 6 feet inside to near the head, but is little used.

Grays Inn Creek, on the west side of Chester River, 12 miles above Love Point Light, has a depth of 8 feet to a small settlement on the western side 2.5 miles above the entrance. It is frequented by schooners up to 8-foot draft.

There are shoals on both sides at the entrance and a middle ground 1 mile above. These can be avoided by passing close eastward of the black buoy off the entrance and heading for the end of the wharf at **Spring Point (lat. 39°05′, long. 76°13′),** on the south side, on a **315°** course until 0.3 mile from it, and then shaping the course to pass 50 yards off the wharf. There are no marks above the entrance, but the mid-channel is clear above Spring Point.

Langford Creek, on the northwest side of Chester River, 12 miles above Love Point Light, has a depth of about 12 feet across the bar at the entrance and deeper water to the fork 2.5 miles above. ***East Fork*** has a depth of 10 feet for 3 miles and 6 feet for a farther distance of 1.5 miles, and ***West Fork*** a depth of 10 feet for 2.8 miles and 6 feet for a farther distance of 0.8 mile into either of the two branches at the head. The only village on Langford Creek or its tributaries is **Piney Neck** in ***Long Cove,*** but there are several farm landings, from which produce and grain are occasionally shipped in motor boats and schooners. A marine railway for small boats is located in Long Cove.

The principal shoals in the lower reach of the creek are marked by buoys, and strangers of 6 feet or less draft should have no trouble in following the channel with aid of the chart. There are no marks above the fork. An unmarked shoal extends from **Cacaway Island,** at the fork, southwestward to mid-channel, and above this the mid-channel is clear in both branches if the points be given a good berth.

Cliffs Point, on the northwest side of Chester River, 1.5 miles northeastward of the entrance to Corsica River, is marked by a symmetrical clump of trees on the end of a wharf in ruins on the east side. Freight boats make landings at numerous wharves between here and Chestertown.

Southeast Creek, on the east side of Chester River, 21 miles above Love Point Light, has a depth of 4 feet in the entrance and 3 feet for 2 miles above to within 300 yards of a landing at the fork, 2 miles from the village of **Church Hill.** It is used by motorboats and a few small vessels of 3- to 5-foot draft. The best water in entering, is along the north side. ***Island Creek,*** on the south side 0.5 mile above the entrance has a depth of 3½ feet in the entrance and 6 feet inside to a bridge 2 miles above.

Chestertown is a town on the west side of Chester River, 26 miles above Love Point Light. It is a county seat, and has bus and railroad connections with Philadelphia and Baltimore. Freight boats up to 10-foot draft call at the town. The county landing just below the bridge has a depth of 8 feet alongside; the commercial wharf immediately southward 12 feet; and the two oil company landings 9 feet.

The Chestertown Yacht Club wharf, on the western shore about 1 mile below the highway bridge, will accommodate vessels of 10-foot draft. Gasoline and fresh water can be secured here.

A double-bascule bridge crosses the river here with a span 60 feet wide between fenders and 12-foot high-water clearance when closed.

Morgan Creek, on the northwest side of Chester River, 2 miles above Chestertown, has a narrow, crooked channel with a depth of 6 feet for 2.8 miles above the mouth. The channel at the mouth is a narrow slough leading between flats nearly bare at low water and is usually marked by bush stakes. Above the entrance the mid-channel is clear. There is a fixed bridge 0.8 mile above the mouth with a span 100 feet wide and clearance of 8 feet at high water. The creek is entered by vessels of 5- to 7-foot draft.

Crumpton is on the south side of Chester River 34 miles above Love Point Light. A bridge having a center-pier draw, either opening 35 feet wide with a headroom of 4 feet at high water, crosses the river here.

Millington, a village and railroad station at the head of navigation on Chester River, 40 miles above the mouth, can be reached only by small boats and has little business by water.

Directions, Chester River.—The channel is marked by buoys as far as Crumpton.

From the mouth to the entrance of Corsica River, 13 miles above, the channel has ample width and is easily followed.

From Corsica River to Chestertown the channel is narrow in places, and there are unmarked shoals close to it. Strangers of a greater draft than 8 feet may desire to take a pilot if going above Corsica River. Between Chestertown and Crumpton the channel is very narrow in places, with broad flats on either side nearly bare at low water. It is marked by buoys, but it is difficult without local knowledge; the channel is more easily followed at low water. Above Crumpton local knowledge is required.

For Table of Courses and Distances see chapter 3.

Swan Creek is on the eastern side of Chesapeake Bay, 5 miles northeastward of Love Point Light. The approach, which is also the approach to Rock Hall Harbor, is from southward, eastward of ***Swan Point Bar.*** The creek has a depth of 9 feet to **Deep Landing (lat. 39°09′, long. 76°16′)** on the east side of the entrance and 6 feet for 1.3 miles above in a narrow channel. The channel is marked by a lighted range and by buoys as far as Deep Landing. About 0.3 mile southeast of **Little Neck Island,** shoaling has occurred on the westerly side of the channel and a depth of 3 feet has been found close to the range line.

A wreck, visible at all stages of the tide, is located on the western side of the entrance to Swan Creek and another is on the eastern side just northward of the old ferry slip.

Deep Landing wharf is in ruins. Gasoline can be obtained at the small landing midway between this wharf and the ferry slip. The depth of water at the landing is 4½ feet.

There is a marine railway in ***The Haven*** for hauling out small boats 40 feet in length and 3 feet in draft, but no repairs can be made.

Rock Hall Harbor, on the eastern side of the approach to Swan Creek, has been improved by dredging a channel 7 feet deep and 60 feet wide from the approach channel of Swan Point Creek to a channel of the same dimensions parallel to the harbor terminals; an anchorage basin of the same depth, 100 feet wide and about 800 feet long; and twin stone jetties, extending west and southeast, to protect the harbor. In October 1946 the project depth of 7 feet prevailed except for spots at either end of the anchorage basin.

The entrance between the jetties is lighted and has a width of 95 yards. Rock Hall Harbor lighted range, formed by the light on the outer end of the eastern jetty and a light on a white skeleton tower ashore on the bearing 057°, marks the approach channel as far as the black buoy about 100 yards outside the jetties. A prominent elevated tank about 700 yards inland is slightly south of the range. The channel paralleling the wharves is marked by daybeacons.

The harbor is used by many local fishing boats and small pleasure craft of 3- to 6-foot draft. The landings have depths of up to 9 feet. Gasoline and fresh water are available at the water front and supplies in **Rock Hall,** a village and post office 0.5 mile eastward of the wharves. There are two marine railways for general small-boat repairs. The larger railway can accommodate a vessel 60 feet in length and 6 feet in draft. The water tank, halfway to the village from the water front, has a white light on it.

Huntingfield Creek, just southward of Rock Hall Harbor, has a depth of about 1 foot and is not used.

Tavern Creek, just eastward of Swan Point, has a depth of 2½ feet on the bar

at the entrance and 6 feet inside for 0.5 mile. The best water in entering, it is reported, leads along the eastern side of Little Neck Island.

Directions, Swan Creek.—From Chesapeake Bay steer any course between **081°** and **147°** to a position 0.3 to 1 mile northward of Love Point bell buoy 2.

Then steer eastward until Love Point Light bears 213°, and then change course to **033°** and, with Love Point Light astern, proceed to Swan Creek lighted range. Head along the range on course **349°**, passing close westward of buoy 4, off **Huntingfield Point.** After passing this buoy, leave the range and keep it slightly open on the port bow. Pass eastward of buoy 5 on course **351°** and continue on that course until Deep Landing wharf shows to the left of the red buoy opposite Little Neck Island, when a mid-channel course should be taken.

Courses may be laid for Rock Hall Harbor, leaving Swan Creek lighted range when Rock Hall Harbor lighted range is closed and steering the range **057°** until abeam of the black buoy. Then head for the entrance between the jetties.

Appendix

Coast and Geodetic Survey

Coast Pilots

Atlantic Coast:
- Section A, St. Croix River to Cape Cod, 1941
- Section B, Cape Cod to Sandy Hook, 1940
- Section C, Sandy Hook to Cape Henry, 1947
- Section D, Cape Henry to Key West. 1936
- Gulf Coast, Key West to Rio Grande, 1936
- Puerto Rico and Virgin Islands, 1939

Pacific Coast:
- California, Oregon, Washington, 1942

Alaska:
- Part I, Dixon Entrance to Yakutat Bay, 1943
- Part II, Yakutat Bay to Arctic Ocean, including the Aleutian Islands, 1947

Hawaiian Islands, 1933

Philippine Islands:
- Part I, Luzon, Mindoro, and Visayas, 1939
- 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 Building, 90 Church Street, New York 7, N. Y.
Southeastern District: 418 U. S. Post Office Building, Norfolk 10, Va.
Southern District: 314 Customhouse, 423 Canal Street, 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 Building, 534 Southwest Third Avenue, Portland 4, Oreg.
Northwestern District: 400 Insurance Building, Seattle 4, Wash.
Pacific District: 244 Federal Office Building, Honolulu, T. H.

Chart Agencies

New Jersey:
- Atlantic City
- Bay Head
- Cape May
- Point Pleasant

Delaware:
- Wilmington

Pennsylvania:
- Philadelphia

Maryland:
- Annapolis
- Baltimore
- Crisfield

District of Columbia:
- Washington

Virginia:
- Newport News
- Norfolk
- Richmond

Distance Table

DISTANCES ARE GIVEN IN NAUTICAL MILES

From— / To—	New York	Barnegat Inlet	Atlantic City	Cape May Harbor	Trenton	Philadelphia	Chester	Wilmington	Harbor of Refuge	Baltimore	Annapolis	Washington	Fredericksburg	West Point	Richmond	Petersburg	Hopewell	Newport News	Norfolk	Chesapeake City	Queenstown	St. Michaels	Cambridge	Crisfield
New York, N. Y. (Battery)	------	62	95	125	270	240	227	219	156	418	397	430	404	323	379	361	351	291	294	[1] 202	413	400	391	335
Barnegat Inlet, N. J.	62	------	35	66	188	158	145	136	78	346	325	358	332	251	307	289	279	219	222	[1] 140	341	328	319	263
Atlantic City, N. J.	95	35	------	37	159	129	116	107	50	319	298	331	305	224	280	262	252	192	195	[1] 107	314	301	292	236
Cape May Harbor, N. J.	125	66	37	------	126	96	83	74	17	291	270	303	277	196	252	234	224	164	167	[1] 77	286	273	264	208
Trenton, N. J.	270	188	159	126	------	30	43	57	117	417	396	429	403	322	378	360	350	290	293	[1] 77	412	399	390	334
Philadelphia, Pa.	240	158	129	96	30	------	13	27	87	381	360	393	367	286	342	324	314	254	257	[1] 47	376	363	354	298
Chester, Pa.	227	145	116	83	43	13	------	14	74	368	347	380	354	273	329	311	301	241	244	[1] 34	363	350	341	285
Wilmington, Del.	219	136	107	74	57	27	14	------	66	360	339	372	346	265	321	303	293	233	236	[1] 26	355	342	333	277
Harbor of Refuge, Del.	156	78	50	17	117	87	74	66	------	297	276	309	283	202	258	240	230	170	173	[1] 65	292	279	270	214
Baltimore, Md.	418	346	319	291	417	381	368	360	297	------	29	176	206	167	244	226	216	169	172	51	32	46	60	103
Annapolis, Md.	397	325	298	270	396	360	347	339	276	29	------	155	185	146	223	205	195	135	138	52	23	25	39	82
Washington, D. C.	430	358	331	303	429	393	380	372	309	176	155	------	218	179	256	238	228	168	171	199	171	158	149	132
Fredericksburg, Va.	404	332	305	277	403	367	354	346	283	206	185	218	------	154	231	213	203	143	146	229	201	188	179	128
West Point, Va.	323	251	224	196	322	286	273	265	202	167	146	179	154	------	149	131	121	61	64	190	162	149	140	86
Richmond, Va.	379	307	280	252	378	342	329	321	258	224	223	256	231	149	------	38	28	88	99	267	239	226	217	160
Petersburg Va.	361	289	262	234	360	324	311	303	240	226	205	238	213	131	38	------	110	70	81	249	221	208	199	142
Hopewell, Va.	351	279	252	224	350	314	301	293	230	216	195	228	203	121	28	10	------	60	71	239	211	198	189	132
Newport News, Va.	291	219	192	164	290	254	241	233	170	169	135	168	143	61	88	70	60	------	13	179	151	138	129	72
Norfolk, Va.	294	222	195	167	293	257	244	236	173	172	138	171	146	64	99	81	71	13	------	195	154	141	132	75
Chesapeake City, Md.	[1] 202	[1] 140	[1] 107	[1] 77	[1] 77	[1] 47	[1] 34	[1] 26	[1] 65	51	52	199	229	190	267	249	239	179	195	------	49	69	83	126
Queenstown, Md.	413	341	314	286	412	376	363	355	292	32	23	171	201	162	239	221	211	151	154	49	------	41	55	98
St. Michaels, Md.	400	328	301	273	399	363	350	342	279	46	25	158	188	149	226	208	198	138	141	69	41	------	42	85
Cambridge, Md.	391	319	292	264	390	354	341	333	270	60	39	149	179	140	217	199	189	129	132	83	55	42	------	75
Crisfield, Md.	335	263	236	208	334	298	285	277	214	103	82	132	128	86	160	142	132	72	75	126	98	85	75	------

[1] Via Chesapeake & Delaware Canal.

