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R. S. PATTON, *Director*

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UNITED STATES COAST PILOT

ATLANTIC COAST

SECTION C

SANDY HOOK TO CAPE HENRY
INCLUDING DELAWARE AND CHESAPEAKE BAYS

FOURTH EDITION

1937

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PREFACE

The present publication covers the coast from Sandy Hook to Cape Henry. It includes the Delaware and Chesapeake Bays and tributaries, and the inside route from Delaware River to Chesapeake Bay and the inside coastal route from Delaware Bay to Cape Charles, Va. It is based mainly upon the work of the United States Coast and Geodetic Survey, including the results of a special examination in 1935 and 1936.

This volume covers the same territory as the first edition of Section C, excepting that the Inland Waterway along the coast of New Jersey, and the Delaware and Raritan Canal, New York Bay to the Delaware River, have been omitted, as the first named route is fully described in the United States Inside Route Pilot, New York to Key West, and the canal is no longer open to navigation.

Navigators and others are requested to notify the Director, United States Coast and Geodetic Survey, of any errors or omissions that may be found in this publication, or of any additional matter which they think should be inserted for the information of mariners.

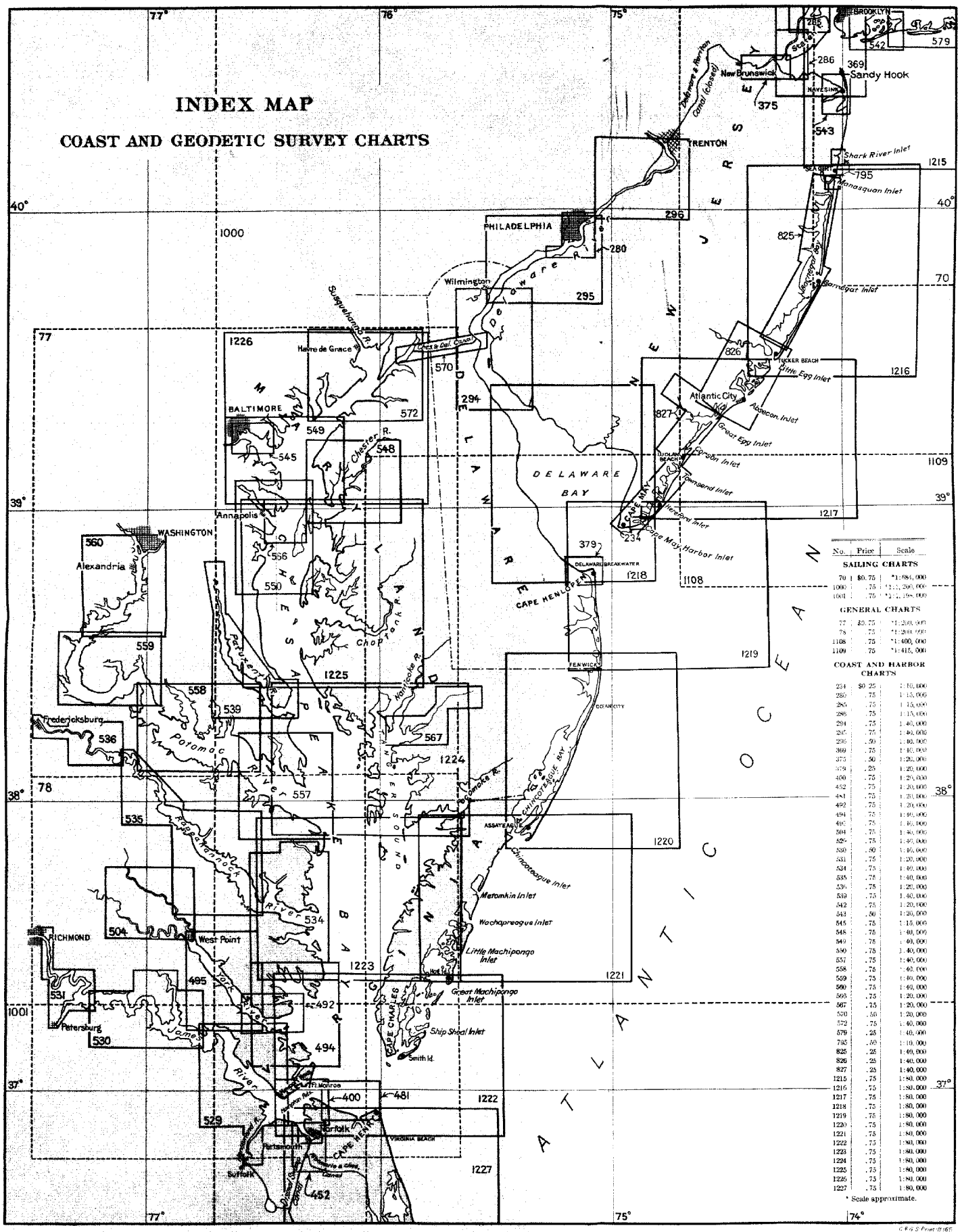
Corrections and additions affecting Coast Pilot volumes are included in Notice to Mariners, published weekly by the United States Department of Commerce. The aids to navigation mentioned in this pilot are those effective, according to the latest available information, on December 30, 1936. A supplement, giving the more important changes to the text, is issued about a year after a Coast Pilot volume is published, and again at approximately yearly intervals thereafter until a revised edition appears. Each supplement is complete in itself and cancels all previous issues. The date of the latest supplement to each Coast Pilot is given in the list of Coast Pilots published quarterly in Notice to Mariners.

In using this volume reference should be made to the latest supplement and to Notices to Mariners issued subsequent to the volume or supplement and due regard should be given to the possibility of changes having occurred since the date of the latest of these publications. The supplement may be obtained, free of charge, upon application to the United States Coast and Geodetic Survey, Washington, D. C., or to any of its Field Stations, or Sales Agents.

This edition was prepared by Lt. Comdr. Charles Shaw, United States Coast and Geodetic Survey, under the direction of Commander F. B. T. Siems, chief, coast pilot section. The United States Engineers, the United States Lighthouse Service and other authorities all cooperated in furnishing information.

R. S. Patton, *Director.*

December 30, 1936.



NOTE: This edition of Atlantic Coast Pilot, Section C, was reprinted in 1941 and the above index map corrected to date. No corrections were made in the text of the pilot for charts that have been cancelled or for new charts published. Consequently, when reading the various descriptions, reference should be made to this map rather than to the chart numbers appearing in the text.

UNITED STATES COAST PILOT

ATLANTIC COAST—SECTION C—SANDY HOOK TO CAPE HENRY

The courses and bearings given in degrees are *true*, reading clockwise from 0° at north to 359°, and are followed by the corresponding *magnetic* course in points, in parentheses. General directions, such as northeastward, west-southwestward, etc., are magnetic.

Distances are in *nautical miles* and may be converted approximately to statute miles by adding 15 percent to the distances given.

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

Except where otherwise stated, all depths are at *mean low water*.

In accordance with the desire of the International Hydrographic Bureau, each depth is followed, in parentheses, by its equivalent in meters.

Heights are given in feet with metric equivalent in parentheses.

Use this Coast Pilot with reference to the latest Supplement that may have been published and the Notices to Mariners issued after the date of the edition of this pilot and the Supplement.

1. GENERAL INFORMATION

THE COAST AND RIVERS

The general character of the coast is low and sandy, backed by woods, except in the vicinity of Navesink Highlands, where the land reaches a height of 276 feet (84 m). The coast of New Jersey is distinguished by the large number of summer resorts, with large hotels and occasional prominent standpipes or watertanks. The coast southward has three smaller summer resorts within a 25 mile stretch of the Delaware and Maryland coast but otherwise there are few landmarks except the lighthouses and Coast Guard stations. The depths along the coast are irregular, there being many outlying sand shoals, and the lead is of little assistance to the navigator.

The coast is broken by two important entrances, Delaware and Chesapeake Bays, having broad and deep channels leading into them, and all of the other entrances are narrow inlets, subject to frequent change in depth, with only four of them fixed in position by stone jetties. Inside the entrances there is generally little natural change in the shore, shoals, and other features, except in the more open parts of Delaware and Chesapeake Bays.

Delaware Bay and River banks are generally low and there are but few conspicuous landmarks except in the industrial centers along the river. Many tributary streams of shallow depths have been improved.

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 there is general bluff formation on the western side of the upper part of the bay. Cottages dot the shores, but these are usually inconspicuous. Aids to navigation are numerous.

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

Air-photo maps covering extensive sections of the coastal areas of the United States are published by the United States Coast and Geodetic Survey. These maps give detailed topographic features but no elevations, contours, or depths. The nautical chart gives the depths in the water areas, the shore line, important land features, and all other information essential to the navigator; the airphoto maps simply give additional detail of land-areas. The maps vary considerably in size, being laid out to conform with the coast line as conveniently as possible. The average size is about 44 inches by 24 inches or a nearly equivalent area. The scale of the maps varies, the majority being on a scale of 1:20,000 but a 1:10,000 scale and at times a 1:5,000 scale is used. On these scales, the approximate area covered by an average sheet is 80 square miles (nautical), 20 square miles, and 5 square miles, respectively.

Index sheets showing the geographical layout of these maps may be secured from the Coast and Geodetic Survey, Washington, D. C. The maps are sold to the public at 75 cents per copy.

Along the Atlantic coast of the United States within the limits of this Coast Pilot air-photo maps are available for the following areas:

New Jersey:
Sandy Hook to Cape May;
36 maps—scale 1:10,000.

Delaware:
Cape Henlopen;
1 map—scale 1:20,000.

Virginia:
Chincoteague to Wachapreague;
2 maps—scale 1:10,000.
3 maps—scale 1:20,000.

HARBORS AND PORTS, REPAIRS, HOLIDAYS, ETC.

Harbors and ports.—The most important places, either commercially or as harbors of refuge, are Delaware Breakwater, Wilmington, Chester, Philadelphia, Camden, Hampton Roads, Norfolk, Newport News, and Baltimore.

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 Inlet may be used by moderate size vessels (see page 72). Small local craft often seek shelter inside the other inlets, but they can not be entered in safety during heavy weather, and the unimproved inlets are often difficult for strangers even in good weather. 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 in southerly weather. The principal anchorges in Delaware Bay and River are described on page 75, and those in Chesapeake Bay on page 139.

The entrances to inlets on the coast of New Jersey, Delaware, Maryland, and Virginia are more or less obstructed by shifting sand bars. Some of the entrances are being 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 volume than on those not under improvement. Vessels bound to the inlets along this coast should, in cases where the given depths approximate the draft of their vessel, inquire 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. Generally, a stranger should, if possible, select a rising tide for entering an inlet.

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

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

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.

The principal docking facilities are listed below.

Largest dry docks and marine railways

[New York Harbor. See page 5, U. S. Coast Pilot, Atlantic Coast, Section B, Cape Cod to Sandy Hook.]

Port	Type	Length over all	Depth on sill at high water	Capacity
		Feet	*Feet*	*Tons*
Wilmington, Del	Railway	380 [2] 210	[1] 13	1,000
Chester, Pa	Dry dock [4]	523	[1] 22½	10,000
Camden, N. J	Dry dock [4]	210	13¾	1,000
Camden, N. J	Railway	[2] 278 580	[1] 17	2,000
Camden, N. J	Railway	[2] 220 500	[1] 14½	1,000
Philadelphia, Pa	Dry dock [5]	428	20	-------
Philadelphia, Pa	Dry dock [5] (Navy Yard)	1,011⅓	43½	-------
Philadelphia, Pa	Railway	288	[1] 13	1,500
Baltimore, Md	Dry dock [5]	614	22	-------
Baltimore, Md	Railway	380	[1] 20	4,000
Newport News, Va	Dry dock [5]	802	30	20,000
Berkley, Va	Railway	[3] 420 800	[1] 20	5,000
Norfolk, Va	Dry dock [4]	310	20	4,000
Norfolk, Va	Railway	[3] 230 630	[1] 16	1,000
Portsmouth, Va	Dry dock [5] (Navy Yard)	1,013½	43¾	-------
Washington, D. C	Railway (Navy Yard)	[2] 130	[1] 12	500

[1] Aft on blocks.
[2] Length over blocks.
[3] Length of vessel that can be hauled out.
[4] Floating dry dock.
[5] Graving dry dock.

Port facilities.—The principal facilities available at the various ports are described under the respective port headings. Fuller details regarding the facilities at most of the ports are given in the Port Series publications.

The **Port Series**, publications of the United States Army, Corps of Engineers, 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 of these reports is generally prepared along similar lines; the general subjects covered include the following:

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

Complete information regarding the **organization, administration and regulations** of the port are given under "Port customs and regulations."

The following volumes of the Port Series sold by the Superintendent of Documents, Washington, D. C., are available for the ports within this Coast Pilot:

No. 4. Part 1. Philadelphia, Pa., Camden and Gloucester, N. J., and ports on the Delaware River above Philadelphia (Trenton, Bordentown, Roebling, Florence, Burlington and Delair, N. J., and Bristol, Pa.) Revised 1932, price $1.00.

Part 2. Wilmington, Del., and ports on the Delaware River below Philadelphia (Newcastle, Pigeon Point, Edgemoore, Bellevue and Claymont, Del., Marcus Hook, Chester, Eddystone, and Essington, Pa., and Paulsboro, Billingsport, Thompsons Point, Penns Grove, Carneys Point, Deepwater Point and Pennsville, N. J.) Revised 1931 price $0.25.

No. 15. Norfolk, Portsmouth, Newport News and Hampton, Va., Revised 1934, price $0.80.

No. 16. Baltimore, Md., Washington, D. C., and Alexandria, Va., price $1.10.

Part 1. Baltimore, Md., Revised 1933 price $0.50.

The publication, **Port and Terminal Charges at United States Ports,** Miscellaneous Series, No. 1 (edition 1936), price $1.00, also prepared by the United States Army 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 (quarantine and hospital services), the Customs Service, and the Immigration Service; it also includes a list of Federal documents which vessels are required to have.

In connection with the Customs Service, there is listed the Custom Collection Districts and the ports of entry for the United States. Within the limits covered by this volume are the following ports of entry with **Offices of the Customs Service.** The headquarters for Custom Collection Districts are indicated by italics. Marine documents may be issued at all of the ports with an asterisk preceding the name.

* *New York, N. Y.*
* Albany, N. Y.
* Newark, N. J.
* Perth Amboy, N. J.
* *Philadelphia,* (including Camden, and Gloucester City, N. J.)
Chester, Pa.
Lewes, Del.
* Wilmington, Del.
* *Baltimore, Md.*
* Annapolis, Md.
* Crisfield, Md.
* Cambridge, Md.
* Washington, D. C.
* *Norfolk, Va.*
* *Newport News, Va.*
* Alexandria, Va.
* Cape Charles City, Va.
Chincoteague, Va.
Petersburg, Va.
* Reedville, Va.
Richmond, Va.

A similar publication, **Shipping Charges at United States and Foreign Ports,** Miscellaneous Series No. 2, price $0.25, prepared by the United States Army Corps of Engineers and sold by the Superintendent of Documents, contains information relative to services and charges of the United States consular officers abroad, of foreign consular officers stationed at the various seaports of the United States, monetary systems, rates of exchange and passport rules.

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

January 1, New Year's Day.
January 19, Lee's Birthday (in Virginia only).
January 20, Inauguration Day (District of Columbia only in 1937 and every fourth year thereafter).
February 12, Lincoln's Birthday (not in Virginia, District of Columbia, or Maryland).
March 25, Maryland Day (in that state only).
Good Friday (Friday before Easter) (not in the District of Columbia or Virginia).
Easter (Maryland only) (First Sunday following the Paschal Full Moon which happens upon or next after the 21st of March. Date of Easter varies between March 22 and April 25th).
May 30, Decoration or Memorial Day.
June 3, Birthday of Jefferson Davis (in Virginia only).
July 4, Independence Day.
Labor Day (First Monday in September).
September 12, Defenders Day (in Maryland only).
October 12, Columbus Day (not in Virginia nor the District of Columbia).
General Election Day (not in the District of Columbia) (First Tuesday after first Monday in November).
November 11, Armistice Day (also in Delaware and Maryland by Governor's proclamation only; not in the District of Columbia).
Thanksgiving Day (Last Thursday in November).
December 25, Christmas Day.
Sundays (when a legal holiday falls on Sunday, the following Monday is observed).

In the ports described in this volume stevedores are not prohibited by law, union rules, or other regulations from working ships on holidays, and it is possible to make arrangements in advance for work on such days. In most cases workmen receive extra pay for work on holidays, Saturday afternoons, Sundays and nights in accordance with rates fixed by agreement between the labor unions and ship operators.

Communication is by regular lines of coasting and river steamers, by rail, by airplane, and by telephone, telegraph, and radio. There are regular lines of steamers operating from Philadelphia, Baltimore, and Hampton Roads ports to practically all parts of the world, either by direct sailings to the various ports or by transhipment services. There are excellent railroad and highway connections between the ports and to all parts of the country. There are regular air lines into Philadelphia (Camden), Atlantic City, Wilmington, Baltimore, Washington, and Richmond.

DISTANCES BETWEEN PORTS

The Coast and Geodetic publication "Distances Between United States Ports, Serial No. 444" is a compilation of numerous tables of distances giving, in a condensed and convenient form, distances between ports of the United States and its off-lying territories. The ports include all the important harbors and a sufficient number of minor ports so that distances can be given between points at short and fairly regular intervals along the various coasts. Each distance between two ports is along the shortest route marked by aids to navigation and affording a safe depth for the maximum draft that can enter both ports.

For ready reference and for use in combining these tables with those issued by other nations, a number of distances from United States to foreign ports are included.

This publication may be obtained from the Coast and Geodetic Survey, Washington, D. C., or from the sales agencies of the bureau at the various ports; the price is 10 cents.

The table of distances given on page 8 is typical of the tables given in the above publication; it is an abridgement of tables in the publication listing numerous additional ports. Distances in this table are given in nautical miles which may be converted approximately to statute miles by adding 15 percent to the distances given, and more precisely by multiplying the distance in nautical miles by 1.15155.

The Hydrographic Office publication No. 117 (1936), "Table of Distances Between Ports" gives distances (in nautical miles), via the shortest navigable routes, between the principal world ports, including the principal United States ports. This publication may be obtained from the Hydrographic Office, Washington, D. C., or from authorized sales agencies in the various ports, for $1.50.

A more complete tabulation of distances between ports on the Great Lakes will be found in the bulletin "Survey of the Northern and Northwestern Lakes," issued annually by the United States Lake Survey Office, Detroit, Mich.

Distances between Atlantic coast ports, New York to Cape Henry, including Delaware and Chesapeake Bays

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	City Point (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	47	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
City Point (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	-----	182	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	47	52	199	229	190	267	249	239	179	182	-----	49	60	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. (Delaware & Raritan Canal, closed to traffic.)

NOTE.—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.

PILOTS AND PILOTAGE

Pilots.—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 and River is given on page 77, and in Chesapeake Bay on page 138.

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, West Point, Washington, and Baltimore.

Harbor masters are appointed for the principal ports, and they have charge of the anchorage and berthing of vessels in their respective harbors. Harbor and anchorage regulations are given under the descriptions of the ports or in the Appendix. The Port Series of publications (see page 4) give full information regarding port regulations. Federal laws prohibit the dumping of refuse material of any kind and of oil into the navigable waters of the United States.

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

Navigation laws of the United States are published by the Bureau of Navigation, Department of Commerce, at intervals of four years, the present edition being that of 1935. The volume can be obtained from the Superintendent of Documents, Government Printing Office, Washington, D. C.; price, $1.

Rules of the Road.—International Rules and Inland Rules to prevent collision of vessels are given in the appendix of this volume, and they may be obtained in a printed pamphlet form. (See below.)

Pilot Rules for certain inland waters of the Atlantic and Pacific coasts and of the coast of the Gulf of Mexico; and Pilot Rules for the rivers whose waters flow into the Gulf of Mexico and their tributaries (Pilot Rules for Western Rivers) are similarly published in pamphlet form.

Most of these pilot rules are given in the appendix of this volume. Copies of the above three pamphlets may be obtained gratis from the Bureau of Marine Inspection and Navigation, Washington, D. C.

(Requests for copies of publications given free should be addressed to the Bureau in which they originate.)

QUARANTINE AND MARINE HOSPITALS

Quarantine for all ports within the limits of this volume is enforced in accordance with the requirements of the **United States Public Health Service.**

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

Quarantine inspection for all ports on Delaware Bay will be conducted at Harbor of Refuge, Reedy Island and Marcus Hook. (See page 79.)

Quarantine inspection for all ports on Chesapeake Bay and tributaries, except Baltimore, is conducted in Hampton Roads, off 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 at Marcus Hook, Hampton Roads and Leading Point (Baltimore) stations within the limits of this volume.

Medical relief.—American merchant seamen are entitled to free medical relief at the expense of the Government through the United States Public Health Service at its established marine hospitals and relief stations. A list of such stations in the region covered by this volume is given below.

An American merchant seaman is one "engaged on board in the 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."

Free medical advice is also furnished seamen by radio; for information regarding the same, see page 36.

Relief stations of the Public Health Service are located at the following ports:

MARINE HOSPITALS:
- Baltimore, Md.
- Norfolk, Va.

RELIEF STATIONS:
- Philadelphia, Pa.
- Cambridge, Md.
- Lewes, Del.
- Perth Amboy, N. J.
- Washington, D. C.

RELIEF STATIONS:
- Cape May, N. J.
- Crisfield, Md.
- Newport News, Va.
- Richmond, Va.
- White Stone, Va. (near Taft)
- Reedville, Va.

RELIEF STATION, FOURTH CLASS
(in charge deputy collector of customs):
- Wilmington, Del.

THE UNITED STATES 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 determination of geographical positions and elevations in the interior of the country,

to coordinate the coastal survey and provide a framework for mapping and other engineering work; (3) the study of tides and currents, to furnish datum planes to engineers and tide and current tables to mariners; (4) the compilation of aeronautical charts, to meet the needs of the pilots of aircraft; (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 data required in designing structures to reduce the earthquake hazard.

These duties require hydrographic, topographic, and aerial-photographic surveys along the coasts, including the rivers to the head of tidewater, for determining the depths of the waters and the configuration of the adjacent land; tide and current observations, for use as a basis for future predictions; base measurements; determination of latitudes, longitudes, and azimuths by astronomical observations, triangulation, and traverse; determination of elevations by spirit leveling or by vertical angles; **magnetic surveys** in all parts of the country, including the operation of magnetic observatories; the operation of instruments recording building vibrations and strong earthquake motions, and cooperation with non-Federal agencies engaged in this work; and gravity measurements throughout the country.

The results of these surveys and studies are analyzed in the Washington office and published as **nautical** and **aeronautical charts**; annual tables of **predicted tides** and **currents**; charts showing magnetic declination; annual lists of United States earthquakes; publications of geographic positions and elevations; **Coast Pilots; Notice to Mariners** (jointly with Bureau of Lighthouses); and as annual and special publications covering all of its other activities, including comprehensive manuals prescribing the methods which obtain for its various classes of surveying.

THE UNITED STATES LIGHTHOUSE SERVICE AND AIDS TO NAVIGATION

The United States Lighthouse Service is charged with the establishment and maintenance of aids to navigation, and with all equipment and work incident thereto, on the sea and lake coasts of the United States, and on the rivers of the United States so far as specifically authorized by law, and on the coasts of all other territory under the jurisdiction of the United States, with the exception of the Philippine Islands and Panama.

The bureau publishes Light Lists and radiobeacon charts giving information regarding aids to navigation maintained by the Lighthouse Service; it publishes each week, jointly with the Coast and Geodetic Survey, Notices to Mariners, giving the changes in lights, buoys, etc.; it also issues broadcasts and local notices.

The lighthouses and lightships, radiobeacons, radio direction-finder (Navy) and distance finding stations, and other aids to navigation are the principal guides and mark the approaches and channels to the principal ports. The buoyage is in accordance with the sys-

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tem adopted by the United States and is described below. The lightships and principal coast lights are described in the text of this volume. Several of the light stations are equipped with radiobeacons and distance-finding apparatus.

A list of the radiobeacons and radio distance-finding stations operated by the United States Lighthouse Service and the radio direction-finder stations operated by the United States Navy in the area covered by this volume are given under the heading, **Radio Service.**

Descriptions of aids to navigation (except those maintained by the State in the New Jersey Inland Waterway, see Inside Route Pilot, New York to Key West) will be found in the publications of the United States Lighthouse Service listed on page 318.

Private aids to navigation, such as stakes and small floats, are not supervised by the Government, and are therefore not listed or indicated on the charts. When private aids are established similar to those maintained by the Government, they must be authorized by the United States Lighthouse Service.

System of buoyage, colors, shapes, and numbers.—On the *right or starboard* side of the channel for the entering vessels are placed *conical or nun buoys*, painted *red*, and with *even numbers*, and on the *left or port side*, *cylindrical or can buoys*, painted *black*, and with *odd numbers;* the numbers for each side increase from seaward.

Obstructions, with channel ways on either side, are marked with buoys painted with *red and black horizontal bands*, which may be left on either side, with due regard as to the position of the buoy with relation to the obstruction, as shown on the chart. In general, obstruction buoys have no distinctive shape, but in the case of buoys with horizontal bands marking obstructions or bifurcations of channels, when it is desired to indicate the main channel, a can buoy with black band at the top is used when the important channel is to the right, for the entering vessel, and a nun buoy with red band at the top when the important channel is to the left.

Fairways are indicated, where necessary, by buoys painted with *black and white vertical stripes;* such buoys are placed in good water in mid-channel or approaches, and may be passed close-to on either side. Mid-channel buoys have no distinctive shape at present.

Offshore Buoys along the Atlantic Coast are colored and numbered from north to south, and along the Pacific coast from south to north, conforming to the order of Light Lists; this does not apply to outside buoys which have a definite approach signification, and which are colored and numbered to conform to the approach. In channels not having a definite approach character, buoys are colored and numbered from north to south or from east to west on the Atlantic coast and from south to north or west to east on the Pacific coast.

Bell buoys have a flat-topped float with skeleton superstructure supporting a bell. **Gong buoys** have a flat top with skeleton framework supporting a series of four gongs of varied tone. **Whistle buoys** are conical, with whistle at top. **Spar buoys** are long slender buoys of wood or iron. These classes of buoys, as well as lighted buoys, have not at present a shape distinction to indicate the side of channel or

entrance, although a shape distinction is being introduced for wood spar buoys.

Anchorage Buoys are painted white.

Quarantine Anchorage Buoys are painted yellow.

Certain Other Special Buoys are in use locally, such as white with green top for dredging buoys, and black and white horizontally banded for fish-net areas in the fifth district.

Coast and Geodetic Survey *sono-radio buoys*, used in radio acoustic ranging, may be found anchored on the continental shelf in areas being surveyed. Some of these buoys are fitted with mechanism to show a white light upon the approach of a vessel. When within about a mile of the buoy the sound of a ship's propeller, or other ship noises, produce the audio mechanical effect resulting in a fluctuating illumination.

Station Buoys, colored the same as the regular aids, are placed alongside of lightships and important buoy stations to mark them in case the regular aid is carried away. Lightship station buoys bear the letters "LS" above the initials of the station.

Colors of Lights for Buoys and Beacons.—*Red or white lights* are placed on the *right or starboard* side of a channel for the entering vessel, and *white or green lights* on the *left or port side*. White lights may be on either or both sides of the channel, but colored lights are only on the sides indicated respectively. The same rules apply to lights on fixed structures serving a purpose similar to that of buoys. Coast lights and lightships near channels or entrances may not conform to this system.

Lighted buoys are not at present uniformly differentiated as to shape, with respect to the side of the channel; they have bodies which contain the gas tanks or gas, and are usually surmounted by skeleton superstructures with lanterns; combination buoys have both light and bell, or light and whistle.

Caution Regarding Buoys.—Buoys are liable to be carried away, shifted, capsized, sunk, etc., lighted buoys may be extinguished, or whistling or bell buoys may not sound, as the result of storm, the accumulation of ice, running ice, or other natural causes, or collision, or other accidents. Buoys marking channels subject to frequent changes are moved as may be necessary and should be used only with local knowledge. Such buoys may not be charted.

Day Beacons are constructed and distinguished with special reference to each locality, and particularly with regard to the background upon which they are projected. Beacons on the sides of channels are, when practicable, colored to conform to the coloring of buoys, subject to the above conditions as to background.

Reflectors (red or white) are placed on some buoys or day beacons to enable the navigator, using a searchlight, to readily locate such aids.

Significance of light characteristics

Flashing characteristics are used on lighted buoys to distinguish their principal purposes, corresponding in part ot the color distinctions that are made on unlighted buoys.

Characteristic of flashing	Purpose indicated	Color of light	Color of buoy
1. ***Flashing:*** Less than 30 light periods per minute.	Channel sides and Coasts.	White Green Red	Red or black. Black. Red.
2. ***Quick flashing:*** Not less than 60 flashes per minute.	Sudden constriction or sharp turns in channel. *A distinctly cautionary significance is indicated.*	White Green Red	Black or red. Black. Red.
3. ***Interrupted quick flashing (group):*** Quick flashing as above but interrupted by eclipse periods of 4 seconds at regular intervals about 8 times per minute.	Obstructions, Middle grounds, Junctions or Wrecks. *A distinctly cautionary significance is indicated.*	White Green Red	Top band of *buoy either red or black. Top band of *buoy black only. Top band of *buoy red only. *Red and black horizontally striped buoy.
4. ***Short-long flashes:*** Groups of a short and a long flash. Groups are repeated about 8 times per minute.	Mid-Channels and Fairways.	White	Black and white vertical stripes.

NOTE.—While a thorough understanding of the significance of these features will be of material assistance to the navigator, it is not contemplated that they shall be implicitly relied upon without reference to the charts which should always be consulted for guidance. Many conditions do not permit of proper understanding in any other way.

The publications of the Lighthouse Service pertinent to this Coast Pilot are The Light List, Atlantic Coast of the United States (price $0.60); The Local Light and Buoy List, New York and Approaches (price $0.15); The Local Light and Buoy List, Cape May to Cape Lookout (price $0.20); and Notice to Mariners (free). The Light Lists may be obtained from the Superintendent of Documents, Government Printing Office, Washington, D. C., or numerous sales agencies.

Mariners are referred to the above lists for detailed information regarding the characteristics, power, visibility, etc., of lights, as well as a description of light structures and day marks, buoys, fog signals, etc. Such information is not given in this Coast Pilot volume except for a few of the more important aids.

The above light lists also contain (in the introduction) considerable valuable information to mariners. This includes a description of the character and power of lights and of light sectors and distances at which lights can be seen, information regarding the use of radiobeacon signals, distance-finding stations, and radio direction-finding stations and notes regarding sound-in-air fog signals, sub-

marine oscillators and bells, whistle and bell buoys, lightships, and lighthouse tenders.

The **Notice to Mariners** (United States and territorial waters) gives all changes in aids to navigation as well as recent chart correction data. This publication will be mailed free to mariners who apply to the Superintendents of Lighthouses, or single copies may be obtained or consulted at the offices of the Superintendents of Lighthouses, or the Coast and Geodetic Survey Field Stations, or other agencies distributing marine information.

Defects in Aids to Navigation.—Aids to navigation are protected by law, and mariners in their own interest should use every precaution to avoid collisions with them. Mariners are requested to report defects in the aids to navigation *using official designation identification in the Light Lists* direct to the Superintendent of Lighthouses of the district concerned by commercial radio, by radio communication with lightships, or other prompt means.

Suggestions as to Aids to Navigation.—Mariners are also invited to send suggestions as to improvements or changes in aids to navigation directly to the Superintendents of Lighthouses, as listed below, or to confer with them, or to address the Commissioner of Lighthouses, Washington, D. C.

Dangers, Changes in Channels, Shoals, etc.—Mariners are requested to send important facts affecting the charts or other publications of the Coast and Geodetic Survey promptly to the Director of the Coast and Geodetic Survey, Washington, D. C., or to the nearest Coast and Geodetic Survey Field Station. The Field Stations are listed in the appendix of this volume.

Communication with outlying light stations.—All stations having radio communication facilities observe watch on 500 kilocycles during the first 15 minutes of each hour from 8 a. m. to 8:15 p. m. standard time for radiotelegraph communication. Information of importance in the maintenance of aids to navigation or other urgent matters from vessels may be transmitted at such times. Should the radio beacon be in operation for regular schedule, fog, or thick weather, it will not be interrupted for such communication except in matters of extreme urgency. Calling and brief communication can be carried on during the silent periods of the radiobeacons. (See Light and Buoy Lists, United States Lighthouse Service, for signal characteristics and operating times.) See page 29.

The district offices of the Lighthouse Service in the area covered by this publication are:

THOMPKINSVILLE, STATEN ISLAND, N. Y., Superintendent of Lighthouses, *Third District.*—Includes the waters of Rhode Island west of Point Judith, Connecticut, New York, and part of New Jersey.

PHILADELPHIA, PA., Superintendent of Lighthouses, *Fourth District.*—Includes Delaware Bay, River, and coast.

NORFOLK, VA., Superintendent of Lighthouses, *Fifth District.*—Includes the waters of Maryland, Virginia, and North Carolina, from Fenwick Island Light Station to and including New River Inlet. Suboffice, Baltimore, Md.

Radio broadcasts.—The United States Lighthouse Service makes official announcement from time to time of the more important Notice to Mariners data, covering the establishment of new aids to navigation, changes in existing aids, or emergency happenings relat-

ing to aids to navigation which shipping interests should receive without delay.

Broadcast announcements are preceded by the introductory words "Lighthouse Services—Notice to Mariners" and are concluded by a signature as "Lighthouse Superintendent Norfolk" and are transmitted by the stations listed in radio reference (b) page 22 and at the time and on the frequency designated. Emergency broadcasts announcing unusual happenings are made at any time using the 500-kilocycle frequency. Lighthouse Tenders also make emergency broadcasts in this manner when necessity therefor occurs. These radio broadcasts are supplemental to other established means of disseminating Notice to Mariners and are not in lieu thereof. Hydrographic Office Publication No. 205, Radio Aids to Navigation, gives a schedule of hydrographic broadcasts. The Hydrographic Office also publishes from time to time a schedule sheet of marine broadcasts from United States Naval Radio Stations convenient for posting in the ship radio room; this covers the transmitting schedules for Time, Weather, Navigational warnings, and Ice. See radio references page 22.

Determination of Compass Error by the Use of Navigational Ranges.—Navigational ranges provide a convenient means of determining compass error for the headings along the ranges when a vessel is entering or leaving a port or harbor. However, extreme caution should be exercised in the matter. Definite information as to the correct azimuth of any particular range is absolutely necessary; also, the permanency of the range should be taken into consideration.

The azimuths of channel ranges, which have been determined with sufficient accuracy for compass error determination, will be 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.

Channel ranges that are subject to changes in location may lead to serious misinformation if used for the determination of the compass error. If a change has taken place, the exact data relating to the change in azimuth may not be made immediately available in the Notices to Mariners or otherwise.