NOTES.—All distances between ports not on the same bay are coastwise, with the exception of distances to and from Chesapeake City, which are via the inside route, as noted. To find the distance via the Chesapeake & Delaware Canal between a port in Chesapeake Bay and a port to the northward, find the distance from each port to Chesapeake City and add the two distances.

Table of Mean Water Temperature and Density at Selected Ports

(DENSITIES HAVE BEEN REDUCED TO A STANDARD TEMPERATURE OF 15° C OR 59° F)

Place	Fort Hamilton, N. Y.		Atlantic City		Philadelphia		Baltimore		Solomons Island	
Years of record	Temp. ° F 12	Density 12	Temp. ° F 29	Density 31	Temp. ° F 20	Density 22	Temp. ° F 29	Density 31	Temp. ° F 5	Density 7
January	35. 8	1. 0166	36. 9	1. 0233	36. 0	0. 9995	36. 7	1. 0068	37. 9	1. 0108
February	34. 2	1. 0173	35. 4	1. 0233	35. 8	0. 9995	36. 3	1. 0066	37. 4	1. 0110
March	36. 3	1. 0148	39. 4	1. 0232	40. 8	0. 9995	41. 9	1. 0055	42. 4	1. 0094
April	43. 7	1. 0125	46. 8	1. 0230	50. 4	0. 9996	52. 2	1. 0038	52. 9	1. 0075
May	53. 2	1. 0152	55. 6	1. 0233	63. 1	0. 9998	63. 7	1. 0035	65. 3	1. 0074
June	62. 6	1. 0170	64. 4	1. 0235	73. 6	0. 9999	73. 9	1. 0038	74. 8	1. 0080
July	69. 4	1. 0181	69. 1	1. 0237	78. 4	0. 9999	79. 3	1. 0043	79. 3	1. 0093
August	71. 2	1. 0190	71. 4	1. 0235	78. 4	0. 9998	79. 3	1. 0050	80. 8	1. 0101
September	67. 6	1. 0187	69. 4	1. 0234	72. 7	0. 9998	74. 7	1. 0064	75. 2	1. 0109
October	59. 7	1. 0179	61. 0	1. 0235	61. 9	0. 9997	64. 9	1. 0073	65. 7	1. 0120
November	49. 6	1. 0168	50. 9	1. 0234	49. 6	0. 9995	53. 1	1. 0074	54. 5	1. 0123
December	40. 8	1. 0165	41. 2	1. 0233	39. 6	0. 9995	42. 3	1. 0073	43. 5	1. 0117
Mean	52. 0	1. 0167	53. 4	1. 0234	56. 7	0. 9997	58. 3	1. 0056	59. 2	1. 0100
Maximum	80. 6	1. 0242	79. 9	1. 0260	89. 6	1. 0012	85. 6	1. 0132	87. 1	1. 0148
Minimum	27. 5	1. 0008	27. 5	1. 0199	30. 2	0. 9973	31. 1	1. 0006	30. 2	1. 0033

Army Engineers

The area with which this Coast Pilot is concerned lies within the North Atlantic and Middle Atlantic Divisions of the United States Engineers.

The **District offices** are:

New York, Room 601, 120 Wall Street, New York 5.
Philadelphia, (P. O. Box 8629), Penn Mutual Building, Philadelphia 1.
Baltimore, 8th Floor, Standard Oil Building, Baltimore 2.
Washington, 1st and Douglas Streets, N. W., Washington 25.
Norfolk, (P. O. Box 119) Fort Norfolk, Norfolk 1.

Port Series.—The Port Series is being rewritten and the various volumes will be published as they are completed. In May 1947 none of the volumes covering ports within this Coast Pilot had been made available. Inquiries about these publications should be addressed to the Board of Engineers for Rivers and Harbors, Washington 25, D. C.

Branch Hydrographic Offices

New York, Room 1108, 90 Church Street.
Philadelphia, Room 1001, Customhouse.
Baltimore, Room 15, Customhouse.
Norfolk, Room 213, Customhouse.

Coast Guard

District Commanders:

New York, 42 Broadway.
Norfolk, New Post Office Building.

Marine Inspection Officers:

New York, 42 Broadway.
Philadelphia, 801 Customhouse.
Baltimore, 209 Chamber of Commerce Building.
Norfolk, New Post Office Building.

Buoy Depots:

Edgemoor, Delaware.
Baltimore, Maryland.
Chesapeake City, Maryland.
Portsmouth, Virginia.

Air Stations:

Brooklyn, New York.
Elizabeth City, North Carolina.

Lifeboat Stations, Sandy Hook to Cape Henry

Number for aviation purposes only	Name of station	State	Location
97	Sandy Hook	New Jersey	On bay side, ½ mile south of point of Hook.
100	Monmouth Beach	do	About 1 mile south of Seabright.
103	Shark River	do	North side of the mouth of Shark River Inlet.
105	Manasquan	do	East side of Cooks Creek ¼ mile west of entrance to Manasquan Inlet at Point Pleasant.
109	Toms River	do	On the beach abreast mouth Toms River.
112	Forked River	do	2¼ miles north of Barnegat Light.
113	Barnegat	do	½ mile south-southeast of Barnegat Light.
116	Ship Bottom	do	Midway of Long Beach.
118	Bonds	do	2¼ miles southwest of Beachhaven and ½ mile north of Beachhaven Inlet.
119	Little Egg	do	1½ miles west of Tucker Island, Little Egg Inlet.
123	Atlantic City	do	East end of Atlantic City.
125	Great Egg	do	6 miles southwest of Absecon Light.
126	Ocean City	do	South side of Egg Harbor Inlet, at Ocean City.
128	Corson Inlet	do	On Ludlam Beach at Strathmere.
130	Townsend Inlet	do	Near the inlet, north side.
132	Stone Harbor	do	2⅝ miles north by east of Hereford Inlet Light.
133	Hereford Inlet	do	Just south of Inlet.
137	Cape May Point	do	Near the light.
139	Lewes	Delaware	2 miles southwest of north tip of Cape Henlopen.
142	Indian River Inlet	do	North of inlet 1½ miles.
146	Ocean City	Maryland	At Ocean City, ½ mile north of entrance to Sinepuxent Bay.
147	North Beach	do	10 miles south of Ocean City.
149	Popes Island	Virginia	9¾ miles northeast of Assateague Light.
150	Assateague Beach	do	On Fishing Point, 3⅛ miles southwest of Assateague Light.
152	Metomkin Inlet	do	On Metomkin Inlet, north shore Cedar Island.
154	Parramore Beach	do	North end Parramore Island, south of Inlet.
155	Little Machipongo	do	North side Hog Island, south of Inlet.
156	Hog Island	do	South end of Hog Island, west of light.
157	Cobb Island	do	South end of Cobb Island, north of Sand Shoal Inlet.
158	Smith Island	do	⅛ mile west of Cape Charles Light.
161	Little Creek	do	8½ miles west of Cape Henry Light.

Customs Ports of Entry

Those marked with * are authorized to issue marine documents.

NEW JERSEY:

Perth Amboy*, Monmouth County is among those counties included in the New York District.

PENNSYLVANIA:

Philadelphia*, headquarters port for that part of the State of Pennsylvania lying east of 79° west longitude, the State of Delaware, and that part of the State of New Jersey not included in the New York District; Second and Chestnut Streets.

Chester, 5th Street and Edgemont Avenue.

DELAWARE:

Lewes,

Wilmington*, Federal Post Office and Customs Building, Eleventh and Market Streets.

MARYLAND:

Baltimore*, headquarters port for the State of Maryland and the District of Columbia; Lombard and Gay Streets.

MARYLAND—Continued

Annapolis*

Cambridge*

Crisfield*

DISTRICT OF COLUMBIA.

Washington*, 1221 Thirty-first Street, N. W.

VIRGINIA:

Norfolk*, headquarters port for the State of Virginia; Main and Granby Streets.

Alexandria*, South Washington and Prince Streets.

Cape Charles City*

Newport News*, Twenty-fifth Street and West Avenue.

Petersburg

Reedville*

Richmond, U. S. Post Office Building, Main and Tenth Streets.

Immigration and Naturalization Offices

NEW YORK:
Ellis Island, Upper Bay (station).
NEW JERSEY:
Gloucester (station).
PENNSYLVANIA:
Philadelphia, 605 Customhouse, Second and Chestnut Streets.
MARYLAND:
Baltimore, Post Office Building.
VIRGINIA:
Norfolk, Post Office and Courthouse Building.

Public Health Service

Quarantine Stations

NEW YORK:
Rosebank, Staten Island.
PENNSYLVANIA:
Marcus Hook.
MARYLAND:
Baltimore, Leading Point.
VIRGINIA:
Newport News, Old Point Comfort.

Marine Hospitals

NEW YORK:
Ellis Island
Staten Island
MARYLAND:
Baltimore, Wyman Park Drive and Thirty-first Street.
Out-patient Office, Customhouse.
VIRGINIA:
Norfolk, Hampton Boulevard, Larchmont
Out-patient Office, Federal Building.

Second-Class Relief Stations

NEW YORK:
New York, U. S. Public Health Service Dispensary, 67 Hudson Street.
PENNSYLVANIA:
Philadelphia, 225 Chestnut Street.
DISTRICT OF COLUMBIA:
Washington, Railroad Retirement Board Building, Fourth and D Streets SW.

Third-Class Relief Stations

NEW JERSEY:

Cape May, Columbia Avenue and Ocean Street.
Perth Amboy, Federal Building.

DELAWARE:

Lewes, Savannah Road.

MARYLAND:

Cambridge, 1 Church Street.
Crisfield, 322 Main Street.

VIRGINIA:

Kilmarnock.
Newport News, 2903 West Avenue.
Reedville.
Richmond, 2920 Park Avenue.

Fourth-Class Relief Station (Medical attention arranged through the Deputy Collector of Customs in Charge).

DELAWARE:

Wilmington, Eleventh and Market Streets.

Federal Communications Commission

District Offices:

Philadelphia, Pennsylvania, 1200 New Customhouse, Second and Chestnut Streets.
Baltimore, Maryland, 508 Old Town Bank Building, Gay Street and Fallsway.
Norfolk, Virginia, 402 New Post Office.

Fish and Wildlife Service Offices

Toms River, New Jersey.
Cambridge, Maryland.
Tappahannock, Virginia.

Yacht Clubs

Absecon Island Yacht Club, Margate City, N. J.
Alpha Boat Club, Chester Pa.,
Anchor Yacht Club, Bristol, Pa.
Annapolis Roads Club, Annapolis, Md.
Annapolis Yacht Club, Annapolis, Md.
Arundel Boat Club, Baltimore, Md.
Atlantic City Tuna Club, Atlantic City, N. J.
Atlantic City Yacht Club, Atlantic City, N. J.
Avalon Yacht Club, Avalon, N. J.
Baltimore Yacht Club, Sue Island, Md.
Bay Head Yacht Club, Bay Head, N. J.
Beach Haven Yacht Club, Beach Haven, N. J.
Belmar Yacht Club, Belmar, N. J.
Beverly Yacht Club, Beverly, N. J.
Bordentown Yacht Club, Bordentown, N. J.
Brielle Yacht Club, Brielle, N. J.
Bush River Boat Club, Otter Point, Md.
Cambridge Yacht Club, Cambridge, Md.
Capital Yacht Club, Washington, D. C.
Chesapeake Yacht Club, Easton, Md.
Chesapeake Cruising Club, Chesapeake City, Md.
Chester River Yacht and Country Club, Chestertown, Md.
Columbia Yacht Club, Torresdale, Philadelphia, Pa.
Columbia Yacht Club, Washington, D. C.
Corinthian Yacht Club of Baltimore, Balnew, Md.
Corinthian Yacht Club of Philadelphia, Essington, Pa.
Corinthian Yacht Club of Washington, Washington, D. C.
Delaware River Yacht Club, Torresdale, Pa.
Elk River Yacht Club, Oldfield Point, Md.
Evening Star Yacht Club, Atlantic City, N. J.
Fairhaven Sailing Club, Fairhaven, Md.
Farragut Sportsmen's Association, Camden, N. J.
Gibson Island Yacht Squadron, Gibson Island, Md.
Greater Wildwood Yacht Club, Wildwood Crest, N. J.
Hampton Yacht Club, Hampton, Va.
Haverford Nautical Club, Haverford, Pa.
Havre de Grace Yacht Club, Havre de Grace, Md.
Island Heights Yacht Club, Island Heights, N. J.
Langley Yacht Club, Langley Field, Va.
Lavallette Yacht Club, Lavallette, N. J.
Lewes Yacht Club, Lewes, Del.
Little Egg Harbor Yacht Club, Beach Haven, N. J.
Manasquan River Yacht Club, Brielle, N. J.
Mantoloking Yacht Club, Mantoloking, N. J.
Margate Yacht Club, Margate, Md.
Maryland Yacht Club, Baltimore, Md.
Miles River Yacht Club, St. Michaels, Md.
Mount Royal Yacht Club, Mount Royal, N. J.
Newport News Yacht Club, Newport News, Va.
Norfolk Boat Club, Norfolk, Va.
Norfolk-Portsmouth Yacht Racing Association, Norfolk, Va.
Norfolk Yacht and Country Club, Norfolk, Va.
Ocean City Yacht Club, Ocean City, N. J.
Ocean Gate Yacht Club, Ocean Gate, N. J.
Old Dominion Boat Club, Alexandria, Va.
Pennsylvania Yacht Club, Cornwall Heights, Pa.
Pine Beach Yacht Club, Pine Beach, N. J.
Pleasantville Yacht Club, Pleasantville, N. J.
Potapskut Sailing Association, Rock Creek, Md.
Quaker City Yacht Club of Philadelphia, Tacony, Pa.
Rappahannock River Yacht Club, Irvington, Va.
Richmond Yacht Club, Varina, Va.
Riverside Yacht Club, Essington, Pa.
Riverton Yacht Club, Riverton, N. J.
Rock Hall Yacht Club, Rock Hall, Md.
Salem Yacht Club, Salem, N. J.
Seaside Park Yacht Club, Seaside Park, N. J.
Shore Acres Yacht Club, Osbornville, N. J.
Solomons Island Yacht Club, Solomons, Md.
Sparrows Point Yacht Club, Sparrows Point, Md.
Stone Harbor Yacht Club, Stone Harbor, N. J.
Tockwogh Yacht Club, Fredericktown, Md.
Toms River Yacht Club, Toms River, N. J.
Tred Avon Yacht Club, Oxford, Md.
Trenton Yacht Club, South Trenton, N. J.
Tri-State Yacht Club, Essington, Pa.
Urbanna Yacht Club, Urbanna, Va.
Washington Yacht Club, Washington, D. C.
Wellwood Country and Yacht Club, Charlestown, Md.
West Creek Yacht Club, West Creek, N. J.
West River Sailing Club, Galesville, Md.
West River Yacht Club, Mayo, Md.
Windward Yacht Club, Riverbank, N. J.
Wissinoming Yacht Club, Philadelphia, Pa.
Yacht Club of Sea Island City, Sea Island City, N. J.
Yachtmen's Club, Philadelphia, Pa.

Marine Railways and Drydocks

WHERE SEVERAL MARINE RAILWAYS ARE LOCATED AT ONE PLACE, THE DIMENSIONS ARE GIVEN ONLY FOR THE LARGEST ONE.

Port	Type	Length	Draft	Capacity	Machine shop
NEW JERSEY:		*Feet*	*Feet*	*Tons*	
Avon	Marine railway	50	4		
Atlantic City	do	100	8	85	
North Wildwood	do	40	3		
Cape May Harbor	do	110	12	300	Yes.
Brielle	do	65	4½	35	
Bay Head	do	85	7	50	
Beaverdam Creek	do	40	3		
West Osbornville	do	30	3		
Mantoloking	do	50	6	50	
Silverton	do	40			
Pelican Island	do	35	4		
Island Heights	do	45	3		
Toms River	do	60	7		
Seaside Park	do	50	5	25	Yes.
Lanoka Harbor	do	30	3½		
Forked River	do	50	4		
Barnegat City	do	35	4		
Ship Bottom	do	50	5		
Cedar Run	do	45	4		
West Creek	do	35	4		
Beach Haven	do	45	4		
Tuckerton	do	50	4½		Yes.
Mullica	do	42	4		
Port Republic	do	50	5		Yes.
Bass River	do	32	4		
Mott Creek	do	30	3		
Oyster Creek	do	30	3		
Absecon	do	45	4		
Ventnor Heights	do	40	3½	12	
Margate City	Crane	38	3½	15	
Longport	Marine railway	46	5	12	
Ocean City	do	50	4½	30	Yes.
Anchorage Point	do	40	4	15	
Bass Harbor	Crane	36	4	15	Yes.
Somers Point	Marine railway	40	4	20	
Powell Creek	do	38	3½		
Mays Landing	do	75	6	80	
Sea Isle City	do	50	4	18	
Stone Harbor	do	35	3	8	Yes.
Wildwood	do	60	6		
Leesburg	do	115	8		Yes.
Dorchester	do	115	8	100	
Mauricetown	do	65	6		
Port Elizabeth	do	35			
Millville	do	40	3		
Greenwich Pier	do	115	8		Yes.
Fairton	do	40	3		
Bridgeton	do	40	3		Yes.
Bridgeport	do	40			
Woodbury	do	50	4		
Camden	do	240	12	2,000	Yes.
Delanco	do	50	5		
Newbold Island	do	100	9	100	Yes.
DELAWARE:					
Milford	do	60	5		
Bowers	do	45	5		
Smyrna	do	40	3		
Wilmington	do	105	12	400	Yes.
Seaford	do	60			

Marine Railways and Drydocks—Continued

Port	Type	Length	Draft	Capacity	Machine shop
PENNSYLVANIA:		*Feet*	*Feet*	*Tons*	
Chester	Floating drydock	522	18	10, 000	Yes.
Philadelphia	Graving dock	645	24		Yes.
Bristol	Marine railway	40	4		
VIRGINIA:					
Franklin City	do	60	4		
Chincoteague	do	100	10		
Wachapreague	do	60	5		
Willis Wharf	do	60	8		
Cape Charles	do	40	4		
Nandua	do	40	2½		
Onancock	do	35	4		
Tangier	do	35	4		
Newport News	do	1, 000			Yes.
Norfolk	Floating drydock			13, 000	Yes.
Hampton	Marine railway	125	9	125	
Jones Creek	do	40	3		
Lanexa	do	50	6		
Dutch Gap	do	45	4	50	
Bennett Creek	do		6	50	
York Point	do		6	80	Yes.
Ship Point	do	100	8		
Seaford	do	60	5		Yes.
Perrin	do	120	7	100	Yes.
Sarah Creek	do	65	7		
Greenway Wharf	do	75	7	150	
Deltaville	do	50	4		
Ruark	do	200	12	500	Yes.
Locklies Creek	do	30	4		
Weems	do	180	12	1, 000	Yes.
Irvington	do	70	5		
Urbanna	do	50	5		Yes.
Simonson	do	30	4		
Tappahannock	do	30	3		
Reedville	do	85	7	85	
Sunnybank	do	45	4		
Harryhogan Point	do	100	7		Yes.
Fox Harbor	do	45	5		
Ewells	do	70	7		Yes.
Palmers	do	40	3		
Cobb Island	do	40	3½		
Colonial Beach	do	40	3		
DISTRICT OF COLUMBIA:					
Washington	do	50	8		Yes.
MARYLAND:					
Solomons	do	125	10	150	Yes.
Island Creek	do	40	3		
Benedict	do	40	3		
Rockhold Creek	do	50	3		Yes.
Galesville	do	80	6		Yes.
Mayo	do	40	3		
Carr Wharf	do	40	4		
Glebe Creek	do	40	5		
Beards Creek	do	50	6		
Eastport	do	125	11	150	Yes.
Annapolis	do	110	10		Yes.
Gibson Island	do	40	7		
Fairview	do	85	7		Yes.
Baltimore	Floating drydock	160	22½	20, 000	Yes.
Fairfield	do	068	28	18, 000	Yes.

Marine Railways and Drydocks—Continued

Port	Type	Length	Draft	Capacity	Machine shop
MARYLAND—Continued		*Feet*	*Feet*	*Tons*	
Worton Creek	Marine railway	45	5		
Fredericktown	do	85	7		
Havre de Grace	do	60	5		
Charlestown	do	60	6		Yes.
Chesapeake City	do	150	12	500	Yes.
Crisfield	do	100	6	125	Yes.
Whitehaven	do	150	6	150	Yes.
Shad Point	do	75	5	35	
Salisbury	do	160	12	1,000	Yes.
Hoopersville	do	100	5		
Knapps Narrows	do	50	3½		Yes.
Wittman	do	46	4		
Oxford	do	125	8		Yes.
Cambridge	do	100	9	150	Yes.
Kent Island Narrows	do	50	3½		
St. Michaels	do	40	4		
The Haven	do	40	3		
Rock Hall	do	60	6		

Weather Bureau

Offices:

Barometers may be compared with standards at these offices.

Atlantic City, New Jersey, Weather Bureau Building, 23 South Rhode Island Ave.

Philadelphia, Pennsylvania, Customhouse, Second and Chestnut Streets.

Baltimore, Maryland, Customhouse, Gay and Water Streets.

Cape Henry, Virginia, Fort Storey.

Norfolk, Virginia, Post Office and Federal Courthouse.

Storm Warning Display Stations:

Stations marked with an * display signals both day and night.

NEW JERSEY:

Atlantic City, Tuna Club.
Atlantic City, Clam Creek Coast Guard Station*
Atlantic City, Kentucky Avenue Life Guard Station (June to October, inclusive).
Barnegat City.
Barnegat Lightship.
Bay Head (May to October, inclusive).
Beach Haven.
Bivalve*
Cape May Point.
Great Egg Coast Guard Station
Long Branch*
Manasquan
Monmouth Beach*
Ocean City
Red Bank (May to October, inclusive)
Sandy Hook*
Scotland Lightship
Shark River
Townsend Inlet

DELAWARE:

Delaware Entrance Speaking Station, Cape Henlopen*
Five Fathom Bank Lightship
Overfalls Lightship

MARYLAND:

Annapolis*
Baltimore, American Building*
Baltimore, Anchorage Building*
Baltimore, Maryland Yacht Club
Bar Neck, Tilghman Island*
Cambridge
Crisfield
Oxford*
Solomons

VIRGINIA:

Cape Henry*
Chesapeake Lightship
Fort Monroe*
Newport News*
Norfolk, Two at Naval Base
Norfolk, Federal Building*
Winter Quarter Shoal Lightship

Weather broadcasts by commercial radio stations: The following table lists alphabetically 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	Daily	Sunday	Holidays	States for which forecasts are given
Atlantic City	WFPG	1450	250	*1230	None	None	New Jersey and offshore (*none Saturday).
Baltimore	WBAL	1090	50, 000	0710 0805 2325	None None None	0710 0805 2325	Delaware, Maryland, New Jersey, Pennsylvania, Virginia, West Virginia, and offshore.
New York	WHN	1050	50, 000	0922 1341	None None	1156 1730	New England, New Jersey, Eastern New York, Pennsylvania.
	WNYC	830	1, 000	0800 1300 1845	0800 None 1845	0800 1300 1845	Southern New England, New Jersey, Eastern New York, Eastern Pennsylvania.
Philadelphia	KYW	1060	50, 000	0650	None	None	Delaware, Maryland, New Jersey, Eastern Pennsylvania.
				1250	None	None	Agricultural forecasts.
				1818	None	None	Delaware, Maryland, New Jersey, Eastern Pennsylvania.
Richmond	WMBG	1380	5, 000	*1235	None	1235	North Carolina, Virginia (*none Saturday).
	WNRL	910	5, 000	0735	None	0735	North Carolina, Virginia.