It is not considered good practice to derive the azimuth of a channel range from the chart. The scale of the chart and other considerations will usually prevent cartographic plotting of the azimuths to a degree of accuracy desired for the purpose of determining compass error. Furthermore, the chart may not show the latest known positions of the objects of the range (this will not affect the safe navigation of the channel, if the vessel follows the existing range beacons actually marking the channel).

Along short reaches of the channel ranges, sufficient time may not be available for the requisite steadying of the compass along the course of the range and this will cause inaccuracies in observing for compass error.

When a known area of local magnetic attraction would interfere with such use of ranges, a note describing local attraction will be found on the chart.

THE UNITED STATES HYDROGRAPHIC OFFICE

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

The charts and coast pilots pertaining to the territorial waters of the United States and its possessions are published by the **United States Coast and Geodetic Survey.**

Among the publications of the Hydrographic Office are monthly pilot charts for the various oceans, a weekly notice to mariners (domestic and foreign waters), a weekly hydrographic bulletin and a daily memorandum of information of interest to navigators. These publications can be secured by mariners who cooperate with the bureau by furnishing certain desired marine data. It also publishes numerous special charts, books, manuals, and tables of interest to navigators and aviators. Navigational warnings for the Hydrographic radio broadcasts are prepared.

Branch Hydrographic Offices within the area covered by this volume are located in the Customhouses at New York, Philadelphia, Baltimore, and Norfolk. In these offices, bulletins are posted giving information of value to mariners who can also avail themselves of publications pertaining to navigation and facilities for correcting their charts from standards. No charge is made for this service.

THE UNITED STATES 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.

The attention of navigators is called to the various publications of the United States Engineers relative to matters of nautical interest, which are listed under Publications in the appendix of this volume.

The area with which this Coast Pilot is concerned lies within the North Atlantic and the South Atlantic Divisions of the United States Engineers with offices in New York City and Norfolk, respectively. Likewise within this area, District Offices of the first mentioned Division are at New York City and Philadelphia, and of the other Division at Baltimore, Washington and Norfolk. Information concerning the various ports, improvements, channel depths, navigable waters, and the condition of the Intercoastal Waterway in the

areas under their jurisdiction may be obtained direct from the District Engineer Offices.

The **New Jersey Inland Waterway** is under the jurisdiction of the State Board of Commerce and Navigation, Jersey City, and information concerning existing channel depths may be obtained from the Board.

THE UNITED STATES BUREAU OF MARINE INSPECTION AND NAVIGATION

The Bureau of Marine Inspection and Navigation under the Department of Commerce is charged with general superintendence of the commercial marine and merchant seamen of the United States, except so far as supervision is lodged with other offices of the Government.

In addition to various other duties the Bureau is especially charged with the decision of all questions relating to the issuing of registers, enrollments, and licenses of vessels; investigates the operation of the laws relative to navigation; is charged with the enforcement and investigation of violations of the navigation and marine inspection laws; and is charged with the duty of inspecting vessels, the licensing of the officers of vessels, and the administration of the laws relating to such vessels and their officers for the protection of life and property. The Bureau certificates the able seamen who form the crew of merchant vessels, and the inspectors of the Service, also certificate the lifeboat men.

For administrative purpose the Supervising Inspectors of the Service maintain 7 district offices, and Local Inspectors have offices in the more important cities having maritime interests.

Offices of Local Inspectors of the Bureau, within the area covered by this volume, are maintained at New York City, Philadelphia, Pa., Baltimore, Md. and Norfolk, Va. New York and Norfolk also have **Supervising Inspectors.**

Offices of **U. S. Shipping Commissioners** are maintained in the above cities as well as at Newport News, Va. These officials administer the laws for the protection of seamen, the maintenance of discipline on shipboard, maintain an employment agency for securing seafaring personnel for all ships of American registry and promote Americanization of crews.

The licensed officer in command of any vessel shall report in writing and in person to the board of local inspectors nearest the port of first arrival any accident to said vessel involving loss of life, or damage to property to an approximate amount exceeding $500, 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.

THE UNITED STATES COAST GUARD

The United States Coast Guard is a military branch of the Government maintained for the purpose of enforcing the navigation and other maritime laws under the jurisdiction of the United States,

rendering of assistance to vessels in distress, saving life and property, destroying derelicts and removing obstructions and menaces to navigation. These duties include the International Ice Patrol (see p. 36), the Bering Sea Patrol, flood-relief work, patrol of regattas and marine parades, and rendering medical relief to deep-sea fishermen and to the natives of Alaska.

The Coast Guard makes no charge for its services to vessels in distress, and will respond promptly to all proper requests for assistance so far as the distribution and condition of its facilities will permit. However, it is not the purpose of the Coast Guard to compete or interfere with commercial enterprise in ordinary towing and salvage operations, but to confine its assistance activities to cases of actual or potential distress.

Instructions for obtaining the assistance of Coast Guard units are given on page 21 (without radio) and on page 26 (with radio).

Coast Guard stations are maintained at the places named in the following table. The stations are fully manned, except as noted, throughout the year and are supplied with boats, wreck guns, beach apparatus, and other appliances for affording assistance in case of shipwreck. Instructions to enable marines to avail themselves fully of the assistance thus afforded will be found in the appendix, page 327; note **caution** paragraph.

The Coast Guard stations are provided with the International Code Signals and are prepared to send or receive signals in that code or by means of the Semaphore Code, the Occulting or Flashing-light Code, or the International Morse Wigwag Code. Telephone facilities are available at the stations for the summoning of Coast Guard cutters, tugs, or other assistance, or for communicating with telegraph lines.

The following Coast Guard Stations are in the Fifth, Sixth, and Seventh Districts, the commanders of which are stationed at Asbury Park, N. J., Chincoteague, Va. and Elizabeth City, N. C., respectively. Division commanders with administratice offices are stationed at New York City and Norfolk:

Coast Guard stations—Sandy Hook to Cape Henry

Name of station	State	Location	Former number and designation for aviation purposes only
Sandy Hook	N. J.	On bay side, ½ mile south of point of Hook (Fifth District).	97
Spermaceti Cove	N. J.	2½ miles south of Sandy Hook Light	98
Seabright	N. J.	About 1½ miles south of Navesink Light	99
Monmouth Beach	N. J.	About 1 mile south of Seabright	100
Long Branch	N. J.	Breens Pond	101
Deal	N. J.	At Deal Lake, Asbury Park	102
Shark River	N. J.	North side of the mouth of Shark River Inlet.	103
Spring Lake [1]	N. J.	2½ miles south of Shark River Inlet	104
Squan Beach	N. J.	1 mile southeast of Manasquan	105

[1] Discontinued as an active unit at present.

Coast Guard stations—Sandy Hook to Cape Henry—Continued

Name of station	State	Location	Former number and designation for aviation purposes only
Bayhead	N. J.	At the head of Barnegat Bay	106
Mantoloking	N. J.	2½ miles south of head of Barnegat Bay, on Island Beach.	107
Chadwick [1]	N. J.	5¼ miles south of head of Barnegat Bay	108
Toms River	N. J.	On the beach abreast mouth Toms River	109
Island Beach	N. J.	1½ miles south of Seaside Park	110
Cedar Creek [1]	N. J.	On Island Beach, 6 miles north of Barnegat Light.	111
Forked River	N. J.	2¼ miles north of Barnegat Light	112
Barnegat	N. J.	½ mile south-southeast of Barnegat Light.	113
Loveladies Island [1]	N. J.	2½ miles south of Barnegat Light	114
Harvey Cedars	N. J.	5½ miles south of Barnegat Light	115
Ship Bottom	N. J.	Midway of Long Beach	116
Long Beach [1]	N. J.	1¾ miles northeast of Beachhaven	117
Bonds	N. J.	2¼ miles southwest of Beachhaven and ½ mile north of Beachhaven Inlet.	118
Little Egg	N. J.	1½ miles west of Tucker Island, Little Egg Inlet.	119
Little Beach [1]	N. J.	South side of Little Egg Inlet	120
Brigantine	N. J.	5¾ miles northeast of Absecon Light	121
South Brigantine [1]	N. J.	3¼ miles northeast of Absecon Light	122
Atlantic City	N. J.	At Absecon Light	123
Absecon [1]	N. J.	At Atlantic City, 2¾ miles southwest of Absecon Light.	124
Great Egg	N. J.	6 miles southwest of Absecon Light	125
Ocean City	N. J.	Southside of Egg Harbor Inlet, at Ocean City.	126
Pecks Beach	N. J.	3⅜ miles northeast of Corson Inlet	127
Corson Inlet	N. J.	On Ludlum Beach at Strathmere	128
Sea Isle City	N. J.	At Sea Isle City, 3¼ miles north of Townsend Inlet.	129
Townsend Inlet	N. J.	Near the inlet, north-side	130
Avalon	N. J.	¾ mile south of Townsend Inlet	131
Stone Harbor	N. J.	2⅝ miles north by east of Hereford Inlet Light.	132
Hereford Inlet	N. J.	Just south of Inlet	133
Wildwood	N. J.	At Wildwood 2½ miles south of Hereford Inlet Light.	134
Two Mile Beach [1]	N. J.	⅞ mile north of Cape May Harbor Inlet	135
Cold Spring [1]	N. J.	At Cape May, 2¼ miles west of above Inlet.	136
Cape May Point	N. J.	Near the light	137
Lewes	Del.	2 miles west from Cape Henlopen Light	139
Cape Henlopen	Del.	⅞ mile southerly of Cape Henlopen Light.	140
Rehobeth Beach [1]	Del.	5¾ miles south of Cape Henlopen Light	141
Indian River Inlet	Del.	North of inlet 1½ miles	142
Bethany Beach [1]	Del.	6½ miles north of Fenwick Island Light	143
Fenwick Island	Del.	1½ miles north of light	144
Isle of Wight [1]	Md.	3½ miles south of Fenwick Light (Sixth District).	145
Ocean City	Md.	At Ocean City	146
North Beach	Md.	10 miles south of Ocean City	147
Green Run Inlet [1]	Md.	14½ miles north of Assateague Light	148
Popes Island	Va.	9¾ miles northeast of Assateague Light	149

[1] *Discontinued as an active unit at present.*

Coast Guard stations—Sandy Hook to Cape Henry—Continued

Name of station	State	Location	Former number and designation for aviation purposes only
Assateague Beach	Va	On Fishing Point, 3⅛ miles southwest of Assateague Light.	150
Wallops Beach	Va	1½ miles west of Chincoteague Inlet, Wallops Island.	151
Metomkin Inlet	Va	On Metomkin Inlet, north shore Cedar Island.	15
Wachapreague	Va	South end of Cedar Island, north of Inlet.	153
Parramore Beach	Va	North end Parramore Island, south of Inlet.	154
Little Machipongo	Va	North side Hog Island, south of Inlet	155
Hog Island	Va	South end of Hog Island, west of light	156
Cobb Island	Va	South end of Cobb Island, north of Sand Shoal Inlet.	157
Smith Island	Va	At Cape Charles light (old tower)	158
Cape Henry	Va	¾ mile southeast of Cape Henry Light (Seventh District).	161

Other Coast Guard Assistance Facilities.—Floating units are stationed at the following ports with larger vessels at the points marked with an asterisk (*).

*New York City
*Cape May, N. J.
Baltimore, Md.
*Norfolk, Va.

There is an aviation station at Cape May with facilities for rendering assistance by airplane. The amphibian planes are especially adapted for ambulance work.

Assistance or Distress Procedure.—Small craft or planes off the coasts of New York, New Jersey, Delaware, Maryland or Virginia may obtain the assistance of the Coast Guard by making the international or inland distress signal, if in sight of a vessel, lighthouse, or Coast Guard station. Passing vessels will inform the Coast Guard by radio. Persons on shore telephone to "Coast Guard, Customhouse, New York City, Whitehall 4–2717," or "Coast Guard, Federal Building, Norfolk, Virginia, Norfolk 2–6638" or to any nearby Coast Guard vessel or station. See pages 339 and 345.

In minor cases of distress or trouble, if equipped with radio, use the **urgent signal (XXX)** or the general call for Any Coast Guard Unit (**NCU**) by key (or the expression **PAN** on the radio-telephone).

In case of extreme emergency call SOS by key or the spoken expression **MAYDAY** on the radio-telephone. Transmit on the International calling and distress frequency of 500 kilocycles (600 meters).

General procedure for vessels requesting assistance by radio is given under **Radio Services** pages 24 to 27.

RADIO SERVICES

The supervision of radio communication in the United States, including the Hawaiian Islands, is controlled by the Federal Com-

munications Commission. Twice a month, the Commission issues a Radio Service bulletin, giving those current corrections to the international Berne publications that affect radio services of the United States. Interested parties can secure copies of this bulletin by addressing the Commission at Washington, D. C. At the present time this is the only publication of the Commission.

The Rules and Regulations of the former Federal Radio Commission are remaining in effect until such time as superseding regulations are promulgated by the present Commission. Changes in these **Rules and Regulations** are included in the above **Radio Service Bulletin.**

Radio information available from the Commission is incorporated into the publications of the Bureau of the International Telecommunication Union of Berne, Switzerland. They are published every 6 months; editions in English can be secured by sending remittance direct to the Bureau. The list of these publications is given below.

These Berne publications show, *name of station* and *owner or operator*, *geographical locations*, *call*, *frequencies*, *type of emission*, *power*, *hours of service*, and *rates*.

LIST OF BERNE PUBLICATIONS

1. List of Frequencies and Supplements, 40 Swiss gold francs, including postage.
2. List of Coast Stations and Ship Stations (includes Inland Rates tables), 3.60 Swiss gold francs, including postage.
3. List of Aeronautical and Aircraft Stations, 2.60 Swiss gold francs, including postage.
4. List of Broadcasting Stations and Supplements, 3.70 Swiss gold francs, including postage.
5. List of Stations Performing Special Services and Supplements, 5.50 Swiss gold francs, including postage.
6. List of Call Letters of Fixed, Land and Mobile Stations and Supplements, 9.30 Swiss gold francs, including postage.

NOTE.—Remittances should be made by international money order to the International Bureau of the Telecommunication Union, Berne, Switzerland.

Comprehensive information regarding navigational radio services can also be obtained from the **Hydrographic Office Publication No. 205, Radio Aids to Navigation,** which can be obtained from the Hydrographic Office, Navy Department, Washington, D. C., price $1.80. This publication lists radio stations throughout the world including U. S. coastal broadcasting stations which perform services of value to navigation upon the high seas and their adjacent waters. It includes details of radio time signals, radio direction-finder stations, radiobeacon stations, radio distance-finding stations, radio weather bulletins, storm and navigational warnings, medical advice by radio, distress, emergency and safety traffic, etc. Additions and changes to this publication are issued weekly in the Hydrographic Office Notice to Mariners and extracts affecting the publication will be mailed monthly to those not in receipt of the Notice to Mariners .

Radio References.—There are listed herewith publications giving information regarding the various radio services available to mariners.

(*a*) The Berne List of Publications (see above).
(*b*) Hydrographic Office Publication No. 205, Radio Aids to Navigation (see above).

(*c*) United States Naval Radio Stations, Broadcast Schedules for Time, Weather, Hydrographic and Ice; issued from time to time by the Hydrographic Office.

(*d*) Light Lists, United States Lighthouse Service.

(*e*) United States Weather Bureau, Circular No. 1, Radio.

Further information regarding the radio services noted below can be secured from the above publications.

COMMERCIAL RADIO AND RADIOTELEPHONE STATIONS

The following commercial radio and radiotelephone stations are ocated on or near the coast of the north Atlantic states of the United States:

Station	Call	Owner
Amagansett, N. Y	WSL	Mackay Radio & Telegraph Co.
Baltimore, Md	WMH	R. C. A.; licensed to City.
Brooklyn, New York	WNY	Radio Corporation of America.
Chatham, Mass. (special)	WCC	Do.
Chatham, Mass	WCM	Do.
Do	WIM	Do.
Garden City, New York	WPN	Globe Wireless, Ltd.
Hingham, Mass	WBF	Tropical Radio Telegraph Co.
Lawrenceville,[1] New Jersey	WOY	American Tel. & Tel. Co.
Marshfield,[1] Mass	WOU	New England Tel. & Tel. Co.
New London, Conn	WSA	Radio Corporation of America.
New York, New York	WSF	Mackay Radio & Telegraph Co.
Ocean Gate,[1] N. J	WOO	American Tel. & Tel. Co.
Philadelphia, Pa	WNW	Tidewater Wireless Telegraph Co.
Staten Island,[1] N. Y	WOX	New York Telephone Co.
Thomaston, Maine	WAG	Mackay Radio & Telegraph Co.
Tuckerton, N. J	WSC	Radio Corporation of America.

[1] Radio Telephone stations.

TIME SIGNALS

Radio time signals are sent daily either from the United States radio stations at Arlington, Va. or Annapolis, Md. (call letters NAA/NSS). **Hydrographic information, weather reports** (see pages 27 and 35, and other information of benefit to shipping are also sent out from these stations.

For the latest information as to the time, frequency in kilocycles, and type of emission see radio reference (b) page 22.

As indicated in the table below, the time signal consists of the transmission of dots (.) and the omission of the dots (O) for various seconds preceding the hour signal. The hour signal is the beginning of the transmission of a dash (—) which is much longer than the others (i. e., 1.3 seconds).

In all cases the beginnings of the dots and the dash indicate the beginning of the seconds and the ends of the dots and the dash are without significance.

It will be noted that the number of dots 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 case of the failure of a signal, it is repeated 1 hour later.

Naval radio time signals [1]

Minute interval during preceding hour	Seconds of minute intervals												
	1 to 28	29	30 to 50	51	52	53	54	55	56	57	58	59	60
Min.													
55 to 56	Dot (.) every second 1 to 28, incl.	0	Dot (.) every second 30 to 50, incl.	0	.	.	.	.	0	0	0	0	.
56 to 57		0		.	0	.	.	.	0	0	0	0	.
57 to 58		0		.	.	0	.	.	0	0	0	0	.
58 to 59		0		.	.	.	0	.	0	0	0	0	.
59 to hour		0		0	0	0	0	0	0	0	0	0	▬

[1] U. S. System.

EMERGENCY, AND SAFETY RADIO TRAFFIC

Radio regulations, concerning distress, emergency, and safety traffic, are contained in the International Telecommunication Convention of Madrid, 1932, which has been ratified by the United States and many other maritime nations. This publication can be obtained from the Superintendent of Documents, Government Printing Office, Washington, D. C., at 30 cents. Pertinent extracts from the Madrid Convention are given in Hydrographic Office Publication No. 205, Radio Aids to Navigation. The following items merit special attention:

Any means of obtaining help may be used.—No provision of these regulations shall prevent a mobile station in distress from using any means available to it for drawing attention, signaling its position, and obtaining help.

Distress wave.—The wave of 500 kc (600 m) shall be the international distress wave. It shall be used for that purpose by ship stations and aircraft stations in requesting help from the maritime services. This wave must preferably be used in type A_2 and B. Vessels which cannot transmit on the international distress wave shall use their normal calling wave.

Times of listening on distress wave.—In order to increase safety of life at sea (ships) and over the sea (aircraft), all stations which normally listen on the waves of the authorized bands between 365 and 515 kc (822 and 583 m) must, during their working hours, make the necessary provisions to insure the watch on the distress wave twice per hour, for 3 minutes beginning 15 minutes and 45 minutes after the hour, Greenwich mean time. During these intervals, other transmissions must cease in the bands 460 to 550 kc (652 to 545 m) and transmission of type B waves are forbidden outside these bands. (See page 26.)

Distress and urgent signals.—The international radio distress signal SOS indicates that a ship, aircraft, or other mobile station sending it is threatened by serious and imminent danger and requests immediate assistance. Many cases occur when the degree of danger is such as not to warrant the use of the **SOS** signal but assistance is required. The international urgent signal **XXX** has been provided for those cases to indicate that the calling station has a very urgent message to transmit concerning the safety of a ship, aircraft, or other mobile station or concerning the safety of some person on board or sighted from on board. Shipmasters are urged to refrain from the use of the **SOS** signal when the **XXX** signal will serve the purpose.

Priority of distress call.—The distress call shall have absolute priority over other transmissions. All stations hearing it must immediately cease all transmission capable of interfering with the distress traffic and must listen on the wave used for the distress call. This call must not be sent to any particular station and does not require an acknowldgment of receipt.

Distress call and message.—The distress call shall include the distress signal transmitted three times, the word DE, and the call signal of the station in distress transmitted three times. The distress message shall follow as soon as possible; it shall include information regarding the position of the craft in distress, the nature of the distress, the nature of the help requested, and any further information which might facilitate assistance.

The distress call shall, as a general rule, be immediately preceded by the alarm signal. See below.

Repetition of distress call.—Any station which is not in a position to render assistance but which has heard a distress message for which acknowledgment of receipt has not immediately been given, must take all possible steps to attract the attention of stations which are in a position to furnish help.

In the United States, special instructions request that, "if during distress traffic, it is evident that coastal radio stations are unaware of the disaster, some ship which is not taking an active part in the distress traffic, shall relay the distress message to the nearest Government or commercial shore station in order that the proper officials may be notified, that additional aid may be sent out from the coast, and that preparations may be made to receive survivors. In sending this message the greatest care must be taken not to interfere with the distress traffic; whenever possible the message should be sent on other than the distress wave.

Control of distress traffic.—The control of distress traffic shall devolve upon the station in distress or upon the station which for special reasons has sent the distress call. These stations may delegate the control of the distress traffic to another station.

Silence during distress traffic.—Any station which becomes aware of distress traffic must listen to this traffic even if it does not take a part in it. For the entire duration of distress traffic it shall be prohibited for all stations which are aware of this traffic and which are not taking part in it, either to use the distress wave of 500 kc (600 m) or the wave on which the distress traffic is taking place to use type B waves.

Distress-signal interference.—The successful expedition of distress traffic requires the adherence of all the operators to the rules of procedure and non-interference. One of the most conspicuous difficulties in handling this traffic is the interference caused by the operator, who, no doubt, is anxious to assist, but by his efforts in trying to persuade another operator to maintain silence, is himself contributing to the confusion. It sometimes happens that several operators are trying to silence an operator that they feel is an offender while they themselves are offenders.

If one vessel is sending, when a distress signal is broadcast, it is easier to copy through her interference than add further interference by several vessels trying to stop her.

See page 26 for procedure to be followed to avoid distress-signal interference.

End of distress traffic.—A vessel having sent a distress call has started an extensive machinery of rescue, which not only extends to shipping within range but to Government agencies, and perhaps to the suspension of other traffic. So the responsibility devolves on such a ship to keep her position and condition known. When it is no longer necessary to observe silence, or when the distress traffic is ended, the station which has controlled this traffic shall send on the distress wave, and, where necessary, on the wave used for this distress traffic, a message addressed "to all", indicating that the distress traffic is ended. This message shall take the following form: CQ call "to all" (three times), the word DE, call signal of the station transmitting the message, distress signal, time of filing of the message, name and call signal of the mobile station which was in distress, and words "distress traffic ended."

Urgent signal.—The urgent signal shall consist of the group **XXX** transmitted three times, with the letters of each group, as well as the consecutive groups well separated. The urgent signal shall have priority over all other communications except distress communications and all stations hearing it must take care not to interfere with the transmission of the message which follows the urgent signal. Stations hearing the urgent signal must listen for at least 3 minutes.

Authority.—The distress call and message, or urgent signal, shall be sent only by order of the master or person responsible for the ship, aircraft, or other vehicle carrying the mobile station.

Alarm signal.—The alarm signal shall consist of a series of 12 dashes sent in 1 minute, the duration of each dash being 4 seconds and the duration of the interval between dashes, 1 second. It may be transmitted by hand or by means of an automatic instrument. The only purpose of this special signal is to set automatic alarm apparatus into operation. It must only be used to announce that a distress call or message is to follow, or to announce the transmission of an urgent cyclone warning; in the latter case it can only be used by coast stations duly authorized by their government.

Safety signal.—The safety signal shall consist of the group **TTT**, transmitted three times, with the letters of each group, as well as the consecutive groups well separated. This signal shall be followed by the word DE and three transmissions of the call signal of the station sending it. It announces that this station is about to transmit a message concerning the safety of navigation or giving important meteorological warnings.

REQUESTS FOR ASSISTANCE FROM VESSELS IN DISTRESS

A vessel in distress, or a vessel sighting another vessel in distress, may follow the procedure given on pages 21, 24, and 25.

Information desired by Coast Guard in requests for assistance.—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 dispatch 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.

When in distress.—Approximately 10 minutes after the transmission of the original distress message, the ship in distress is requested to transmit slowly on the distress wave, "MO" and its own call signal for 3 minutes. This will enable ships and radio direction-finder stations in the vicinity to take radio bearings and to plot accurately the position of the distressed ship, thereby permitting assistance to be dispatched without difficulty and delay.

When another is in distress:

1. *Give absolute priority* to distress call and messages relating thereto.
2. *Cease all transmissions* capable of interfering with the conduct of distress communications.
3. Maintain *absolute silence* if within range and not actually taking part in the conduct of distress communications.
4. Concentrate attention on the distress case and *intercept all information possible.*
5. If unquestionably in vicinity of distressed vessel, *acknowledge receipt* of the distress message, if received, *giving your position* to the vessel in distress, stating action being taken.
6. Be extremely careful *not to interfere* with stations more favorably situated to handle the case.
7. Do not try to silence other units, i. e. **"QRT"**, *unless you are in control.*

The vessel in distress controls: Permit him to handle the situation without being interfered with. The vessel in distress may delegate this control to some other station more favorably situated. Do not interfere with the station lawfully controlling the situation.

In Minor Cases of distress or other trouble.—See page 21.

United States Coast Guard Form 800–D is a card form covering the above recommended procedure. It is designed to be posted on the bridge and in the radio room of radio-equipped vessels; copies of this card can be obtained upon request from the Commandant, United States Coast Guard, Washington, D. C.

Small commercial and private craft, equipped with radio, may obtain the assistance of the Coast Guard by transmitting the **distress message** on the inter-Coast Guard frequency 2,670 kc (112 m). The Coast Guard stands continuous watch on 2,670 kc (112 m) and will

answer emergency calls made thereon. This distress frequency is employed, in addition to the 500 kc (600 m), because a suitable antenna is more easily accommodated on small craft than the relatively long aerial required for efficient operation at the lower frequency. Any or all radio stations will forward such requests for assistance to the appropriate assisting agencies.

RADIO WEATHER BROADCASTS

Forecasts and general weather information are broadcast daily by the United States Weather Bureau from a number of Government and commercial radio stations for the benefit of marine, aviation, and commercial interests. Storm and hurricane warnings are broadcast whenever issued.

Radiophone weather broadcasts for the benefit of small craft are is-issued from U. S. Coast Guard radio stations at Boston (NMF) 2,676 kc, New York (NMY) 2,660 kc, and Princess Anne (NMN) 2,664 kc, beginning at 10:25 A. M. and P. M., E. S. T., daily.

Storm warnings and **notices concerning the safety of navigation at sea** of an urgent nature are broadcast by United States naval radio stations immediately upon receipt and repeated hourly thereafter for a period of 12 hours or until superseded. Similar broadcasts are made by **Ensenada, P. R. (via WPR)**.

Complete details relative to this service are published in circulars issued by the Weather Bureau, which, together with a card descriptive of storm warnings, may be obtained upon application to any United States Weather Bureau office. Details are also given in Hydrographic Office Publication No. 205, Radio Aids to Navigation. These publications give the schedules with times and frequencies of all broadcasts, together with tables for decoding as needed. (See Navigational Warnings, page 35.)

General broadcast schedules are:

Washington, D. C. (via NAA/NSS).—A Marine-Angot bulletin, issued twice daily by the United States Weather Bureau, contains observations from ships at sea; surface weather observations from selected land stations; forecasts; warnings; and a summary of general atmospheric pressure distribution. The bulletin includes suitable data for preparing weather maps at sea. Base charts for the preparation of weather maps at sea will be supplied free by the United States Weather Bureau to masters of vessels who regularly take and forward weather observations to the Bureau or to the Hydrographic Office, United States Navy.

Balboa, Canal Zone (via NBA).—This marine bulletin, issued twice daily, is a rebroadcast of the Marine-Angot bulletin, except forecasts and warnings for the area Eastport, Maine, to Jacksonville, Fla., inclusive, are omitted. A selection of ship observations from the North Pacific Ocean, west of Mexico and Central America, between the area 5° N. and 33° N. is included in the broadcast.

San Juan, P. R. (via NAU).—A weather bulletin is broadcast daily during the period July 1 to November 15, inclusive, containing whether reports from stations in the West Indies, followed by weather forecasts, storm warnings, and a synopsis of atmospheric pressure distribution. Hurricane warnings and advisory messages are broadcast whenever issued.

328178 O—41——3

Local weather forecasts and information are broadcast from numerous stations along the Atlantic and Gulf coasts and about the Caribbean Sea. Stations making such broadcasts, together with full advice regarding the same, are listed in the Hydrographic Office Publication No. 205, Radio Aids to Navigation, and other publications noted under **Radio References** on page 22.

Tropical Storms.—During the 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. (See p. 40.)

Reports should be sent when a storm is encountered or when the presence or formation of one is suspected. The nearer the ship is to the center of the storm, the more valuable is the radio weather report. It is realized that in such a situation the master and his officers are occupied with the duties of navigating the ship, but the dispatch of an observation by radio under those weather conditions may result in timely advices to other ships at sea and in warnings to the inhabitants of islands and coastal communities where life and property are in jeopardy.

These reports should be sent in the New International Code, form 5, preceded by the ship's name, but unsigned. Messages should be checked collect, and when in the Atlantic Ocean north of latitude 35° N., the observations should be addressed "Observer, Washington"; in the Gulf of Mexico, Caribbean Sea, and the Atlantic Ocean south of latitude 35° N., they should be addressed "Observer, Jacksonville." If a copy of the International Meteorological Code is not on shipboard it will be found in Hydrographic Office Publication No. 205, Radio Aids to Navigation, or a copy may be obtained on application to the United States Weather Bureau, Washington, D. C. If code is impracticable, the message may be sent in plain language, giving the ship's position, Greenwich time of observation, direction and force of the wind, state of the weather, and barometer reading.

Weather reports should not be sent when weather conditions are normal, except by ships with which specific arrangements have been made by the United States Weather Bureau.

RADIOBEACONS AND DISTANCE FINDING

The United States Lighthouse Service operates a system of radio beacons, established along the United States coasts. This system has recently been coordinated with that of the Lighthouse Administration of Canada in order that the methods of operating the radiobeacon system of the United States and Canada might become more effective. In order to facilitate the widest utilization of this system of navigational aids, there are issued at intervals radiobeacon charts, upon which the radiobeacons are shown, with their characteristics and operating schedules. These charts may be obtained free from the offices of the District Lighthouse Superintendents.

All radiobeacons operate during fog or low visibility; also in clear weather during scheduled intervals. For details as to frequencies, geographic positions, signals, and thick and clear weather transmission, see Light List—Atlantic Coast, United States, of the

Lighthouse Service and other Radio References (p. 22). Changes are announced in the Notices to Mariners.

The radiobeacons and distance finding stations in or near the area covered by this volume are given in the following table:

Radiobeacons

Station	Call	Latitude N.		Longitude W.	
		°	′	°	′
Coastal:					
1, Pollock Rip Lightship, Mass	WPQ	41	36	69	51
1, Block Island, S. E., Light Station, R. I	-------	41	09	71	33
1, Nantucket Shoals Lightship, Mass	WPS	40	37	69	37
2, Fire Island Lightship, N. Y	WPZ	40	28½	73	11½
2, Ambrose Channel Lightship, N. Y	WRG	40	27	73	49½
Scotland Lightship, N. J	-------	40	27	73	55
2, Barnegat Lightship, N. J	WRA	39	45½	73	56
3, Five-Fathom Bank Lightship, N. J	WRE	38	47	74	34½
3, Overfalls Lightship, Del	-------	38	48	75	01
3, Winter-Quarter Shoal Lightship, Va	WRO	37	55½	74	56½
4, Chesapeake Lightship, Va	WRS	36	58½	75	42
5, Cape Henry Light Station, Va	-------	36	55½	76	00½
4, Diamond Shoal Lightship, N. C	WRV	35	05	75	20
4, Cape Lookout Light Station, N. C	-------	34	37½	76	31½
Chesapeake Bay:					
5, Wolf Trap Light Station, Va	-------	37	23	76	11
5, Smith Point Light Station, Va	-------	37	53	76	11
Cove Point Light Station, Md	-------	38	23	76	23
Sandy Point Light Station, Md	-------	39	01	76	23

NOTE.—Stations having the same number in the above table are coordinated for cross bearing observation. All the above stations have distance finding facilities except Scotland Lightship, Cape Lookout and Block Island Light Stations. Nantucket Shoals Lightship is equipped with a warning radiobeacon. Stations with the call letters omitted have no radio operator. See page 32 for direction-finder stations used as radiobeacons.

Radiobeacons are now recognized to be all-weather aids to navigation aside from their use as valuable fog signals. Their use, however, is limited to vessels equipped with radio compasses.

Radio bearings greatly reduce the dangers incident to navigation in fog, but this should not lead the navigator to neglect other precautions especially sounding. General information concerning radiobeacons and radiobeacon navigation is contained in the publication by that name, see page 318.

The radio compass apparatus is simple and may be operated by the navigator without the assistance of a radio operator or with the knowledge of the telegraph code. It is important to note that the bearing of an incoming radio wave is subject to errors not unlike the deviation of the magnetic compass, and the calibration curve should be accurate, Radio bearings are subject to what is called "night effect," introducing unknown errors. On some nights this effect is more pronounced than on others and the effect is usually greatest during hours of twilight. The uncertainty due to this cause may be lessened by taking repeated radio bearings over a short period and accepting the average value of them.

The signals from the radiobeacons have definite characteristics for identifying the station, and bearings may be obtained with even greater facility than sight bearings on visible objects.

The assignments of operating times and other details of these beacons have been coordinated by the United States and Canada,

and the facility for cross bearing observations has been given attention.

Accuracy of bearings.—No exact rules can be given as to the accuracy to be expected in radio bearings taken by a ship as the accuracy depends to a large extent upon the skill of the ship's operator, the condition of the ship's equipment, and the accuracy of the ship's calibration curve. Mariners are urged to *obtain this information for themselves by taking frequent radio bearings when their ship's position is accurately known and by recording the results.* United States radiobeacons are operated on hourly schedules regardless of weather conditions and at other times upon request (see special operation of radiobeacon stations, given in Light Lists), giving mariners opportunity to make such frequent observations, and often to check the results directly with visual bearings.

Skill in the operation of the radio direction-finder can be obtained only by practice and by observing the technical instructions for the set in question. For these reasons the operator should study carefully the instructions issued with the set and should practice taking bearings frequently so that when bearings are needed he can obtain them rapidly and accurately.

As the operator obtains bearings by revolving the direction-finder coil until the signal disappears or becomes a minimum, the operator can tell by the size of the arc of silence or of minimum strength approximately how accurately he has taken the bearing. For instance if the minimum is broad and the residual signal covers about 10° with equal strength, it is doubtful if the bearing can be accurately estimated within 3° or 4°. On the other hand, if a sharp minimum can be obtained, the operator can determine the bearing to within a quarter of a degree. Where direction-finder bearings are not taken by the navigating officer, it will frequently be advantageous for the mariner to have his ship's operator report the probable operator's error of the bearing taken.

Distance Finding.—Radio beacon stations that are also equipped for distance finding transmit a special radio signal and sound a corresponding air or submarine signal at the same period of time. Thus, whenever the sound signal of a radiobeacon distance-finding station is operating, there is transmitted at the end of the radiobeacon minute of operation (1 minute out of every 3) a group of two radio dashes (a short dash and a long dash), 1 second and 5 seconds, respectively; and a group of two sound signals of corresponding length is sounded at the same time. These signals are uniformly the same for all the distance-finding stations, except that the long fog signal blast and corresponding long radio dash may be made as short as 3 seconds where desired. They are entirely distinctive and should not be confused with the characteristic signals which identify the stations.

The reception of the sound signal by a vessel will be delayed, depending upon the distance the sound has to travel; whereas the radio signal will be received practically instantaneously. This delay is measured by observing the time that elapses between hearing a part of the group of radio dashes and the corresponding part of the group of sound blasts, say the end of the long radio dash and the end of the long sound blast. This elapsed time in seconds (time interval of sound travel in air), divided by 5 (or more exactly 5.5),

gives the approximate distance in nautical miles the observer is off the radiobeacon. The error of such observations should not exceed 10 percent.

The 1-second dash preceding the long dash in a stand-by signal, as is also the 1-second blast. The latter serves as an identification signal to assure the observer that he is taking time on the correct sound signal blast.

Where the submarine oscillator is synchronized with the radiobeacon, the method of distance finding is the same excepting that the interval of time in seconds (sound travel in water) is divided by 1.25 to obtain the distance in nautical miles.

See table, page 29, and for further details, see Light Lists, published by the United States Lighthouse Service and other radio references listed on page 22.

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

Many navigators are using the ship's radio direction finder as a help in avoiding collision in fog, detecting with it the presence and observing the direction of approaching vessels.

Caution in approaching lightships.—The attention of mariners is directed to the serious dangers which may arise from the misuse of radio signals, and particularly to the danger of collision with lightships operating such signals. The mariner, who in thick weather approaches a radiobeacon directly ahead on a radio bearing and relies on hearing the fog signal in sufficient time to alter course to avoid danger, is taking an unjustifiable risk. The vagaries of sound fog signals are well known, and warnings regarding them are widely printed; such signals may not be heard with certainty in time to avoid collision. Safety demands that all precautions be taken in approaching lightships. The risk of collision can be avoided by getting the radiobeacon on the bow, taking successive bearings, and ensuring that the radio bearing does not remain constant; the angle between the course and the radiobeacon should increase for a vessel passing clear.

Nearly half of the radiobeacons on the coasts of the United States are placed on lightships, and these radio signals provide valuable marks for approaching the coasts and ports. In using radio bearings for approach, it is important that the courses at all times be set to pass safely clear. Radiobeacons offer to navigators a convenient means of checking this by methods well known in ordinary navigation, but sometimes overlooked in navigation by radio bearings. The navigator may check his position with respect to the lightship radiobeacon when steering to pass to one side, by taking successive radio bearings and using these with the intervening distances run, to

ascertain the distances off from time to time. Radio cross bearings should also be taken, and the effect of currents should not be overlooked. Where warning radiobeacons and direct distance finding facilities are provided, they should be utilized. Soundings should not be neglected, as a few soundings in connection with a radio bearing or a chain of soundings alone usually give an excellent position. See Soundings and Echo Soundings, page 323.

The caution as to passing lightships at a safe distance, and approaching them using all care, of course applies to all lightships, whether or not they are provided with radiobeacons, and it applies also to radiobeacons at lighthouses which may be approached close-to.

In preparing these notes, advantage has been taken of many reports from practical mariners, who systematically make use of radio direction finders or radio-compasses in navigation, and it is appreciated that great interest is already taken in the problems of radiobeacon navigation. Further suggestions and reports on these subjects are invited, and may be sent to the Commissioner of Lighthouses, Washington, D. C.

RADIO DIRECTION-FINDER STATIONS ASHORE

United States naval direction-finder stations will furnish radio bearings to mariners of all vessels equipped with radiotelegraphic transmitters. While the use of these bearings should not lead a mariner to neglect other precautions, such as the use of the lead, etc., during thick weather, these bearings will greatly reduce the dangers incident to navigation in the fog.

Where only one station is available, the mariner may fix his position by two or more bearings, from the station with the distance run between, or may use the bearings as a line of position, or as a danger bearing. Or the bearing may be crossed with a line of position obtained from an observation of an astronomical body to establish a fix.

Accuracy of bearings.—The bearings taken by radio direction-finder stations and reported by them to ships are corrected for all determinable errors except the difference between a great circle track and a rhumb line (see below), and are normally accurate within 2° for distances under 150 miles. However, this error may be increased by various circumstances, some of which are weak signals, broad frequency tuning, coastal refraction (bearings which cut an intervening coastline at an oblique angle or cross high intervening land have been reported 4° or 5° in error), night effect (see p. 29), and the danger from erroneous reciprocal bearing correction. See the introductory pages of the Light Lists and other radio references page 22 Bearings signaled as "doubtful", "approximate" or "second class" should be regarded with suspicion as being subject to considerable error.

Direction-finder stations used as radiobeacons.—United States direction-finder stations will transmit their call signals on 375 kc (800 m) (the normal radio direction-finding wave) for 45 seconds upon the request of ships desiring to use them as radiobeacons. In using radio direction-finder stations as radiobeacons, the bearings taken by the ship must be plotted from the position of the direction-finder station's transmitting antenna and not from its receiving antenna. The Government accepts no responsibility for the consequences of an

inexact bearing. These stations also maintain a continuous watch on 500 kc (600 m) which is the DISTRESS FREQUENCY.

The following list of naval radiodirection-finder stations will be of use to vessels navigating the approximate limits of this volume; these stations are noted on the charts by the symbol "N. R. C."

The arc of calibration is a sector of the circle of which the compass coil at the radio station is the center. Compass bearings are reliable only when they fall within the calibrated arcs.

Naval radio direction-finder stations

Station	Radio call	Position of receiver						Position of transmitter						Arc of reliable calibration [2]
		Latitude north			Longitude west			Latitude north			Longitude west			
		°	′	″	°	′	″	°	′	″	°	′	″	° °
Amagansett, L. I., N. Y.	NBM	40	58	10	72	07	27	40	58	20	72	07	39	039–232
New York Entrance Group:														
Fire Island, N. Y.[1]	NJY	40	37	55	73	13	01	40	37	55	73	13	01	088–260
Sandy Hook, N. J.	NHD	40	27	54	73	59	50	40	27	54	73	59	50	000–182
Manasquan, N. J.	NFK	40	07	05	74	01	58	40	07	05	74	01	58	024–185
Delaware Bay Entrance Group:														
Cape May, N. J.	NKC	38	55	55	74	54	34	38	55	55	74	54	34	040–240
Cape Henlopen,[1] Del.	NSD	38	47	33	75	05	24	38	47	33	75	05	26	000–200
Bethany Beach, Del.	NBN	38	32	45	75	03	23	38	32	45	75	03	23	000–200
Chesapeake Bay Entrance Group:														
Virginia Beach,[1] Va.	NCZ	36	51	10	75	58	33	36	51	09	75	58	37	339–170
Poyners Hill, N. C.	NDX	36	17	16	75	47	48	36	17	17	75	47	48	347–150

[1] Master station.
[2] Clockwise from 0° (north).

CONVERSION OF RADIO BEARINGS TO MERCATOR BEARINGS

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

On page 35 is given a table of corrections for the conversion of a radio bearing into a Mercator bearing. It is sufficiently accurate for practical purposes for distances up to 1,000 miles and should be used when the distance between the ship and station is over 50 miles.

The only data required are the latitudes and longitudes of the radiobeacons or direction-finder stations and of the ship by dead reckoning. The latter is scaled from the chart, and the former either taken from pages 29 or 33, or the Light Lists, or other radio references (p. 22), or scaled from the chart.

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

When bearings are taken from the ship, the sign of the correction (bearings read clockwise from the north) will be as follows: In *north latitude*, the minus sign is used when the ship is *east* of the radiobeacon and the plus sign is used when the ship is *west* of the radiobeacon. In *south latitude*, the plus sign is used when the ship is *east* of the radiobeacon, and the minus sign is used when the ship is *west* of the radiobeacon.

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

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

If the bearing is from a radio direction-finder station ashore, the sign of the correction will be reversed to that given when the bearing is taken from the ship.

Example.—A ship in latitude 39°50′ N., longitude 67°35′ W., by dead reckoning, obtains a radio bearing of 299° true on the radiobeacon of the Nantucket Shoals Lightship, located in latitude 40°37′ N., and longitude 69°37′ W.

Radiobeacon station	Latitude, 40°37′ N.
Dead reckoning position of ship	39 50
	Middle latitude, 40 14

Radiobeacon station	Longitude, 69°37′ W.
Dead reckoning position of ship	39 50
	Longitude difference, 2 02

Entering the table with difference of longitude equals 2°, which is the nearest tabulated value, and opposite 40° middle latitude, the correction of 39′ is read.

The ship being east of the radiobeacon, the correction is minus. The Mercator bearing will then be 299°−0°39′=298°21′. To facilitate plotting, add 180° and plot from Nantucket Shoals Lightship, thus; 298°21′+180°=478°21′ or 118°21′, which true bearing should be laid off from the plotted position of Nantucket Shoals Lightship.

Table of corrections, in minutes

[Difference of longitude in degrees]

Mid. L.	½°	1°	1½°	2°	2½°	3°	3½°	4°	4½°	5°	5½°	6°	6½°	7°	7½°	8°	8½°	9°	9½°	10°
20°	5	10	15	21	26	31	36	41	46	51	56	62	67	72	77	82	87	92	98	103
21°	5	11	16	21	27	32	38	43	48	54	59	64	70	75	81	86	91	97	102	108
22°	6	11	17	22	28	34	39	45	51	56	62	67	73	79	84	90	96	101	107	112
23°	6	12	18	23	29	35	41	47	53	59	64	70	76	82	88	94	100	105	111	117
24°	6	12	18	24	31	37	43	49	55	61	67	73	79	85	92	98	104	110	116	122
25°	6	13	19	25	32	38	44	51	57	63	70	76	82	89	95	101	108	114	120	127
26°	7	13	20	26	33	39	46	53	59	66	72	79	85	92	99	105	112	118	125	131
27°	7	14	20	27	34	41	48	54	61	68	75	82	89	95	102	109	116	123	129	136
28°	7	14	21	28	35	42	49	56	63	70	77	84	92	99	106	113	120	127	134	141
29°	7	15	21	29	36	44	51	58	65	73	80	87	95	102	109	116	124	131	138	145
30°	7	15	22	30	38	45	53	60	68	75	83	90	98	105	113	120	127	135	143	150
31°	8	15	23	31	39	46	54	62	70	77	85	93	100	108	116	124	131	139	147	155
32°	8	16	24	32	40	48	56	64	72	79	87	95	103	111	119	127	135	143	151	159
33°	8	16	25	33	41	49	57	65	74	82	90	98	106	114	123	131	139	147	155	163
34°	8	17	25	34	42	50	59	67	75	84	92	101	109	117	126	134	143	151	159	168

Table of corrections, in minutes—Continued

Mid. L.	½°	1°	1½°	2°	2½°	3°	3½°	4°	4½°	5°	5½°	6°	6½°	7°	7½°	8°	8½°	9°	9½°	10°
35°	9	17	26	34	43	52	60	69	77	86	95	103	112	120	129	138	146	155	163	172
36°	9	18	26	35	44	53	62	71	79	88	97	106	115	123	132	141	150	159	168	176
37°	9	18	27	36	45	54	63	72	81	90	99	108	117	126	135	144	153	163	172	181
38°	9	18	28	37	46	55	65	74	83	92	102	111	120	129	139	148	157	166	175	185
39°	9	19	28	38	47	57	66	75	85	94	104	113	123	132	142	151	160	170	179	189
40°	10	19	29	39	48	58	68	77	87	96	106	116	125	135	145	154	164	174	183	193
41°	10	20	30	39	49	59	69	79	89	98	108	118	128	138	148	157	167	177	187	197
42°	10	20	30	40	50	60	70	80	90	100	110	120	130	140	151	161	171	181	191	201
43°	10	20	31	41	51	61	72	82	92	102	113	123	133	143	153	164	174	184	194	205
44°	10	21	31	42	52	63	73	83	94	104	115	125	135	146	156	167	177	188	198	208
45°	11	21	32	42	53	64	74	85	95	106	117	127	138	149	159	170	180	191	201	212
46°	11	22	32	43	54	65	76	86	97	108	119	129	140	151	162	173	183	194	205	216
47°	11	22	33	44	55	66	77	88	99	110	121	132	143	154	165	176	186	197	208	219
48°	11	22	33	45	56	67	78	89	100	111	123	134	145	156	167	178	190	201	212	223
49°	11	23	34	45	57	68	79	91	102	113	125	136	147	158	170	181	192	204	215	226
50°	11	23	34	46	57	69	80	92	103	115	126	138	149	161	172	184	195	207	218	230
51°	12	23	35	47	58	70	82	93	105	117	128	140	152	163	175	186	198	210	221	233
52°	12	24	35	47	59	71	83	95	106	118	130	142	154	165	177	189	201	213	225	236
53°	12	24	36	48	60	72	84	96	108	120	132	144	156	168	180	192	204	216	228	240
54°	12	24	36	49	61	73	85	97	109	121	133	146	158	170	182	194	206	218	231	243
55°	12	25	37	49	61	74	86	98	111	123	135	147	160	172	184	197	209	221	233	246
56°	12	25	37	50	62	75	87	100	112	124	137	149	162	174	187	199	211	224	236	249
57°	13	25	38	50	63	75	88	101	113	126	138	151	164	176	189	201	214	226	239	252
58°	13	25	38	51	64	76	89	102	115	127	140	153	165	178	191	204	216	229	242	254
59°	13	26	39	51	64	77	90	103	116	129	141	154	167	180	193	206	219	231	244	257
60°	13	26	39	52	65	78	91	104	117	130	143	156	169	182	195	208	221	234	247	206

RADIO NAVIGATIONAL WARNINGS

In general, radio broadcasts of navigational warnings contain information of importance to the safety of navigation, such as the position of ice and derelicts, defects and changes to aids to navigation, advice about mine fields, etc.

In the United States, radio navigational warnings are compiled by the Hydrographic Office, Navy Department, and by the Bureau of Lighthouses, Department of Commerce. Those issued by the Hydrographic Office commence "Govt. Hydro." and end "Hydro"; those issued by the Bureau of Lighthouses commence "Govt. USLHS" and end "United States Lighthouse Service." Broadcasts frequently include warnings issued by both offices.

For scheduled broadcasts of navigational warnings see radio references listed on page 22.

Major hydrographic broadcasts, generally covering the Atlantic and Gulf coasts of the United States, are sent out daily by Washington through Arlington or Annapolis (NAA/NSS). Local broadcasts, for particular areas, are made from stations listed below. **Emergency broadcasts** are made immediately upon receipt of information regarding imminent dangers. Such emergency broadcasts are repeated hourly for a period of 12 hours or until superseded.

The masters of every ship, which meets with dangerous ice, a dangerous derelict, a dangerous tropical storm, or any other direct dangers to navigation, should communicate the information, by all the means of communication at their disposal, to ships in the vicinity and also to the competent authorities at the first point of the coast with which they can communicate.

Local hydrographic broadcasts—Navigational warnings

Station	Area covered by local broadcast
International Ice Patrol (Ship on duty) (NIDK).	North Atlantic Ocean.
Boston, Mass. (NAD)	South of Lat. 45°00′ N. and north of Point Judith and Nantucket Shoal Lightship.
New York, N. Y. (NAH).	Lat. 42°00′ N. to Lat. 38°30′ N.
Norfolk, Va. (NAM)	Lat. 39°00′ N. to Lat. 33°00′ N.
Charleston, S. C. (NAO).	Lat. 35°00′ N. to Lat. 27°00′ N.
Key West, Fla. (NAR)	Coast of Florida east of Long. 85°00′ E. (except east coast north of Lat. 29°00′ N.) and important notices for Gulf of Mexico.
San Juan, P. R. (NAU)	Caribbean Sea north of Lat. 15°00′ N. and West Indian waters generally.
Pensacola, Fla. (NAS)	Gulf of Mexico.
Galveston, Tex. (NKB)	Gulf of Mexico.

MEDICAL ADVICE BY RADIO

Arrangements are made in various countries whereby mariners of all nationalities may obtain medical advice by radio. Requests for medical advice of an urgent nature should be preceded by the urgent signal in order to give them priority over all other radio traffic except distress communications. The International Code of Signals, 1931, contains a medical section. By use of this code in communicating with foreign stations, difficulties of language may be avoided. The case-stating system in this medical section gives the nature of the information which should be included in the request for medical advice. Whether the message is to be sent in code or plain language, it is recommended that the mariner read this section before preparing his message.

Free medical advice by radio may be obtained direct from the following stations of the United States Public Health Service. United States governmental and commercial radio stations will transmit free messages addressed to any of these stations. In order to avoid confusion and to make the practice uniform, replies will be signed "Marine Hospital No. —", or "Public Health Service Relief Station No. —", as the case may be. These hospitals and relief stations have copies of the International Code of Signals, 1931, for use in communicating with ship masters who are unable to use the English language.

ATLANTIC COAST:

New York, N. Y., United States Marine Hospital.
Stapleton, N. Y., United States Marine Hospital.

GULF OF MEXICO:

Key West, Fla., United States Marine Hospital.
Port Arthur, Tex., United States Public Health Service Relief Station.
Galveston, Tex., United States Marine Hospital.

Coastal stations operated by the Radiomarine Corporation of America offer free medical message service to ships. The messages are sent to the nearest United States marine hospital, or in some cases where there is none in the vicinity, to private physicians.

No radio charges are made on such messages when they are prefixed "DH Medico."

Stations of the Radiomarine Corporation are listed below:

Chatham, Mass. (WCC).
Chatham, Mass. (WIM).
Chatham, Mass. (WCM).
New London, Conn. (WSA).
Brooklyn, N. Y. (WNY).
Tuckerton, N. J. (WSC).
Savannah, Ga. (WSV).
Palm Beach, Fla. (WAX).
Galveston, Tex. (WGV).
Port Arthur, Tex. (WPA).

The United Fruit Co., Tropical Radio Telegraph Co., and affiliated companies have established a free medical service which is available to ships. Mariners desiring to avail themselves of this service should use whichever of the following addresses is appropriate:

UNIFRUITCO Miami (Fla.).
UNIFRUITCO Preston (Cuba).
UNIFRUITCO New Orleans (La.).
UNIFRUITCO Puerto Barrios (Guatemala).
TELARAILCO (Tela, Honduras).
TRURAILCO (Truxillo, Honduras).
UNIFRUITCO Puerto Limon (Costa Rica).
UNIFRUITCO Almirante (Panama).
UNIFRUITCO Santa Marta (Colombia).

In addition to the above, all passenger steamers of the United Fruit Co., carry doctors, and free medical advice may be obtained from any of them by addressing a radiogram to "Ship's Doctor", followed by the name of the steamer.

In cases of emergency, free medical advice may be obtained by ships at sea by radio from the Panama Canal, through the radio stations at Gatun, Balboa, or Cape Mala. Such message should be addressed: "Govt. C. B., Medico, Pancanal", state briefly and clearly the symptoms to be treated, and be signed by the master.

Medical advice radiograms must be checked and sent "DH Medico." Such radiograms will be given preference over all messages except SOS calls.

Medical advice will be phrased in language intelligible to the layman. Complete details relative to the service furnished by all companies is published in the manual, Ship Sanitation and First Aid, issued by the Seaman's Church Institute of New York. This manual contains diagrams and a list of symptoms to be considered in preparing messages.

In addition to the above, current information on this subject can be secured by referring to the radio references listed on page 22.

WEATHER

Prevailing winds.—North of the thirty-eighth parallel the prevailing winds are westerly. South of the thirty-eighth parallel they are southerly throughout the year, except in September and October, when they are northeasterly. They are subject to many variations at all seasons. See also the meteorological tables in the Appendix.

Fogs are most frequent along the coast during the months of March and April, 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 two or three days, sometimes practically suspending navigation in the harbors and bays.

In Chesapeake Bay fogs are most frequent in the spring, fall, and winter months and will sometimes remain for a period of several days, during which time navigation in the bay and its tributaries

is seriously interrupted. The most dense fogs and those of longest duration occur from early in November to March. During the summer months there will sometimes be a fog in the tributaries of the bay during the early morning, but it rarely interrupts navigation after the sun is two hours high.

The following table shows the average number of hours per month, from a record of about five years, that the fog signals were operated at the stated light stations of the United States:

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
Christiana 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
Janes 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

Ice rarely interferes with navigation along the coast, but in severe winters may form a serious obstacle to navigation inside the entrances. Ice conditions in Delaware Bay are described on page 78 and in Chesapeake Bay on page 141. Ice in the tributaries is treated under their descriptions.

STORM WARNINGS

Storm warnings are displayed by the United States Weather Bureau at numerous places on the coasts of the United States and the Great Lakes.

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

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

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

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

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

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

These warnings are displayed at all stations on the Atlantic and Gulf coasts of the United States and at the following points about the Caribbean Sea:

Bermuda.
Habana, Cuba.
Guantanamo, Cuba.
Kingston, Jamaica.
Turks Island.
Port au Prince, Haiti.
Puerto Plato, Dominican Republic.
Puerto Rico (at numerous ports about the island).
St. Thomas, Virgin Islands.
St. Kitts Island.
Dominica Island.
Martinique Island.
St. Lucia Island.
St. Vincent Island.
Barbados Island.
Grenada Island
Trinidad Island.
Curacao.
Bluefield, Nicaragua.
Belize, British Honduras.

The following are the storm warning display stations within the limits covered by this volume:

New Jersey:
- Atlantic City (d).[1]
- Avalon Coast Guard Station (d).[1]
- Bayhead (May to October incl.).
- Bivalve.
- Cape May Point Coast Guard station.
- Great Egg Coast Guard station (d).[1]
- Island Heights (June to September inc.) (d).[1]
- Long Branch.
- Ocean City (d).[1]
- Sandy Hook.

Delaware:
- Delaware Breakwater.
- Reedy Island.

Maryland:
- Annapolis.
- Baltimore (American Building).
- Baltimore (The Anchorage).
- Baltimore (Maryland Yacht Club)
- Bar Neck (Tilghman Id) (d).[1]
- Crisfield (d).[1]
- Oxford.

Virginia:
- Cape Henry.
- Fort Monroe.
- Newport News.
- Norfolk (New Federal Building).
- Norfolk (Navy wireless).

Barometers may be compared with standards at all U. S. Weather Bureau offices. Offices are maintained at Philadelphia, Atlantic City, Sandy Hook, Baltimore, Cape Henry, and Norfolk.

Information relative to radiotelegraphic weather broadcasts will be found on page 27.

[1] (d) indicates day only.

WEST INDIAN HURRICANES

Tropical cyclones of the North Atlantic Ocean are usually designated as West Indian hurricanes, but actually many of these storms originate and die out far from the mainland and hundreds of miles from the West Indies. The storm area 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.

Hurricanes form over a wide range of the ocean between the Cape Verde and the Windward Islands, over the western part of the Caribbean Sea, and in the Gulf of Mexico. While some move northward in the beginning, especially those that originate southeast of Bermuda, the majority take a westerly to northwesterly course. Of these some curve gradually northward, either to the eastward of or above the larger islands of the West Indies, then turn northeasterly or easterly near to or at considerable distance from the Atlantic coast of the United States. Others pass over or south of the greater islands and enter the Gulf of Mexico; thence curve northward or northeastward and strike some part of the east Gulf coast or continue to the westward and strike the west Gulf coast. 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.

The hurricane season is likely to begin in June and close with November. The months of greatest frequency are August, September, and October. Hurricanes are most likely to be severe during August and the early half of September. During all the months of the season, however, the posibilities of encountering an intense storm are sufficiently great to warrant the mariner in keeping careful watch of the weather elements while in these waters. (See p. 28.)

Signs of approach.—One of the earliest signs of a hurricane is the appearance of high cirrus clouds which converge toward a point on the horizon that indicates the direction of the center of the storm. The snow-white fibrous mares' tails appear when the center is about 300 or 400 miles distant. Another usual early indication is a long, heavy swell propagated to a considerable distance, sometimes 2 or 3 days in advance, when there is no intervening land to interrupt it. This swell comes from the general direction in which the storm is approaching. There is usually a slight rise of the barometer at the outset, followed by a continuous fall. If front of the storm, if it is advancing in some westerly direction toward the observer, the winds blow from a northerly point (northeast, north, or northwest); if in

some northerly direction toward the observer, they will blow from an easterly point (southeast, east or northeast). A further indication is a rough, increasing sea. If one or more of these signs be wanting, there is little cause for anticipating a hurricane.

As the storm center approaches the barometer continues to fall; the velocity of the wind increases and blows in heavy squalls, and the changes in its direction become more rapid. Rain in showers accompanies the squalls, and when closer to the center the rain is continuous and attended by furious gusts of wind; the air is frequently thick with rain and spume drift, making objects invisible at a short distance. A vessel on a line of the hurricane's advance will experience the above disturbances, except that as the center approaches the wind will remain from the same direction, or nearly so, until the vessel is close to or in the center.

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.

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 overriding 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.

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.

To find in which semicircle the vessel is situated:

If the wind shifts to the right, the vessel will be in the right-hand or dangerous semicircle with regard to the direction in which the

storm is traveling, in which case the vessel should be kept on the starboard tack and increase her distance from the center.

If the wind shifts to the left, the vessel will be in the left or navigable semicircle. The helm should be put up and the vessel run with the wind on the starboard quarter, preserving the compass course, if possible, until the barometer rises, when the vessel may be hove to on the port tack, or if there is not sea room to run, the vessel can be put on the port tack at once.

Should the wind remain steady and the barometer continue to fall, the vessel is in the path of the storm and should run with the wind on the starboard quarter into the navigable semicircle.

In all cases act so as to increase as soon as possible the distance from the center, bearing in mind that the whole storm field is advancing.

In receding from the center of a hurricane the barometer will rise and the wind and sea subside.

VARIATION OF THE COMPASS

The magnetic variations for 1936 and the annual increase of points mentioned are as follows:

Locality	Variation west		Annual increase
	°		′
Sandy Hook	11	00	1
Atlantic City	9	30	1
Overfalls Light Vessel	8	30	1
Ship John Shoal Lighthouse	8	45	0
Reedy Island	8	45	0
Philadelphia	9	30	1
Winter Quarter Shoal Light Vessel	8	00	1
Chesapeake Light Vessel	6	45	0
Hampton Roads	6	15	0
Richmond	5	45	0
Wolf Trap Lighthouse	6	30	0
West Point	6	15	0
Pocomoke Sound	7	00	0
Vienna	7	45	0
Potomac River entrance	7	00	0
Washington	7	00	0
Cambridge	7	45	0
Bloody Point Bar Lighthouse	7	45	0
Baltimore Harbor	7	45	0
Havre de Grace	7	45	0

TIDES AND CURRENTS

Tide Tables for the Atlantic Ocean are published in advance annually by the United States Coast and Geodetic Survey, price 25 cents. This volume supplies full tidal data for the east Coast of North and South America, the west and north coasts of Africa, and all of Europe.

It contains a table 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. Table 4 gives the time of the rising and setting of the sun. Table 6 gives the time of the rising and setting of the moon at certain places.

The effect of strong winds, in combination with the regular tidal action, may at times cause the water to fall below the plane of reference of the chart, mean low water. The water may also rise about the same amount 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- or 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 or 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 of the United States are published in advance annually by the United States Coast and Geodetic Survey. This 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 six bodies of water along the coast, 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. These tables are for sale by the Coast and Geodetic Survey, Washington, D. C., and by authorized sales agencies; price 10 cents.

Tidal Current Charts in four volumes at 25 cents per volume are published by the United States Coast and Geodetic Survey for Boston and New York Harbors, San Francisco Bay, and Block Island and Long Island sounds. 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.

CURRENTS, SANDY HOOK TO CAPE HENRY

The following statements are deducted from current observations which have been made at the lightships along this section of the coast and from other sources:

Tidal currents.—These are rotary in character, generally turning clockwise, with minimum velocities three hours after strength of

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flood and ebb in a direction at right angles to that at the time of strength. When not influenced by the larger bays or rivers, such as Delaware River, Chesapeake Bay, and New York Bay, these tidal currents are weak, averaging about 0.2 knot at strength, the direction of the flood and ebb at strength being on and off shore, respectively. In the immediate vicinity of the larger bays or rivers, the direction of flood and ebb at strength is directly in and out, and the strength of the current is increased, depending on the proximity of the mouth. These three rivers and bays affect the direction of the tidal currents to a distance of about 20 miles from their entrances, but the strength of the offshore current is not affected until within a few miles of the mouth.

Wind currents (*see also p. 45*).—Moderate to heavy winds set up strong currents in a direction about 20° to the right of the wind, reversing or greatly accelerating the normal currents; in fact, the principal currents along this stretch of coast, when away from the larger bays, are the wind currents. Their strength and set depend on the direction, strength, and duration of the wind.

Offshore currents.—Observations made offshore have developed the existence of weak tidal currents, veering around the compass, similar in character to those inshore, although of less strength. These are accompanied by a general drift in a southerly to southwesterly direction, amounting to about ¼ of a knot; this extends from about the 20-fathom curve out nearly to the Gulf Stream.

The following is a more detailed statement of the observations made at several localities. The wind currents are of more importance than the tidal currents, and the two must be combined in making allowance for set. (See Current Tables, Atlantic Coast).

Ambrose Channel Lightship.—The tidal currents have a mean velocity of about ¼ knot at strength of flood or ebb, the flood setting in a westerly and the ebb in an easterly direction. The strength of flood occurs about 1 hour before time of high water at Sandy Hook, and the strength of ebb about 1 hour before time of low water at Sandy Hook. Wind velocities of 10 to 25 miles produce currents of about 0.5 to 1 knot, setting about 20° to the right of the wind. The greatest observed velocity of the current was about 1.4 knots during a gale.

Latitude 38°58′ N., longitude 74°31′ W. (off the entrance to Delaware Bay).—The tidal currents have a mean velocity of ¼ knot at strength of flood or ebb, the flood setting in a northwesterly and the ebb in a southeasterly direction. The strength of flood occurs about 1¾ hours earlier than the strength of flood at Overfalls Lightship (or about 2¾ hours earlier than the time of high water at Sandy Hook). The strength of ebb occurs about 1 hour earlier than the strength of ebb at Overfalls Lightship (or about 2½ hours earlier than the time of low water at Sandy Hook). Wind velocities of 10 to 30 miles produce currents of about 0.5 to 0.9 knot, setting about 20° to the right of the wind. The wind current must be combined with the tidal current in making an allowance for set. The greatest observed velocity of the current was 1.2 knots during a 50-mile-an-hour gale.

Overfalls Lightship.—See currents, Delaware Bay (p. 80).

Latitude 38°25′ N., longitude 74°46′ W.—The tidal currents have a mean velocity of about ¼ knot at strength of flood or ebb, the flood

setting in a northerly direction and the ebb in a southerly direction. The strength of flood occurs about ½ hour later than the strength of flood at Overfalls Lightship (or about ½ hour before the time of high water at Sandy Hook), and the strength of ebb occurs approximately at the same time as at Overfalls Lightship (or about 1¼ hours before the time of low water at Sandy Hook). Wind velocities of 10 to 30 miles produce currents of about 0.5 to 1 knot, setting about 20° to the right of the wind. This wind current must be combined with the tidal current in making an allowance for set. The greatest observed velocity of the current was 2 knots during a 60-mile-an-hour gale.

Winter Quarter Shoal Lightship.—The tidal currents are weak and rotary, the normal velocity being about 0.1 knot throughout the day. Observations indicate a southerly set of about 0.1 knot. The greatest observed velocity of the current was about 2 knots during a northeast gale.

Gulf Stream.—For data concerning this unique and important current see either United States Coast Pilot, Atlantic Coast, Section D, Cape Henry to Key West, 1936, pages 32 to 36 or United States Coast Pilot, Gulf Coast, Key West to Rio Grande, 1936, pages 45 to 49.

WIND CURRENTS

There are given below the results of recent investigations on the currents caused by local winds. These investigations are based on observations made on a number of the lightships along the Atlantic coast from Nantucket Shoals Lightship to Brunswick Lightship. The results, therefore, apply more directly along the route between lightships but are applicable also to the coastal sailing routes farther offshore.

Direction of current due to wind.—It is evident that a wind continuing for some time will give rise to a current, the velocity of which increases with an increase in the velocity of the wind; and the mariner has taken it for granted that this current brought about by the wind sets in the same direction as the wind. But the results of careful observations show that this is not the case. Instead of setting with the wind, the current on the Atlantic coast of North America produced by local winds sets on the average about 20° to the right of the wind.

For example, a wind blowing from north will, on the North Atlantic coast, bring about a current that sets not south but about 20° to the right of south, or 200°. Similarly a wind from south will produce a current setting 20° to the right of north, or 20°. It is to be noted that while the current due to the wind will, on the North Atlantic coast, set 20° to the right of the wind direction, the current which a vessel experiences at any time is the resultant of the combined action of the tidal current, the wind current, and any other currents, such as the Gulf Stream or currents due to river discharge.

Velocity of current due to wind.—The velocity of the current brought about by winds of different velocities is given in the table below. It will be seen that on the Atlantic coast of the United States the velocity of the wind current is about 1½ percent of the velocity of the wind.

Table of current velocity due to wind—North Atlantic coast

Wind velocity.....miles per hour..	10	20	30	40	50	60
Current velocity.....knots..	0. 2	0. 3	0. 4	0. 6	0. 8	1. 0

An easily remembered working rule to get the velocity of the current due to wind along the Atlantic coast is to multiply the velocity of the wind (in miles per hour) by 1½ and point off two places. This will give the velocity of the current in knots. For example, to determine the current due to a 40-mile wind we have $40 \times 1\frac{1}{2} = 60$, and pointing off two decimal places gives 0.60, or six-tenths of a knot.

The maximum velocities likely to occur during storms at the following offshore localities are Ambrose Channel lightship, 1½ knots; Five-Fathom Bank North Lighted Whistle buoy 2 FB, 1½ knots; Overfalls lightship, 3½ knots; Fenwick Island Shoal Lighted Whistle buoy 2, 2 knots; Winter Quarter Shoal Lightship, 2 knots; and Tail of the Horseshoe Lighted Whistle buoy TH, 3 knots.