Hours of Operation of Fog Signals

Light station	January	February	March	April	May	June	July	August	September	October	November	December	Total
Ambrose Channel Light Vessel	123	86	116	86	113	89	69	43	70	57	55	76	983
Overfalls Light Vessel	80	65	71	43	72	58	37	23	55	49	43	43	639
Fourteen-foot Bank	92	58	68	30	43	23	13	4	45	27	45	37	485
Ship John Shoal	85	48	61	24	27	16	11	5	30	22	52	43	424
Christina North Jetty	59	31	49	12	12	7	6	6	19	12	42	43	298
Cherry Island	75	41	56	15	15	5	8	6	20	20	48	45	354
Fort Mifflin	48	33	48	16	10	9	11	12	46	24	42	44	343
Winter Quarter Shoal Light Vessel	35	50	67	48	68	50	8	6	23	16	25	23	419
Killick Shoal	29	38	28	13	26	13	2	1	11	10	26	29	226
Cape Henry	46	42	55	41	35	19	0	1	4	18	18	35	314
Thimble Shoal	31	31	37	18	15	6	1	1	4	13	23	28	208
Newport News Middle Ground	29	23	27	10	8	2	5	1	8	14	23	26	176
Deep Water Shoals	32	21	24	6	4	3	1	0	8	9	22	28	158
Jordan Point	12	10	8	1	1	0	1	1	2	8	14	15	73
York Spit	40	40	47	15	15	6	1	0	4	8	27	35	238
Bells Rock	17	18	13	7	3	2	1	0	16	18	23	16	134
Bowlers Rock	27	16	8	3	3	3	3	2	8	11	28	14	126
Windmill Point	58	46	64	21	18	6	1	0	7	16	25	45	307
James Island	51	35	35	10	8	2	0	1	8	3	24	33	210
Smith Point	60	58	62	21	19	7	1	0	11	6	23	31	299
Maryland Point	39	30	39	6	8	4	1	1	13	14	28	21	204
Fort Washington	38	38	27	6	4	4	1	2	20	20	38	21	219
Great Shoals	52	37	42	11	7	11	2	3	21	13	26	28	253
Cedar Point	60	49	56	17	16	8	0	1	10	12	28	30	287
Sharps Island	51	46	45	10	12	3	0	0	4	6	24	22	223
Choptank River	59	54	45	10	12	6	4	3	18	13	37	32	293
Bloody Point Bar	62	42	46	11	15	4	0	0	8	3	32	22	245
Sandy Point	74	53	73	20	20	6	2	1	11	9	35	38	342
Fort Carroll	49	29	33	6	2	2	0	1	11	5	33	23	194
Pooles Island	30	15	10	5	4	2	0	1	4	3	23	14	111
Turkey Point	70	22	54	13	20	9	3	4	10	20	55	45	325

748520—48——23

Meteorological Tables

COMPILED BY THE UNITED STATES WEATHER BUREAU

Aberdeen, Md. Position: Lat. 39°28′N., Long. 76°10′W. Altitude: 61 Feet

Month	Pressure reduced to sea level: Mean: For month	Pressure: Extremes: Highest	Pressure: Extremes: Lowest	Air temperature in degrees F.: Mean: For month	Air temperature: Mean: Mean maximum	Air temperature: Mean: Mean minimum	Air temperature: Extremes: Highest	Air temperature: Extremes: Lowest	Average relative humidity	Average cloud amount 0-10	Precipitation: Average (inches)	Precipitation: Maximum in 24 hours	Precipitation: Percent of hourly observations recording snow and sleet	Average number of days with—: Precipitation 0.01 inch or more	Average number of days with—: Percent of hourly observations recording Fog	Average number of days with—: Percent of hourly observations recording thunderstorms	Average number of days with—: Percent of observations recording visibility less than 1 mile	Average number of days with—: Percent of observations recording gales (over 27 knots)	Wind: Mean velocity (knots)	Wind: Estimated maximum velocity (knots)	Wind: Percentage of observations from—: N	NE	E	SE	S	SW	W	NW	Calm
January	----	----	----	32.6	39.8	25.1	70	−2	----	----	2.25	----	4	9.2	7.2	0	7.8	1	8.5	40	18	14	4	3	8	13	20	18	2
February	----	----	----	34.7	42.4	26.7	72	5	----	----	1.66	----	3	6.6	6.8	0	7.6	1	9.6	(#)	16	13	3	4	10	12	18	22	2
March	----	----	----	41.0	49.7	32.0	84	9	----	----	4.24	----	4	11.2	4.3	.1	4.7	1	9.9	(#)	14	14	5	5	11	11	18	21	1
April	----	----	----	52.0	62.3	41.6	92	21	----	----	3.56	----	(*)	9.5	2.7	.2	2.8	1	9.6	(#)	13	14	7	9	13	12	14	17	1
May	----	----	----	64.7	75.1	54.3	96	35	----	----	3.06	----	(*)	10.2	1.1	.9	1.2	(*)	7.9	(#)	10	12	7	11	19	13	13	13	2
June	----	----	----	72.9	82.2	63.5	96	45	----	----	3.32	----	0	9.8	1.4	1.5	1.4	(*)	7.0	40	11	9	7	9	19	18	12	12	3
July	----	----	----	76.2	85.5	66.9	100	51	----	----	3.42	----	0	9.4	.9	1.2	.9	(*)	6.4	40	11	8	5	8	22	19	12	12	3
August	----	----	----	75.5	84.5	66.3	96	49	----	----	3.55	----	0	9.2	.6	1.3	.7	(*)	6.7	40	17	11	6	8	19	15	9	12	3
September	----	----	----	67.4	77.2	57.5	98	35	----	----	1.51	----	(*)	5.0	1.9	.5	1.9	(*)	7.0	40	20	14	5	7	15	12	10	13	4
October	----	----	----	56.6	66.1	46.9	96	23	----	----	3.70	----	(*)	8.2	3.7	.2	3.8	(*)	7.7	40	18	13	3	7	14	12	14	15	4
November	----	----	----	45.3	54.6	35.8	78	15	----	----	2.60	----	1	7.2	3.0	0	3.2	1	8.3	40	14	9	3	4	14	14	20	19	3
December	----	----	----	36.3	43.8	28.6	62	0	----	----	2.68	----	2	9.4	7.3	0	7.7	1	8.2	40	18	13	3	3	10	13	20	17	3
Mean	----	----	----	53.9	62.9	44.8	----	----	----	----	----	----	1	----	3.4	.5	3.6	1	8.1	----	15	12	5	6	14	14	15	16	3
Total	----	----	----	----	----	----	----	----	----	----	35.55	----	----	104.9	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Extreme	----	----	----	----	----	----	100	−2	----	----	----	----	----	----	----	----	----	----	----	(#)	----	----	----	----	----	----	----	----	----
Number of years record	----	----	----	8-9	8-9	8-9	8-9	8-9	----	----	8-9	----	8-9	8-9	8-9	8-9	8-9	7-8	8-9	7-8	7-8	7-8	7-8	7-8	7-8	7-8	7-8	7-8	7-8

*Less than one.
#Greater than 40 knots.

Atlantic City, N. J. Position: Lat. 39°22′N., Long. 74°25′W. Altitude: 8 Feet

Month	Pressure reduced to sea level: Mean: For month	Pressure: Extremes: Highest	Pressure: Extremes: Lowest	Air temperature in degrees F.: Mean: For month	Air temperature: Mean: Mean maximum	Air temperature: Mean: Mean minimum	Air temperature: Extremes: Highest	Air temperature: Extremes: Lowest	Average relative humidity (0730, 1200, 1830)	Average cloud amount 0-10	Precipitation: Average (inches)	Precipitation: Maximum in 24 hours	Precipitation: Average snowfall (inches)	Average number of days with—: Precipitation 0.01 inch or more	Fog (heavy)	Thunderstorms	Visibility less than 1 mile	Gales, 27 knots	Wind: Mean velocity (knots)	Wind: Maximum velocity (knots)	Percentage of observations from—: N	NE	E	SE	S	SW	W	NW	Calm
January	30.11	30.98	28.80	33.8	40.6	26.4	68	−4	74	6.0	3.50	2.98	4.2	12	2	(*)	------	9	14.0	56	12	8	5	5	10	12	28	20	0
February	30.07	30.97	28.74	33.5	40.3	26.6	77	−9	73	5.5	3.28	2.66	5.0	10	2	(*)	------	8	13.8	63	11	9	5	6	12	11	25	21	0
March	30.02	30.96	28.37	39.6	46.3	32.9	79	8	73	5.6	3.68	2.63	2.3	12	2	1	------	9	14.7	59	8	11	6	7	17	11	22	18	(*)
April	30.00	30.72	28.94	48.1	54.9	41.4	90	15	72	5.6	3.26	3.15	.3	11	2	2	------	9	14.5	63	7	12	9	9	20	11	18	14	(*)
May	29.99	30.62	29.08	58.4	64.9	51.8	95	33	75	5.4	2.90	3.06	0	11	3	3	------	4	12.8	43	6	13	9	12	25	13	13	9	(*)
June	29.97	30.51	29.40	67.4	73.8	61.1	97	45	78	5.4	3.09	4.22	0	10	2	4	------	3	12.0	43	6	10	9	12	26	17	11	9	(*)
July	29.98	30.50	29.37	72.7	78.8	66.7	102	52	78	5.2	3.63	5.41	0	10	2	5	------	3	11.6	43	5	9	9	11	29	17	12	8	(*)
August	30.00	30.45	29.30	72.3	78.2	66.8	104	48	78	5.1	4.50	8.97	0	10	1	4	------	3	11.6	56	8	11	12	10	25	15	10	9	(*)
September	30.08	30.60	28.73	67.5	73.5	61.4	94	37	76	4.9	3.19	9.13	0	8	1	2	------	3	12.1	71	10	12	13	10	20	12	12	11	(*)
October	30.08	30.81	29.06	57.0	63.9	50.1	91	29	73	4.6	3.20	9.21	T	9	1	1	------	5	12.8	55	12	10	7	9	14	13	18	17	(*)
November	30.10	30.84	28.74	46.2	53.1	39.3	77	10	72	5.2	3.03	4.88	.6	9	1	(*)	------	6	13.5	57	10	7	5	8	13	15	25	17	(*)
December	30.10	30.90	28.84	36.8	53.7	30.0	68	−7	73	5.9	3.65	3.52	2.7	10	2	(*)	------	5	13.2	49	12	6	4	5	9	13	30	21	(*)
Mean	30.04	------	------	52.8	59.3	46.3	------	------	75	5.4	------	------	------	------	------	------	------	------	13.0	------	9	10	8	9	18	13	19	14	(*)
Total	------	------	------	------	------	------	------	------	------	------	40.91	------	15.1	122	21	22	------	67	------	------	------	------	------	------	------	------	------	------	------
Extreme	------	30.98	28.37	------	------	------	104	−9	------	------	------	9.21	------	------	------	------	------	------	------	71	------	------	------	------	------	------	------	------	------
Number of years record	73	73	73	71	71	71	71	71	21-57	47	71	71	61	71	40	71	------	2	23	22	22	22	22	22	22	22	22	22	22

T—Trace.
*Less than one.

Baltimore, Md. Position: Lat. 39°17′ N., Long. 76°37′ W. Altitude: 14 Feet

Month	Pressure reduced to sea level: Mean: For month	Pressure reduced to sea level: Extremes: Highest	Pressure reduced to sea level: Extremes: Lowest	Air temperature in degrees F.: Mean: For month	Air temperature: Mean: Mean maximum	Air temperature: Mean: Mean minimum	Air temperature: Extremes: Highest	Air temperature: Extremes: Lowest	Average relative humidity (0730, 1200, 1930)	Percent of possible sunshine	Precipitation: Average (inches)	Precipitation: Max. in 24 hours	Precipitation: Average snowfall (inches)	Average number of days with—: Precipitation 0.01 in. or more	Average number of days with—: Fog (dense)	Average number of days with—: Thunderstorms	Percent of observations recording visibility less than 1 mile	Wind: Gales	Wind: Mean velocity (knots)	Wind: Maximum velocity (knots)	Percentage of observations from—: N	NE	E	SE	S	SW	W	NW	Calm
January	30.12	31.02	28.80	34.8	41.7	27.9	79	−6	66	49	3.42	3.27	6.2	11	2	(*)	13.1	------	7.0	39	9	12	5	5	5	8	16	14	26
February	30.08	30.96	28.96	35.6	42.8	28.4	83	−7	63	55	3.22	3.48	6.4	10	2	(*)	9.8	------	7.5	43	9	11	5	5	5	8	13	22	22
March	30.03	30.96	28.75	43.3	51.3	35.1	88	5	61	58	3.75	3.51	5.1	12	2	1	8.5	------	7.8	43	7	11	7	9	5	8	13	17	23
April	30.00	30.75	29.07	53.6	62.4	44.8	94	15	58	59	3.54	3.99	.7	11	1	2	3.4	------	7.7	41	8	12	9	15	6	8	13	15	14
May	29.98	30.62	29.00	64.7	73.7	55.7	98	34	60	61	3.54	3.25	T	11	(*)	5	2.3	------	7.0	35	7	12	6	14	7	9	12	12	21
June	29.98	30.50	29.38	73.3	82.1	64.5	105	46	62	64	3.64	4.47	0	11	(*)	6	1.7	------	6.8	44	8	8	7	14	10	14	9	9	21
July	29.97	30.39	29.38	77.8	86.2	69.4	107	54	63	65	4.43	4.02	0	11	(*)	8	1.0	------	6.4	47	6	9	7	14	15	14	8	6	21
August	30.00	30.47	29.08	75.6	83.7	67.5	105	51	66	64	4.51	7.62	0	11	(*)	6	2.4	------	6.2	43	8	10	8	12	10	13	8	7	24
September	30.07	30.62	29.27	69.3	77.5	61.1	101	39	67	64	3.54	6.07	0	8	1	3	5.3	------	6.3	38	7	15	7	11	8	9	9	8	26
October	30.10	30.84	29.11	58.1	66.6	49.6	97	30	65	63	3.03	5.30	.1	8	1	1	5.3	------	6.6	39	12	8	6	10	8	8	11	12	25
November	30.11	30.84	28.99	46.9	54.3	39.5	82	12	64	55	2.76	4.19	.7	9	2	(*)	6.7	------	6.9	38	9	9	3	8	9	9	17	15	21
December	30.12	30.92	28.73	37.4	44.1	30.8	74	−3	65	49	3.14	3.16	3.9	11	3	(*)	12.5	------	6.9	38	9	11	5	4	4	8	17	18	24
Mean	30.05	------	------	55.9	63.8	47.9	------	------	63	59	------	------	------	------	------	------	6.0	------	6.9	------	8	11	6	10	8	10	12	13	22
Total	------	------	------	------	------	------	------	------	------	------	42.52	------	23.1	124	14	32	------	------	------	------	------	------	------	------	------	------	------	------	------
Extreme	------	31.02	28.73	------	------	------	107	−7	------	------	------	7.62	------	------	------	------	------	------	------	47	------	------	------	------	------	------	------	------	------
Number years record	74	74	74	75	74	74	74	74	54–71	53	75	75	63	75	55	62	7	------	74	73	6	6	6	6	6	6	6	6	6

*Less than One.
T—Trace.

Cape May, N. J. Position: Lat. 38°53′N., Long. 78°53′W. Altitude: 16 Feet

Month	Pressure reduced to sea level: Mean: For month	Pressure reduced to sea level: Extremes: Highest	Pressure reduced to sea level: Extremes: Lowest	Air temperature in degrees F.: Mean: For month (½ max. plus ½ min.)	Air temperature: Mean: Mean maximum	Air temperature: Mean: Mean minimum	Air temperature: Extremes: Highest	Air temperature: Extremes: Lowest	Average relative humidity	Average cloud amount 0-10	Precipitation: Average (inches)	Precipitation: Max. rainfall in 24 hours	Precipitation: Percent of observations recording snow (6 obs. daily)	Average number of days with—: Precipitation 0.01 in. or more	Average number of days with—: Percent of observations recording fog (vsby. <1,100 yds.) (6 obs. daily)	Average number of days with—: Percent of observations recording thunder and thunderstorms (6 obs. daily)	Average number of days with—: Percent of observations recording visibility less than 1¼ mile (6 obs. daily)	Average number of days with—: Percent of observations recording gales (>27 knots)	Wind: Mean velocity (knots)	Wind: Estimated maximum velocity (knots)	Wind: Percentage of observations from— N	NE	E	SE	S	SW	W	NW	Calm
January				33.3	39.2	27.4	67	8			2.72		2	8.8	4	0	8	2	10.5	40	17	13	5	2	11	10	11	30	1
February				35.2	41.3	29.0	67	8			2.03		2	7.3	4	0	7	2	11.1	40	14	7	8	5	11	9	16	29	1
March				41.5	47.6	35.4	75	14			6.44		2	14.7	5	(*)	7	2	11.2	40	10	7	11	11	15	11	16	18	1
April				49.5	56.8	42.2	83	26			2.23		(*)	10.0	3	(*)	4	2	11.0	40	8	6	10	7	18	12	17	22	(*)
May				62.3	68.8	55.8	91	42			1.56		0	7.0	3	(*)	6	(*)	8.7	40	4	11	10	13	31	12	8	11	0
June				71.4	77.7	65.0	91	54			1.85		0	8.3	4	1	6	0	7.9	27	7	6	10	7	29	18	10	13	(*)
July				73.9	80.2	67.6	97	56			3.19		0	10.7	4	1	6	0	6.9	27	8	7	7	8	35	14	10	11	0
August				72.2	79.0	65.3	93	56			3.89		0	8.0	2	1	3	0	8.0	27	10	9	7	7	34	14	10	9	(*)
September				68.6	74.5	62.7	89	42			3.61		0	8.0	2	(*)	5	1	8.5	(#)	19	12	11	8	20	10	9	11	0
October				59.6	65.7	53.4	91	34			3.18		0	9.0	2	0	5	(*)	9.5	40	14	13	6	7	16	11	11	22	(*)
November				48.6	54.8	42.4	71	0			3.47		0	7.6	2	0	5	1	10.4	(#)	10	8	5	5	15	11	12	33	1
December				37.8	44.2	31.5	59	4			2.16		2	9.8	5	0	7	1	10.1	40	12	9	6	4	9	12	19	27	2
Mean				54.5	60.8	48.1							1		3	(*)	6	1	9.5		11	9	8	7	20	12	12	20	1
Total											36.33			109.2															
Extreme							97	0												(#)									
Number years record				4-5	4-5	4-5	4-5	4-5			4-5		4-5	4-5	4-5	4-5	4-5	3-5	3-5	3-5	3-5	3-5	3-5	3-5	3-5	3-5	3-5	3-5	3-5

*Less than 0.5 percent.
Greater than 40 knots.

Chincoteague, Va. Position: Lat. 37°48′ N., Long. 75°27′ W. Altitude: 49 Feet

Month	Pressure reduced to sea level: Mean: For month	Pressure reduced to sea level: Extremes: Highest	Pressure reduced to sea level: Extremes: Lowest	Air temperature in degrees F.: Mean: For month (½ max. plus ½ min.)	Air temperature: Mean: Mean maximum	Air temperature: Mean: Mean minimum	Air temperature: Extremes: Highest	Air temperature: Extremes: Lowest	Average relative humidity	Average cloud amount 0-10	Precipitation: Average (inches)	Precipitation: Max. rainfall in 24 hours	Precipitation: Percent of observations recording snow (6 obs. daily)	Average number of days with—: Precipitation 0.01 in. or more	Average number of days with—: Percent of observations recording fog (vsby. less than 1,100 yds.) (6 obs. daily)	Average number of days with—: Percent of observations recording thunder and thunderstorms (6 obs. daily)	Average number of days with—: Percent of observations recording visibility less than 1¼ mile (6 obs. daily)	Average number of days with—: Percent of observations recording gales (over 27 knots)	Wind: Mean velocity (knots)	Wind: Estimated maximum velocity (knots)	Wind: Percentage of observations from: N	NE	E	SE	S	SW	W	NW	Calm
January	----	----	----	33.0	39.1	27.0	55	12	----	----	3.78	----	1	10.5	3	0	6	0	7.6	27	14	11	3	1	5	13	10	39	4
February	----	----	----	39.0	46.3	31.6	69	18	----	----	4.55	----	1	15.0	4	0	6	0	7.8	27	13	12	8	4	8	13	7	33	2
March	----	----	----	42.9	50.8	35.0	79	20	----	----	6.11	----	2	14.0	2	0	3	(*)	9.2	(#)	14	9	8	9	11	20	4	21	4
April	----	----	----	51.9	60.3	43.5	81	28	----	----	6.17	----	0	17.0	2	0	3	0	8.9	27	8	8	10	3	16	21	10	21	3
May	----	----	----	66.0	74.3	57.7	89	48	----	----	1.15	----	0	5.0	1	(*)	1	0	8.3	27	5	6	13	8	23	27	6	10	2
June	----	----	----	77.2	85.6	68.7	97	56	----	----	2.21	----	0	8.0	0	1	(*)	0	7.7	27	5	6	9	6	19	16	20	17	2
July	----	----	----	75.8	83.3	68.4	97	52	----	----	3.42	----	(*)	10.5	(*)	1	(*)	0	6.5	27	4	7	7	5	31	23	13	4	6
August	----	----	----	74.0	82.1	65.9	95	44	----	----	1.54	----	0	6.5	0	1	(*)	0	6.2	27	8	8	5	8	24	21	13	9	4
September	----	----	----	69.0	75.6	62.3	91	46	----	----	4.80	----	0	10.0	4	0	4	2	7.4	40	12	15	7	5	12	14	12	20	3
October	----	----	----	55.4	63.2	47.5	79	38	----	----	6.65	----	0	7.0	1	0	3	1	6.4	40	11	11	4	5	8	12	13	30	6
November	----	----	----	46.5	55.6	37.4	69	28	----	----	0.40	----	0	10.0	1	0	3	0	6.6	21	5	5	1	3	9	20	12	36	9
December	----	----	----	37.3	44.8	29.8	63	16	----	----	1.54	----	1	9.5	3	0	3	(*)	7.4	40	19	9	1	4	3	13	20	29	2
Mean	----	----	----	55.7	63.4	47.9	----	----	----	----	----	----	(*)	----	2	(*)	3	(*)	7.5	----	10	9	6	5	14	18	12	22	4
Total	----	----	----	----	----	----	----	----	----	----	44.32	----	----	123.0	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Extreme	----	----	----	----	----	----	97	12	----	----	----	----	----	----	----	----	----	----	----	(#)	----	----	----	----	----	----	----	----	----
Number years recorded	----	----	----	3	3	3	3	3	----	----	2-3	----	3	2-3	3	3	1-2	1-2	1-2	1-2	1-2	1-2	1-2	1-2	1-2	1-2	1-2	1-2	1-2

* Less than 0.5 percent.
\# Greater than 40 knots.

Dahlgren, Va. Position: Lat. 38°20′N., Long. 77°02′W. Altitude: 20 Feet

Month	Pressure reduced to sea level: Mean: For month	Pressure reduced to sea level: Extremes: Highest	Pressure reduced to sea level: Extremes: Lowest	Air temperature in degrees F.: Mean: For month (½ max. plus ½ min.)	Air temperature: Mean: Mean maximum	Air temperature: Mean: Mean minimum	Air temperature: Extremes: Highest	Air temperature: Extremes: Lowest	Average relative humidity	Average cloud amount 0-10	Precipitation: Average (inches)	Precipitation: Max. rainfall in 24 hours	Precipitation: Percent of observations recording snow (6 obs. daily)	Average number of days with—: Precipitation 0.01 in. or more	Average number of days with—: Percent of observations recording fog (vsby. less than 1,100 yds.) (6 obs. daily)	Average number of days with—: Percent of observations recording thunder and thunderstorms (6 obs. daily)	Average number of days with—: Percent of observations recording visibility less than 1¼ mile (6 obs. daily)	Average number of days with—: Percent of observations recording gales (over 27 knots)	Wind: Mean velocity (knots)	Wind: Estimated maximum velocity (knots)	Wind: Percentage of observations from—: N	NE	E	SE	S	SW	W	NW	Calm
January				36.7	44.3	29.1	77	2			3.14		2	10.6	4	0	11	1	8.4	(#)	14	9	7	11	7	16	10	25	1
February				37.3	45.6	29.0	87	2			2.74		4	10.1	2	0	9	1	8.8	40	13	8	8	12	9	14	8	26	2
March				45.0	53.9	36.0	85	10			2.91		2	10.3	2	(*)	7	1	10.6	40	10	8	8	13	7	18	11	24	1
April				53.8	62.9	44.6	95	28			3.52		(*)	10.9	1	(*)	3	1	10.6	40	11	11	12	15	6	16	9	20	(*)
May				64.7	74.1	55.3	95	36			3.11		0	11.9	(*)	1	1	(*)	8.4	40	12	10	13	17	6	17	7	17	1
June				73.4	82.0	64.9	101	42			3.26		0	11.4	(*)	2	1	(*)	7.7	(#)	10	8	10	18	7	22	8	17	(*)
July				77.2	86.0	68.5	109	50			4.41		0	10.3	(*)	2	1	0	7.1	27	7	9	13	17	9	21	9	14	1
August				75.8	84.1	67.6	103	48			6.67		0	10.0	(*)	1	2	(*)	7.1	40	12	10	13	16	9	17	7	15	1
September				70.0	78.3	61.7	99	38			3.78		0	8.6	1	1	3	(*)	7.2	(#)	14	11	12	16	8	14	7	17	1
October				58.2	67.2	49.1	91	26			2.39		0	6.9	2	(*)	4	(*)	7.8	40	15	8	11	13	8	15	8	21	1
November				48.2	56.5	39.9	85	6			2.84		1	8.8	3	0	7	1	8.8	(#)	12	8	8	13	9	18	8	23	1
December				39.2	47.0	31.5	87	6			2.22		2	9.1	4	0	12	(*)	7.9	40	15	7	5	10	10	15	9	27	2
Mean				56.6	65.1	48.1							1		1.6	.6	5	(*)	8.4		12	9	10	14	8	17	8	21	1
Total											40.99			118.9															
Extreme							109	2												(#)									
Number years record				15-20	15-20	15-20	15-20	15-20			15-20		15-20	15-20	15-20	15-20	14-16	17	14-16	17	14-16	14-16	14-16	14-16	14-16	14-16	14-16	14-16	14-16

*Less than 0.5 percent.