INLAND WATERWAYS

The following data concerning the Intracoastal Waterway, from Boston to the Rio Grande, the Route 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

The Intracoastal Waterway affords a protected route, with the exception of various sections, for vessels between Boston, Mass., and the Rio Grande, a distance of approximately 3,100 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. The minimum width for the entire route is 40 feet. The locks in the alternate route through the Dismal Swamp Canal have a width of 37 feet and a length of 225 feet. The height of the masts of vessels is restricted by an overhead power cable at Socastee, South Carolina, to 74 feet (22.6 m) at normal low water and 67 feet (20.4 m) during freshets, allowing 3 feet for a factor of safety against high voltage current with conditions of dampness or sleet.

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 controlling depth in December 1936 was 23 feet (7.0 m) and the minimum channel width was 205 feet. The vertical clearance through the canal is 135 feet (41 m).

From the canal, the route generally followed extends from Buzzards Bay to the Atlantic Ocean, thence through Block Island and Long Island Sounds and the East River to upper New York Bay,

thence through the more open waters to lower New York Bay. There are numerous harbors on both sides of Long Island Sound.

An inland waterway extends along a portion of the south side of Long Island and affords a protected route from Gardiners Bay to East Rockaway Inlet with a controlling depth of 4 feet (1.2 m).

New York Harbor to Delaware Bay.—An outside run between New York Bay and Delaware Bay is now necessary. Vessels whose draft permits use of the New Jersey Inland Waterway (described in the *Inside Route Pilot New York to Key West*) may shorten the run outside. This waterway is entered at its northern end through Manasquan Inlet, 23 miles south of Sandy Hook, and extends for 99 nautical miles to Cape May Inlet at Cape May. The waterway is maintained by the State of New Jersey as a 6-foot (1.8 m) project, but the controlling depth in April 1936 was reported to be 4 feet (1.2 m). Vessels are obliged to run outside from Sandy Hook to Manasquan Inlet, and to round Cape May and cross the lower reaches of Delaware Bay to the Chesapeake and Delaware Canal.

The Intracoastal Waterway formerly extended from New York Bay through the Raritan River, the Delaware and Raritan Canal, and the Delaware River to Delaware Bay. The Delaware and Raritan Canal, now under the jurisdiction of the State of New Jersey, has not been open to navigation since 1933.

Delaware Bay to Norfolk.—The Chesapeake and Delaware Canal (see p. 309) is a sea-level route which extends for a distance of 19 miles, from Reedy Point on the Delaware River 40 miles below Philadelphia, Pa., to the junction of Back Creek and Elk River, about 4 miles west of Chesapeake City, Md. There are no locks. The vertical clearance is 140 feet (43 m). It was reported in 1936 that vessels with a draft up to 12 feet (3.7 m) could use the canal. Dredging is in progress to increase the depth to 27 feet (8.2 m).

From the junction of the canal and Chesapeake Bay to Norfolk, a distance of 210 miles through Chesapeake Bay, depths in excess of 12 feet (3.6 m) obtain.

Norfolk to Beaufort, N. C.—A sea-level waterway, paralleling the Atlantic coast, with a tidal lock at Great Bridge, Va., is afforded by the route through the Albemarle and Chesapeake Canal, the Alligator River-Pungo River Canal, and the sounds of North Carolina. The project for this waterway provides a depth of 12 feet (3.6 m) at mean low water, but the controlling depth was 11 feet (3.4 m) in September 1936.

The alternate route to Albemarle Sound by way of the **Dismal Swamp Canal**, a lock canal, had a controlling depth of 7 feet (2.1 m) in September 1936.

Navigation is practicable throughout the year on both of the above-named routes.

Beaufort, N. C., to Winyah Bay.—In September 1936 there was a controlling depth of 12 feet (3.7 m) from Beaufort Harbor to the Cape Fear River, thence 8 feet (2.4 m) to Little River, and thence 6 feet (1.8 m) to Winyah Bay.

Winyah Bay to Charleston.—The project depth is 10 feet (3.0 m). The controlling depth in November 1936 was about 7.8 feet (2.4 m) but dredging to remove shoaling was under way.

Charleston to the St. Johns River, through the rivers and sounds of South Carolina and Georgia.—The project depth through the main

waterway is 7 feet (2.1 m), and in 1936 this depth controlled to Beaufort, South Carolina, thence the route to Fernandina via Archers Creek 4 feet (1.2 m) and via Port Royal Sound 6½ feet (2.0 m), and thence to the Saint Johns River 7 feet (2.1 m).

St. Johns to Miami.—This section of the waterway extends from the St. Johns River by way of the old Florida East Coast Canal through natural and connecting waterways to Miami on Biscayne Bay. A project depth of 8 feet (2.4 m) at mean low water is being maintained, although the controlling depth in November 1936 was reduced to 7.3 feet (2.2 m).

Miami to Key West.—Hawk Channel—The route north of the Florida Keys and thence via Hawk Channel had a controlling depth of 5 feet (1.5 m) in September 1936. Anchorages, sheltered from all ordinary weather, may be found anywhere along the passages in the lee of reefs and keys.

Key West to Apalachicola.—From Key West to San Carlos Bay the most protected route is via Hawk Channel, Florida Bay and then along the west coast (Florida). The limiting depth is about 6 feet (1.8 m). Shelter from weather is afforded in Shark River, among Ten Thousand Islands, and in the passes back of Cape Romano.

From San Carlos Bay there is an inland channel with a controlling depth of about 6 feet (1.8 m) through Pine Island Sound to Charlotte Harbor.

Outside passage is necessary from Charlotte Harbor to Venice Inlet.

An inland channel through shoal areas is available from Venice Inlet by way of Tampa Bay to Clearwater Harbor with controlling depths of 3 feet (0.9 m) from Venice to Sarasota, 7 feet (2.1 m) from Sarasota to Tampa, and about 3½ feet (1.1 m) from Tampa Bay to Clearwater Harbor and Saint Joseph Sound.

Outside passage is necessary from St. Joseph Sound to St. George Sound, the eastern approach to Apalachicola. The controlling depth is about 7 feet (2.1 m) from St. George Sound to Apalachicola River.

Apalachicola to Pensacola.—The channel from Apalachicola River to St. Andrews Bay provides a protected route with a controlling depth of 5 feet (1.5 m). Dredging is in progress to deepen the channel to 9 feet (2.7 m); this depth was made available in February 1937.

Outside passage is necessary between St. Andrews Bay and Choctawhatchee Bay, but an inside passage 9 feet (2.7 m) deep is being dredged and the route is to be opened for traffic in 1938.

An inland waterway by way of the Narrows and Santa Rosa Sound affords a passage with a controlling depth of 9 feet (2.7 m) between Choctawhatchee Bay and Pensacola Bay.

Pensacola Bay to New Orleans.—The controlling depth in the waterway between Pensacola Bay and Mobile Bay is 8 feet (2.4 m).

The major portion of the waterway between Mobile and New Orleans is subject to rough weather as it follows the open waters of Mississippi Sound and Lake Pontchartrain. The controlling depth is 9 feet (2.7 m).

New Orleans to Galveston.—The controlling depths in this section (1936) are 9 feet (2.7 m) to Port Arthur and thence 8 feet (2.4 m) to Galveston.

Galveston to Corpus Christi.—The construction of a new inside route westward of Galveston is under way. The old waterway is no longer

maintained and it has shoaled to such an extent that it is no longer navigable throughout.

Corpus Christi to the Rio Grande.—There is no inland route between these places.

Charts covering the routes along the Atlantic Coast and the Gulf of Mexico are published by the United States Coast and Geodetic Survey.

The inland waters are covered in the following publications of the Coast and Geodetic Survey:

United States Coast Pilot, Section B, covering the coast and inland waters from Race Point, Cape Cod, to Sandy Hook, including Long Island Sound, New York Harbor, and tributaries.

United States Coast Pilot, Section C (this volume) covering the coast and inland waters from Sandy Hook to Cape Henry, including Delaware and Chesapeake Bays, and the inside route from New York to Norfolk.

United States Coast Pilot, Section D, covering the coast from Cape Henry to Key West.

Inside Route Pilot, New York to Key West.

United States Coast Pilot, Gulf Coast, covering the coast and inland waters of the Gulf of Mexico.

Additional information concerning the latest controlling depths in the Intracoastal Waterway can be secured at the various United States Engineer offices along the route.

ROUTE ACROSS SOUTH FLORIDA

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. When the improvement of this waterway is completed early in 1937, it will have a controlling depth of 6 feet (1.8 m).

Latest information concerning this route can be secured at the United States Engineer District Office at Jacksonville, Fla., or at the office of the United States Engineers at Clewiston, Fla.

OTHER MOTORBOAT ROUTES IN FLORIDA

Much information on the waterways of Florida can be found in Senate Document No. 14, Seventy-first Congress, First Session, entitled "Inland and Coastal Waterways of Florida." Copies of this document can be secured from the Superintendent of Documents, Washington, D. C.

NEW YORK STATE CANAL SYSTEM

The New York State Barge Canal, known as the Erie Canal, affords an all-water route from the Hudson River on the east to Lake Erie. The canal is free for the use of both commercial and pleasure vessels. The canal was constructed for a depth of 12 feet throughout. Barges loaded to about 11 feet (3.4 m) use the canal with safety.

There are 35 locks, the usable dimensions being 300 feet in length, 44½ feet in width, and 12 feet (3.6 m) over the sills. The controlling clearance under fixed bridges is about 14½ feet (4.7 m).

If bound to Lake Ontario, the Erie Canal is followed to Three Rivers Point where the canalized Oswego River is entered and followed to Oswego on Lake Ontario. There are seven locks in the Oswego Canal,

which is 24 miles in length. The locks are the same dimensions as those in the Erie Canal.

Troy to St. Lawrence River.—The Champlain Canal, Lake Champlain, and the Richelieu River 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 (Canadian), which have usable dimensions of 118 feet in length, 22 feet in width, and 6½ feet (2.0 m) of water over the sills. The locks of the Champlain Canal are the same design as those in the Erie Canal. The distance from Albany to Montreal via this route is 309 statute miles. The Canadian Government requires permits or let-passes from pleasure boats entering Canadian waterways, which may be obtained at their canal statistical offices at St. Johns and Prescot. American vessels when leaving Canada should report at the customs office.

Charts of the Erie Canal, Champlain Canal, Lake Champlain, and Great Lakes are published by the United States Lake Survey Office, Detroit, Mich., and sections of the New York State canals by the Superintendent of Public Works, Albany, N. Y.

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 latter part of March.

LAKES TO GULF WATERWAY

The Lakes to Gulf Waterway by way of the Illinois Waterway System and the Mississippi River affords passage for 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 (2.7 m) to be taken from Chicago to the Mississippi River. The limiting clearance under fixed bridges between Chicago and Grafton, Ill., is 13½ feet (4.1 m) at high water.

Charts of the Illinois Waterway System may be obtained from the District Engineer, First District, United States Engineer office, 333 North Michigan Avenue, room 1325, Chicago, Ill.

The Mississippi River.—This section of the waterway follows the natural and improved channels of the Mississippi River.

Grafton to Cairo.—The project depth is 9 feet (2.7 m) 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 (1.5 m). Except for some delays during periods of very low water, navigation is relatively easy. The least vertical clearance of 44.6 feet (13.6 m), extreme high water, is at Merchants Bridge, St. Louis, Mo.

Cairo to Baton Rouge.—The project depth of the channel is 9 feet (2.7 m). 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 (17 m) above the highest water on record at the fixed bridge at Vicksburg, Miss.

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 river current is sluggish for low water flows but during times of high water reaches 6 miles per hour. The effect of tide is felt as far north as Baton Rouge. On the completion of the bridge now being constructed 2 miles above New Orleans the controlling vertical clearance will be 135 feet (41.1 m) above ordinary high water.

Charts of the Mississippi River may be obtained from the office of the Mississippi River Commission, Box 665, Vicksburg, Miss.

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 (2.7 m) project depth has been adopted for the channel improvement of the Upper Mississippi from Grafton to St. Paul and Minneapolis. At present a channel with a controlling depth of 6 feet (1.8 m) is available to Minneapolis.

Information relative to improvements and navigation may be obtained either from the District Engineer, U. S. Engineer Office at Rock Island, Ill., or at St. Paul, Minn.

Missouri River.—A 6-foot (1.8 m) project has been adopted for the Missouri River from its outlet into the Mississippi River 15 miles above St. Louis, to Sioux City. The section between the mouth and Kansas City is now open to navigation.

Charts and information relative to improvements and navigation may be obtained from the United States Engineer Offices, 232 Manufacturers Exchange Building, Kansas City, Mo., and City National Bank Building, Omaha, Neb.

Ohio River.—A 9-foot (2.7 m) project on the Ohio River has been completed and an excellent channel to Pittsburgh, and beyond, is available.

Charts and information relative to improvements and navigation may be obtained from the United States Engineer office, Custom House, Cincinnati, Ohio.

Red, Arkansas, and Ouachita Rivers.—These rivers flow into the Mississippi River between New Orleans and Cairo. The Red and Arkansas Rivers have not been improved to any great extent, but will accommodate light-draft river boats. The Ouachita River has been canalized to Camden, Ark., and provides a depth of 6½ feet (2.0 m).

Charts and information relative to improvements and navigation may be obtained from the United States Engineer Offices, P. O. Drawer 667, Vicksburg, Miss., and P. O. Box 97, Memphis, Tenn.

Intracoastal Waterway.—Connection with the Intercoastal Waterway is made at New Orleans, La.

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.

MISCELLANEOUS

Bridge Regulations.—Regulations for the lighting of bridges over navigable waters, also for lights on sheer booms, piers, dams, and similar obstructions to navigation are prescribed by the Department of Commerce. (See list of Publications, p. 319.)

The following regulations have been prescribed by the War Department (see list of Publications, p. 319) to govern the operation of drawbridges which are now or may hereafter be constructed across all navigable waterways of the United States discharging their waters into the Atlantic Ocean south of and including Chesapeake Bay and all navigable waters emptying into Chesapeake Bay, and the Gulf of Mexico, excepting the Mississippi River and its tributaries:

1. The 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.

2. *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, horn, or megaphone shall be sounded *from the vessels* when within reasonable hearing distance of the bridge.

When the draw of the bridge can be opened immediately, the draw tender shall reply by three distinct blasts of a whistle, horn, or megaphone or by three loud and distinct strokes of a bell.

When the draw of the bridge cannot be opened immediately or when the bridge is open and is to be closed immediately, the draw tender shall reply by two long distinct blasts of a whistle, horn, or megaphone or by two loud and distinct strokes of a bell.

3. *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.

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

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

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

5. 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 draw tender shall reply as prescribed and in turn to the signal of each vessel.

6. 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 that bridge can be opened immediately, the bridge tender 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.

7. The draw shall be opened with the least possible delay, upon receiving the prescribed signal: *Provided*, That the draw span 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 draw span.

8. When a bridge tender is about to close a draw, he shall sound two distinct blasts of a whistle, horn, or megaphone, or two loud and distinct strokes of a bell.

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

10. These regulations shall be in force on and after January 1, 1930, and shall supersede the general bridge regulations approved October 12, 1925.

Regulations prescribing closed periods and applicable to particular bridges remain in full force and effect (see text relating to particular bridge).

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 water; 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.

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 (see *Rules and Regulations relating to Navigable Waters* listed on page 319), and the supervision of the fishing structures is controlled by the Chief of Engineers, United States Army. Strangers should proceed with caution when crossing areas of possible fish weirs, and should avoid crossing such areas at night, whenever possible. The areas within which fish weirs are allowed along the coast from Cape Henlopen to Cape Charles are described on page 122; further information concerning fish weirs in Chesapeake Bay is given on page 141. As a general rule, fish-trap limits are shown on the charts.

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

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 appliance.

When several structures or appliances are placed on one line with no navigable passage between them, they will be considered, for lighting purposes, as one structure.

Lighthouse tenders, when working on buoys in channels or other frequented waters, may display a red flag (international signal code flag B) and a black ball at the fore as a warning to other vessels to slow down in passing. Passing vessels will facilitate the work of the Lighthouse Service by a proper observance of the signals.

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

By day a surveying vessel of the Coast and Geodetic Survey, under way and employed in hydrographic surveying, may carry in a vertical line, one over the other not less than 6 feet apart where they can best be seen, three shapes not less than 2 feet in diameter of which the highest and lowest shall be globular in shape and green in color and the middle one diamond in shape and white.

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

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

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.

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 the 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.

2. DIRECTIONS, NEW YORK TO CHESAPEAKE BAY ENTRANCE

(Charts 1215 to 1222, 1108, and 1109)

A description of the coast and outlying shoals from Sandy Hook to Cape May is given on page 61, and from Cape Henlopen to Cape Charles on page 119.

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 the coast is fronted with extensive areas of broken ground, depths of 10 fathoms (18.3 m) and less being found at distances of nearly 20 miles offshore in places. Several wrecks exist this distance offshore.

Recently a shoal of about 24 feet (7.3 m) was found about 7 miles 129° true from Ludlam Beach Light. This shoal is marked by a lighted gong buoy and station buoy (both black).

Owing to the numerous outlying shoals and wrecks this coast is a dangerous one for deep-draft vessels, and unless sure of the vessel's position soundings should be taken to give warning of too close an approach from seaward. The 15-fathom (27.4 m) 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 quite regularly from 30 fathoms to 15 fathoms (55 to 27.4 m), but inshore of the latter depth the soundings are irregular, and shoals rise abruptly in many cases from about 10 fathoms (18.3 m) of water. In case one of the lights or lightships are not made when in a depth of 15 fathoms (27.4 m) it is advisable to stand alongshore until one of them is sighted.

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 lighthouses and the lightships will be sighted, so that the vessel's position can be readily determined. Radio direction finder and radio beacon stations will also assist in determining a vessel's position (see pp. 28 and 32).

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

The routes followed by vessels along this part of the coast vary greatly, according to their draft and the condition of wind and weather. Complete directions to meet all conditions can not be given, but the following suggestions may be of some assistance to strangers.

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 (16.5 m). The courses given below, lead in a least depth of about 9 fathoms (16.5 m) except in approaching the entrances to Delaware and Chesapeake Bays. They lead across a least depth of 6¾ fathoms (12.2 m) in Delaware Bay entrance and in 7½ fathoms (13.7 m) but close to 6¼ fathoms (11.6 m) spots in Chesapeake Bay entrance. Off the New Jersey coast the course leads 1.3 miles eastward of a reported 5½ fathom spot about 6 miles east-southeastward of Shark River Inlet.

From Ambrose Channel Lightship bearing 5° true distant 1 mile steer 185° true (S. by W. ⅜ W. mag.) for 40.7 miles to Barnegat Lightship bearing 280° true distant 1.5 miles. (International Rules apply seaward of Ambrose Channel Lightship). Then steer 206½° true (SW. ¾ S. mag.) for 66.3 miles to Five Fathom Bank Lightship bearing 300° true distant 2.2 miles. To approach Delaware Bay from here, steer 273° true (WNW. ⅞ W. mag.) for 23.7 miles to Overfalls Lightship bearing 60° true distance 1.0 mile. (For courses entering the Bay, see p. 82). Continuing southward along the coast from Five Fathom Bank Lightship steer 199° true (SSW. ½ W. mag.) for 54.3 miles to Winter Quarter Shoal Lightship bearing 295° true distant 1.5 miles, and passing 3¼ miles off *Fenwick Island Shoal Lighted Whistle Buoy 2.*

Approaching Delaware Bay from the southward steer 322° true (NNW. ⅝ W. mag.) for 27.3 miles from *Fenwick Island Shoal Lighted Whistle Buoy 2*, bearing 260° true distant 3.9 miles, to Overfalls Lightship bearing 60° true distant 1 mile. (International rules apply seaward of the lightship.)

From the position off Winter Quarter Shoal Lightship steer 213° true (SW. ½ S. mag.) for 68 miles to Chesapeake Lightship, bearing 315° true distant 1.2 miles. Then steer 231° true (SW. by W. ⅛ W. mag.) for 10.4 miles to Chesapeake Bay Entrance Lighted Whistle Buoy 2 CB, bearing 315° true distant 0.3 mile and round the buoy southward until it bears 45° true. (For courses entering the Bay, see p. 82.) These courses, if followed closely, lead over a least found depth of 45 feet (13.7 m) and 3⅓ miles southeastward of 38-foot (11 m) depths about 10½ miles eastward of Ship Shoal Inlet. The last course leads between shoals of 31 to 36 feet (9.4 to 11.0 m) depth; care should be taken not to make the entrance buoy anywhere on the port bow on this course, and not to make it more than 1 mile to the eastward unless passing well outside of the 36-foot (11.0 m) shoal.

Many large vessels entering Chesapeake Bay from the northward run from Winter Quarter Shoal Lightship on course 216° true (SW. ⅛ S. mag.), to the lighted whistle buoy 5 miles westward of Chesapeake Lightship, passing 2½ miles off Smiths Island Shoal lighted

whistle buoy, thence to Cape Henry lighted whistle buoy on course 250° true (WSW. 7/8 W. mag.). The least found depth crossed on these courses is 37 feet (11.3 m).

To go southward to Diamond Shoal Lightship (Cape Hatteras) bearing 240° true distant 5 miles, from the position off Barnegat Lightship steer 193° true (S. by W. 7/8 W. mag.), for 285.0 miles, or from the position off Winter Quarter Shoal Lightship steer 185½° true S. by W. mag.) for 167.8 miles.

Coasting vessels of 17 to 24 feet (5.2 to 7.3 m) draft and the largest tows, except those trading between Delaware Bay and points northward, usually keep outside the lightships.

The following courses represent approximately the mean of the courses followed by vessels of this class. 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.

Courses and Distances—New York (Sandy Hook) to Chesapeake Bay Entrance

[For vessels of 17 to 24 feet (5.2 to 7.3 m) draft]

For reverse direction, read upward	Course (Reverse course in *Italics*)		Distance
	True	Magnetic	
	°	*Points*	*Nautical miles*
1. Gedney Channel Lighted Whistle Buoy, bearing 117° true and distant 0.4 mile:			
Direct	180	S. by W	43. 3
Reverse	*0*	*N. by E*	*43. 3*
International Rules apply outside of the line between Ambrose Channel Lightship and Navesink L. H. (south tower).			
Scotland Lightship distant 0.8 mile, *Shrewsbury Rocks Lighted Bell Buoy 1* distant 1.1 miles and Sea Girt Lighthouse distant 5.8 miles.			
2. Barnegat Lightship, bearing 280° true and distant 1.5 miles:			
Direct	206½	SW. ¾ S	66. 3
Reverse	*26½*	*NE. ¾ N*	*66. 3*
***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.**			
3. Five Fathom Bank Lightship, bearing 300° true and distant 2.2 miles:			
Direct	274	WNW. ⅛ W	23. 0
Reverse	*94*	*ESE. ⅛ E*	*23. 0*
3A. Overfalls Lightship, bearing 45° true and distant 300 yards.			
3. Five Fathom Bank Lightship, bearing 300° true and distant 2.2 miles:			
Direct	199	SSW. ½ W	21. 5
Reverse	*19*	*NNE. ½ E*	*21. 5*

Courses and Distances—New York (Sandy Hook) to Chesapeake Bay Entrance—Continued

For reverse direction, read upward	Course (Reverse course in *Italics*)		Distance
	True	Magnetic LAT LONG	
	°	*Points*	*Nautical miles*
4. Fenwick Island Shoal Lighted Whistle Buoy 2, bearing 260° true and distant 3.9 miles:			
Direct	324	NNW. ⅜ W	27.3
Reverse	*144*	*SSE. ⅜ E*	*27.3*
3A. Overfalls Lightship, bearing 45° true and distant 300 yards (International Rules apply seaward of Overfalls Lightship).			
4. Fenwick Island Shoal Lighted Whistle Buoy 2, bearing 260° true and distant 3.9 miles:			
Direct	199	SSW. ½ W	32.8
Reverse	*19*	*NNE. ½ E*	*32.8*
5. Winter Quarter Shoal Lightship, bearing 295° true and distant 1.5 miles. *Cape Charles Lighted Whistle Buoy 12* distant 2.7 miles, Chesapeake Lightship distant 3.0 miles:			
Direct	216½	SW. ⅛ S	71.5
Reverse	*36½*	*NE. ⅛ N*	*71.5*
6. Cape Henry Approach Lighted Whistle Buoy 2, bearing 333° true distant 0.7 mile:			
Direct	254	W. ¾ S	5.8
Reverse	*74*	*E. ¾ N*	*5.8*
7. Cape Henry Junction Lighted Whistle Buoy, bearing 344° true distant 0.3 mile.			

Tows and other local vessels of less than 17 feet (5.2 m) draft usually pass inside of Five Fathom Bank and Fenwick Island Shoal at all times, and close outside of McCrie Shoal and Winter Quarter Shoal, except in westerly weather. The route most often followed both northward and southward in good weather by vessels with local knowledge is as follows: From the outer end of Ambrose Channel or from Scotland Lightship to 1 mile eastward of Shrewsbury Rocks lighted bell buoy; thence to 2 miles westward of Barnegat Lightship; thence eastward 1 mile of Brigantine Shoal lighted whistle buoy; of Ludlum Beach lighted bell buoy (24-foot (7.3 m) spot lies about 2¾ miles south of this buoy, and is marked on its west side by a lighted gong buoy and station buoy), of McCrie Shoal lighted whistle buoy, and of Overfalls Lightship; thence to 1 mile westward of Fenwick Island Shoal lighted whistle buoy; thence to ½ mile eastward of Great Gull Bank lighted whistle buoy; thence to ¼ mile westward of Winter Quarter Shoal lighted whistle buoy; thence eastward ¼ mile of the lighted whistle buoys of Blackfish and Parramore Banks: thence to 1 mile eastward of Cape Charles lighted whistle buoy; thence to ¼ mile south of Middle Ground South end lighted bell buoy in the entrance to Chesapeake Bay; thence to ¼ mile south of Tail of the Horseshoe lighted whistle buoy. (International Rules apply seaward of a line drawn between Cape Charles Lighthouse and Cape Henry Lighthouse.)

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 2½ miles eastward of Middle Ground South End lighted bell buoy (Chesapeake Bay entrance) to ½ mile eastward of Great Machipongo Inlet outer bell buoy; thence along shore at a distance of about 3 miles to Turners Lump lighted bell buoy; thence midway between Chincoteague Shoals and Black Fish Bank; thence to *Six-Fathom lighted buoy 4A;* thence to Great Gull 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 can buoy, guarding against the 3 wrecks, charted in 1936 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 Island Shoal lighted whistle buoy; thence to 1 mile eastward of McCrie Shoal lighted whistle buoy, of Ludlum Beach lighted bell buoy (see 24-foot (7.3) spot page 70), and of Brigantine Shoal lighted whistle buoy; 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 15 feet (4 m) 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 ensure safer running at night. In bad weather or with a deeper draft, follow the directions for vessels of 17 to 24 feet (5.2 to 7.3 m) draft, preceding.

Courses and Distances—New York (Sandy Hook) to Chesapeake Bay Entrance

[See preceding paragraph]

For reverse direction, read upward	Course (Reverse course in *Italics*)		Distance
	True	Magnetic	
	°	*Points*	*Nautical miles*
1. Main and Swash Channel Ranges, 1¾ miles E. by N. of Sandy Hook Point:			
Direct	131½	SE. ⅝ S	2.6
Reverse	*311½*	*NW. ⅝ N*	*2.6*
Steer Swash Channel range in South Channel, heading toward Scotland Lightship.			
2. [redacted]:			
Direct	174	S. ½ W	7.0
Reverse	*354*	*N. ½ E*	*7.0*
International Rules apply seaward of a line drawn between Ambrose Channel Lightship and Navesink L. H. (south tower). Guard against wreck about 0.4 mile westward of course and 1¼ miles before next position.			

Courses and Distances—New York (Sandy Hook) to Chesapeake Bay Entrance—Continued

For reverse direction, read upward	Course (Reverse course in *Italics*)		Distance
	True	Magnetic	
	°	*Points*	*Nautical miles*
3. Shrewsbury Rocks lighted Bell Buoy 1, bearing 270° true and distant 300 yards:			
Direct	193½	SSW. ⅛ W	14.7
Reverse	*13½*	*NNE. ⅛ E*	*14.7*
Guard against two reported wrecks about 0.2 mile westward of course distant 2¾ miles and 0.5 mile eastward of course distant 4 miles, respectively, from position 3.			
4. Manasquan Inlet North Breakwater Light, bearing 270° true and distant 1.5 miles:			
Direct	186½	S. by W. ½ W	21.1
Reverse	*6½*	*N. by E. ½ E*	*21.1*
5. Barnegat Lighted Buoy, bearing 270° true and distant 1.5 miles:			
Direct	200½	SSW. ¾ W	23.2
Reverse	*20½*	*NNE. ¾ E*	*23.2*
Guard against the reported wreck about 0.4 mile westward of the course 5½ miles beyond position 5, and the wreck about 0.6 mile westward of the course 4¾ miles before position 6.			
6. Brigantine Shoal Lighted Whistle Buoy 2BS, bearing 270° true distant 1.0 mile:			
Direct	225	SW. ⅞ W	21.8
Reverse	*45*	*NE. ⅞ E*	*21.8*
7. Ludlum Beach Lighted Bell Buoy 2 LB, bearing 270° true distant 1.0 mile:			
Direct	215	SW. ⅛ S	21.4
Reverse	*35*	*NE. ⅛ N*	*21.4*
Pass westward of Avalon Shoal Lighted Gong Buoy 1 about ½ mile.			
Guard against a wreck about 1.4 miles westward of the course 3¼ miles beyond position 7.			
8. McCrie Shoal Lighted Whistle Buoy 2, bearing 270° true distant 1.0 mile:			
Direct	226½	SW. ⅞ W	11.7
Reverse	*46½*	*NE. ⅞ E*	*11.7*
9. Hen and Chickens Shoal Lighted Whistle Buoy 1 HC, bearing 270° true distant 200 yards:			
Direct	174½	S. ¼ W	15.5
Reverse	*354½*	*N. ¼ E*	*15.5*
10. Fenwick Island Shoal Lighted Whistle Buoy 1 FIS, bearing 90° true distant 0.5 mile:			
Direct	190	S. by W. ⅝ W	10.6
Reverse	*10*	*N by E. ⅝ E*	*10.6*
11.[1] Great Gull Bank Lighted Whistle Buoy 4, bearing 270° true distant 200 yards:			
Direct	193	S. by W. ⅞ W	18.8
Reverse	*13*	*N. by E. ⅞ E*	*18.8*
Passing 300 yards westward of *Sugar Point Lighted Bell Buoy 3.*			

[1] Barge *Jonesport* wreck lies about 1 mile northward of buoy. (March 1937.)

Courses and Distances—New York (Sandy Hook) to Chesapeake Bay Entrance—Continued

For reverse direction, read upward	Course (Reverse course in *italics*)		Distance
	True	Magnetic	
	°	*Points*	*Nautical miles*
12. Winter Quarter Shoal Lighted Whistle Buoy 6 WQS, bearing 270° true distant 350 yards:			
Direct	214	SW. ¼ S	30.4
Reverse	*54*	*NE. ¼ N*	*30.4*
Passing 425 yards eastward of *Blackfish Bank Lighted Whistle Buoy 8.* 500 yds 270°			
13. Parramore Banks Lighted Whistle Buoy 10, bearing 270° true distant 600 yards:			
Direct	205½	SSW. ⅞ W	30.5
Reverse	*25½*	*NNE. ⅞ E*	*30.5*
14. Cape Charles Lighted Whistle Buoy 12, bearing 270° true distant 1 mile:			
Direct	241	WSW	11.4
Reverse	*61*	*ENE*	*11.4*
15. Middle Ground South End Lighted Bell Buoy 4, bearing 0° true distant 525 yards:			
Direct	250	WSW. ⅞ W	4.1
Reverse	*70*	*ENE. ⅞ E*	*4.1*
16. Tail of the Horseshoe Lighted Whistle Buoy TH, bearing 0° true distant 525 yards. (International Rules apply seaward of a line drawn between Cape Charles L. H. and Cape Henry L. H.)			

3. COAST FROM SANDY HOOK TO CAPE MAY

(Charts 1215 to 1219) (520) 41

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 be given a berth of 5 miles or more. Smaller vessels can follow the coast closer inshore, but they should pass outside the fish wier areas. From Corson Inlet southwestward to Cape May there are shoal spots with a least depth of 15 feet (4.6 m) extending in places up to 14 miles offshore, but with channels inside of them.

Inlets.—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 with their approximate depths (1936), are: Shark River Inlet, depth 5 feet (1.5 m); Manasquan Inlet, depth 8 feet (2.4 m); Little Egg Inlet, depth 9 feet (2.7 m); Absecon Inlet (January 1937), depth 15.2 feet (4.6 m), Great Egg Inlet, depth 11½ feet (3.5 m); and Cape May Harbor Inlet, depth 22½ feet (6.9 m). 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 Inland Waterway, extending from Manasquan Inlet to Cape May Harbor Inlet, is fully described in the United States Inside Route Pilot, Intracoastal Waterway, New York to Key West.

New York Bay and the surrounding area, including the Raritan, Navesink, and Shrewsbury Rivers, are fully described in the United States Coast Pilot, Atlantic Coast, Section B, Cape Cod to Sandy Hook.

Sandy Hook, the southern point at the entrance of New York Harbor, and the northern point of the New Jersey coast is low and sandy. On the northeastern end of Sandy Hook is *North Hook Fog Signal*, but the structure is not distinctly visible from seaward. The signal is an air horn. Near the western end of the hook are a Weather Bureau station where storm warnings are displayed from a tower, a Coast Guard Station and two tall observation towers of telegraph companies reporting vessels to the Maritime Exchange, New York City. These observation towers and a large black standpipe to the southeastward are the most prominent objects on the northern end of the hook. Southward from these are some houses, Sandy Hook Radio Direction Finder Station and Sandy Hook Lighthouse.

Sandy Hook including Island Beach 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.

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

Storm warnings are also displayed by the United States Weather Bureau at Bayhead, and at Little Egg, Atlantic City, Great Egg, Ocean City, and Avalon Coast Guard Stations.

Sandy Hook Lighthouse is a white stone tower. The light is fixed white, 88 feet (26.8 m) above the water, and visible 15 miles. This lighthouse is of especial interest as it was established in 1764, and is the oldest in use in the United States.

Sandy Hook Point light is on the northwest end of the point. The light is fixed white with a vertical beam, and a horizontal beam visible 11 miles. A fog bell sounds 1 stroke every 10 seconds.

Navesink Highlands is a prominent high wooded ridge about 276 feet high 5 miles southward of the north end of Sandy Hook, on the side of which, in a cleared space, and at an elevation of 180 feet, is Navesink Lighthouse. The latter consists of two brownstone towers connected by a dwelling. The light, shown from the south tower, is flashing white of high power (light 0.3 seconds, eclipse 4.7 seconds), 246 feet (75 m) above the water, and visible 22 miles.