New York City, N. Y. Position: Lat. 40°43′N., Long. 74°00′W. Altitude: 10 Feet

Month	Pressure reduced to sea level: Mean: For month	Pressure reduced to sea level: Extremes: Highest	Pressure reduced to sea level: Extremes: Lowest	Air temperature in degrees F.: Mean: For month	Air temperature: Mean: Mean maximum	Air temperature: Mean: Mean minimum	Air temperature: Extremes: Highest	Air temperature: Extremes: Lowest	Average relative humidity (0730, 1200, 1930)	Average cloud amount 0-10	Precipitation: Average (inches)	Precipitation: Max. in 24 hours	Precipitation: Average snowfall (inches)	Average number of days with—: Precipitation 0.01 in. or more	Average number of days with—: Fog (heavy)	Average number of days with—: Thunderstorms	Percent of observations recording visibility less than 1 mile	Average number of days with gales (over 33 knots)	Wind: Mean velocity (knots)	Wind: Maximum velocity (knots)	Wind: Percentage of observations from—: N	NE	E	SE	S	SW	W	NW	Calm
January	30.09	31.01	28.61	30.9	37.4	24.5	68	−6	66	6.1	3.53	3.42	7.8	12	3	(*)	6.5	7	14.6	57	14	7	7	3	6	13	20	30	0
February	30.04	31.00	28.70	31.3	38.4	24.2	73	−14	64	5.8	3.52	3.25	9.7	10	2	(*)	6.8	6	14.8	63	16	8	8	4	7	13	15	29	0
March	29.99	31.00	28.38	37.7	45.4	30.2	84	3	63	5.9	3.79	3.60	5.8	11	2	1	5.0	7	14.3	61	12	8	8	6	10	12	13	31	(*)
April	29.99	30.71	29.03	49.4	57.2	41.6	91	12	61	5.9	3.31	3.72	1.1	11	1	2	2.2	5	14.0	56	12	11	11	8	12	11	11	24	0
May	29.96	30.64	29.02	60.6	68.5	52.6	95	34	63	5.6	3.21	4.17	0	11	2	4	2.9	3	12.1	60	13	9	10	9	15	15	11	18	(*)
June	29.95	30.56	29.34	68.8	77.0	60.5	97	44	66	5.7	3.48	3.88	0	11	2	6	2.4	2	11.4	58	14	7	8	9	19	17	11	15	(*)
July	29.97	30.51	29.35	73.8	81.7	65.9	102	54	69	5.7	4.22	3.80	0	11	1	7	1.3	1	10.6	59	13	6	6	8	21	19	13	14	(*)
August	30.01	30.45	29.28	73.1	80.1	65.2	102	51	70	5.5	4.33	5.05	0	10	(*)	6	1.8	1	10.5	44	15	11	8	8	19	18	10	11	(*)
September	30.06	30.61	28.72	66.8	78.7	59.8	100	39	70	5.1	3.59	6.17	0	9	1	3	2.0	1	11.0	70	16	10	8	7	15	18	11	15	(*)
October	30.06	30.72	29.06	56.3	68.7	49.0	90	27	67	5.0	3.45	9.40	T	9	2	1	1.8	8	12.6	56	17	9	5	5	12	17	14	21	(*)
November	30.09	30.82	28.70	44.2	51.0	37.3	75	7	68	5.8	3.11	3.62	1.1	9	2	1	1.7	5	14.1	53	11	8	7	4	10	19	18	23	(*)
December	30.08	30.93	28.73	35.0	41.2	28.8	69	−13	67	6.1	3.26	3.23	5.9	11	3	(*)	6.8	6	14.4	60	15	8	7	3	6	12	19	30	(*)
Mean	30.02			52.3	59.6	45.0			66	5.7							3.4		12.9		14	8	8	6	13	15	14	22	(*)
Total											42.80		31.4	125	21	31		52											
Extreme		31.01	28.38				102	−14				9.40								70									
Number years record	30	64	64	46	46	46	76	76	29-58	56	76	76	62	76	42	63	7	35	35	35	15	15	15	15	15	15	15	15	15

T—Trace.
*Less than one.

Norfolk, Va. Position: Lat. 36°51′N., Long. 76°17′W. Altitude: 11 Feet

Month	Pressure reduced to sea level: Mean: For month	Pressure reduced to sea level: Extremes: Highest	Pressure reduced to sea level: Extremes: Lowest	Air temperature in degrees F.: Mean: For month	Air temperature: Mean: Mean maximum	Air temperature: Mean: Mean minimum	Air temperature: Extremes: Highest	Air temperature: Extremes: Lowest	Average relative humidity (0130, 0730, 1330, 1930)	Average cloud amount 0-10	Precipitation: Average (inches)	Precipitation: Maximum in 24 hours	Precipitation: Average snowfall (inches)	Average number of days with—: Precipitation 0.01 inch or more	Fog (dense)	Thunderstorms	Visibility less than 1 mile	Gales (over 27 knots)	Wind: Mean velocity (knots)	Wind: Maximum velocity (knots)	Percentage of observations from—: N	NE	E	SE	S	SW	W	NW	Calm
January	30.14	30.95	28.88	41.7	49.3	33.9	80	5	73	5.6	3.18	4.07	2.5	11	2	(*)	-----	3	10.6	45	17	17	6	5	13	15	15	12	0
February	30.09	30.96	29.04	42.4	50.5	34.2	82	2	69	5.2	3.38	3.45	2.7	11	2	1	-----	2	10.8	43	16	16	7	7	14	14	13	13	0
March	30.06	30.91	28.35	48.9	57.8	40.2	92	14	69	5.1	3.78	2.78	1.7	12	1	2	-----	4	11.5	50	13	16	8	9	16	15	12	11	0
April	30.02	30.71	29.02	57.1	66.1	48.1	95	23	67	4.8	3.33	5.19	T	10	1	3	-----	2	10.9	45	10	17	9	11	17	15	11	10	0
May	30.00	30.59	29.23	66.7	75.6	57.8	98	38	71	4.8	3.71	3.78	0	11	1	5	-----	1	9.8	50	8	16	11	11	19	18	11	6	0
June	30.00	30.46	29.39	74.8	83.3	66.2	102	49	74	4.9	4.24	5.97	0	11	1	7	-----	2	9.0	51	7	12	10	10	21	21	12	7	0
July	30.01	30.38	29.46	78.5	86.7	70.5	104	57	77	5.0	5.82	5.00	0	13	(*)	9	-----	2	8.6	46	5	12	10	10	24	22	12	5	0
August	30.02	30.41	29.37	77.4	84.8	70.1	105	56	77	5.0	5.28	6.84	0	12	(*)	7	-----	1	8.5	55	7	18	12	9	19	20	10	5	0
September	30.08	30.56	29.07	72.4	79.6	65.5	100	40	77	4.6	3.79	4.36	0	8	1	2	-----	1	8.9	49	10	22	15	10	17	13	8	5	0
October	30.11	30.64	29.35	62.1	69.7	54.8	94	31	75	4.4	3.07	6.29	T	8	2	1	-----	1	9.5	41	16	19	10	8	15	13	11	8	0
November	30.12	30.72	29.15	51.9	59.6	44.4	82	17	71	4.6	2.46	5.48	.2	8	2	(*)	-----	1	10.1	40	19	16	6	6	16	14	12	11	0
December	30.12	30.85	29.03	43.4	50.9	36.2	76	5	72	5.4	3.21	2.52	2.0	10	2	(*)	-----	2	10.2	50	19	16	6	4	12	16	16	11	0
Mean	30.07	-----	-----	59.8	67.8	51.8	-----	-----	73	5.0	-----	-----	-----	-----	-----	-----	-----	-----	9.9	-----	12	17	9	8	17	16	12	9	0
Total	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	45.25	-----	9.1	125	15	37	-----	22	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Extreme	-----	30.96	28.35	-----	-----	-----	105	2	-----	-----	-----	6.84	-----	-----	-----	-----	-----	-----	-----	55	-----	-----	-----	-----	-----	-----	-----	-----	-----
Number years record	45	45	45	76	72	72	76	76	9-59	40	76	76	76	76	54	62	-----	34	34	76	29	29	29	29	29	29	29	29	29

* Less than 1.

Philadelphia, Pa. Position: Lat. 39°57′ N., Long. 75°09′ W. Altitude: 26 Feet

Month	Pressure reduced to sea level: Mean: For month	Pressure reduced to sea level: Extremes: Highest	Pressure reduced to sea level: Extremes: Lowest	Air temperature in degrees F.: Mean: For month	Air temperature: Mean: Mean maximum	Air temperature: Mean: Mean minimum	Air temperature: Extremes: Highest	Air temperature: Extremes: Lowest	Average relative humidity (0600, 1200, 2000)	Percent of possible sunshine	Precipitation: Average (inches)	Precipitation: Max. in 24 hours	Precipitation: Average snowfall (inches)	Average number of days with—: Precipitation 0.01 in. or more	Average number of days with—: Fog (heavy)	Average number of days with—: Thunderstorms	Percent of observations recording visibility less than 1 mile (#)	Gales	Wind (#): Mean velocity (knots)	Wind (#): Maximum velocity (knots)	Wind (#): Percentage of observations from—: N	NE	E	SE	S	SW	W	NW	Calm
January	30.13	31.02	28.67	32.6	39.5	25.7	73	−5	70	49	3.30	3.33	6.0	12	2	(*)	9.5	------	9.5	43	8	11	5	4	7	16	11	22	16
February	30.09	30.99	28.78	33.9	40.9	26.9	79	−11	68	57	3.32	3.86	6.8	11	1	(*)	8.3	------	10.0	43	8	10	4	4	6	14	12	25	17
March	30.04	30.96	28.54	40.8	48.6	33.0	86	5	66	58	3.39	2.79	3.8	12	1	1	6.0	------	10.3	46	7	12	5	6	8	16	14	20	12
April	30.01	30.71	29.00	52.1	60.9	43.3	93	14	62	58	3.05	2.77	.9	11	(*)	2	2.3	------	9.6	41	6	13	8	7	11	13	12	18	12
May	29.99	30.64	29.00	62.9	72.0	53.8	96	35	63	61	3.26	3.16	0	11	(*)	4	2.7	------	8.6	59	7	11	5	6	13	19	9	15	15
June	29.96	30.54	29.88	71.4	80.4	62.4	102	46	65	62	3.24	4.59	0	10	(*)	5	3.4	------	8.9	42	8	9	7	8	17	19	6	11	15
July	29.99	30.51	29.37	76.2	84.6	67.8	104	52	65	64	4.15	3.18	0	11	(*)	7	2.0	------	8.4	45	6	6	6	7	17	22	7	9	20
August	30.02	30.46	29.40	74.8	82.5	67.1	106	51	67	62	4.62	5.89	0	11	(*)	5	4.7	------	8.0	38	8	11	6	9	13	16	4	9	24
September	30.06	30.61	29.17	68.0	76.0	60.0	102	40	69	63	3.14	5.62	0	8	1	2	3.9	------	8.5	39	10	10	6	7	12	15	5	12	23
October	30.09	30.74	29.10	57.8	65.9	49.7	94	29	66	63	2.81	3.70	.1	8	1	1	5.4	------	8.6	50	11	9	4	6	9	13	7	18	23
November	30.10	30.84	28.88	45.7	52.6	38.8	77	8	68	53	2.70	3.38	.7	9	1	(*)	7.2	------	8.9	41	8	9	4	5	10	14	11	21	18
December	30.11	30.96	28.79	36.3	42.8	29.8	70	−5	68	49	3.43	3.78	4.1	10	2	(*)	8.2	------	9.3	43	9	10	4	3	6	14	12	24	18
Mean	30.04	------	------	54.4	62.3	46.6	------	------	66	58	------	------	------	------	------	------	5.3	------	9.0	------	8	10	5	6	11	16	9	17	18
Total	------	------	------	------	------	------	------	------	------	------	40.41	------	22.4	124	9	27	------	------	------	------	------	------	------	------	------	------	------	------	------
Extreme	------	31.02	28.54	------	------	------	106	−11	------	------	------	5.89	------	------	------	------	------	------	------	59	------	------	------	------	------	------	------	------	------
Number years record	76	76	76	47	58	58	75	75	26-58	52	75	75	61	75	75	75	9	------	74	74	9	9	9	9	9	9	9	9	9

*Less than one.
#Observations taken at Camden, N. J.