The New Jersey coast is particularly distinguished by the large number of summer resorts and standpipes and tanks which show well to seaward. From Navesink Highlands southward to Bayhead there is practically a continuous line of summer resorts along the coast

The following are the names of the most important, with their distances southward of Navesink Lighthouse: **Seabright,** 2 miles; **Long Branch,** 6 miles; **Asbury Park,** 10½ miles; **Ocean Grove,** 11 miles; **Bradley Beach,** 12 miles; **Belmar** (south side of Shark River Inlet), 13 miles; **Springlake,** 15 miles; **Sea Girt,** 16 miles; **Manasquan,** 17 miles; **Point Pleasant,** 19 miles; and **Bayhead,** 20 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. When viewed from the end the light shows occulting white (light 10 seconds, eclipse 1 second). When seen from either side it shows light 10 seconds, eclipse 11 seconds. Mariners should be careful not to confuse this sign with any of the seacoast navigational lights. Springlake is marked by two large hotels with cupolas, Manasquan by a Coast Guard station, Point Pleasant by a tank and standpipe close together and Bayhead by a water tank.

Shrewsbury Rocks, 3½ miles southward of Navesink Lighthouse, extend 1¼ miles from shore, have a least depth of 14 feet (4.3 m), and are marked at the eastern end by a black can buoy and by a lighted bell buoy 0.9 mile farther eastward. Along a distance of about 5 miles there are 3 wrecks from 1¾ to 2¼ miles offshore in the general vicinity of the lighted bell buoy. Otherwise, southward to within 4 miles of Barnegat Inlet the coast is clear, and the 5-fathom (9.1 m) curve lies nowhere more than ¾ mile from shore.

Shark River Inlet, the only harbor between Sandy Hook and Manasquan Inlet, is 18 miles southward from Sandy Hook and 5 miles northward from the northern end of the New Jersey Inland Waterway. The inlet is frequented by small local yachts and fishing boats. Gasoline and provisions can be obtained. There are marine railways on either side of the river just east of the second highway bridge, capable of hauling out boats about 60 feet long and 5 feet (1.5 m) draft. Repairs can be made.

Shark River Inlet has been improved by the construction of two stone jetties. The entrance is marked by *Shark River Inlet Lighted Bell Buoy*, *Shark River Breakwater Light* which is located on the outer end of the south jetty, and by Shark River North Breakwater Light located on the end of the north jetty. In May, 1936, it was reported that there was a controlling depth of 8 feet (2.4 m) at mean low water across the bar to the first bridge at the inner end of the jetties, thence 4 feet (1.2 m) to the basin just beyond. The channel to the wharves near the second bridge is crooked. It is marked by stakes and buoys but local knowledge is required for the best water. A 7-foot (2.1 m) channel is being dredged near the south side of the river through the second, third and fourth bridges to Belmar Yacht Club about ½ mile beyond. The general depth in the river above the bridges is 2 to 6 feet (0.6 to 1.8 m).

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

In entering, the north jetty should be favored at a distance of about 50 feet until about ¾ of the way from the outer end of the jetty to the highway bridge at the shore ends of the jetties; an "S"

turn is then made through the bridge. A cross-current, strongest on the ebb tide, may be experienced here. Strong currents sweep through the inlet and entrance should not be attempted by boats for which there is insufficient clearance at the bridge. A vessel should wait until the span of the bridge at the entrance is completely open. It is recommended that strangers employ a pilot. A substation of the United States Coast Guard, equipped with a motorboat hanging on davits, is located on the south side just inside the entrance bridge to render emergency service.

The mean range of tide at the Inlet entrance is about 4 feet.

The highway bridge at the entrance has a double-leaf bascule span, horizontal clearance 50 feet, vertical clearance when closed, 14.7 feet (4.5 m) *at mean low water*. The bridge is tended all the time. Extracts from the regulations governing the opening of the draw of this bridge follow:

Call signals for opening the draw.—The sound signal is 3 distinct blasts of a whistle, horn, or megaphone, or 3 loud and distinct strokes of a bell, sounded within a reasonable hearing distance of the bridge.

The visual signals used in conjunction with the sound signals when the conditions are such that the sound signal may not be heard are 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.—When draw is to be opened immediately, the sound signals are the same as those for call signals, and the visual signal is 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.

When the draw cannot be opened immediately, or if open must be closed immediately, the sound signal is 2 long distinct blasts of a whistle, horn or megaphone, or 2 loud and distinct strokes of a bell until acknowledged by the vessel; and the visual signal is 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.

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

The following are the additional bridges crossing the river, the distance in nautical miles above the entrance, the least width of the openings, and the headroom at high water when closed:

South channel, highway (bascule), 0.6 mile, 50 feet, 8 feet (2.4 m).
South channel, railroad (fixed), 0.75 mile, 50 feet, 8 feet (2.4 m).
South channel, highway (fixed), 0.78 mile, 50 feet, 10½ feet (3.2 m).

It is reported that the latter two bridges are later to have draw spans. The three corresponding north channel bridges have fixed spans with least width of 20 feet and least headroom at high water of 7 feet (2.1 m).

Sea Girt Inlet, just northward of Sea Girt Lighthouse, is closed at low water, and is only occasionally used at high water and with a smooth sea by small fishing boats of 2 feet (0.6 m) draft. The mean range of tide at the entrance is about 4 feet.

Sea Girt Lighthouse, 16 miles south-southwestward of Navesink Lighthouse, is a square red-brick tower in front of a dwelling. The light is flashing white.

Manasquan Inlet, 23 miles southward of Sandy Hook, is the northern entrance to the **New Jersey Inland Waterway** which extends southward to Cape May Harbor Inlet. The entrance is protected by jetties and a channel has been dredged 10 feet (3.0 m) deep from seaward to and including the channel between the jetties. On June

30, 1936 the controlling depth in the inlet was 8 feet (2.4 m) at mean low water from the 10-foot (3.0 m) curve in the ocean to a point 700 feet easterly of the New York and Long Branch Railroad bridge at the connection with the New Jersey Inland Waterway, except for a few scattered shoals between the jetties of 4 to 6 feet (1.2 to 1.8 m) depth. The mean range of tide at the entrance is about 3.8 feet.

The entrance is marked by *Manasquan Inlet Bell Buoy* located in 40 feet (12.2 m), 0.5 mile, 126½° true from **Manasquan Inlet North Breakwater Light** which is on the outer end of the north breakwater. Strangers should enter with caution and it is recommended that a local pilot be used if one is available. To enter steer from the sea buoy to midway between the ends of the jetties. Then favor the north jetty and bank at a distance of about 30 yards to the staked channel. Pass about midway between the north bank and black buoy 1.

There are three marine railways at Manasquan, capable of hauling out boats up to 40 feet long and 5 feet (1.5 m) draft, and making usual small boat repairs.

The New Jersey Inland Waterway from this inlet southward to Cape May Harbor had a controlling depth reported in May 1936 to be 4 feet (1.2 m).

Local vessels of greater draft, however, navigate the lower reaches of Barnegat Bay, the channel between Cape May Harbor Inlet and Ottens Harbor at Wildwood, and other sections.

The New Jersey Inland Waterway is also entered from seaward through a number of inlets with shifting entrances, in most cases marked by buoys. The inlets and interior waters give access to a large number of summer resorts along the beach and many villages on the mainland. They are used by many pleasure boats and boats engaged in the oyster and clam industry and inside and outside fishing. There is considerable passenger and general freight business between points inside, but little coasting trade. *The New Jersey Inland Waterway (Chart 3243) is fully described in United States Inside Route Pilot, New York to Key West*, published by the Coast and Geodetic Survey, price 50 cents.

Bridge Regulations, New Jersey Inland Waterway and Tributaries.—The signal for opening drawbridges is three blasts of the whistle or horn on the vessel desiring to pass through. If the bridge cannot be opened immediately two blasts of a whistle or horn will be blown on the bridge or, in lieu thereof, a red flag will be waved by day and a red light by night. Three blasts of the whistle or horn on the bridge will indicate that the draw opening is clear or, in lieu thereof a white flag will be waved by day and a white light by night. Bridges of a group close together operate as a unit.

Between the hours 6 a. m. and 11 p. m., the bridges of the West Jersey and Seashore Railroad and of the Atlantic City Railroad over Beach Thorofare at Atlantic City, N. J., will be opened upon signal only during the periods of 20 to 30 minutes past each hour.

Ice sufficient to interfere with the navigation of small craft may be expected in the Inland Route at any time between December and April and is most severe during January and February. The canals and other waterways are kept open as long as navigation is possible and are opened as soon as navigation is practicable in the spring.

During mild winters navigation is possible most of the time, but strangers should make inquiries as to conditions before attempting the passage.

Caution.—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 sunk after passing through only a few yards of thin ice.

The beaches separating the inside waters from the ocean are low, and the summer resorts are more widely separated than those northward. For vessels bound southward along the coast the first landmark southward of Bayhead is the town of **Mantoloking** consisting of a large group of houses. Southward of this are **Chadwick, Lavallette** and **Ortley,** small groups of houses with a standpipe at Lavallette. About 1 mile southward of Ortley is **Seaside Heights,** a town with a standpipe at the north end, and 1½ miles farther south is **Seaside Park,** marked by a black water tank.

There is a small group of houses around Island Beach Coast Guard Station, 1¼ miles southward of Seaside Park, and from there to Barnegat Inlet, a distance of about 7½ miles, the only marks are the Coast Guard stations.

Barnegat Lighthouse, the most prominent mark in the vicinity of Barnegat Inlet, is a conical tower, lower half white, upper half red. The light is flashing white (flash 2.5 seconds, eclipse 7.5 seconds), 175 feet (53 m) above the water, and visible 19 miles.

Barnegat Lightship is established 8 miles east true from Barnegat Inlet. It shows an occulting white light visible 12 miles, and is equipped with a radiobeacon and with distance-finding facilities. The fog signal is an air horn blast 3 seconds, silent 17 seconds. The submarine bell sounds groups of 3 strokes every 15 seconds. The code flag signal and radio call letters are WRA. The ship has a ~~black~~ hull with the word "**Barnegat**" painted on each side in large white letters.

Barnegat Inlet, 43 miles south of Sandy Hook, is marked on the south side by *Barnegat Lighthouse*, the most prominent mark in the vicinity. The entrance and the channel across the bar are marked by a bell buoy, a lighted buoy and several other buoys 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 7 feet (2.1 m) at high water. Strangers usually take a pilot, either picking up a fisherman outside or setting a signal and waiting for one from Barnegat City. With a smooth sea it is usually safe for boats of 3 to 4 feet (0.9 to 1.2 m) draft to enter by following the buoys. In December 1936 there was a depth of 5 feet (1.5 m) at mean low water over the bar; thence 4.1 feet (1.2 m) through Oyster Creek Channel, and across the bar to deep water in Barnegat Bay. The Coast Guard reports that during prevailing northeast winds the approach to the inlet has been known to shoal to a depth of only 2 feet (0.6 m), and, unless unusually smooth, it is then impossible for any type of boat to enter. The channel changes so rapidly that directions are impossible.

Inside the entrance the channels are more stable, and there is good anchorage in the channel southwestward of the lighthouse. From the inlet the principal inside channel, which is buoyed, and has a least depth of about 4 feet (1.2 m), leads southwestward and northward, as

shown on the chart, until westward of Sedge Island, and then through Oyster Creek Channel to the route of the New Jersey Inland Waterway.

There is a project providing for two converging stone jetties at the inlet entrance, a 10-foot (3.0 m) dredged channel through the outer bar and an 8-foot (2.4 m) dredged channel southwest of Sedge Island and to the route as above.

The mean range of tide at the Inlet is 2.7 feet, 0.5 feet at Oyster Creek Channel and less than a foot at the south end of Barnegat Bay.

Barnegat City is a summer resort with a permanent settlement of oystermen and fishermen. A privately dredged channel leads from the Barnegat Inlet channel southward to the landings on the inner beach just inside the point. There are no public docks but boats sometimes tie up at the Coast Guard Station bulkhead. Gasoline may be secured in limited quantities in an emergency at the fish company dock. There are no channels from the inlet southward between the islands except for small boats at high water.

Lying 4 miles southwestward of Barnegat Lighthouse is **Highpoint**, marked by a black water tank, and 1 mile farther south is **Harvey Cedars**, a small settlement without prominent marks. Two miles below it is **Surf City**.

Southwestward of Surf City are several small settlements with standpipes or water tanks, and 14 miles southwestward of Barnegat Lighthouse is **Beachhaven**, a large town marked by a black water tank and a tall yellow smokestack. There is a small group of houses around Bond Coast Guard Station, 1½ miles southwestward of Beachhaven, and another group at **Tucker Beach**, 2½ miles farther southwestward.

Beachhaven Inlet has broken through the beach 3 miles southward of Beachhaven, and should not be mistaken for Little Egg Inlet. The entrance is marked. It has two narrow, shifting, winding channels with a controlling depth of about 3 feet (0.9 m), but they should not be attempted without local knowledge, as the buoys may not mark the latest channel. Tucker Island separating Beachhaven and Little Egg Inlets is eroding. The Coast Guard formerly on this island have been transferred to the north side of Shooting Thorofare. The building was left standing. The mean range of tide at Tucker Island is about 3 feet.

There is broken ground along the outside coast and a charted wreck between Barnegat and Little Egg Inlets, and vessels should give this area a berth of about 3 miles or more to insure a depth of 30 feet (9.1 m).

Little Egg Inlet, southward from 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, and in August 1936 a survey showed 9 feet (2.7 m) at mean low water. Breakers from all the way across the entrance only in very heavy weather. The shore and channels at the inlet are subject to rapid change, both in location and depths. The entrance is marked, but strangers should not enter before obtaining local information as to conditions. The buoys are not charted because they are frequently shifted in position. There are no regular pilots, but strangers usually can pick up a fisherman outside to act as a pilot, or can set signal and wait for one from the Coast Guard station.

From Little Egg Inlet to Absecon Inlet, a distance of 8 miles, there are Coast Guard Stations, two tanks and groups of houses at Brigantine Beach. A large conspicuous hotel with pier is located due south of South Brigantine Coast Guard Station (closed). Two wrecks eastward of Iittle Egg Inlet, and broken ground, extend nearly 5 miles offshore. The broken ground is marked at the 18-foot (5.5 m) depth by a red buoy and at its eastern end by Brigantine Shoal lighted whistle buoy, both buoys due east of the above hotel.

Brigantine Inlet is 5 miles northeastward of Atlantic City and 4 miles southwestward of Tucker Beach. It has about 7 feet (2.1 m) at high water. It is not buoyed, and the only boats using it 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 inlets not protected by jetties are subject to frequent changes. The Coast Guard station is the only mark. The mean range of tide at the entrance is about 3½ feet. The several thoroughfares leading from Brigantine Inlet are shoal at their western ends and can only be navigated by small boats at high water. Strangers should not enter them.

Absecon Inlet is marked on the south side by a yellow and black conical tower (former lighthouse) 170 feet high and by the buildings at Atlantic City, the largest resort on the Atlantic Coast, showing well seaward. An aviation beacon (occulting red) 284 feet high is privately maintained on the roof of an hotel at the south end of the city. A whistle buoy about 3½ miles and a bell buoy about 1½ 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 these 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 Inland Waterway. The shore on the south side of the inlet is protected from extensive change by artificial means.

Absecon Inlet is improved by dredging. The project calls for maintaining an entrance channel 20 feet (6.1 m) deep and 400 feet wide. In January 1937 there was a controlling depth in the channel across the inlet bar of 15.2 feet (4.6 m) and 13.1 feet (4.0 m) to the Brigantine Bridge. Breakers extend across the inlet in heavy weather. The mean range of tide at the entrance is about 4 feet. Strangers, unless of light draft, usually take a pilot, either picking up a fisherman outside or signaling for a pilot from shore. Strong currents are experienced in the channel and care must be exercised in making the passage through the Brigantine Beach highway drawbridge. The ebb tide causes a cross current which runs east and west; the current on the flood runs fair with the bridge. The above double-leaf bascule bridge has a draw span 75 feet wide and headroom at high water when closed of 11½ feet (3.5 m)

For information regarding additional bridges see the United States Inside Route Pilot, Intracoastal Waterway, New York to Key West. (For bridge regulations see p. 65 of the present volume.)

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.

The **Yachtsman's Dock** at the north end of Atlantic City has a depth of 30 to 40 feet (9.1 to 12.2 m) along the outer face and from 5 to 6 feet (1.5 to 1.8 m) 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.

Gardner Basin, a bulkheaded basin nearly ½ mile long and 60 yards wide, has its entrance 500 yards westward of the Yachtsman's Dock. It has a depth of 6 feet (1.8 m) in midchannel to the head and is used by many motor boats. All boats make fast to the bulkheads, for which a wharfage charge of $1.00 per day is made. All kinds of supplies are obtainable, and there are marine railways and machine shops. The mean range of tide is a little less than 4 feet. Daylight storm signals are displayed at the Atlantic City Tuna Club by the U. S. Weather Bureau.

Snug Harbor and **Delta Basin** lie just west of Gardner Basin. Both have a depth of about 8 feet (2.4 m).

There are also numerous wharves and boathouses on the west front of Atlantic City along **Beach and Inside Thorofares.** The route of the Inland Waterway passes southwestward through these passages with a controlling depth of 6 feet (1.8 m) in this vicinity in May 1936. A speed limit of 7 miles per hour is enforced in the channel off Ventnor.

There are a standpipe and chimney of same height close together at **Ventnor,** 3½ miles southwestward of Absecon Inlet, a standpipe at **Margate City,** and a standpipe at **Longport,** a summer resort on the north side of Great Egg Inlet.

Great Egg Inlet, 7½ miles south of Absecon Inlet, had a reported depth in December 1936 of 11½ feet (3.5 m) at mean low water in the channel across the bar. A bell buoy and a lighted buoy about 1¾ miles southeast of the inlet mark the seaward entrance. The channel buoys are not charted because of occasional shifts to conform to the best water. Local information as to conditions should be obtained before entering. Boats of 4 to 5 feet (1.2 to 1.5 m) 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 may usually be had from fishing boats outside or from Ocean City in answer to signal. The inlet is used by many yachts of 4 to 6 feet (1.2 to 1.8 m) draft and local fishing and pleasure boats. In winter it is used only by a few fishermen and is often rendered dangerous by floating ice. Breakers extend across the inlet in moderately heavy weather. The mean range of tide at the entrance is about 4 feet.

The New Jersey Inland Waterway passes around Great Egg Inlet northwestward of Longport bridge, through Broad Thorofare bridge and west of the toll bridge at the northeast end of Ocean City. The controlling depth in May 1936 in this stretch was 6 feet (1.8 m). The toll and Longport bascule bridges have channel spans of 90 and 50 feet with headrooms of 18 and 9 feet (5.5 and 2.7 m), respectively, when closed. (For bridge regulations see p. 65).

Ocean City, a large summer resort on the south side of Great Egg Inlet, has railroad and highway connections with the mainland. There are also highway connections southward along the beach to

Corson Inlet, and northward through Atlantic City to Brigantine Inlet. There are two prominent standpipes and gas tanks. The wharves are on the northwest side ½ to 1½ miles southwestward of the inlet and have depths of 2 to 6 feet (0.6 to 1.8 m) at the ends. There are two launch basins accommodating boats up to 5-foot (1.5 m) draft. Gasoline can be secured at the wharves and yachting supplies in the town. Minor engine repairs can be made.

Corson Inlet, 7 miles southward of Great Egg Inlet, had a reported depth in December 1936 of 4 feet (1.2 m) at mean low water. The seaward entrance is marked by a bell buoy about 1 mile southeast of the inlet. The channel buoys are not charted because they are frequently shifted in position to mark the best water. The inlet is not recommended for a stranger and local information should be obtained before attempting to enter. It is only used by a few local fishing and pleasure boats up to 4 or 5 feet (1.2 to 1.5 m) draft. The appearance of the water is the best guide. The mean range of tide at the entrance is about 4 feet.

The channel from Corson Inlet northward into **Main Thorofare** is bare at low water and is crossed by two fixed bridges. It is seldom used. The main channel leads southwestward through two drawbridges at Strathmere, then southward of a marshy island and close along the south shore to the east side of **Beach Thorofare**; it then leads north-northwestward for the south point of the marsh and follows it to **Ben Hands** and **Upper Thorofare** which are in the route of the New Jersey Inland Waterway. A draft of about 5 feet (1.5 m) can be carried from inside the inlet to this point. Of the two drawbridges, the draw span, width 31 feet, of the northern one is kept open at all times except during passage of trains, and the head room at high water of the highway draw spans, width 32 feet, of the southern bridge is 4½ feet (1.4 m) when closed. (For **bridge regulations** see p. 65.)

Peck Beach is a small group of houses, without prominent marks, about 1 mile northward of Corson Inlet. It can only be reached by small boats at high water from westward. **Strathmere** is a village and railroad station on the south side of the Inlet. An aluminum painted water tank is prominent.

Sea Isle City is a summer resort on the beach about midway between Corson and Townsend Inlets. The most prominent marks are a slender aluminum painted standpipe, a gray brick stack ¼ mile southward of it, and two church spires farther south. There are railroad and highway connections to the mainland and across Corson Inlet. **Ludlam Beach Lighthouse** (flashing white, with red sector), visible 12 miles, near the north end of the town, is not prominent by day.

There is a shoal with a depth of 15 feet (4.6 m) marked by a buoy with red and black horizontal bands 3¼ miles southeastward of Ludlam Beach Lighthouse and a lighted buoy (flashing red) marks a 24-foot (7.3 m) spot in the same direction about 7 miles from the lighthouse. Broken ground, with a least depth of 4 fathoms (7.3 m), extends about 2½ miles east-northeastward, and is marked there by a lighted bell buoy. A wreck lies about 3½ miles southwest of the latter buoy. There is deeper water inside these shoals, but, on account of the broken bottom, abrupt changes of depth, and fish trap limits (chart 1217) vessels should pass outside of them.

Townsend Inlet, about 6½ miles southward of Corson Inlet, had a reported depth in December 1936 of about 5½ feet (1.7 m). It is used by small fishing and pleasure boats and an occasional cruising yacht up to 5-foot (1.5 m) draft, which enter only at high water and with a smooth sea. The channel and shore line 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 mean range of tide is about 4 feet at the entrance.

Townsend Inlet is a small resort just northward of the inlet. There are no prominent marks. There is a wharf, with a depth of 12 feet (3.7 m), alongside.

Avalon is a resort on the south side of Townsend Inlet. A black standpipe is the most prominent mark. A privately dredged channel leads from ⅓ mile westward of the Inlet southeastward through the marsh to the town and along the western side, with an outlet into Ingram Thorofare just west of the highway drawbridge and one east of the same bridge. These two outlets have at least 6 feet (1.8 m) at low water but, due to the fixed bridge between them, none but unmasted boats may pass between them. A public wharf with 3 feet (0.9 m) at the end is located at the southeast end of the southern one. Gasoline and some supplies can be obtained at Avalon.

The New Jersey Inland Waterway crosses the Inlet just west of Townsend Inlet narrows, and in May 1936 had a controlling depth of 6 feet (1.8 m) in this vicinity.

Peermont is a small resort on the beach 1½ miles southwestward of Townsend Inlet.

Stone Harbor is a summer resort on the beach about 3 miles northeastward of Hereford Inlet. It is marked by a slender standpipe with a white top. There are depths of 15 to 25 feet (4.6 to 7.6 m) in the channel off the town, but the Inland Waterway has only 6 feet (1.8 m) controlling depth reported along this stretch in May 1936. There are several privately dredged basins near the bridge. The bascule draw span is 50 feet wide with headroom when closed at high water of 12 feet (3.7 m). Boats up to 50 feet length and 4 foot (1.2 m) draft can be hauled out and repaired. Supplies are available. The mean range of tide inside is about 3 feet.

Hereford Inlet, 6 miles northeast of Cape May Harbor, had a reported depth in December 1936 of 8 feet (2.4 m) 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 buoys, are not charted, and entrance should not be attempted before obtaining local information as to conditions. There are large areas bare at low water and usually have a sand ridge showing at high water. They are covered with marsh grass in summer. 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 tide at the entrance is about 4 feet.

The inlet is used by many fishing boats and some yachts. Pilots can usually be obtained from fishing boats outside. Stone Harbor Coast Guard station is the only mark on the north side of the inlet.

There are buildings on the south side all the way from Hereford Inlet to 2 miles north of Cape May Harbor, and several prominent marks. **Hereford Inlet Lighthouse** (group flashing white, red sector), visible 13 miles, is a white tower on a dwelling and is not prominent by day. There are two standpipes, black and aluminum color, ¼ mile westward of it at North Wildwood.

The Inland Waterway passes the inlet west of **Nummy Island** with a controlling depth here of 5 feet (1.5 m) in May 1936, and 6 feet (1.8 m) from the inlet to Wildwood.

Anglesea is a summer resort on the south side of Hereford Inlet and is frequented by a large number of fishing boats. There are several wharves along the water front northwestward of the Coast Guard station.

North Wildwood, Wildwood, Holly Beach, and **Wildwood Crest** are summer resorts on Five Mile Beach. There is a black slender standpipe at Wildwood and at Wildwood Crest as well as a yellow tower at the latter town.

Cape May Harbor (Cold Spring Inlet) (Chart 234) is used by fish steamers, pilot boats, and many yachts and large pleasure boats. Some of these anchor in the west end of the harbor, the others go to the wharves, or up **Cape Island Creek** to landings near the bridge. This bridge (bascule) has a draw span 38 feet wide and headroom of 5 feet (1.5 m) when closed at high water. (For **bridge regulations—Inland Waterway of New Jersey and Tributaries**—see p. 65.)

Many fishing steamers go to the fish wharf up the first channel opening to the eastward from the east end of Cape May Harbor. Gasoline, fuel oils, and coal in small quantities can be obtained at the wharves. There are several marine railways, one of which can handle vessels up to 10-foot (3.0 m) draft, 125-foot length, and 200 tons.

The controlling depths at the main wharves were reported in 1936 to be about 8 to 15 feet (2.4 to 4.6 m).

The improved channel from the sea extends between two stone jetties and had a controlling depth of 22½ feet (6.7 m) on June 30, 1936. The outer end of the west jetty is submerged and should not be rounded close. The channel in the harbor is marked by buoys. There are flashing lights on the outer ends of the jetties, the western one being green and the other white. A fog bell has been established on the west jetty just inshore from the light.

Cape May Harbor Whistle Buoy, 0.4 mile southeast of the jetties, marks the seaward entrance. The mean range of tide is about 4 feet. A large hangar and water tank on Sewall Point are prominent. There are railway connections.

Rifle range.—A danger zone of a rifle range extends about 1 mile from shore ⅜ mile westward of Cape May Harbor entrance. The rifle range is in use from May to October, and vessels are warned to avoid this area during that time.

Cape May Harbor forms the southern end of the New Jersey Inland Waterway leading from **Jarvis Sound** through the **Middle Thorofare**. In 1936, the controlling depth in this waterway to **Ottens Harbor (Wildwood)** was 10 feet (3.0 m).

About 2 miles westward of the entrance to Cape May Harbor is **Cape May**, a summer resort having several large and prominent hotels; and 2 miles westward of Cape May is the summer resort of **Cape May**

Point, marked by Cape May Lighthouse. **Storm Warnings** are displayed at the Cape May Point Coast Guard station just south of the lighthouse.

Cape May Lighthouse (flashing white every 30 seconds) 165 feet (50 m) above the water and visible 19 miles, is a gray tower with two white dwellings.

Five Fathom Bank is an area of broken ground about 13 miles eastward of Cape May. It is about 9 miles long in a northerly and southerly direction inside the 5-fathom (9.1 m) curve and about 2 miles wide, and there are detached shoal spots eastward and northward of it. The least depth found is 15 feet (4.6 m), lying 10 miles 133° true (SE. ⅝ S. mag.) from Hereford Inlet Lighthouse, and is marked on the northeast side by *Five Fathom Bank Buoy FFB*. Southward 3½ miles off a 23-foot (7.0 m) shoal a red nun buoy marks the south end of the shoals. It should be passed eastward and southward. Lighted whistle buoys mark the northeast and northwest parts of the bank, and the latter the east side of the passage inside of the bank. The greater part of the shoal is within authorized fish trap limits (chart 1219).

Two wrecks are charted between the former buoy and Five Fathom Bank Lightship. There is very broken ground, with 5 fathoms (9.1 m) or less, and abrupt changes in depth, between Five Fathom Bank and Cape May, and there is broken ground extending to a distance of about 7 miles southward of Cape May Harbor and Cape May.

The **passage inside of Five Fathom Bank**, passing either eastward or westward of McCrie Shoal, is generally used by coasting vessels entering Delaware Bay from northward. In a heavy sea, vessels of a greater draft than 18 feet (5.5 m) should pass outside of Five Fathom Bank, and this is also the safer course at all times for strangers in vessels of a greater draft than 18 feet (5.5 m).

In the submarine slough extending northeastward to the middle of the western side of Five Fathom Bank an area 1 mile wide and 4 miles long (approximately delineated by the section of the 10 fathom (18.3 m) curve, chart 1219) has been authorized as dumping grounds to a least depth of 50 feet (15.2 m) below mean low water. In August 1936 it was reported that no appreciable decrease in depths had taken place.

Five Fathom Bank Lightship, about 4 miles southeastward of the south end of Five Fathom Bank, has a straw-colored hull with "Five Fathom" on the sides and two masts with red grating at each masthead. The station buoy is 0.1 mile north of the lightship. Light shown from foremast 65 feet above the water is occulting white every 6 seconds and visible 14 miles. The riding light is fixed white, on forestay, 23 feet high. The fog signal consists of two steam horns, sounded alternately, horns point athwartship, one to starboard and one to port. Each sounds a 2-second blast, silent 28 seconds, and so timed that there is a blast every 15 seconds. A whistle is used if the horns are disabled. ~~The submarine bell strikes groups of 4 and 2 strokes "42" every 28 seconds.~~ A radio beacon transmits signals and there are distance finding facilities (see p. 30). The code flag signal and radio call are WRE.

McCrie Shoal, having a least depth of 18 feet (5.5 m), lies 7 miles 136° true (SE. ⅞ S. mag.) from Cape May Lighthouse. It is marked

on the southeast side by a lighted whistle buoy. The shoals and channels southwestward of Cape May are described under "Delaware Bay, Eastern Side."

Tides.—The mean range of tide on the outside coast varies from about 4 to 4⅛ feet.

Storm warnings of the United States Weather Bureau are displayed along the coast at several stations. (See p. 38.)

4. DELAWARE BAY AND RIVER

(Charts 1219, 1218, 379, 294, 295, 280, and 296)

GENERAL

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, 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 near Cape Henlopen is available for vessels of any draft. (See "Channels," following.)

The Delaware and Raritan Canal, between New York and Delaware River, has been abandoned.

Vessels of 12 feet (3.7 m) draft can pass from the Delaware River to Chesapeake Bay through the Chesapeake & Delaware Canal. The project depth underway calls for a channel 27 feet (8.2 m).

The inside route from Delaware River to Chesapeake Bay is described on page 307.

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."

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 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, but a channel with a depth of 35 feet (10.7 m) or more leads from the entrance to the lower end of the dredged channel 3½ miles above Ship John Shoal Lighthouse. The least width (about ¼ mile between the 30-foot (9.1 m) curves) is abreast Elbow of Cross Ledge Lighthouse. The channel is well marked by lighthouses and buoys, but strangers in deep-draft vessels should not attempt to enter by night.

Improvements to December 1936 have provided a channel with a controlling depth of 35 feet (10.7 m) from the 35-foot (10.7 m) depth curve in Delaware Bay to Allegheny Avenue (upper end of Port Richmond), Philadelphia, 800 feet wide in the straight reaches, 1,200 feet wide at Bulkhead Bar, 1,000 feet wide at other bends and in Philadelphia Harbor. The limiting depth was in the upper Philadelphia harbor, below which the controlling depth was 34.4 feet (10.5 m).

The project from Allegheny Avenue to the Delair Bridge calls for a depth of 28 feet (8.5 m), thence 25 feet (7.6 m) deep to the upper end of the Marine Terminal at Trenton, N. J., both reaches being 300 feet wide; thence 12 feet (3.7 m) deep and 200 feet wide to the Penn. R. R. bridge at Trenton. In 1936 there was a controlling depth of 26.1 feet (8.0 m) from Allegheny Avenue to the Delair Bridge, thence[1] 20.2 feet (6.2 m) to the Trenton Marine Terminal, and 10 feet (3.0 m) to the Penna. R. R. bridge. There is a turning basin 25 feet (7.6 m) deep 1,700 feet long and 500 feet wide off the above Terminal.

The condition of this channel is given at frequent intervals in the Notice to Mariners.

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 no. 294. They are marked by lights as shown on 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 p. 87.)

Deep-draft vessels sometimes anchor in the vicinity of the main channel above Fourteen Foot Bank Lighthouse. **Bombay Hook Roads** is the widened part of the channel of the bay between Ship John Shoal Lighthouse and the entrance to the dredged channel, which was formerly used as an anchorage by sailing vessels while waiting for a favorable tide to cross Duck Creek Flats. Deep-draft vessels can anchor here, south of the Liston range, in 5 to 7 fathoms (9.1 to 12.8), soft bottom; the shoals rise abruptly in places on the sides of the channel, as shown on the chart.

In Delaware River there is good anchorage anywhere where the depth and bottom are suitable; in every case care must be taken not to anchor on or close to the ranges, nor in the dredged channels. The improved anchorages off Philadelphia are on the eastern side of the channel abreast Gloucester and abreast Petty Island. (See Gloucester and Port Richmond Anchorages.)

Marcus Hook Anchorage is on the southeast side of Marcus Hook channel between Marcus Hook Bar and abreast Birch Creek. The area abreast the United States Quarantine Station is reserved for Quarantine Inspection. NOTE.—Should the remainder of the 35-foot (10.7 m) Marcus Hook Anchorage be in use, this reserved area, when unoccupied may be used by deep draft vessels *not* subject to quarantine inspection. See next page.

[1] 26 feet (7.6 m) in March 1937.

Mantua Creek Anchorage is on the east side of the Mifflin range channel at its lower end, opposite the mouth of Mantua Creek.

Small, light draft vessels must anchor in the angle marked by lighted buoy 2 F, or above the upper jetty at Mantua Creek, east of the anchorage limits.

Gloucester Anchorage is east of the dredged channel off Gloucester Point.

Port Richmond Anchorage is south of the dredged channel between the upper and lower ends of Petty Island. Light draft vessels must anchor west of pier no. 11, Port Richmond. There is a restricted area off Crew Levick Wharf, Petty Island, to facilitate the movement of vessels.

The limits of these four improved anchorages are shown on chart 295. In May 1936, the controlling depths were 35 feet (10.7 m) except Gloucester Anchorage which was 30 feet (9.1 m).

Unimproved additional anchorages are established by the Commissioners of Navigation of Pennsylvania, as follows:

Deepwater Point Anchorage is to the eastward of the channel, marked by Cherry Island Range Lights; to the northward of a line running 280° true from Deepwater Point Range front light; to the southward of a line running 112° true from the Christiana Creek South Jetty.

Marcus Hook Anchorage is east of the dredged channel and extends northeastward of the area reserved for Quarantine Inspection (see above) to abreast of Raccoon Creek entrance. Vessels drawing 25 feet (7.6 m), or under, *and not subject to quarantine inspection*, must anchor above the Sinclair Oil Company's Wharf at Marcus Hook and to the southward of the main ship channel.