Richmond, Va. Position: Lat. 37°32′N., Long. 77°25′W. Altitude: 162 Feet

Month	Pressure reduced to sea level: Mean: For month	Pressure: Extremes: Highest	Pressure: Extremes: Lowest	Air temperature in degrees F.: Mean: For month	Air temperature: Mean: Mean maximum	Air temperature: Mean: Mean minimum	Air temperature: Extremes: Highest	Air temperature: Extremes: Lowest	0730 1330 1930: Average relative humidity	Percent of possible sunshine	Precipitation: Average (inches)	Precipitation: Max. in 24 hours	Precipitation: Average snowfall (inches)	Average number of days with—: Precipitation 0.01 in. or more	Average number of days with—: Fog (heavy)	Average number of days with—: Thunderstorms	Percent of observations recording visibility less than 1 mile	Gales	Wind: Mean velocity (knots)	Wind: Maximum velocity (knots)	Wind: Percentage of observations from—: N	NE	E	SE	S	SW	W	NW	Calm
January	30.14	31.00	28.87	37.9	46.9	28.9	80	−1	71	50	3.21	2.66	3.6	10	2	(*)	9.4	------	7.1	42	15	10	4	7	17	14	8	9	16
February	30.10	30.97	29.00	39.6	48.8	30.3	82	−3	67	55	3.17	3.30	3.5	10	1	(*)	5.7	------	7.3	42	15	9	4	6	19	12	7	14	14
March	30.04	30.90	28.58	47.2	57.5	36.9	94	12	64	58	3.68	3.59	2.2	11	1	2	4.0	------	8.0	37	13	9	4	11	18	15	9	12	9
April	30.01	30.73	29.16	56.6	67.3	45.8	96	19	61	62	3.49	5.33	.4	10	(*)	3	2.2	------	7.6	40	15	9	6	12	17	11	8	11	11
May	29.98	30.59	29.15	66.5	77.2	55.8	98	35	63	67	3.79	2.39	0	11	1	6	2.8	------	6.3	40	15	8	6	10	20	13	7	8	13
June	29.99	30.47	29.40	74.1	84.0	64.2	104	43	67	65	3.90	3.69	0	11	(*)	8	2.3	------	5.7	41	11	6	6	11	22	12	5	9	18
July	29.97	30.41	29.46	78.5	88.3	68.7	105	52	70	66	4.73	7.26	0	11	1	10	3.2	------	5.6	32	10	7	5	11	23	15	5	5	19
August	30.02	30.45	28.93	76.5	85.8	67.2	107	49	72	62	4.42	5.71	0	11	1	7	2.5	------	5.4	37	11	9	6	11	20	12	4	6	21
September	30.08	30.58	29.43	70.5	80.2	60.8	101	40	72	64	3.25	6.68	0	10	2	3	5.2	------	5.5	31	14	10	7	11	15	11	4	7	21
October	30.10	30.69	29.30	59.6	69.9	49.2	99	28	69	65	2.88	4.81	T	7	3	1	5.0	------	6.0	36	17	7	4	8	14	11	6	12	21
November	30.14	30.88	29.12	48.3	58.2	38.4	83	14	67	59	2.21	2.77	.4	7	2	(*)	6.5	------	6.5	32	15	6	3	10	19	10	8	12	17
December	30.13	30.91	29.01	39.8	48.3	31.2	77	−2	70	50	3.29	2.52	2.8	10	2	(*)	6.9	------	6.6	36	17	9	2	4	16	14	9	10	19
Mean	30.06	------	------	57.9	67.7	48.1	------	------	68	60	------	------	------	------	------	------	4.6	------	6.5	------	14	8	5	9	18	12	7	10	17
Total	------	------	------	------	------	------	------	------	------	------	42.02	------	12.9	119	16	40	------	------	------	------	------	------	------	------	------	------	------	------	------
Extreme	------	31.00	28.58	------	------	------	107	−3	------	------	------	7.26	------	------	------	------	------	------	------	42	------	------	------	------	------	------	------	------	------
Number years record	49	49	49	50	49	49	49	49	29–49	44	50	49	49	49	49	49	10	------	49	49	10	10	10	10	10	10	10	10	10

T—Trace.
* Less than 1.

Trenton, N. J. Position: Lat. 40°13′ N., Long. 74°46′ W. Altitude: 56 Feet

Month	Pressure reduced to sea level: Mean: For month	Pressure: Extremes: Highest	Pressure: Extremes: Lowest	Air temperature in degrees F.: Mean: For month	Mean: Mean maximum	Mean: Mean minimum	Extremes: Highest	Extremes: Lowest	Average relative humidity (0730) (1930)	Percent of possible sunshine	Precipitation: Average (inches)	Precipitation: Max. in 24 hours	Precipitation: Average snowfall (inches)	Average number of days with—: Precipitation 0.01 in. or more	Fog (heavy)	Thunderstorms	Percent of observations recording visibility less than 1 mile	Average number of days with gales (over 27 knots)	Wind: Mean velocity (knots)	Maximum velocity (knots)	Percentage of observations from—: N	NE	E	SE	S	SW	W	NW	Calm
January	30.10	30.98	28.74	30.5	39.3	25.0	73	−13	72	49	3.31	2.65	6.6	10	2	(*)	17.5	5	9.6	46	17	11	4	3	10	14	17	24	0
February	30.04	30.96	28.89	30.7	39.8	24.2	76	−14	70	55	3.27	2.68	7.6	9	2	(*)	13.0	4	9.7	46	18	11	6	3	11	11	14	26	0
March	30.00	30.97	28.51	39.1	49.8	32.7	86	1	68	58	3.40	2.61	3.8	10	1	1	13.5	5	10.2	43	16	10	6	4	14	11	13	26	0
April	30.00	30.70	28.99	49.8	60.7	41.6	93	11	66	62	2.94	3.69	.9	10	1	2	6.4	4	10.0	41	15	11	8	6	15	13	13	19	0
May	29.97	30.63	28.99	61.1	72.3	52.1	99	33	67	64	3.08	4.20	0	11	1	4	5.2	2	8.7	40	15	8	8	5	18	18	13	15	0
June	29.96	30.48	29.31	69.5	80.4	60.9	100	41	70	65	3.09	4.79	0	11	1	7	6.3	1	8.0	42	14	7	8	7	18	18	13	15	0
July	29.97	30.40	29.35	74.5	84.8	66.3	106	50	73	67	3.94	4.30	0	11	1	9	4.4	1	7.5	47	12	7	6	7	23	19	12	14	0
August	30.00	30.45	29.45	73.0	82.4	64.5	105	46	75	65	4.75	5.20	0	10	2	6	8.9	1	7.4	36	16	9	7	6	21	16	13	12	0
September	30.06	30.58	29.07	66.9	76.4	58.2	97	35	76	65	3.40	4.02	0	8	2	3	9.7	1	7.6	43	20	10	8	6	18	16	9	12	1
October	30.07	30.74	29.10	55.6	65.5	47.2	94	26	74	61	2.78	5.42	T	7	3	1	8.8	2	8.2	37	18	10	4	4	16	15	12	20	1
November	30.10	30.85	29.12	44.4	53.3	37.5	78	9	73	53	2.73	3.60	.8	9	2	(*)	10.6	3	9.0	36	13	9	5	3	16	16	16	22	0
December	30.09	30.94	29.74	34.4	42.1	28.1	70	−8	73	47	3.35	2.77	4.4	9	2	(*)	11.3	4	9.1	43	16	10	4	2	10	15	17	26	0
Mean	30.03			52.5	62.2	44.9			71	58							9.6		8.8		16	10	6	5	16	15	13	19	(*)
Total											40.04		24.1	115	20	33		33											
Extreme		30.98	28.51				106	−14				5.42								47									
Number years record	34	34	34	74	74	74	74	74	34	34	72	59	72	58	34	34	4	34	34	35	21	21	21	21	21	21	21	21	21

*Less than one.

Washington, D. C. Position: Lat. 38°54′ N., Long. 77°03′ W. Altitude: 72 Feet

Month	Pressure reduced to sea level: Mean: For month	Pressure reduced to sea level: Extremes: Highest	Pressure reduced to sea level: Extremes: Lowest	Air temperature in degrees F.: Mean: For month	Air temperature: Mean: Mean maximum	Air temperature: Mean: Mean minimum	Air temperature: Extremes: Highest	Air temperature: Extremes: Lowest	Average relative humidity (0730, 1330, 1930, 0130)	Average cloud amount 0–10	Precipitation: Average (inches)	Precipitation: Maximum in 24 hours	Precipitation: Average snowfall (inches)	Average number of days with: Precipitation 0.01 in. or more	Average number of days with: Fog (dense)	Average number of days with: Thunderstorms	Percent of observations recording visibility less than 1 mile	Average number of days with gales over 27 knots	Wind: Mean velocity (knots)	Wind: Maximum velocity (knots)	Percentage of observations from: N	NE	E	SE	S	SW	W	NW	Calm
January	30.13	31.01	28.85	35.0	42.6	27.3	77	−14	67	5.9	3.32	2.98	6.2	11	1.8	.2	12.9	1.3	6.5	37	15	8	7	4	17	13	6	29	1
February	30.09	30.97	28.71	35.4	43.6	27.3	84	−15	63	5.5	2.88	2.29	5.5	10	.9	.5	9.1	1.0	7.3	41	14	7	8	4	18	11	6	31	1
March	30.04	30.92	28.67	44.8	54.1	35.5	93	4	62	5.5	3.45	2.80	4.0	12	.8	1.2	5.5	1.6	7.5	41	13	7	7	5	19	13	5	30	1
April	30.02	30.74	29.10	54.2	64.3	44.0	95	15	59	5.2	3.30	3.21	.4	11	.6	2.3	2.0	.8	7.1	32	11	9	9	8	18	12	6	26	1
May	30.00	30.62	29.35	64.8	75.2	54.4	97	33	65	5.2	3.36	3.50	T	12	.3	5.3	1.6	.2	6.0	37	10	8	8	8	20	16	7	21	2
June	29.97	30.50	29.37	72.7	82.4	63.0	102	43	69	5.0	3.91	4.16	0	11	.2	7.2	.6	.5	5.4	36	10	6	7	6	19	22	8	20	2
July	29.98	30.52	29.40	77.2	86.7	67.8	106	52	71	5.0	4.37	5.80	0	11	.2	8.6	.8	.4	5.0	46	10	7	6	6	20	24	7	17	3
August	30.01	30.47	28.94	75.2	84.4	66.0	106	49	73	5.0	4.42	7.31	0	11	.3	5.9	1.0	.3	5.0	36	14	8	7	6	19	19	6	17	4
September	30.06	30.62	29.16	69.2	78.8	59.6	104	36	74	4.7	3.64	5.66	0	8	.7	3.0	3.7	.1	5.0	44	15	10	8	7	18	16	6	15	5
October	30.09	30.83	28.79	57.7	67.6	47.8	96	26	71	4.5	2.91	3.98	.1	8	1.6	.8	3.8	.2	5.4	36	14	8	5	5	16	16	9	22	5
November	30.13	30.84	28.99	46.7	55.5	37.9	83	11	67	5.3	2.46	3.20	.7	9	1.6	.4	7.6	.5	6.4	37	13	6	6	4	20	14	7	28	2
December	30.13	30.94	28.72	36.9	44.4	29.4	74	−13	68	5.7	3.09	2.70	3.3	10	1.5	.2	9.3	.8	6.3	34	14	7	7	3	17	14	7	29	2
Mean	30.05			55.8	65.0	46.7			67	5.2							4.8		6.1		12	8	7	6	18	16	7	24	2
Total											41.11		20.02		10.5	35.6		7.7											
Extreme		31.01	28.67				106	−15				7.31								46									
Number years record	73	73	73	50	50	50	75	75	31–41	62	50	75	58	75	74	63	9	41	14	74	25	25	25	25	25	25	25	25	25

T—Trace.

Ocean Area No. 1. Position: Lat. 35° N. to 40° N., Long. 70° W. to 75° W. Greenwich Noon Observations. Years Covered 1878–1934

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 (0–10)	Average air temperature	Average sea surface temperature
January	10,597	16.0	15	10	6	6	9	13	15	25	1	6	2	2	2	7	3	2	(*)	5	(*)	9	6	6.5	48.1	54.9
February	10,269	16.5	15	11	6	5	8	12	14	28	1	7	2	2	2	6	4	2	(*)	5	(*)	10	5	6.6	46.4	53.1
March	11,186	15.5	17	11	7	6	10	12	12	24	1	7	3	4	2	6	2	2	(*)	4	(*)	8	5	5.5	49.2	52.9
April	11,091	12.5	16	12	7	6	12	14	13	17	3	11	2	5	1	5	(*)	1	1	3	(*)	4	6	5.3	54.5	55.3
May	10,714	10.2	13	13	8	9	15	17	11	10	4	13	3	8	1	4	(*)	2	1	2	(*)	1	5	5.1	61.8	60.7
June	11,148	8.9	11	12	8	7	16	24	10	8	4	12	3	7	1	5	(*)	2	1	1	(*)	1	5	5.0	69.4	68.2
July	11,362	8.9	9	10	6	7	18	27	12	8	3	10	2	3	1	5	(*)	3	1	2	(*)	1	6	4.8	75.1	74.1
August	11,260	9.3	11	15	9	7	14	22	10	9	3	9	2	1	1	4	(*)	2	1	3	(*)	1	6	4.9	76.0	76.0
September	11,174	10.2	15	19	11	8	11	14	8	11	3	9	2	2	1	3	(*)	2	1	2	(*)	2	7	4.9	72.4	73.4
October	11,813	13.0	19	18	8	7	8	10	10	18	2	6	2	1	1	5	(*)	2	(*)	4	(*)	5	8	5.2	64.5	67.8
November	10,846	14.5	17	11	6	6	8	14	14	23	1	6	1	1	1	4	(*)	2	(*)	4	(*)	6	7	5.4	56.6	62.3
December	10,564	15.5	16	9	5	5	8	13	16	27	1	5	2	1	1	6	2	2	(*)	5	(*)	7	5	6.3	50.8	57.8
Mean		12.6	15	13	7	7	11	16	12	17	2	8	2	3	1	5	1	2	1	3	(*)	5	6	5.5	60.4	63.0
Totals	132,624																									

*Less than 0.5 percent.

Ocean Area No. 2. Position: Lat. 35° N. to 40° N., Long. 75° W. to 80° W. Greenwich Noon Observations. Years Covered 1879–1935

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 (0–10)	Average air temperature	Average sea surface temperature
January	2,287	12.0	20	12	5	5	9	15	12	19	3	9	5	3	2	5	1	1	(*)	2	(*)	6	5	5.7	47.5	49.9
February	2,085	12.5	21	12	6	6	8	13	12	19	3	10	3	6	2	6	2	1	(*)	2	(*)	5	4	5.6	45.1	48.2
March	2,331	12.5	19	13	6	6	13	13	10	18	2	12	4	7	2	5	1	1	(*)	2	(*)	6	3	5.2	48.6	50.1
April	2,282	9.7	18	13	6	7	12	15	11	14	4	13	4	5	2	4	(*)	1	(*)	1	0	2	4	4.8	54.8	54.5
May	2,170	8.9	16	14	8	9	16	15	9	9	4	14	3	5	1	4	(*)	2	1	2	(*)	1	4	4.8	63.8	61.8
June	2,271	7.6	12	14	6	6	17	21	10	8	6	12	3	3	2	4	(*)	2	(*)	1	(*)	1	4	4.7	71.2	70.0
July	2,090	7.6	10	10	7	9	18	25	9	7	5	10	2	1	1	4	(*)	2	1	2	(*)	1	7	5.0	76.1	75.0
August	2,222	8.0	13	16	8	7	13	22	10	7	4	8	2	1	1	4	0	2	1	2	(*)	1	7	4.7	76.7	76.6
September	2,184	9.3	18	23	10	7	9	13	8	8	4	9	2	1	1	3	(*)	2	(*)	2	(*)	2	6	4.6	73.6	74.1
October	2,410	10.6	25	20	8	6	6	9	7	15	4	7	5	2	1	3	0	1	(*)	2	(*)	3	7	4.5	64.4	67.9
November	2,300	11.6	21	13	5	5	8	11	12	21	4	7	3	3	1	3	(*)	1	(*)	2	(*)	4	6	5.1	55.7	61.2
December	2,462	11.6	22	10	4	5	9	13	13	20	4	7	3	3	1	5	1	1	(*)	2	(*)	4	5	5.6	50.0	54.1
Mean		10.2	18	14	7	6	12	15	10	14	4	10	3	3	1	4	(*)	1	(*)	2	(*)	3	5	5.0	60.6	62.0
Total	27,094																									

*Less than 0.5 percent.

Ocean Area No. 3. Position: Lat. 40° N. to 45° N., Long. 70° W. to 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 (0–10)	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	(*)	4	(*)	6	5	6.4	38.2	43.0
February	2,779	15.0	13	11	6	6	6	10	23	24	1	7	3	5	2	6	8	1	(*)	4	(*)	7	5	6.1	36.9	40.4
March	3,159	13.5	14	10	7	7	10	10	20	20	2	8	4	8	2	5	5	1	(*)	3	(*)	5	6	5.7	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	(*)	1	(*)	2	6	5.3	45.2	43.3
May	3,722	8.0	12	11	9	7	14	18	14	10	5	12	6	18	2	5	(*)	1	1	1	0	1	5	5.5	53.2	50.2
June	3,612	7.2	11	10	7	6	14	22	14	9	7	15	6	18	1	3	(*)	1	(*)	1	(*)	(*)	4	5.1	62.1	58.9
July	3,788	7.2	9	8	5	6	17	26	14	9	6	14	6	14	1	3	(*)	2	1	1	(*)	(*)	3	5.2	68.7	66.0
August	3,820	7.6	11	13	7	7	13	20	13	11	5	11	7	7	1	4	(*)	1	1	1	(*)	1	5	5.1	69.7	68.7
September	3,743	8.4	14	15	9	6	12	16	12	12	4	9	6	6	1	4	(*)	1	1	1	(*)	1	6	4.9	65.7	65.8
October	3,811	12.0	16	15	7	6	9	13	15	17	2	7	4	4	2	7	(*)	1	(*)	3	(*)	3	6	5.3	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	(*)	3	(*)	5	5	5.8	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	(*)	4	(*)	5	6	6.3	41.8	47.3
Mean		11.0	12	11	7	6	11	16	18	16	3	9	5	8	1	5	2	1	(*)	2	(*)	3	5	5.6	52.3	53.0
Total	41,029																									

*Less than 0.5 percent.

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.

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 authorized agents.

Nautical Charts

Coasts of the United States, Territories, and Possessions:
- Issued by the United States Coast and Geodetic Survey.
- For sale by the United States Coast and Geodetic Survey, Washington, D. C., district offices of the United States Coast and Geodetic Survey, and authorized sales agents in the various ports.

Mississippi River from the Head of Passes to Cairo:
- Issued and for sale by the Mississippi River Commission, Vicksburg, Mississippi.

Illinois Waterway System:
- Issued and for sale by the United States Engineers, Chicago, Illinois.

Ohio River:
- Issued and for sale by the United States 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, Michigan.

New York State Canal System:
- Issued and for sale by the Superintendent of Public Works, Albany, New York.

Foreign countries:
- Issued by the Hydrographic Office, United States Navy Department.
- For sale by the Hydrographic Office, Washington, D. C., and authorized sales agents in the various ports.

Coast Pilots

Coasts of the United States, Territories, and Possessions:
- Published by the United States Coast and Geodetic Survey.
- For sale by the United States Coast and Geodetic Survey, Washington, D. C., district offices of the United States Coast and Geodetic Survey, and authorized sales agents in the various ports.

Foreign countries:
- Published by the Hydrographic Office, United States Navy Department.
- For sale by the Hydrographic Office, Washington, D. C., and authorized sales agents in the various ports.

Tide Tables

Atlantic Ocean, and Pacific and Indian Oceans—Two volumes:
Published by the United States Coast and Geodetic Survey.
For sale by the United States Coast and Geodetic Survey, Washington, D. C., district offices of the United States Coast and Geodetic Survey, and authorized sales agents in the various ports.

Current Tables

Atlantic Coast, North America, and Pacific Coast, North America, and Philippine Islands—Two volumes:
Published by the United States Coast and Geodetic Survey.
For sale by the United States Coast and Geodetic Survey, Washington, D. C., district offices of the United States Coast and Geodetic Survey, and authorized sales agents in the various ports.

Tidal Current Charts

Boston Harbor, Narragansett Bay to Nantucket Sound, Long Island and Block Island Sounds, New York Harbor, San Francisco Bay—Five volumes:
Published by the United States Coast and Geodetic Survey.
For sale by the United States Coast and Geodetic Survey, Washington, D. C., or its agents.

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.

Notice to Mariners

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

Light Lists

North Atlantic Coast, South Atlantic Coast, Intracoastal Waterway, Pacific Coast:
Published by the United States Coast Guard.
For sale by the Superintendent of Documents, Washington, D. C., and by authorized sales agents in the various ports.
Foreign Countries:
Published by the Hydrographic Office, United States Navy Department.
For sale by the Hydrographic Office, Washington, D. C., and authorized sales agents in the various ports.

Radio

Charts of Radiobeacon System, Atlantic and Gulf Coasts, Pacific Coast, and Great Lakes:
Free on application to the United States Coast Guard.
Radio Circulars giving schedules, frequencies and data included in weather broadcasts.
Free on application to the Chief, U. S. Weather Bureau, Washington 25, D. C.
Radio Navigational Aids (H. O. Pub. No. 205).
Radio Weather Aids to Navigation (H. O. Pub. No. 206).
Published by the Hydrographic Office, United States Navy Department.
For sale by the Hydrographic Office, Washington, D. C., and authorized sales agents in the various ports.
List of radiobeacons:
See Light Lists published by the United States Coast Guard.
Hydrographic Bulletin:
Issued weekly by the United States Hydrographic Office.

International Code of Signals (American Edition) Vol. II (Radio):
For sale by United States Hydrographic Office.

International Convention for the Safety of Life at Sea, London, 1929 (affecting radio), Extracts From:
May be obtained from Federal Communications Commission, Washington, D. C.

Communications Act of 1934:
For sale by Superintendent of Documents, Washington, D. C.

Ship Radio Telegraph Safety Rules:
From the 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

Weather Bureau Circular M, "Instructions to Marine Meteorological Observers."
For sale by Superintendent of Documents, Washington, D. C. This publication will also be furnished free of charge on request to ships' officers cooperating with the U. S. Weather Bureau.

Weather Bureau Circular R, "Preparation and Use of Weather Maps at Sea."
For sale by Superintendent of Documents, Washington, D. C. This publication will also be furnished free of charge on request to ships' officers cooperating with the U. S. Weather Bureau.

Weather Bureau Circular S, "Codes for Cloud Forms and States of the Sky."
For sale by Superintendent of Documents, Washington, D. C. This publication will also be furnished free of charge on request to ships' officers cooperating with the U. S. Weather Bureau.

Miscellaneous

American Practical Navigator (Bowditch):
Published by the Hydrographic Office, United States Navy Department.
For sale by the Hydrographic Office and the Superintendent of Documents, Washington, D. C., and their agents.

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.

General Rules and Regulations Prescribed by the Board of Supervising Inspectors—four volumes:
Published by and issued free on application to the Coast Guard, Washington, D. C.

Laws Governing Steamboat Inspection:
Published by and free on application to the Coast Guard, Washington, D. C.

List of Bridges Over the Navigable Waters of the United States:
Published by the United States Engineers:
For sale by the Superintendent of Documents, Washington, D. C.

Navigation Laws of the United States:
Published by the Coast Guard.
For sale by the Superintendent of Documents, Washington, D. C.

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 Coast Guard, Washington, D. C.

Pilot Rules for Rivers whose Waters Flow into the Gulf of Mexico and Their Tributaries and Red River of North:
Published by and free on application to the Coast Guard, Washington, D. C.

Pilot Rules for Great Lakes and Their Connecting and Tributary Waters:
Published by and free on application to the Coast Guard, Washington, D. C.

Port and Terminal Charges at United States Ports:
Prepared by the Board of Engineers for Rivers and Harbors, War Department, in cooperation with the United States Maritime Commission.
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Port Series—of the United States:
Prepared by the Board of Engineers for Rivers and Harbors, War Department, in cooperation with the United States Maritime Commission.
For sale by the Superintendent of Documents, Washington, D. C.

Rules and Regulations; The Navigable Waters of the United States:
Prepared by the United States Engineers.

Shipping Charges at United States and Foreign Ports; Consular Services and Charges:
Prepared by the Board of Engineers for Rivers and Harbors, War Department, in cooperation with the United States Maritime Commission.
For sale by the Superintendent of Documents, Washington, D. C.

The American Ephemeris and Nautical Almanac:
Published by the United States Naval Observatory:
For sale by the Superintendent of Documents, Washington, D. C., and by authorized agents in the various ports.

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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		252 58		352 58	
84 23	E ½ N	174 23	S ½ E	264 23	W ½ E	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

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						