Thompson Point Anchorage is south of the dredged channel and extends between Thompson Point and Crab Creek. It is used for loading Explosives only.

League Island Anchorage is north of the dredged channel and adjacent to the Navy Yard opposite Eagle Point. Special permission must be obtained to anchor in this area.

Greenwich Anchorage is east of the dredged channel extending northward from Gloucester Anchorage to abreast Kaighn Point. There is a restricted area south of Jefferson Street, Camden to facilitate movement of carfloats. Should Greenwich and Gloucester Anchorages become so congested that vessels are compelled to anchor in restricted area of Greenwich Anchorage, they must move immediately when another berth is available.

Cooper Point Anchorage is east of the dredged channel and west of Cooper Point, in such a position as not to interfere with vessels going to or from Cooper River.

These anchorage areas are evident on the chart but for further details see Harbor Rules and Regulations, Port of Philadelphia, revised June 4, 1935, and copies of which are available at room 344, Bourse Building.

Vessels carrying explosives may anchor anywhere in the Delaware River below Point House Wharf, near the lower end of Philadelphia Harbor, subject to local regulations, which are administered by the Commissioners of Navigation of Pennsylvania.

War vessels of the United States and of foreign nations and pleasure yachts, with permission of the Commissioners of Naviga-

tion, 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 Rivere.

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 Lighthouse to Cape Henlopen ~~Lighthouse~~.

The fees for piloting between Delaware Bay entrance and the port of Philadelphia or any other place on Delaware River (see p. 119) are as follows: Vessels of 12 feet or less draft, $2 per ½ foot; vessels of over 12 feet draft, $2.50 per ½ foot. An increase of 10 per cent over these fees is charged when a vessel is spoken east of Five Fathom Bank lightship or north of Hereford Inlet Lighthouse or south of Fenwick Island Lighthouse, and a deduction of 10 per cent is made when a vessel is spoken inside of a line joining Cape May and Cape Henlopen Lighthouses, 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.

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 Light 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 will be found aboard one vessel, either a steamer or auxiliary schooner, which will be found cruising outside the entrance of the bay.

In case a pilot having charge of a vessel and whilst conducting said vessel be detained, either by order of the master, owner, or con-

signee, 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 in Delaware Breakwater for orders usually retain the pilot and pay him the detention fee.

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, Pa., and Bivalve, Dorchester, and Greenwich Pier, N. J. 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 sailing 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 that requires the services of steam, 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 Fort Delaware, 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 sailing vessels, which if caught in the pack ice are set on the shoals, and 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 119.

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 reporting stations at Delaware Breakwater and Marcus Hook, and by day from reporting stations at Reedy Island and New Castle. During the ice season an auxiliary station is placed in commission at Gloucester, N. J. Messages can be exchanged by International Code with any of the stations during the day and with the Delaware Breakwater 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 Refage Lighthouse. The station will answer all signals with pennant by day and by one long flash, followed by one short flash, at night. The fol-

lowing 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.

The Superintendent of Lighthouses for the fourth district has offices in the Customhouse. In reporting defects in aids to navigation see page 15.

Towboats will usually be found cruising in the river and bay or at Delaware Breakwater. Towboats to tow vessels or barges into the tributaries of Delaware River are usually engaged from Delaware City, Wilmington, or Philadelphia.

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

Quarantine.—Federal quarantine stations are maintained at Reedy Island and at Marcus Hook, Pa. Vessels are boarded by the quarantine officer at Reedy Island for Wilmington and ports below, and at Marcus Hook for ports above, and all vessels subject to inspection are required to stop until given practique. Inspection of vessels will be made at the Harbor of Refuge by the quarantine officer at Lewes, Del., if desired but this is seldom done. Vessels with sickness on board should anchor at Reedy Island until inspected. The quarantine hospital is located at Marcus Hook and a detention station is maintained at Reedy Island.

Supplies.—Coal and fuel oil for large vessels can best be obtained at Philadelphia and Wilmington and for small steamers and tugs at these places and at Delaware City, Pigeon Point, and Chester. Water is obtainable at all of these places, and at half ebb tide the water in the river as far down as Chester is fresh enough for use in boilers. Gasoline and provisions are obtainable at all of the towns on the river and bay. Points near Delaware Bay where they are obtainable 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 Coast Guard station, Delaware Breakwater, Bivalve, and Reedy Island. (See p. 38.) A branch office of the Weather Bureau is maintained at the Customhouse, Philadelphia, to serve marine interests.

Tides.—The mean range of tides is 4.2 feet at Delaware Breakwater Harbor, 4.9 feet at Brandywine Shoal Lighthouse, 5.8 feet at Elbow of Cross Ledge Lighthouse, 5.9 feet at Ship John Shoal Lighthouse,

5.9 feet at Reedy Island, 5.4 feet at Marcus Hook, and 5.2 feet at Philadelphia. Tidal information for the tributaries is given under their descriptions. Full tidal information, including daily predictions for Philadelphia and Breakwater Harbor, is given in the Tide Tables for the Atlantic Ocean.

CURRENTS, DELAWARE BAY AND RIVER

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. This publication contains time differences for slack water at about 500 stations and six current diagrams, including one for Delaware Bay and River.

Five Fathom Bank Lightship.—The tidal current is rotary, turning clockwise. The strength of the flood occurs about 1 hour earlier than the strength of the flood at Overfalls Lightship (or about 2 hours earlier than the time of high water at Sandy Hook) and sets westward with a velocity of about ¼ knot. The strength of the ebb occurs about ½ hour earlier than the strength of ebb at Overfalls Lightship (or about 2 hours earlier than the time of low water at Sandy Hook) and sets eastward with a velocity of about ¼ knot. Currents of a knot or more occur only with strong winds.

Main ship channel off Fourteen Foot Bank Lighthouse.—The slack waters before flood and ebb occur about ¼ hour after the corresponding slack waters at Overfalls Lightship (or approximately 1¾ hours after the times of low and high waters, respectively at Breakwater Harbor). The strength of the flood sets northwesterly with an average velocity of about 1¼ knots and the strength of the ebb sets southeasterly with an average velocity of about 1½ knots.

Channel off Ship John Shoal.—The slacks before flood and ebb occur about 1½ hours after the corresponding slack waters at Overfalls Lightship (or approximately 3 hours after low and high waters, respectively, at Breakwater Harbor). The strength of flood sets northwesterly with a velocity of about 1½ knots and the strength of ebb sets southeasterly with a velocity of about 2 knots.

Channel off Reedy Island.—The slacks before flood and ebb occur about 3 hours after the corresponding slack waters at Overfalls Lightship (or approximately 2½ hours before low water and 1¼ hours before high water, respectively, at Philadelphia). The strength of flood sets northward with a velocity of about 1½ knots. and the strength of ebb sets southward with a velocity of about 2 knots.

Channel off New Castle.—The slacks before flood and ebb occur about 4 hours later than the corresponding slacks at Overfalls Lightship (or approximately 1½ hours before low water and ½ hour before high water, respectively, at Philadelphia). Strengths of flood or ebb have an average velocity of about 1½ knots. The flood sets northeastward and the ebb southwestward.

Channel off Chester.—The slack waters before flood and ebb occur about 4¾ hours after the corresponding slack waters at Overfalls Lightship (or approximately ¾ hour before low water and ½ hour after high water, respectively, at Philadelphia). Velocities at

strength of flood and ebb average about 1¾ knots. The flood sets notheastward and the ebb southwestward.

Channel off Philadelphia.—The slack waters before flood and ebb occur about 6 hours and 5¼ hours, respectively, after the times of the corresponding slacks at Overfalls Lightship (or approximately ½ hour after low water and 1 hour after high water, respectively, at Philadelphia). Velocities at strength of flood or ebb average about 1¾ knots. The flood sets northward and the ebb southward.

Channel off Burlington.—The slack waters before flood and ebb occur approximately 7½ hours and 6½ hours, respectively, after the times of the corresponding slack waters at Overfalls Lightship (or approximately 2 hours after low water and high water, respectively, at Philadelphia). The flood and ebb currents have velocities at strength of about 1¼ knots.

GENERAL REMARKS, APPROACHES TO DELAWARE BAY

[Charts 1219, 1109, and 1108]

Between the parallels of 38° 15′ N. and 39° 15′ N. the 100-fathom (183 m) curve is from 70 to 100 miles offshore and the 30-fathom (55 m) curve is about 25 miles closer in toward the shore, both having a general northeasterly and southwesterly trend. Inside the 30-fathom (55 m) curve the water shoals gradually westward to the 20-fathom (37 m) curve, but inside the latter curve the depths are somewhat irregular, and if uncertain of her position, especially in thick weather, a vessel, when inside of the 20-fathom (37 m) curve, should approach the coast with care and in no case approach closer than in 12 fathoms (21.9 m) 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.

Vessels coming from southward and seaward in clear weather should shape a course so as to cross the meridian of 74°30′ W. in latitude 38°45′ N.; this will lead them 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 (37 m) until between the parallel of 38°40′ N. and the parallel of the Five-Fathom Bank Lightship, and the entrance then be approached between those parallels.

In approaching the entrance from northward and seaward, when between the parallels of 39°15′ N. and 38°40′ N., soundings of 20 fathoms (37 m) indicate a distance of 25 to 30 miles from shore. In clear weather a vessel standing westward on the parallel of 38°45′ N. should make Five Fathom Bank Lightship before the depth is lessened to 15 fathoms (27.4 m). There are least found depths of 29 to 38 feet (8.8 to 11.6 m) between latitude 38°39′ N. and 38°42′ N., and longitude 74°43′ W. and 74°49′ W.

Entering from northward, the passage inside of Five Fathom Bank eastward or westward of McCrie Shoal, is used by most of the coasting vessels of less than 24 feet (7.3 m) draft. In a heavy sea vessels of a greater draft than 18 feet (5.5 m) 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 (5.5 m).

Entering from southward, coasting vessels of the deepest draft keep outside *Fenwick Island Shoal Lighted Whistle Buoy 2*. Vessels of 15 feet (4.6 m) draft usually pass inside of Fenwick Island Shoal in good weather, but strangers should use this passage with caution.

DIRECTIONS, DELAWARE BAY AND RIVER TO PHILADELPHIA

[Charts 1218, 294, 295, and 280]

Directions for the outside coast and courses to Overfalls Lightship from northward and southward are given on page 56. Directions for Delaware Breakwater are given on page 88.

The channel is well marked by lighthouses and buoys to the entrance of the dredged channel and by lighted ranges and buoys above that point. The dredged channels are generally 800 feet wide in the straight reaches, 1,000 feet wide in the bends, and Philadelphia Harbor, and 1,200 feet wide in Bulkhead Bar Channel. The buoys marking the dredged channels are usually maintained on or close to the edge, and vessels on the ranges will usually pass them at a distance of 100 to 200 yards. Buoys marking each range are numbered separately, and each buoy bears the first letter of the range which it marks. The ranges do not all show well as daymarks, but vessels will ordinarily have no trouble in running by the buoys except when ice is running, at which times the buoys may be dragged from their positions.

Shoaling is liable to take place at any time where the channel has been improved, but the channels are usually redredged as soon as the shoaling is found. In general, the bottom is soft and vessels, if on or close on the ranges, do not sustain damage from grounding, except near the intersection of the Marcus Hook and Chester ranges and near the intersection of the Chester and Tinicum ranges, where the bottom is rocky. At the shoalest places deep-draft vessels take advantage of the tide, which has a mean rise and fall of 5 to 6 feet (1.5 to 1.8 m) between the entrance of the river and the wharves at Philadelphia, but during strong northerly winds the high and low waters may be as much as 2.5 to 3.5 feet (0.8 to 1.1 m) lower than the mean.

It must be remembered that the channel in the river is being improved and that dredges may be found at work on or near any of the range lines. Directions for passing dredges are given on page 347.

At night a stranger may be confused by the lights of vessels at anchor near the channels, and strangers in deep-draft vessels are advised not to run. Red sectors are established in the lighthouses to cover the dangers on both sides of the channel from Overfalls Lightship to the entrance of the dredged channel and should be observed closely if running at night.

The following table gives the courses and distances from Overfalls Lightship to Philadelphia. They lead in a least depth of 33 feet (10.1 m) to the entrance of the dredged channel and in the dredged channel (least depth 35 feet (10.7 m)) to Philadelphia. Many cutoffs are possible for light-draft vessels, but strangers are advised to follow the main channel.

Courses and Distances—Delaware Bay Entrance to Philadelphia

For reverse direction, read upward	Course (Reverse course in *Italics*) True	Course (Reverse course in *Italics*) Magnetic	Distance
1. **Overfalls Lightship**, bearing 45 true, distant 300 yards, ~~passing 0.4 mile eastward of lighted bell buoy 7~~, 0.9 mile westward of Brandywine Shoal Lighthouse, ~~close westward of lighted bell buoy 10 (marking a 20-foot (6.8 m) spot, 0.6 mile eastward of Fourteen Foot Bank Lighthouse~~. Miah Maull Shoal Lighthouse is slightly on the starboard bow on this course:	°	*Points*	*Nautical miles*
Direct	336	N. by W. ⅜ W	19. 3
Reverse	*156*	*S. by E. ⅜ E*	*19. 3*
2. ~~**Joe Flogger Shoal Lighted Bell Buoy 11** bearing 240° true, distant 0.3 mile, passing 0.6 mile southwestward of Miah Maull Shoal Lighthouse and 100 yards northeastward of lighted bell buoy 10 A~~:			
Direct	326	NNW. ¼ W	6. 5
Reverse	*146*	*SSE. ¼ E*	*6. 5*
3. **Elbow of Cross Ledge Lighthouse** bearing 60° true, distant 300 yards:			
Direct	335	N. by W. ⅜ W	1. 5
Reverse	*155*	*S. by E. ⅜ E*	*1. 5*
4. ~~**Joe Flogger Shoal Lighted Bell Buoy 17** bearing 240° true, distant 300 yards~~:			
Direct (Elbow of Cross Ledge Light astern).	329	NNW	2. 8
Reverse (same ahead)	*149*	*SSE*	*2. 8*
5. ~~**Ben Davis Point Shoal Lighted Bell Buoy 10** bearing 45° true, distant 150 yards~~, passing 0.3 mile southwest of Ship John Shoal Lighthouse, entering the dredged channel ½ mile south-southeast of lighted bell buoy 2L, and steering the Liston Range:			
Direct	318	NNW. ⅞ W	17. 1
Reverse	*138*	*SSE. ⅞ E*	*17. 1*
6. **Baker Range Buoy 1B** bearing 240° true, distant 150 yards:			
Direct (Baker Range ahead)	355	N. ⅜ E	1. 7
Reverse (Baker Range astern)	*175*	*S. ⅜ W*	*1. 7*
7. **Junction of Baker and Reedy Island Ranges**, midway between buoys 1R and 2R:			
Direct (Reedy Island Range astern)	15	NNE. ⅛ E	2. 1
Reverse (Reedy Island Range ahead)	*195*	*SSW. ⅛ W*	*2. 1*
8. **Junction of Finns Point and Reedy Island Ranges**, buoy 1F bearing 230° true, distant 300 yards:			
Direct (Reedy Island Range astern)	15	NNE. ⅛ E	2. 3
Reverse (positions 10 to 8, steering Finns Point Range astern)	*188*	*S. by W. ½ W*	*2. 6*

Courses and Distances—Delaware Bay Entrance to Philadelphia—Continued

For reverse direction, read upward	Course (Reverse course in *Italics*)		Distance
	True	Magnetic	
9. Junction of Reedy Island and New Castle Ranges, midway between buoys 1N and 2N:			
Direct (New Castle Range ahead)	° 334	Points N. by W. ½ W	Nautical miles 0.5
Reverse (position 10 to 8, steering Finns Point Range astern)	*188*	*S. by W. ½ W*	*2.6*
10. Junction of Finns Point Range, lighted bell buoy 3N bearing 270° true:			
Direct (New Castle Range ahead)	334	N. by W. ½ W	3.8
Reverse (New Castle Range astern)	*154*	*S. by E. ½ E*	*3.8*
11. Junction of New Castle and Bulkhead Bar Ranges, lighted bell buoy 2B bearing 90° true:			
Direct (Bulkhead Bar Range ahead).	8	N. by E. ½ E	0.6
Reverse (Bulkhead Bar Range astern).	*188*	*S. by W. ½ W*	*0.6*
12. Junction of Bulkhead Bar and Deepwater Point Ranges, ~~lighted bell buoy 2D bearing 120° true~~:			
Direct (Deepwater Point Range ahead).	42	NE. ½ E	3.8
Reverse (Deepwater Point Range astern).	*222*	*SW. ½ W*	*3.8*
13. Junction of Deepwater Point and Cherry Island Ranges, lighted bell buoy 1C bearing 300° true:			
Passing about 300 yards eastward of the lighted buoy off the jetty at the Christiana River Entrance to Wilmington. There is a privately maintained fog signal (siren) on the dock at Deepwater Point. (Entering the Christiana River steer the entrance lighted range, course 293° true (NW. by W. ¼ W. mag.) 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).	16½	NNE. ¼ E	4.0
Reverse (Cherry Island Range astern).	*196½*	*SSW. ¼ W*	*4.0*
14. Cherry Island Range Lighted Buoy 9C bearing 290° true, distant 175 yards:			
Direct (Rounding to Bellevue Range).	27	NE. ¾ N	0.5
Reverse (Rounding to Cherry Island Range).	*207*	*SW. ¾ S*	*0.5*

Courses and Distances—Delaware Bay Entrance to Philadelphia—Continued

For reverse direction, read upward	Course (Reverse course in *Italics*)		Distance
	True	Magnetic	
	°	*Points*	*Nautical miles*
15. Cherry Island Front Range Light bearing 0° true, distant 0.3 mile:			
Direct (Bellevue Range astern)	35½	NE	2.8
Reverse (Bellevue Range ahead)	*215½*	*SW*	*2.8*
16. Marcus Hook Lighted Bell Buoy 2M bearing 125° true, distant 250 yards. Rounding to Marcus Hook Range. (Light shown at Grubb's Landing (offshore from west bank) when this buoy is replaced by an unlighted buoy during ice runs):			
Direct (Marcus Hook Range astern).	58	ENE	4.4
Reverse (Marcus Hook Range ahead)	*238*	*WSW*	*4.4*
17. Junction of Marcus Hook and Chester Ranges, Schooner Ledge Rock Lighted Bell Buoy bearing 290° true.			
Direct (Chester Range ahead)	51	NE. by E. ⅝ E.	1.9
Reverse (Chester Range astern)	*231*	*SW. by W. ⅝ W.*	*1.9*
18. Chester Range Lighted Buoy 6C bearing 145° true, distant 200 yards.			
Direct	64	ENE. ½ E	0.9
Reverse	*244*	*WSW. ½ W*	*0.9*
19. Tinicum Island Range Lighted Buoy 2T bearing 180° true, distant 200 yards.			
Direct (Tinicum Range ahead)	92	E. by S	3.1
Reverse (Tinicum Range astern)	*272*	*W. by N*	*3.1*
20. Tinicum Island Range Lighted Buoy 5T bearing 0° true, distant 175 yards.			
Direct	70	E. by N	1.1
Reverse	*250*	*W. by S*	*1.1*
21. Mifflin Bar Range Lighted Buoy 1F bearing 0° true, distant 175 yards. (Fog signal (siren) at outer end of lower pier at Fort Mifflin). Entering the Schuylkill River steer the entrance lighted range, course 20½° true (NNE. ⅝ E. mag.) and follow chart 280. Fog signal (bell) on bulkhead at west side of river entrance:			
Direct (Fort Mifflin Bar Range astern).	54	NE. by E. ⅝ E.	2.8
Reverse (Fort Mifflin Bar Range ahead).	*234*	*SW. by W. ⅝ W.*	*2.8*
22. Junction of Fort Mifflin Bar Range and Horseshoe Range, West Group:			
Direct (latter range astern)	94	ESE. ¾ E	1.8
Reverse (latter range ahead)	*274*	*WNW. ¾ W*	*1.8*
23. Junction of Horseshoe, West Group and Eagle Point Ranges:			
Direct (latter range astern)	64	ENE. ⅝ E	0.5
Reverse (latter range ahead)	*244*	*WSW. ⅝ W*	*0.5*
24. Junction of Eagle Point Range and Horseshoe Range, East Group:			
Direct (latter range astern)	25	NE. ¼ N	1.1
Reverse (latter range ahead)	*205*	*SW. ¼ S*	*1.1*

Courses and Distances—Delaware Bay Entrance to Philadelphia—Continued

For reverse direction, read upward	Course (Reverse course in *Italics*)		Distance
	True	Magnetic	
25. Horseshoe Range, East Group, abreast Immmigration Station, Gloucester, New Jersey, and thence follow dredged channel on chart 280 along Philadelphia and Camden waterfronts:	°	*Points*	*Nautical miles*
Direct	Various	Various	5.6
Reverse	*Various*	*Various*	*5.6*
26. Fisher Point Range abreast Allegheny Avenue, Philadelphia.			
The Sailing Directions to Trenton are not given at this time on account of frequent changes made in the directions of the improved channels. Until conditions in this respect are stabilized the chart, corrected from time to time, showing the aids is the best guide.			

DELAWARE BAY, WESTERN SIDE

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 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 few houses at Mahon River; and the ranges at Leipsic River.

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 frequented by freight and passenger steamers and schooners carrying produce, fertilizer, and canned goods to or from the towns at their heads and the farm landings below, the usual draft of boats engaged in this trade being 6 to 8 feet (1.8 to 2.4 m). Oyster and fishing boats also seek anchorage in the mouths of many of them. Towboats are not often used, and strangers seldom enter.

Most of the business from the rivers is northward to Chester and Philadelphia. Local vessels usually take advantage of the tide up and down the Delaware River, leaving the mouths of the creeks bound northward at a little after low water, and leaving Philadelphia bound southward at high water or a little before. 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.

There are many detached shoal spots with depths of 2 to 6 feet (0.6 to 1.8 m) 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 perpendicularly 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.

Vessels entering this channel from northward usually leave the main channel of Delaware River at lighted bell buoy 21, 2½ miles southward of Ship John Shoal Lighthouse, pass close eastward of buoy 3, at the north end of Blake Channel, and steer 181° true (S ⅞ W. mag.) to ¼ mile east of the lighted bell buoy off the entrance of St. Jones and Murderkill Rivers. The northerly sector of Mahon River Lighthouse covers the entrance to the channel at night. The least depth crossed on this course is 7 or 8 feet (2.1 or 2.4 m) but passes about ¼ mile east of a 4-foot (1.2 m) spot off Little River.

Cape Henlopen, on the southwest side of the entrance to Delaware Bay, is a high white sand hill, bare of vegetation. The point of the cape, from a comparison of the surveys, is moving northward at a slow but uniform rate. Vessels should keep in the white sector of Delaware Breakwater light when passing north of the cape. A shoal with little depth as shown on the chart, extends nearly ⅜ mile eastward from the end of Cape Henlopen, and is marked at its easterly end by a black bell buoy.

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 and is a safe harbor for light-draft vessels in all but heavy northwesterly gales, and affords considerable protection even in such weather. Under the most favorable conditions a vessel of as much as 15 feet (4.6 m) draft can select anchorage with sufficient swinging room in the easterly part of the harbor, but the harbor is generally crowded in heavy weather, and vessels of a greater draft than about 10 feet (3.0 m) should preferably anchor westward or northwestward of the inner breakwater or in Harbor of Refuge.

Breakwater Harbor has depths of 10 to about 30 feet (3.0 m to 9.1 m) in its easterly part, eastward of the line joining the reporting station on the breakwater and the easternmost fish-oil works. The angle in the westerly part of the breakwater is shoal, depths of 9 to 10 feet (2.7 to 3.0 m) extend nearly ⅜ mile south-southwestward from the westerly half of the breakwater, and depths of 12 to 13 feet (3.7 to 4.0 m) extend to shore southwestward.

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 1.9 knots. The general direction of tidal currents is parallel with the breakwater, with a considerable set toward the lower end on the ebb and toward the upper end on the flood.

Directions, Breakwater Harbor.—From Overfalls Lightship steer 279° true (WNW. ⅜ W. mag.) until Delaware Breakwater Lighthouse bears about 240° true (WSW. ⅛ W. mag). Then steer this course for that lighthouse and pass about 100 yards southeastward of it in entering the harbor. The entrance is about ¼ mile wide between the lighthouse 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 Brown Shoal lighted bell buoy, and steer 175° true (S. ⅜ W. mag.) for Harbor of Refuge Lighthouse (flashing white) with Brandywine Shoal Lighthouse astern, pass 350 yards eastward of the lighthouse and then steer 203° true (SSW. ⅞ W. mag.) to pass 100 yards eastward of Delaware Breakwater Lighthouse.

Wharves.—The easterly wharf on the south side of Breakwater Harbor is in ruins. Westward of it are wharves of fish-oil works, with out 12 feet (3.7 m) at the ends, some of them in ruins, and 1¼ miles westward is a former railroad wharf but now in ruins. The wharf east of the Coast Guard station has 10 feet (3.0 m) depth, and railroad connection. An extensive wharf, which is to have a depth of 9 feet (2.7 m), is being constructed for the Coast Guard off the station.

Lewes is a town with railroad communication lying ½ mile southwestward of the wharves. Provisions, gasoline, ice, and some ship chandlery are obtainable, and some coal in case of necessity.

The inner breakwater is nearly 1 mile long in a west-northwesterly direction, and is marked at its east end by Delaware Breakwater Lighthouse, and at its west end by a flashing green light. A telegraph and reporting station, from which vessels are reported to the Maritime Exchange at Philadelphia, is located near the middle of the breakwater, and storm warnings are displayed.

Delaware Breakwater Lighthouse (occulting white), on the east end of the inner breakwater, is a brown conical tower. It has a red sector south of bearings to the light of 245° true and 98° true, covering a shoal off the point of Cape Henlopen and Breakwater Harbor. It is 61 feet (18.6 m) high and visible 13 miles. The fog signal is given on a horn, blast 2 seconds, silent 13 seconds. If the horn is disabled a bell will be struck by hand, one stroke every 10 seconds.

Lying westward and northwestward of the inner breakwater is an extensive anchorage with depths of 16 to 25 feet (4.9 to 7.6 m), muddy bottom, where vessels are sheltered from southeasterly and northeasterly winds, and this anchorage is much used by coasting vessels. The anchorage is easy of access, the least depths in the approach being 21 to 30 feet (6.4 to 9.1 m) between the inner breakwater and *Fourteen-foot lump buoy*.

Harbor of Refuge, lying 1 to 2 miles north-northwestward of Cape Henlopen, is formed by a breakwater which extends 1¼ 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 Lighthouse, and at its north end by a red light. The harbor, except in its northern part, has depths of 4 to 7 fathoms (7.3 to 12.8 m), 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 (2.7 to 3.7 m). The deepest water, depths 5 to 7 fathoms (9.1 to 12.8 m), will be found ⅜ mile westward of the south part of the breakwater. During seasons of ice, drifting ice often forms a danger.

A ridge, having lumps with depths of 11 to 18 feet (3.4 to 5.5 m), extends 145° true (SSE. ⅜ E. mag.) from the south end of the Shears toward Delaware Breakwater Lighthouse. The south end of the shoaler part of the ridge is marked by a buoy, which lies 1¼ miles 273° true (W. by N. mag.) from Harbor of Refuge Lighthouse. On the extension of this ridge depths of 21 to 24 feet (6.4 to 7.3 m) exist for another ¾ mile.

Harbor of Refuge Lighthouse, on the south end of the Harbor of Refuge Breakwater, is a flashing white light, 72 feet (21.9 m) above the water and visible 14 miles. Red sector from 325° to 351° true covers Hen and Chickens Shoal, and from 127° to 175° covers Brown Shoal. The fog signal is a siren giving blasts as follows: Three 2-second blasts, 2 seconds apart; silent 35 seconds. A bell is struck once every 15 seconds if the siren is disabled.

On the north end of the breakwater is a ~~fixed~~ red light.

Broadkill ~~River~~ empties into the Delaware River 3½ miles northwestward of Lewes. A channel has been dredged ~~in the entrance and~~ to the town of **Milton**, the head of navigation, 10 miles above the mouth. A jetty, marked on its end by a flashing white light, has been constructed on the west side at the mouth. The entrance is subject to rapid change and local knowledge is necessary to enter. In June 1936 there was a depth of 2.4 feet (0.7 m) in the mouth, thence 4.7 feet (1.4 m) to the bascule drawbridge, and thence 3.0 feet (0.9 m) from there to the town of Milton. The drawbridge crosses the creek about 5 miles above the mouth. The draw has a clear width of 43 feet and a headroom of 3½ feet (1.1 m) at high water when closed.

Shoals extend about 300 yards offshore to the 6-foot (1.8 m) curve, and are subject to change. The channel leads close to the jetty, and thence to the head the mid-channel is the best water, except for a middle ground, bare at a little below high water, which lies 1 mile above the mouth. The middle ground shows discolored water at all times, is usually marked by bush stakes, and the best water is on its south side.

The entrance to the canal which connects Delaware Bay with Rehoboth Bay ~~is about ½ mile inside the entrance of Broadkill River~~, and the canal is described under the heading, "Inlandwaters, Cape Henlopen to Cape Charles", page 122. A new dredged entrance is projected about 1½ miles southeastward of the present.

Tides.—The mean range of tides is 4.4 feet at the entrance and 3.5 feet at Milton. High and low water at Milton occur 55 minutes later than at the entrance.

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 marked at the entrance by a lighthouse (brown, pyramidal, skeleton steel tower with white daymark; flashing white light with a red sector); and by a fish factory just inside the mouth. A long jetty, having an occulting red light with white sector near the end, has been constructed on the south side of the mouth, and a short jetty on the north side. In June 1936, the controlling depths in the dredged channel from Delaware River for 10 miles to Milford, at the head of navigation, was 4.7 feet (1.4 m) at the entrance, thence 5.9 feet (1.8 m) to the highway drawbridge, and thence 3.1 feet (0.9 m) to the fixed highway bridge at Milford.

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° true (NW. ⅛ N. mag.) course for Mispillion River Lighthouse. At night the northeasterly edge of the red sector leads along the axis of the dredged channel. 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 lying 1 mile above the mouth. From southward steer on the range of the south jetty light and Mispillion Lighthouse.

The river is used by freight steamers, some schooners, and motor boats, the deepest draft being 8 feet (2.4 m). About ½ mile below Milford there is a highway bascule bridge having a span width of 45 feet and a 2-foot (0.6 m) headroom at high water when closed. There are three marine railways at this town, the largest capable of hauling out a vessel about 70 feet long and 5-foot (1.5 m) draft. Repairs and building of small boats is done.

Tides.—The mean range of tides is 5.1 feet at the entrance and 4.1 feet at Milford. High and low water at Milford occur 1 hour and 5 minutes later than at the entrance.

Murderkill River is 8 miles northward of Mispillion River, 245° true (WSW. ⅝ W. mag.) from Miah Maull Shoal Lighthouse. There is a lighted range for entering 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. There is a low iron chimney showing about 100 feet to the right of it. The rear range is a black skeleton tower and shows well above the buildings at Bowers. There is a mud bank along the south side of the entrance cut, which is bare for a considerable distance at low water, marked by bush stakes at times. There is a lighted bell buoy off the entrance, maintained at the intersection of the Murderkill and St. Jones River ranges. In June 1936, the controlling depths in the dredged channel from Delaware River for 7½ miles to Frederica, at the head of navigation, was 4.3 feet (1.3 m) at the entrance, and thence 5.0 feet (1.5 m). However rowboats go 3 miles farther.

To enter Murderkill River, from the lighted bell buoy head in on the range, course 247° true (WSW. ¾ W. mag.), 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. The deepest draft ordinarily going to Frederica is about 7 feet (2.1 m.) but 10 feet (3.0 m) is carried with local knowledge. There is 8 feet (5.5 m) at the landing. The river is used by steamers and schooners to Frederica and by fishing and oyster boats at the entrance.

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 and provisions are obtainable. There are two marine railways each capable of hauling out a boat 45 feet long and 5-foot (1.5 m) draft. Repairs are made.

Tides.—The mean range of tides is 5.4 feet at the entrance and 3.0 feet at Frederica.

St. Jones River is just north of Murderkill River. There is a lighted range for entering St. Jones River. The front light is flashing red and the rear one is occulting red. Both are carried 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.

The project calls for dredging a channel 7 feet deep for 10 miles from Delaware River to Dover, and the construction of 5000 feet of jetty on the north side of the entrance channel. In June 1936, the controlling depths were as follows; entrance channel 2.4 feet (0.7 m), thence to **Barker's Landing** 6.4 feet (1.9), thence to Lebanon 5.4 feet (1.6 m), and thence to Dover 4.8 feet (1.5 m).

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 266° true (W. ½ N. mag.), passing 40 feet northward of the bushes marking the mud bank. From **Bowers Landing,** just inside the mouth, the best water favors the southwest side for about ½ 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 (2.1 m). Local knowledge is necessary.

A bascule highway bridge, having a span width of 50 feet and 5-foot (1.5 m) headroom at high water when draw is closed, crosses the river at Barker Landing, about 4 miles above the mouth. One mile westward of the bridge is the village of **Magnolia.** About 3 miles farther, a drawbridge crosses the river at Lebanon, having a span width of 30 feet and 6-foot (1.8 m) headroom at high water when draw is closed. Navigation ends below the lower bridge at Dover, and the landing has 5½ feet (1.7 m). There is railroad communication with the city.

Tides.—The mean range of tides is 5.4 feet at the entrance, 3 feet at Lebanon, and 1.2 feet at Dover.

Little River, 1½ miles southward of Mahon River Lighthouse, is is navigable to the landing immediately below the highway bridge at the village of Little Creek 2½ miles above the mouth. A channel

has been dredged to a depth 5 feet (1.5 m) to Little Creek, 60 feet wide across the bar and 40 feet wide in the river, and cut-offs. In 1936, the controlling depths from Delaware River in the entrance channel was 3.2 feet (1.0 m), and thence to the highway bridge at Little Creek Landing 1.8 feet (0.5 m).

There is a lighted range (lights on white wooden posts) for entering, course 310° true (NW. ⅜ N. mag.), 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 the 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 (1.4 m) headroom at high water when closed.

Tides.—The mean range of tides is 5.6 feet at the entrance and 4.5 feet at Little Creek. High and low water at Little Creek occur about ¾ hour later than at the entrance.

Mahon River is marked by Mahon River Lighthouse (fixed white with 3 red sectors) and three smaller houses around it. There is a depth of about 5 feet (1.5 m) across the bar at the mouth and 10 to 15 feet (3.0 to 4.6 m) inside, and it is extensively used as an anchorage by oyster and fishing boats. 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, ⅜ mile southward of the entrance. The southerly edge of the east red sector of Mahon River Lighthouse marks the entrance at night. Small boats can pass through Mahon River into Dona River, but there is little business above the mouth.

Dona River, 2¼ miles northward of Mahon River Lighthouse, has a depth of about 3 or 4 feet (0.9 or 1.2 m) across the flats at the mouth and 6 to 12 feet (1.8 to 3.7 m) 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, 3½ miles northward of Mahon River Lighthouse, and 3¾ miles south-southwestward of Ship John Shoal Lighthouse, is the approach to the town of **Leipsic**, about 8½ miles above the mouth. A channel 6 feet (1.8 m) deep and 50 feet wide, with several cut-offs, has been dredged to Leipsic, and 5 feet (1.5 m) deep and 40 feet wide to **Garrison Mill** (dam) the head of navigation about 4½ miles above Leipsic, with a turning basin at the head. The controlling depth in 1936 was 6.0 feet (1.8 m) from Delaware River to Leipsic, thence 4.0 feet (1.2 m) to Garrison Mill.

A drawbridge (draw not in operation) with two openings 35 feet wide and 3½-foot (1.1 m) headroom at high water crosses the river at Leipsic. The south opening has the best water. There is a marine railway capable of hauling out and repairing a boat about 40 feet long and 2½-foot (0.8 m) draft.

There is a lighted range for entering Leipsic River, each a post with slatted daymark, plainly visible by day. The course on the range is 285° true (NW. by W. ⅞ W. mag.), 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 tides is 5.6 feet at the entrance, 3.8 feet at Leipsic, and 2.5 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 and schooners carrying marsh hay. A fixed bridge crosses the creek just back of **Woodland Beach**.

Smyrna River, 5¾ miles southward of Stony Point Shoal, is navigable to **Smyrna Landing**, about 9 miles above the mouth and 1 mile from the town of **Smyrna**. The deepest draft entering is about 8½ feet (2.6 m), 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 (2.1 m) 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 June 1936 was 4.9 feet (1.5 m) at the entrance and 7 feet (2.1 m) to Smyrna Landing.

There is a lighted range for entering, course 237° true, (SW. by W. ⅞ W. mag.), front light flashing red, on a white iron post, and rear light occulting white, on a skeleton tower, both plainly visible by day. A white dwelling shows 250 yards to the left of the range.

There is a spoil bank, bare at low water, on the south side of the entrance of Smyrna River. The range leads across a shoal bar about ½ mile outside the entrance. Local steamers usually enter at near high water, when the bar can be crossed on the range, but if entering at low water, must 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. A drawbridge crosses the river at **Fleming Landing**, 3 miles above the mouth. It is a center-pier draw, with openings 36 and 37 feet wide, and 5½-foot (1.7 m) headroom when closed. The north opening is generally used. A fixed bridge just above Smyrna Landing has a span 18 feet (5.5 m) wide and headroom of 3 feet (0.9 m) at high water.

Tides.—The mean range of tides is 5.8 feet at the entrance and 3.5 feet at Smyrna Landing. High and low water at Smyrna Landing 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 (3.4 m).

The ruling depth on the eastern side of Delaware Bay is 7 to 15 feet (2.1 to 4.6 m) with many spots of less than 6 feet (1.8 m). 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, on the eastern side of the entrance to Delaware Bay, is marked by the dirigible hangar and water tank on Sewell Point, by the large hotels at the town of Cape May, and by Cape May Lighthouse at the town of **Cape May Point.**

Storm warnings are displayed at Cape May Point Coast Guard station, southward of the lighthouse.

The shoals and channels on the northeastern side of Delaware Bay entrance, as determined by the 1914, 1927, and 1928 surveys, show little change in position or depth. The bottom, in places, consists of clay and sand mixed and with a consistency of hard pan. 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 (4.0 to 5.2 m). 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 the cupola at Cape May Point, shown on the chart. There are depths through here 9 feet (2.7 m) or more.

There are several unimportant creeks northward of Cape May, but the first one open to navigation is **Bidwell Creek.** This is a drainage canal about 12 miles north-northeastward of Cape May Lighthouse. There is 3 feet (0.9 m) at the entrance and 6 feet (1.8 m) inside for about 1½ miles to the highway. Jetties mark the entrance.

Goshen Creek, 13½ miles north-northeastward of Cape May Lighthouse has a depth of about 1 foot (0.3 m) across the flats at the mouth and 2 feet (0.6 m) to **Goshen Landing,** 1 mile above the mouth and 1 mile below the village of **Goshen.** It is only entered by small local boats.

Dennis Creek, 6⅜ miles eastward of East Point Lighthouse, has a depth of 2 feet (0.6 m) across the flats at the mouth and 6 to 12 feet (1.8 to 3.7 m) inside. It is navigable for a considerable distance, but is principally used as an anchorage by oyster boats. The entrance is marked by range lights, which lead in the best water across the flat in the approach. 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 width and 3-foot (0.9 m) headroom at high water.

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 (0.9 m) inside. It is little used.

Deadman Shoal, lying 5 to 7 miles southward of East Point Lighthouse, had a least depth of 3 feet (0.9 m) in 1914. It is marked on the east side by a lighted buoy and at the north end by a buoy with horizontal bands. Extending southward (true) from the 5-foot (1.5 m) shoal 1 mile westward of Deadman Shoal is a ridge with 6 to 7 feet (1.8 to 2.1 m) over it, the south end of which lies 3 miles southwestward from the lighted buoy.

East Point Lighthouse (flashing white, 2 red sectors), a white dwelling on the point on the east side of Maurice River Cove, is the most

prominent mark in the vicinity. The white sector between bearings from seaward of 28° true and 47° true covers the river approach.

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 considerable trade in the upper river, mostly in towed sand and gravel barges. The deepest draft entering the river is 11 feet (3.4 m) and this draft is taken to Millville at high water. In 1936 there was a controlling depth of 5.1 feet (1.6 m) and width of 150 feet in a dredged channel across the flats at the mouth, thence 7.1 feet (2.2 m) to 700 feet downstream from the mill dam at Millville, and thence 1.0 foot (0.3 m) to this dam.

Bivalve is a railroad terminus and important oyster-shipping point on the west bank of Maurice River, 2½ miles above the mouth. Gasoline and provisions are obtainable and there is water on the wharves. There is a railway capable of hauling out boats about 65 feet long and 5 or 6 feet (1.5 or 1.8 m) draft, and a machine shop for ordinary repairs to motors. **Storm warnings** are displayed.

Maurice River, a post office opposite Bivalve, is also the terminus of a railroad and a shipping point for sea food.

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 about ¾ 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. There are two railways at Dorchester capable of hauling out vessels of about 250 tons, 120-foot length, and 7-foot (2.1 m) draft, and machine shops for ordinary repairs to motors. A marine railway at Mauricetown is capable of hauling out a boat 65 feet long and 6-foot (1.8 m) draft.

The highway drawbridge crossing the river at Mauricetown has a center pier draw, with openings 58 and 60 feet wide, and 3½-foot (1.1 m) headroom at high water 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 tide.

In the season over 600 oyster boats operate out of the river. Much sand and gravel is handled.

Millville is an important town at the head of navigation on Maurice River. It has railroad communication and several factories. A drawbridge having a draw opening 36 feet wide and 5-foot (1.5 m) headroom at high water when closed, crosses the river at the lower end of the wharves. Gasoline and provisions may be obtained.

Tides.—The mean range of the tides is 5.7 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.—There are numerous oyster stakes off the entrance, but no difficulty will be experienced if guided by the fixed

aids until sure of the buoys. The following courses will lead in a depth of 9 feet (2.7 m) or more until approaching the entrance:

A 358° true (N. ⅝ E. mag.) course from a position ½ mile westward of the western end of Cape May Point will lead to a position ½ mile eastward of Deadman Shoal lighted buoy. Then a 335° true (N. by W. ⅜ W. mag.) course will lead to a position ¼ mile southward of the entrance to the dredged channel.

Or a 17° true (NNE. ¼ E. mag.) course with Brandywine Shoal Lighthouse astern will lead to the above position off the entrance.

Coming down Delaware Bay the safest course for a stranger is to pass southward of the buoy at the south end of Miah Maull Shoal, steer 82° true (E. ⅛ S. mag.) for 4½ miles, until East Point Lighthouse bears 35° true (NE. ⅛ N. mag.), then steer 37° true (NE. ⅛ E. mag.) for 4¾ miles to the entrance of the dredged channel.

The channel across the bar is marked by a bell—and other buoys, and into the river by a lighted range 346° true (N. ½ W. mag.) and buoys.

The southern edge of the white sector between the two red sectors in East Point Lighthouse on a 47° true (NE. by E. mag.) course leads to the entrance 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 the dredged channel. 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 ⅜ mile eastward of the main entrance. It has a depth of about 2½ or 3 feet (0.8 or 0.9 m) and is much used by motor boats.

Dividing Creek, 2½ miles northeastward of Egg Island Lighthouse, has a depth of about 2½ feet (0.8 m) across the flats at the mouth and 5 to 15 feet (1.5 to 4.6 m) inside. A draft of about 4 feet (1.2 m) 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.

Oranoaken Creek, ½ mile westward of Dividing Creek, has a depth of about 2½ feet (0.8 m) across the flats at the entrance and deeper water inside. It is little used.

Egg Island Lighthouse (occulting white every 2 seconds), a white dwelling, is the most prominent mark in its vicinity. 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 2.1 m) close along the point inside the shoals. The slough is used by local vessels, but strangers should pass southward of the shoals.

Fortescue Beach is a post village and small summer settlement on the shore about 4 miles north-northwestward of Egg Island Lighthouse.

Nantuxent Creek, 6¼ miles east-southeastward of Ship John Shoal Lighthouse, has a depth of about 5 feet (1.5 m) 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 (1.5 m) 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 (1.5 m) and borders the main channel of Delaware Bay.

Cedar Creek, 1¾ miles eastward of Ben Davis Point, has a depth of 4 feet (1.2 m) across the flats at the mouth, 4½ feet (1.4 m) for a distance of about 3 miles above the mouth, and about 3½ feet (1.1 m) at high water for a farther distance of 2½ 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 (1.5 m) 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 Lighthouse and a lighted range, is navigable to the city of Bridgeton, 16 miles above the entrance. It has considerable trade, carried mostly in barges to the upper end, and small schooners and motor boats in the lower end. A large amount of garden truck is shipped down the river in season. The deepest draft entering the river is about 11 feet (3.4 m) and this draft is taken to Bridgeton at high water.

An entrance 100 feet wide has been dredged into the river 500 yards northwestward of Cohansey Lighthouse, and the channel has been improved above to secure a width of 100 feet to the lower drawbridge at Bridgeton, and a width of 60 to 75 feet for a farther distance of about ¼ mile to the head of navigation at the Washington Street Bridge. In March, 1936, there was a controlling depth of 8.4 feet (2.6 m) from Delaware Bay to the mouth, thence 11.2 feet (3.4 m) to Greenwich Piers, thence 12.6 feet (3.8 m) to Fairton, thence 8.9 feet (2.7 m) to Stony Point, thence 7.5 feet (2.3 m) to 700 feet downstream from Broad Street Bridge at Bridgeton, and thence 3.8 feet (1.2 m) to Washington Street Bridge.

Greenwich Pier, a railroad terminus and shipping point for seafood, is on the west bank of Cohansey River, about 4 miles above the entrance. The Cohansey Yacht Club is located here. Gasoline, provisions, coal, and water are obtainable. There is a railway capable of hauling out small vessels 100 feet long and 8 feet (2.4 m) 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, 3½ miles below Bridgeton. There are several railways, the largest is capable of hauling out a vessel 70 feet long and 5 feet (1.5) draft; repairs can be made.

Bridgeton is an important manufacturing town and railroad center. There are three new bridges crossing the river here: Broad Street with 40-foot bascule span and 6½-foot (2.0 m) closed clearance, Commerce Street with 28-foot fixed span width and 6.8-foot (2.1 m) clearance, and Washington Street fixed trestle with 14-foot span width and 5.7-foot (1.7 m) clearance. All clearances are at high water.

Supplies.—Gasoline, coal, and provisions may be obtained at Bridgeton.

Tides.—The mean range of the tides is 6.0 feet at the entrance and 6.5 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 red buoy at the south end of **Arnold Point Shoal**, steer 104° true (ESE. mag.) with Cohansey Lighthouse on the port bow, until up to the Cohansey range, then steer 36° true (NE. mag.) 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 36° true (NE. mag.) 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 Lighthouse, avoiding the shoal making out from Cohansey Lighthouse 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 Lighthouse, has a depth of about 4 feet (1.2 m) 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. There are farm landings near the head from which some produce is shipped, the deepest draft being 6 feet (1.8 m). The best water in entering lies close alongshore southward of the entrance, then eastward and northward of the island in the mouth.

Bayside, at the mouth of Stow Creek, is a railroad terminus and important shipping point for sea food. There is a depth of 3 feet (0.9 m) at the wharf. Gasoline and some provisions are obtainable during the fishing season.

Mad Horse Creek, 6 miles northwestward of Cohansey Lighthouse, has a depth of about 6½ feet (2.0 m) in the entrance. It is navigable for several miles, but is entered only by an occasional truck boat.

DELAWARE RIVER, BELOW CHRISTIANA RIVER

(Chart 294)

Hope Creek, on the east side, 1¾ miles southeastward of Stony Point Shoal, has a depth of about 2 feet (0.6 m) at the mouth and is navigable for several miles, but is little used. A jetty about ½ mile long extends southwesterly from near the west side of the entrance and terminates with a flashing white light and red sector on a white post.

Blackbird Creek, on the west side, ⅜ mile southward of Reedy Island range front light, can be entered with a draft of about 3 feet (0.9 m) 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 drawbridge about 4 miles above the mouth, but is seldom opened. The draw has span widths of 42 and 20 feet and 1-foot (0.3 m) headroom at high water when the draw is closed.

Appoquinimink River, marked at the mouth by range lights (white latticed steel posts), is navigable at high water for vessels of 8 feet (2.4 m) draft to the village of **Odessa**, 6 miles above the mouth, and for small boats a farther distance of about 4 miles.

The channel has been improved by dredging and by cut-offs across the bends. In 1936 there was a controlling depth of 2.3 feet (0.7 m) from Delaware Bay to the mouth of the creek, thence 6.9 feet (2.1 m) to Odessa.

A drawbridge crosses about 3 miles above the mouth. The bridge is a center-pier draw, each opening 39 feet wide, with a headroom of 7.3 feet (2.2 m) at high water. There is a drawbridge just above the wharves at Odessa with a single clear opening 40 feet wide and a headroom of 4.8 (1.5 m) at high water.

Tides.—The mean range of the tides is 6 feet at the mouth and 3.3 feet at Odessa. At Odessa high and low water occur about one hour after high and low water at the mouth.

The shoalest part of ~~Stony Point~~ **Shoal** has been surrounded by a bulkhead and raised to above high water by dumping, forming an artificial island about 2½ miles long. 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 south dike forming a dumping basin the entrance to which is lighted and buoyed.

Alloway Creek, eastward of the north end of the artificial island on ~~Stony Point~~ Shoal, 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 (1.8 m) deep and 60 to 75 feet wide has been dredged to Quinton. The controlling depth in 1936 was 5.2 feet (1.6 m) to the mouth, thence 5.1 feet (1.6 m) to Upper Hancocks Bridge, thence 4.2 feet (1.3 m) to Quinton. Two cut-offs have been made across sharp bends, one 1¼ miles above the entrance and the other above Hancocks Bridge; also a shore dike has been constructed 2½ miles above the entrance at The Square.

The following drawbridges cross the creek (distance above the mouth, width of span, and headroom at high water follow in the order given): Hancocks, 4 miles, 48 feet, 2½ feet (0.8 m); Upper Hancocks, 5½ miles, 35 feet, 3½ feet (1.1 m); Quinton, 8 miles, 31 feet, 3 feet (0.9 m). The best water is in the north opening in Hancocks bridge.

Boats entering Alloway Creek must pass northward of the artificial island on ~~Stony Point~~ 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 tides is 6 feet at the entrance, 4 feet at Quinton, and 2.5 feet at Alloway.

Reedy Island, the site of a Federal quarantine station, is used also as a detention station. **Storm warnings** are displayed here and a day reporting station of the Philadelphia Maritime Exchange is operated. A dike extends 2½ miles southward from the south end of the island. It is covered by the red sector of Old Reedy Island Lighthouse. The lower end is submerged at high water, and is marked by a bell buoy with white reflector, but there is no navigation around it except in small motor boats.

Old Reedy Island Lighthouse (fixed white), a white tower on a dwelling, is on the dike ¼ mile southward of Reedy Island. About midway between the lighthouse and the south end of Reedy Island is an opening in the dike 150 feet wide, with a depth of 5 feet (1.5 m) at low water, used by boats up to 7-foot (2.1 m) draft bound to Port Penn. The south side of the opening is marked by a day beacon, the dike on each side of the opening is visible at high water. Two flashing green lights also mark the dike.

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, and from northward with a depth of about 7 feet (2.1 m) by passing westward of **Reedy Island Bar**. The anchorage off the town, known as **Reedy Island Harbor**, has a depth of about 20 feet (6.1 m), 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 Salem and **Little Salem Rivers**, 3 miles above the mouth. A cut-off channel, 12 feet (3.7 m) 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, but occasionally tugs of 9-foot (2.7 m) draft and a few freight vessels use the river. There is 10 feet (3.0 m) of water at the city dock, dockage free. Gas, oil, water, and provisions may be obtained. Small motor boats may be repaired here.

In 1936 from Delaware Bay through the cut-off to Penns Neck Bridge at the junction of Salem and Little Salem Rivers there was a controlling depth of 10.7 feet (3.5 m), thence 8.7 feet (2.7 m) 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 back range is a tall white mast above a house. On the northwest side of the entrance channel there are several areas that are bare at low water.

To enter Salem River, leave the main channel of Delaware River off Elsinboro Point, steering 38° true (NE. ⅛ E. mag.) to pass close southeastward of buoy 1, until up to the Salem River range, thence along this range on course 28° true (NE. ¾ N. mag.) through the buoyed channel, the cut-off, and mid-channel of the river above to Salem.

The Penns Neck bascule bridge has an opening 60 feet wide and headroom of 5 feet (1.5 m) at high water.

Tides.—The mean range of tides at the entrance and at Salem is 5.6 feet, the tides occurring at the latter place 25 minutes later than at the former.

Salem River was originally navigable to Courses Landing, 15 miles above Salem and 2½ miles below the village of Sharptown. Salem River just above the junction with Little Salem River has shoaled, and is not now used. There is also a dam about 9 miles above here. **Salem Canal** at Deepwater Point front range light has been blocked by a dam near the mouth, and there is now no navigation from the Delaware River.

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 on the east shore of the river. Vessels should not anchor in the vicinity of this 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 green lights, one at the north end and two at intermediate points. The green flashing light about 1 mile above the north end of Pea Patch Island marks the south side of an opening in the dike. In 1933, the depth in the opening was only 1.3 feet (0.4 m) at mean low water.

Delaware City is on the west bank of Delaware River southwestward of Pea Patch Island. There is about 12 feet (3.7 m) at the river docks, but little marine business is carried on.

The main entrance to the **Chesapeake and Delaware Canal** is located at Reedy Point about 1½ miles below Delaware City. A branch canal connecting Delaware City with the main canal has a depth of about 4 feet (1.2 m). The branch canal is crossed by a bascule drawbridge having a span width of 60 feet and headroom of 7 feet (2.1 m) at high water. The Chesapeake and Delaware Canal is described under Inside Route, New York to Norfolk, on page 309.

Bulkhead Shoal Channel, westward of Pea Patch Island and Bulkhead Shoal, is used by vessels bound through the canal.

A bulkheaded fill on **Goose Island Flats** extends about ½ mile offshore and is 1½ miles long. It is marked by two lights.

New Castle is a town on the west bank of Delaware River, 4 miles below the entrance of Christiana River. It has little trade. The main wharf has a depth of about 12 feet (3.7 m) at its end, and the other wharves are in bad repair. There is a small harbor protected from drifting ice by 5 stone fenders (piers) about 10 feet above high water. A yacht basin with 9 feet (2.7 m) is maintained by a club on the water front. 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, 3½ miles below the entrance to Christiana River. There are depths of 7 to 8 feet (2.1 to 2.4 m) at the docks. A wharf at River View Beach north of the ferry slip is used by regular steamers from Wilmington and Philadelphia during the summer.

Just south of the Salem Canal there are two buoyed channels, each marked by a lighted range, leading to a power company wharf which accommodates coal barges drawing about 25 feet (7.6 m).

The upper channel depth is 25 feet (7.6 m) and the lower 18 feet (5.5 m) and they meet just south of the wharf.

There is a railroad wharf and car ferry slip at **Deepwater Point**, which is the site of large factories. There is 26 feet (7.9 m) off the wharf. An electric fog signal is privately maintained on the pier-end.

There is a railroad wharf, with a depth of about 15 feet (4.6 m) at the end, on the end of **Pigeon Point**, 1 mile southward of the entrance to Christiana River. It is used as a shipping point for coal and other freight, principally in car floats and barges. Coal and water are obtainable.

CHRISTIANA RIVER

[Chart 294]

Christiana 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, 2½ 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 and with Penns Grove by ferry. Three important railway systems reach this port. The entrance at the mouth of Christiana River is marked by a lighted bell buoy on the northerly edge of the channel. An occulting red light with white sector, ~~and bell~~, is on the southeast corner of a bulk-headed area on the north side of the entrance. A lighted buoy (flashing green) is just off the outer end of the south jetty. The steel sheet pile jetty is about ½ mile long and 4 feet above high water. The Bellevue range rear light is near the inner end of the bulkhead. The first channel reach of the Christiana River is marked by a lighted range.

Just inside the mouth of the Christiana River on the south bank are the ferry slips of the Penns Grove-Wilmington ferries. Above that is the modern Wilmington marine terminal, with its bulkhead water front, freight sheds, storage facilities, mechanical freight-handling equipment, and rail and highway connections. The wharf has about 30 feet (9.1 m) alongside and is capable of berthing five vessels at one time.

Channels.—These have been dredged in the river, and in June 1936 the following depths existed: From Delaware ~~Bay~~ to Lobdell Canal 23.5 feet (7.2 m); thence to Market Street Bridge, Wilmington, 14.4 feet (4.4 m); thence to the pulp works, 13.3 feet (4.1 m); thence to the Pennsylvania Railroad Bridge No. 4, 9.2 feet (2.8 m); and thence to 1,000 feet upstream from the highway bridge at Newport, 6.3 feet (1.9 m). A channel 400 feet wide is maintained from the Delaware River to Lobdell Canal. 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.

Lobdell Canal is on the south side of the river just above the marine terminal. It is used by towboats and barges and has a reported depth of about 8 feet (2.4 m).

Brandywine River emptying into Christiana River 1¼ miles above the entrance, is good for a depth of about 4 feet (1.2 m) at low water to the railroad bridge 1 mile above the mouth, and a draft of about 6 feet (1.8 m) at high water can be taken a farther distance

of about ¾ 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.

Christiana River is lined with wharves on both banks in the city of Wilmington. The municipal wharf is located just above the second bridge (highway) on the north bank. It is open to the public. Water may be obtained from a connection on the wharf. Newport is the head of the dredged channel, and a draft of 2 or 3 feet (0.6 or 0.9 m) 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 some trade in motor boats and barges up to 4 feet (1.2 m) draft to the latter town. There is 7 feet (2.1 m) at the paint works wharf at Newport.

Bridges.—The following are the drawbridges crossing Christiana River, the distance in nautical miles above the outer ends of the jetties at the entrance, the least width of the draw openings, and the clear height above high water, when closed:

Pennsylvania Railroad (lower), 1.2 miles, 93 feet, 7 feet (2.1 m).
Third Street (highway), 2 miles, 145 feet, 17.5 feet (5.3 m).
Market Street (highway), 2.6 miles, 175 feet, 8.5 feet (2.6 m).
Baltimore & Ohio Railroad, 3.0 miles, 67 feet, 7.6 feet (2.3 m).
Pennsylvania Railroad (middle), 3.6 miles, 67 feet (west), 62 feet (east), 6.4 feet (2.0 m).
Philadelphia & Reading Railroad, 3.7 miles, 66.5 feet (east), 57.3 feet (west), 3.2 feet (1.0 m).
Pennsylvania Railroad (upper), 4.6 miles, 3.7 feet, 2.4 feet (0.7 m).
Newport (highway), 8 miles, 49 feet, 5 feet (1.5 m).
Churchmans (highway), 10.7 miles, 61 feet, 8 feet (2.4 m) (fixed-convertible to bascule).
Christiana (highway), 13.7 miles, 25.5 feet, 8.5 feet (2.6 m).

Five bridges cross the Brandywine River between the mouth and the head of navigation, as follows, with data as above:

Seventh Street (highway, draw), 0.1 mile, 49.5 feet (south) 48.3 feet (north), 10.5 feet (3.2 m).
Eighth Street (Pennsylvania R. R., draw), 1.0 mile, 48 feet, 18.6 feet (5.7 m).
Church Street (highway, draw), 1.1 miles, 40 feet, 12 feet (3.7 m).
Sixteenth Street (highway vertical lift), 1.5 miles, 41 feet, 10.2 feet (3.1 m), and lifted 54 feet (16.5 m).
Market Street (highway, fixed), 1.7 miles, 149 feet, 13.5 feet (4.1 m).

Bridge regulations prescribed for the highway bridges crossing Christiana and Brandywine Rivers require that the draws shall be opened immediately following (see Exception) at all times of the day or night upon a signal of three blasts of a whistle or horn if no person or vehicle passing over the bridge is then in the way. The answer from the bridge is three blasts of a whistle or horn if the bridge can be opened immediately, and two blasts if the bridge can not be opened immediately.

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 on the sides of the drawbridges.

Regulations prescribed for the railroad bridges (see exception below), crossing Christiana River require that the draws shall be opened immediately at all times of the day or night upon a signal of three blasts of a whistle or horn, unless a train is due to arrive

within 5 minutes of the time of giving the signal. But in no case shall there be a delay of more than 10 minutes in opening the draws. The signal shall be answered from the bridge by three blasts of a whistle or horn if the bridge can be opened immediately, and two blasts if the bridge can not be opened immediately.

Exception.—In general, vessels regularly or frequently navigating the river at the site of the Pennsylvania Railroad (lower) bridge, the tops of whose pilot or deck houses will pass under the bridge, either at the draw span or the fixed girder to the south thereof, with a clearance of 18 inches or more at the high tide, should equip and fit their smokestack or other vertical projections with hinges or other devices so as to permit the passage of the boat under the bridge without the opening the draw. Whenever a vessel which cannot pass under the bridge gives the above signal on approaching it, the draw shall be immediately opened, unless a train be on the bridge or approaching it so closely as to be unable to stop, in which case the draw may be kept closed long enough for the passage of said train but no more. When the draw cannot be opened immediately after the above-prescribed signal from the vessel is given, the bridge tender shall signal that fact to the approaching vessel by the prompt display, at night, of two red lights, one vertically over the other; or during the day by the waving of a red flag or by four short blasts of a steam whistle.

Channel regulations.—(1) 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. (For regulations relating to *vessels passing floating plant working in channels*, see appendix, p. 347.

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. The capacity of the largest is given in the table on page 4.

Airport.—The Wilmington airport, privately owned, is located about 6 miles southwest of the city center, to which there is adequate means of transportation. An airline between Washington and New York is maintained.

Tides.—The mean range of tides is 5.6 feet at Wilmington, 5.6 feet at Newport, and 3.5 feet at Christiana. High and low water at Newport occur 1 hour 10 minutes and 1 hour 40 minutes, respectively, later than at Wilmington, and at Christiana 2 hours 30 minutes and 3 hours, respectively, later than at Wilmington.

Tidal Currents.—At the entrance of the harbor the strength of the current, normally, attains a velocity of about 1 knot per hour. 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 varying from 4° to 13° west.

Directions, Christiana River.—The following directions are available for vessels of 10 feet (3.0 m) draft or less; vessels of deeper draft should take a pilot. Enter the river on course 293½° true (NW. by W. ⅛ W. mag.), 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. From here to Newport, only 6.3 feet (1.9 m) in mid-channel was available in 1935.

DELAWARE RIVER, CHRISTIANA RIVER TO PHILADELPHIA

(Chart 295)

There is a powder factory on **Carney Point**, on the south side of **Helms Cove**, eastward of the entrance to Christiana 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 Christiana River. It is a railroad terminus, and has communication by ferry with Wilmington. There is a depth of about 12 feet (3.7 m) at the steamboat wharf.

Edgemoor is a village on the west side of Delaware River, 2 miles northward of the entrance to Christiana River. A buoy depot of the Lighthouse Service is located here with an occulting green light on the end of the south wharf. The Cherry Island front range light (occulting white) with bell is on this wharf. About ¼ mile below, a paint works wharf has a depth of about 17 feet (5.2 m), and a red light on it.

A jetty extends from Edgemoor for ⅔ mile south-southwestward parallel with **Cherry Island Channel**. Bellevue front range light (occulting white) 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 there is a pier in ruins.

Oldmans Creek, on the east side of Delaware River, 4 miles above Christiana River, is the approach to the villages of **Nortonville, Pedricktown** and **Auburn**, 3, 4½ and 9½ miles, respectively, above the mouth. Considerable produce is shipped from the creek, the deepest draft of vessels being 7 feet (2.1 m). A channel 6 feet (1.8 m) deep and 100 feet wide has been dredged across the bar at the mouth, 6 feet (1.8 m) deep and 75 feet wide to Pedricktown, and 5 feet (1.5 m) deep and 40 feet wide to Auburn, and nine cut-offs have been made between the mouth and Auburn. In 1936 there was a controlling depth of 1.9 feet (0.6 m) from Delaware River to the mouth of the creek, thence 7.2 feet (2.2 m) to Nortonville, thence 4.9 feet (1.5 m) to Pedricktown, thence 3.3 feet (1.0 m) to Auburn.

To enter Oldmans Creek, steer 67° true (ENE. ¾ E. mag.), with Cherry Island range rear light (black daymark on white tower) and channel lighted buoy 6 B on range 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 headroom, when closed:

Nortonville (highway, swing), 45 feet, each, 2.5 feet (0.8 m).
Pennsylvania Railroad (swing), 36 feet, 2.1 feet (0.6 m), 3½ miles above mouth.
Pedricktown (highway, swing), 36 feet, south, 7.8 feet (2.4 m).
Auburn (highway, fixed), 29.4 feet, 1-foot (0.3 m).

Tides.—The mean range of tides is about 5½ feet at the entrance, 2.5 feet at Pedricktown, and 1 foot at Auburn. At Pedricktown high and low water occur about ½ hour after high and low water at the entrance, and at Auburn high and low water occur 2 hours and 45 minutes after high and low water at the entrance.

Grubbs Landing is 4¾ miles above the Christiana River on the west side of the Delaware River. It is a stone crib pier above high water and is lighted (flashing white) 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, 4½ miles below Chester, has wharves with depths of 25 to 30 feet (7.6 to 9.1 m). There are petroleum and chemical works.

Marcus Hook, on the west side of Delaware River, 2 miles below Chester, has oil refineries and is an important oil-shipping point. There is a depth of 9 feet (2.7 m) at the public wharf and 18 to 30 feet (5.5 to 9.1 m) at the oil wharves. A rocky patch with a depth of about 25 feet (7.6 m) has been found 50 yards out from the chemical company's dock.

A Federal **quarantine station** operated by officers of the United States Public Health Service is maintained here for ports above Wilmington. The wharf has 12 feet (3.7 m), and is at the lower end of the river front. A quarantine anchorage is opposite the station. A signal station and a day and night **reporting station** of the Philadelphia Maritime Exchange is maintained at this wharf.

A small harbor protected by ice fenders (piers) is located here.

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,** 1½ and 8 miles, respectively, above the entrance. Vessels of 8 feet (2.4 m) draft are taken to Swedesboro at high water. A channel has been dredged, and in 1936 had a controlling depth of 4.5 feet (1.4 m) from Delaware River to the mouth, thence 6.8 feet (2.1 m) to **Springers Wharf,** thence 3.5 feet (1.1 m) to Swedesboro.

There is a bar off the entrance with a least depth of 1 foot (0.3 m) on it, and a channel eastward of it to the mouth of the creek, with a least depth of 4.5 feet (1.4 m) from southward. A jetty has been built out from the south point; there is a flashing red light on the outer end. 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 midchannel up the river.

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 least width of the openings, and the headroom, when closed:

Bridgeport (highway, swing), 1½ miles, 47 and 45 feet, 5 feet (1.5 m).
Pennsylvania Railroad (swing), 1¾ miles, 38 feet, 6.7 feet (2.0 m).
Swedesboro (highway, swing), 7 miles, 60 and 50 feet, 5.8 feet (1.8 m).
Swedesboro (Pa. R. R., fixed), 7½ miles, 40 feet, 21 feet (6.4 m).
Swedesboro (highway, fixed), 8 miles, 40 feet, 7 feet (2.1 m).

The section of channel on Marcus Hook and Chester ranges, which was formerly obstructed by ledge rock, has been blasted and dredged clear to 36 feet (11.0 m).

Tides.—The mean range of tides is about 5½ feet at the entrance and 5 feet at Swedesboro. At Swedesboro high and low water occur 1 hour and 30 minutes after high and low water at the entrance.

Chester is an important manufacturing city 73½ miles above the entrance to Delaware Bay and 14½ miles below Philadelphia. It has considerable trade by vessels. Docks open to the public have 10 to 30 feet (3.0 to 9.1 m) alongside. The principal wharves of the industrial plants have from 8 to 30 feet (2.4 to 9.1 m) alongside. Water and limited quantities of coal can be obtained. There are several machine shops and a shipbuilding plant with two dry docks, the largest 523 feet long, with 10,000-ton lifting capacity and 22½ feet (6.9 m) of water on blocks at ordinary high water.

Chester Creek had a controlling depth in 1936 of 4.3 feet (1.3 m) from Delaware Bay to the Third Street highway bridge, then about 3 feet (0.9 m) to the Pennsylvania Railroad bridge at Sixth Street, and about 1½ feet (0.5 m) 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. There is a railroad bridge just inside the mouth, with a single draw opening 59 feet wide and a headroom of 1½ feet (0.5 m) at high water, and there are eight fixed bridges between this point and Upland, having a least headroom of 6 feet (1.8 m) at high water and least span of 68 feet. The mean range of the tides is about 5½ feet at the entrance and about 5 feet at Upland.

Chester Island, 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 the island. The channel from the dike to the southwest end of the island has been used as a dumping ground and shoaled to a depth of 4 feet (1.2 m), or less.

Ridley Creek has a depth of about 5 feet (1.5 m) at high water to a 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 seven fixed bridges having a least headroom of 9.5 feet (2.9 m) at high water and least span of 50 feet. There is little business by water.

Eddystone, a town just above Chester, has a large factory and other industrial works. The Baldwin Locomotive Works ships locomotives from its piers direct to foreign countries. The two wharves at this port have depths of about 24 to 30 feet (7.3 to 9.1 m).

Crum Creek, just westward of Chester range rear light, is bare in places at low water, and has a depth of 5 feet (1.5 m) 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.

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Darby Creek, ⅜ mile eastward of Chester range rear light, has a depth of about 7 feet (2.1 m) for 4 miles above the mouth and 3 feet (0.9 m) for a further distance of about 2 miles to the fork, ½ mile from the town of **Darby**. It 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 mean rise and fall of tides is about 5½ feet at the mouth, 5 feet at the fork, and nothing at Darby.

Essington is a town on the north side of Delaware River northward of Tinicum Island. There is a depth of 16 feet (4.9 m) at the shipyard wharf and 3 to 7 feet (0.9 to 2.1 m) at the clubhouse wharves. The Philadelphia 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 several marine railways, the largest has a capacity of 125 tons, and can take out vessels 125 feet long and 11 feet (3.4 m) draft. All kind of yacht and small vessel repairs can be done.

Tinicum Island, 11 miles below Philadelphia, is a long, marshy island with bushes on its western end.

There are several large factory buildings between **Thomson** and **Crab Points**, and four wharves, the upper one having a depth of about 29 feet (8.8 m) and the others 8 to 12 feet (2.4 to 3.7 m). The anchorage for loading **explosives** is south of the main channel, as described on page 76.

A large oil depot and refinery is located east of **Bramell Point**, and 33 feet (10.1 m) 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 east of Mantua Creek entrance, there is an oil terminal wharf with about 30 feet (9.1 m) at the face.

Mantua Creek, on the southeast side of Delaware River, ½ mile above Billingsport, is the approach to the villages of **Paulsboro**, **Mount Royal**, and **Mantua**, 1½, 4, and 7½ miles, respectively, above the entrance. A channel has been dredged from the Delaware River to Parkers Landing at Mount Royal about 4 miles long, and a cut-off has been dredged about 2 miles above. The controlling depth in 1936 was 12.4 feet (3.8 m) from Delaware River to the fertilizer plant; thence 7.9 feet (2.4 m) to Paulsboro; thence 5.5 feet (1.7 m) to Mount Royal; and thence 1.6 feet (0.5 m) to Mantua, the head of navigation. There are jetties on both sides at the entrance with lights at the outer ends, and the channel is buoyed to the fertilizer factory.

The following are the bridges crossing Mantua Creek, the distance in nautical miles above the outer ends of the jetties at the entrance, the least width of the openings, and the headroom, when closed:

Paulsboro (Pa. R. R., swing), 1.2 miles, 35.5 feet, 1.7 feet (0.5 m).
Paulsboro (highway, swing), 1.5 miles, 41 feet, each, 4 feet (1.2 m).
Mount Royal (highway, fixed), 4.4 miles, 60 feet, 12 feet (3.7 m).
Mount Royal (Pa. R. R., fixed), 4.5 miles, 42 feet, 13.5 feet (4.1 m).
Mantua (highway, fixed), 7.5 miles, 66.6 feet, 13.5 feet (4.1 m).
Mantua (R. R., fixed), 7.5 miles, 26 feet, 14 feet (4.3 m).

Tides.—The mean range of tides is about 5½ feet at the entrance, 4½ feet at Paulsboro, 4 feet at Mount Royal, and 2½ feet at Mantua. High and low water occur later than at the entrance, as follows: Paulsboro, 20 minutes; Mount Royal, 50 minutes; Mantua, 2 hours and 5 minutes.

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 (1.8 m) deep and 60 feet wide from Delaware River to a highway bridge 1 mile above the entrance, and 6 feet (1.8 m) deep and 40 feet wide to the town of **Woodbury,** 3½ miles above the mouth, with two cut-offs near the mouth and one near the head. The controlling depth in June 1936 was 3½ feet (1.1 m) at the mouth, thence 6½ feet (2.0 m) to the first bridge, thence 3 feet (0.9 m) to the highway bridge at Woodbury.

Two drawbridges cross the creek. The lower bridge, about 1 mile above the entrance, is a center pier draw with openings 40 feet wide and headroom of 6 feet (1.8 m) at high water when closed; the south opening is the better. The second bridge, ¾ mile above the lower one, is a bascule draw with an opening 45 feet wide and a head room of 4 feet (1.2 m) at high water when closed. There is a fixed highway bridge at Woodbury with a headroom of 10 feet (3.0 m) at high water. The dredged channel stops at this bridge and there is little navigation above. The mean rise and fall of tides is 5.3 feet at the entrance and 4 feet at Woodbury. High and low water at Woodbury occur about ¾ 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** (flashing white, with red sector). 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 **Red Bank,** 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 (with red reflector) is 125° true (SE. ⅛ E. mag.) to the entrance. At low water the channel in the creek is well defined.

PORT OF PHILADELPHIA

(Charts 280, 295, and 296)

The port of Philadelphia (State of Pennsylvania Authority) officially includes the Delaware River from Marcus Hook to Morrisville, Pennsylvania.

The harbor of Philadelphia embraces the Delaware River from the mouth of the Schuylkill River to the Pennsylvania Railroad bridge in the upper part of the city, a distance of 12.5 statute miles, and the Schuylkill River as far as the Fairmount Dam, a distance of 8.6 miles.

Immigration service.—The United States immigration station for the port of Philadelphia, and other ports of the Delaware River, is located at Gloucester, N. J., directly opposite Philadelphia on the Delaware River. Immigration inspections are made of all vessels arriving from foreign ports.

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.

Quarantine service.—This is furnished by the United States Public Health Service at Marcus Hook, Pa. for all Delaware River ports above Wilmington, Del. (See p. 79.) **Fumigation** can be done with cyanide, requiring 6 hours. There is a relief station of the Public Health Service at 225 Chestnut Street, Philadelphia.

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.

Oil bunkering.—There are facilities at Point Breeze and Petty Island in the harbor of Philadelphia and at Paulsboro, N. J., Chester, Pa., Marcus Hook, Pa., Claymont, Del., and Wilmington, Del., for supplying oil-burning vessels with fuel.

Coal bunkering.—There are several companies engaged in bunkering vessels with coal. Vessels as a rule are bunkered from barges while at their regular berths loading cargo. There are large coal dumping facilities at Greenwich Point and at Port Richmond. The former has a wharf with a depth of 36 feet (11 m), and the latter has wharves with depths from 15 to 30 feet (4.6 to 9.1 m).

Dry docks and marine railways.—With the exception of those at the navy yard there is only one graving dock at Philadelphia and neighboring localities of sufficient capacity for docking a ship 428 feet long. (For additional data see under Camden.) One of the marine railways can accommodate a ship of 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.

Airports.—Philadephia has several landing fields. The largest is the Philadelphia-Camden Central airport 4½ miles from the center of the city and located in Camden, New Jersey.

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 per cent 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.

In 1934 the total of all this commerce amounted to 28,705,000 tons.

Holidays.—The following holidays are observed: New Year's Day (January 1); Lincoln's Birthday (February 12); Washington's Birthday (February 22); Good Friday (Friday before Easter Sun-

day); Memorial Day (May 30); Independence Day (July 4); Labor Day (first Monday in September); Columbus Day (October 12); Armistice Day (November 11); Thanksgiving Day (last Thursday in November); and Christmas Day (December 25).

For **Harbor and Anchorage Regulations**, and for **Speed Regulations** see the appendix. For anchorages see page 362.

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 (1.5 to 11.6 m) at mean low water. On the Schuylkill River there are depths of 3 to 30 feet (0.9 to 9.1 m) 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.

Tides.—The mean range of tides at Philadelphia is 5.2 feet. Daily predictions are given in the tide tables 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 the entrance of the Schuylkill Navigation Canal, near the **Fairmount Dam**, 7½ miles above the entrance. It is an important outlet for a part of the commerce of Philadelphia. There are large grain elevators at **Girard Point**, oil-refinery wharves opposite **Point Breeze** and at **Gibsons Point**, and other industrial wharves, besides several yacht clubs.

The dredging project in Schuylkill River provides for a channel 30 feet (9.1 m) deep at mean low water and 400 feet wide to Twenty-ninth Street, thence 30 feet (9.1 m) deep and 300 feet wide to Passyunk Avenue, thence 26 feet (7.9 m) deep and 200 feet wide to Gibson Point, and thence 22 feet (6.7 m) deep and 200 feet wide to University Avenue. The restoration of the channel to project dimensions from the Delaware River to University Avenue has been completed, but rapid shoaling necessitates frequent redredging. An examination in 1936 showed a controlling depth of 28 feet (8.6 m) to Passyunk Avenue, thence 18.8 feet (5.7 m) to Gibson Point, and thence 12.2 feet (3.7 m) to University Avenue.

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 black buoy off the mouth of **Mingo Creek** marks a rock with 8 feet (2.4 m) over it. **Anchorage** in Schuylkill River is prohibited except by permission of the commissioners of navigation. The mean range of **tides** is about 5½ feet.

Schuylkill Navigation Canal is a succession of short canals and slackwater pools following the course of the Schuylkill River from a point near **Fairmount Dam**, 7½ miles above the entrance, to **Port Clinton**,

a distance of about 80 miles. The lock at the dam has been filled in and there is no navigation connection now. The available depth at low stage to Phoenixville, 23 nautical miles, is about 4 feet (1.2 m). There is no navigation above this town, the canal from here to **Port Clinton** having been out of use since 1919. There are 12 locks to **Phoenixville**, each 18 feet wide, 110 feet long and 6 feet (1.8 m) over the sill. All of the bridges crossing the canal are fixed, the lowest being a bridge at **Norristown**, 13 miles above the dam, which has a headroom of 13 feet (4.0 m) at mean summer stage and 1 foot (0.3 m) at flood stage. The canal is closed for about 4 months in winter. It is used mostly by yachts and motor boats.

Bridges.—The following are the bridges below the dam crossing the Schuylkill River, the distance in nautical miles above the entrance, the width of the openings, and headroom above high water (draw closed):

Penrose Avenue Ferry (highway, swing), 1.1 miles, 183 feet each, 18 feet (5.5 m).
Passyunk Avenue (highway, bascule), 3.0 miles, 200 feet, 34 feet (10.4 m).
Baltimore & Ohio Railroad (swing), 4.4 miles, 57 feet, each, 15 feet (4.6 m).
Grays Ferry Avenue (R. R., swing), 4.7 miles, 75 and 65 feet, 22½ feet (6.9 m).
Grays Ferry Avenue (highway, swing), 4.7 miles, 75 feet, each, 22½ feet (6.9 m).
University Avenue (highway, bascule), 5.3 miles, 100 feet, and 87 feet, each, 33 feet (10.1 m).
Pennsylvania Railroad (swing), 5.5 miles, 70 and 67 feet, each, 26 feet (7.9 m).
South Street (highway, bascule), 5.8 miles, 100 feet, and 101½ feet, each, 37 feet (11.3 m).
Walnut Street (highway, fixed), 6.2 miles, 113 feet, and 95 feet, each, 22 feet (6.7 m).
Chestnut Street (highway, fixed), 6.3 miles, 160 feet, each, 32 feet (9.8 m).
Market Street (highway, fixed), 6.4 miles, 164 feet, each, 28 feet (8.5 m).
Market Street (R. R., fixed), 6.4 miles, 200 feet, and 69 feet, each, 29 feet (8.8 m).
Arch Street (R. R., fixed), 6.5 miles, 172 feet, each, 38 feet (11.6 m).
Spring Garden Street (highway, fixed), 7.0 miles, 280 feet, 17 feet (5.2 m).

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 can not 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 can not 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, at the junction of the Delaware and Schuylkill Rivers, is the site of a **United States 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 (9.1 m) but has shoaled to 16 and 18 feet (4.9 and 5.5 m) in the entrance. It has shoaled a lesser amount inside. The depths at the wharves are about 20 to 30 feet (6.1 to 9.1 m). The wharves on the south side of the island range in depth from 6 to 35 feet (1.8 to 10.7 m). There are protection lights on the radio towers and the crane on pier 8.

Big Timber Creek, on the southeast side of Delaware River southward of Gloucester, has an improved channel; the project providing a depth of 10 feet (3.0 m) with various widths from the Delaware River to **Clements Bridge at Runnemede,** 6 miles above the entrance. In June 1936, the controlling depths were 8 feet (2.6 m) at the entrance, and thence 9½ feet (2.9 m) to Marters Sand Plant, about 4½ miles above the entrance, and thence 3⅓ feet (1.0 m) to the above bridge. Two buoys mark a 2-foot (0.6 m) spot and the edge of the dredged channel in the mud flats in the entrance. Tugboats and barges of 6 feet (1.8 m) draft go to the wharves at **Westville.** The river is navigable at high water for about 8 miles to **Chews Landing.** Four fixed bridges cross the creek; three at Westville, with headroom of 14.3 feet (4.4 m), each, at high water, least width of span of 34 feet in the railroad bridge; and a highway bridge at Runnemede with headroom of 8.8 feet (2.7 m) at high water and two channel spans 60 feet wide.

Tides.—The mean range of tides at Westville is about 5 feet and about 4 feet at Clements Bridge.

Gloucester is a city on the eastern side of Delaware River opposite the lower end of Philadelphia and the site of shipbuilding and manufacturing plants. The depths at the wharves are 2 to 36 feet (0.6 to 11.0 m), the principal traffic being coal and building materials. During the ice season a signal station is maintained here by the Philadelphia Maritime Exchange. The U. S. Immigration Station for the Delaware River area is located at the foot of Cumberland Street.

Newton Creek, on the eastern side of the Delaware River between Camden and Gloucester, is crossed by three fixed bridges and one bascule bridge near the mouth. Of these fixed bridges, the narrowest span is 6½ feet and the least headroom is 1.6 feet (0.5 m) at high water. There is about 30 feet (9.1 m) of water in the mouth between the wharf 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. The high-water clearance of the bridge is 135 feet and the center span is 1,686 feet wide. A completed project called for dredging in front of this port, to a depth of 18 feet (5.5 m) from that depth north of Cooper Point to Berkley Street, thence 30 feet (9.1 m) deep to Newton Creek, these depths extending from the 35-foot (10.7 m) channel in Delaware River to 50 feet from the pierhead line. Shoaling in spots has taken place and the latest information should be obtained.

The depth of water at the Camden wharves is from a few feet to 38 feet (11.6 m). Two municipal wharves have depths up to 30 feet (9.1 m), and a third has a depth of 7 feet (2.1 m). Two railroad systems have good waterfront connections here.

Five large shipbuilding plants with deep water at their wharves are located here. The largest marine railway is 580 feet long, has 17 feet (5.2 m) on keel blocks aft, and 2,000 ton lifting capacity. It is for company's own repairs. (See under Repairs, p. 4 for additional data.) Dry and cold storage warehouses are available.

The **Central Airport** at Camden is also the principal airport for Philadelphia. 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.

Petty Island, eastward of the main channel at the northern end of the city of Camden, is 1½ 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 (8.5 m) alongside. The other wharves have about 12 to 18 feet (3.7 to 5.5 m).

Port Richmond anchorage, the buoyed area between the main channel and the island has been dredged, and had a controlling depth of 30 feet (9.1 m) in 1935.

The channel eastward of Petty Island is principally used by the traffic to and from Cooper River, and has a least depth of 17 or 18 feet (5.2 or 5.5 m) 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-foot (3.7 m) headroom at high water when closed. The regulations of the Schuylkill River bridges apply for this bridge (see p. 112). The easterly entrance of the channel is a dredged cut 300 feet wide, with a least depth of about 10 feet (3.0 m) 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 nearly ¾ 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 (3.7 m) deep and 70 feet wide across the flats at the mouth and 1¼ miles above the entrance. In June 1936, the controlling depth was 12.0 feet (3.7 m) to the end of the dredged channel about 1½ miles above the entrance. There is a depth of about 6 feet (1.8 m) for a further distance of about 1 mile, and a depth of 2 feet (0.6 m) at low water and 4 feet (1.2 m) at high water to Stoys Landing, at the head of navigation 7¼ miles above the entrance. Vessels using the creek are tugboats and barges up to 12 feet (3.7 m) draft to the industrial plants in the lower part, and small truck and pleasure boats in the upper part. There are buoys at the entrance of the dredged channel. Above the entrance the best water follows a general mid river course.

Cooper River is crossed by ten bridges between the entrance and the head of navigation. The first four, all within a distance of 3 miles from the mouth, are drawbridges, having a least draw width of 35 feet and a least headroom of 4 feet (1.2) at high water when closed. The others are fixed bidges with a least width of 39 feet and a least headroom of 6 feet (1.8 m) at high water.

Tides.—The mean range of tides is 5.2 feet at Cooper Point, just outside the entrance, and 2 feet at Stoys Landing. High and low water at Stoys Landing occur 2 hours and 15 minutes after high and low water at Cooper Point.

DELAWARE RIVER ABOVE PHILADELPHIA

(Chart 296)

The Delaware River is navigable for a distance of 24½ 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 present project calls for a channel 28 feet (8.5 m) deep and 300 feet wide from Allegheny Ave., Philadelphia to the Delair Bridge of the Pennsylvania Railroad, thence 25 feet (7.6 m) deep and same width as above the upper end of the Marine Terminal at Trenton, N. J., and for a turning basin at this upper end, and thence for maintaining the 12-foot (3.7 m) 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 1936, the controlling depth from Philadelphia to the Trenton Marine Terminal was 20.2 feet (6.2 m).

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. There is considerable trade on the river in steamers, schooners, and barges to the industrial plants along the banks. Schooners take a tow at Philadelphia or below.

The Pennsylvania Railroad bridge, crossing the river 1 mile above Petty Island, has a center pier draw, with opening 122 and 124 feet wide, with a headroom of 51 feet (15.5 m) at high water under either the draw when closed or the fixed spans. The **regulations** of the Schuylkill River bridges apply for this bridge (see p. 112).

Pensauken Creek, on the eastern side, ¾ mile above the railroad bridge, has a depth of about 3 feet (0.9 m) at low water 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 headroom of 8.5 feet (2.6 m) at high water, and the other a headroom of 4 feet (1.2 m) at high water.

The Tacony-Palmyra bridge crosses the river between the places of these names. It has a bascule span 240 feet wide and headroom of 53½ feet (16.3 m) at high water when closed. The main fixed span is 520 feet long and has a similar headroom of 64½ feet (19.7 m). The **regulations** of the Schuylkill River bridges apply for this bridge (see p. 112).

Riverton is a town on the eastern side just above this bridge. There is a depth of 7 feet (2.1 m) at the steamboat wharf. A ferry connects Riverton with Tacony.

Bridesburg, Tacony, and **Torresdale** are parts of the city of Philadelphia, 1, 2½, and 6 miles, respectively, above the railroad bridge. The wharves have depths from a few feet to 28 feet (8.5 m).

Frankford Creek, on the western side, 1½ miles above the railroad bridge, has been dredged to a depth of 6 feet (1.8 m) and width of 60 feet for ¾ mile above the mouth, and has a reported controlling depth of 5 feet (1.5 m) at the entrance, and then shoals to about

1 foot (0.3 m) ½ mile upstream to the head of navigation 2 miles above the mouth. It is reported to be an open sewer creek with practically no boat traffic. It is crossed by two drawbridges within a distance of ½ mile from the mouth and by four fixed bridges between the upper drawbridge and the head of navigation.

Pennypack Creek, on the western side, 4½ miles above the railroad bridge, has a depth of about 6 feet (1.8 m) at high water to a fixed bridge 1 mile above the entrance. It is used by tugboats and barges of 6 feet (1.8 m) draft. The **Philadelphia House of Correction** is on the south side.

The **Philadelphia filter plant** is on the western side of the river, ⅜ mile above the mouth of Pennypack Creek. A very tall chimney and a straw-colored cylindrical tower are prominent.

Rancocas River, on the eastern side of the Delaware River, 5½ miles above the railroad bridge, has a depth of 7 feet (2.1 m) for a distance of 4½ miles above the mouth and 4 feet (1.2 m) to the junction of the Lumberton and Mount Holly branches, 7¾ miles above the mouth. It is used by many tugboats and barges up to 10 feet (3.0 m) draft. The Lumberton Branch above Hainesport and the Mount Holly Branch are used only by small pleasure boats. The channel southwest of Hawk Island is marked by a lighted range and buoy. The channel of Rancocas River, 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 river below the fork are described with Delanco, Bridgeboro, and Bougher.

The channel from the fork to the town of **Mount Holly**, a distance of 4½ miles, is nearly bare in places at low water and has a depth of about 3 feet (0.9 m) at high water. Four fixed bridges with least span width of 15 feet and a least headroom of 5½ feet (1.7 m) at high water, cross the river at Mount Holly.

There is a depth of 3 feet (0.9 m) at low water in the **Lumberton Branch** to the town of **Hainesport**, 2½ miles above the fork, and about 4 feet (1.2 m) at high water for a farther distance of 2¼ miles to the town of **Lumberton**. Three bridges cross the Lumberton Branch at Hainesport. The lower highway bridge has a draw opening 46 feet wide with headroom of 5 feet (1.5 m) when closed. The other two are fixed with least span of 48 feet and least headroom of 15 feet (4.6 m).

Riverside is a town on the south side of Rancocas River, 1¼ miles above the entrance. It has several factories and considerable business by water.

Delanco is a town on the north side of Rancocas River, 1½ miles above the entrance. There are wharves on both the Delaware and Rancocas River water fronts. There is a railway here capable of hauling out boats of 50 feet length and 5 feet (1.5 m) draft. Two center-pier drawbridges cross Rancocas River between Delanco and Riverside. Each opening in the highway bridge is 50 feet wide and in the railroad bridge 48 feet, with headroom of 4 and 5 feet (1.2 and 1.5 m), respectively at high water when closed.

Bridgeboro is a village on the south side of Rancocas River, 3 miles above the mouth. A bascule bridge, with opening 60 feet wide and headroom of 8½ feet (2.6 m) at high water when closed, crosses the river at this point.

Bougher is a village on the south side of Rancocas River, 7 miles above the mouth. A bridge having a center-pier draw with a width of 50½ feet in the south opening crosses the river at this point. The headroom at high water when the draw is closed is 6 feet (1.8 m). The north opening is shoal.

Hawk Island is a marshy island, wooded in the center, at the junction of Delaware and Rancocas Rivers.

Mud Island, ¾ 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 (2.7 m) leads around the northwest side.

Beverly is a city on the eastern side, 9 miles above the railroad bridge at Philadelphia. The principal business by water is by the regular river steamers and a few coal barges. There is a depth of 9 feet (2.7 m) at the steamboat wharf. 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, ¾ mile east-northeastward of the standpipe at Beverly, has a controlling depth of about 3 feet (0.9 m) to the third bridge 1¼ 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 9½ feet (2.9 m).

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 considerable trade by water in steamers, and barges, the deepest draft being 15 feet (4.6 m). There is a depth of about 12 feet (3.7 m) at the public wharf, 400 yards westward of a broad standpipe. Water and coal can be obtained at the wharves. The city is connected with Bristol by a vertical lift bridge with center span width of 500 feet; the headroom at high water, with lift span down, is 62 feet (18.9 m), and up, 135 feet (41.1 m). The **regulations** of the Schuylkill River bridges apply for this bridge (see p. 112).

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 wharf on the northwest side opposite Bristol with a depth of about 8 feet (2.4 m) at the end, at which river steamers and motor boats land. The channel southeastward of the island has a controlling depth of 7 feet (2.1 m), being shoalest at the upper end. Vessels of 12 to 15 feet (3.7 to 4.6 m) draft use the lower end as far as a pipe foundry, ¾ mile above the entrance, but the upper end is used only by motor boats. The foundry wharf has about 12 feet (3.7 m) alongside. A dredging project calls for an auxiliary channel 20 feet (6.1 m) 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.

Bristol is a town on the northwest side of the river, 13 miles above the railroad bridge at Philadelphia. It is the terminus of the Delaware & Lehigh Canal, but the entrance formerly connecting with the Delaware River is now filled in, and the canal is reported no

longer used, and abandoned. The wharves in the river at this port have about 12 to 16 feet (3.7 to 4.9 m) alongside.

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 wharf has about 12 feet (3.7 m).

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 17½ miles above the railroad bridge at Philadelphia. There is a depth of about 10 feet (3.0 m) at the clubhouse wharf and 8 feet (2.4 m) at the wireworks wharf 400 yards above. There is considerable dredging for sand outside the dredged channel between Roebling and Newbold Island.

Newbold Island, 18½ 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.

Fieldsboro (White Hill) is a town on the high bank on the east side of the river, ¾ mile above the upper end of Newbold Island. There are factories and a railroad yard close alongshore at the foot of the bank. The steamboat wharf has a depth of 10 feet (3.0 m) at the end.

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 & Raritan Canal, which is now closed. There is a depth of 6 feet (1.8 m) between the black and red buoy marking the entrance to **Crosswick Creek**, at the north end of Bordentown, and about 3 feet (0.9 m) for 3 miles above the mouth, but the channel is crooked and difficult. The bottom is soft. There is a depth of 9 feet (2.7 m) at the steamboat wharf. There are six fixed bridges in this creek for a distance of about 3½ miles above the mouth, having a least span width of 20 feet and least headroom at high water of 5½ feet (1.7 m). Gasoline and provisions are obtainable.

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 1½ miles below the Pennsylvania Railroad bridge at Trenton. They are above high water about 15 feet (4.6 m), and on the edge of, but not obstructing, the present dredged channel, which is 300 feet wide.

There are three oil company piers at **Duck Island** with about 10 feet (3.0 m) alongside.

Trenton, at the head of navigation, 24½ miles above the railroad bridge at Philadelphia, has a bulkhead terminal (Trenton Marine Terminal) at the lower end of the city. The upper end of the 25-foot (7.6 m) project channel opposite the marine terminal has a width of 500 feet to provide turning room for vessels. See page 86.

A dredged channel 200 feet wide with a controlling depth of 12 feet (3.7 m) leads above the terminal along the water front to the railroad bridge, which is the limit of navigation. There are rapids above the bridge. There is 10 feet (3.0 m) depth at the old city wharf and at the oil company wharf near the bridge, and 25 feet

(7.6 m) at the marine terminal. Vessels drawing 25 feet (7.6 m) have berthed at the terminal. There is a yacht club.

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 the tides is 5.0 feet at Riverside, Rancocas River, 4.9 feet at Burlington and Bordentown, and 4.8 feet at 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. When the upper river is closed by ice, daily freight service is maintained by the steamship company with Philadelphia by motor truck.

Freshets.—During March and April freshets of from 10 to 20 feet (3 to 6 m) 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 (2.7 m) 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.

5. COAST FROM CAPE HENLOPEN TO CAPE CHARLES

(Charts 379 and 1219 to 1222)

From Cape Henlopen the coast trends southward for 21 miles to Fenwick Island Lighthouse and then trends south-southwestward for 96 miles to Cape Charles. The coast southward of Cape Henlopen is a chain of low sand beaches, backed by woods, and presents few characteristic features from offshore. There are few towns along the outer beach, and the most prominent marks are the lighthouses and Coast Guard stations, except at the northern end where there are also a few summer resorts with medium sized hotel buildings. There are a few tall water tanks or standpipes. There are no harbors of refuge for deep draft vessels between Cape Henlopen and Cape Charles. Assateague Anchorage can only be used by shallow-draft boats as the entrance has only about 10 feet (3.0 m) controlling depth. The inlets are subject to frequent change and their use requires local knowledge. The inlets and interior waters are described under "Inland waters, Cape Henlopen to Cape Charles," page 122.

The only towns visible from offshore between Cape Henlopen and Cape Charles are the summer resorts of Rehoboth, Bethany Beach, and Ocean City, 5, 16, and 29 miles, respectively, southward of Cape Henlopen. Rehoboth is distinguished by a standpipe, and a large hotel; Bethany Beach by a small group of houses without prominent marks; and Ocean City by two black water tanks and several other prominent objects.

The coast between Cape Henlopen and Cape Charles is fringed with broken ground, on which lumps with depths up to 6 fathoms (11.0 m) are found for distances of 8 to 11 miles from shore. The latest information respecting the outlying shoals is shown on the charts. The principal ones to which names have been applied are mentioned in the following description. There are lightships, or lighted buoys, off the outer edge of the broken ground and deep-draft vessels keep outside of them.

Hen and Chickens Shoal, close inshore off Cape Henlopen, by the last survey, had a least found depth of 8 feet (2.4 m), and there was a channel westward of it with a least depth of 22 feet (6.7 m), seldom used except by small boats. Strangers should pass outside of it. At night a red sector in Harbor of Refuge Lighthouse covers the shoal. A black buoy, lying nearly 2 miles southeastward of Cape Henlopen Coast Guard station, marks the south end of the shoaler part, but a bank with 4 to 5 fathoms (7.3 to 9.1 m) extends 3 miles southeastward from the buoy; this extension is marked by a lighted whistle buoy. Wreck of Harry Foster

Fenwick Island Lighthouse (occulting white) has a white tower, 83 feet (25.3 m) above the water, and visible 15 miles. Shoals with depths of 5 fathoms (9.1 m) or less extend 8 miles offshore eastward of Fenwick Island Lighthouse. **Fenwick Island Shoal** had a least depth of 8 feet (2.4 m) over a wreck 5½ miles 86° true (E. ½ S. mag.) from the lighthouse. Another wreck with more depth lies ¼ mile eastward. The shoal proper has a least found depth of 14 feet (4.3 m). The shoal is marked on the southwest side by a lighted whistle buoy. A spot with 5 fathoms (9.1 m) over it lies 10½ miles 92° true (E. by S. mag.) from Fenwick Island Lighthouse.

Fenwick Island Shoal Lightship has been discontinued and replaced by a lighted whistle buoy. The station buoy, red nun, lies 700 yards northward and marks a wreck.

Isle of Wight Shoal, 7 miles 120° true (SE. ½ E. mag.) from Fenwick Island Lighthouse, had a least depth of 21 feet (6.4 m) by a late survey and is marked on the western side by a horizontally striped buoy. A shoal with 4 fathoms (7.3 m) on it lies about midway between Isle of Wight Shoal and Fenwick Island Shoal.

Little Gull Bank, 2½ miles southeastward of Ocean City, has a least depth of 15 feet (4.6 m) by the last survey. It is marked at the southwest end by a buoy with horizontal bands.

Great Gull Bank, 2½ miles southward of Little Gull Bank, had a least depth by the last survey of 17 feet (5.2 m) at the southwest end. It is marked at the northeast end by a* lighted whistle buoy. Numerous unmarked spots with less than 5 fathoms (9.1 m) lie off shore between Great Gull Bank and Winter Quarter Shoal, as shown on the chart.

Winter Quarter Shoal, 11 miles 72° true (E. ⅞ N. mag.) from Assateague Lighthouse, had a least depth of 10 feet (3.0 m) by the last survey, and is marked on the southwest end by a buoy with horizontal bands. A wreck, the greater part of which is awash, lies on this shoal near its southwest end. There is a lighted whistle buoy 1½ miles eastward of the shoal.

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* Barge *Jonesport* wreck lies about 1 mile northward of *Great Gull Bank Lighted Whistle Buoy.* (March 1937.)

Winter Quarter Shoal Lightship, 20 miles 88° true (E. ½ S. mag.) from Assateague Lighthouse, has a ~~straw-colored~~ hull with "WINTER QUARTER" on the sides in ~~black~~, and two masts with ~~black~~ lantern galleries. The light is group flashing white (flash 2 seconds, eclipse 3 seconds, flash 2 seconds, eclipse 13 seconds), 66 feet (20.1 m) above the water, and visible 14 miles. A fixed white riding light is shown from the forestay. The fog signal, given on a steam diaphragm horn, is a 3-second blast each minute. If horn is disabled, a bell will be struck by hand. ~~The submarine bell strikes groups of 4 strokes every 15 seconds~~. There are a radiobeacon and distance finding facilities, the details for which are given on page 28. The yellow station buoy is about ¼ mile north of the lightship.

Assateague Lighthouse has a red tower. The light is flashing white, 154 feet (46.9 m) above the water, and visible 19 miles. The tower shows well above the trees surrounding it, and is the most prominent mark in the vicinity.

Assateague Anchorage had depths of 9 to 15 feet (2.7 and 4.6 m) in 1934. The holding ground is good. The entrance around Fishing Point has a controlling depth of 10 feet (3.0 m). The point should be rounded close by. Local knowledge should be obtained. The best channel for entering is narrow and dangerous in heavy weather.

Fishing Point is a bare sand spit on the south side of the anchorage and is extending rapidly northwestward. The rate of movement at present is about 75 yards per year. The end of the point is marked by **Fishing Point Light** (flashing white). There are two dismantled fish factories, with prominent iron stacks, and a Coast Guard wharf with about 13 feet (4.0 m) alongside, located in the south bight of Assateague anchorage.

Chincoteague Inlet, southwestward of Fishing Point, affords some protection from northerly and northeasterly swell for vessels anchoring near the bell buoy. Vessels in entering should avoid the wreck with 20 feet (6.1 m) over it, about 1½ miles northwestward of *Turners Lump lighted bell buoy*.

The shoals southeastward and eastward of Fishing Point are subject to some change both in depth and position, and strangers should proceed with caution when in this vicinity. The off-lying shoals are fairly stable, but those southward of Fishing Point are moving slowly southward.

Blackfish Bank, least natural depth 13 feet (4.0 m), lies 4 to 5 miles off Assateague Island, and is marked near the south side by a bell buoy with white reflector. There is a wreck with 11 feet (3.4 m) over it about ½ mile northwest of this buoy. Coasting vessels seeking protection from westerly weather pass westward of this bank but should guard against this wreck.

Porpoise Banks, 10 miles southward of Assateague Anchorage and the same distance offshore, is a broken area on which the least depths found were 5½ to 6 fathoms (10.1 to 11.0 m) as shown on the chart.

Parramore Banks, extending 8 miles from shore off Wachapreague Inlet, is a broken area on which the least depths found are 3 to 4 fathoms (5.5 to 7.3 m), as shown on the chart. A lighted whistle buoy, moored 15 miles 52½° true from Hog Island Lighthouse, marks the eastern end of the banks.

Hog Island Lighthouse is a black skeleton tower. The light is flashing white (flash 1.8 seconds, eclipse 43.2 seconds), 180 feet (55 m) above the water and visible 20 miles.

Smith Island Shoal has a present least depth of 21 feet (6.4 m), lying about 7½ miles 104° true (ESE. ⅛ E. mag.) from Cape Charles Lighthouse. It is marked by *Cape Charles lighted whistle buoy.* Depths less than 30 feet (9.1 m) extend about 2 miles, and broken ground with least found depths of 5¼ to 6¼ fathoms (9.4 to 11.6 m) extends 11½ miles, northeast by east from Smith Island Shoal, as shown on the chart. The shoal breaks heavily in bad weather.

A vessel drawing 22½ feet (6.9 m) reported striking 1¾ miles northwest of this buoy, and a recent survey shows a least depth of 25 feet (7.6 m) in that vicinity.

Cape Charles Lighthouse is a skeleton tower with the upper part black and the lower part white. The light is group flashing white, 180 feet (55 m) above the water, and visible 20 miles. The light flashes 9 times every 60 seconds, thus: Four flashes, eclipse 6.8 seconds, five flashes, eclipse 32.3 seconds; each flash 0.3 second duration.

Smith Island, upon which the lighthouse is located, is low and sparsely wooded, and the lighthouse shows well above the trees surrounding it.

The shoals and channels on the northeast side of the entrance to Chesapeake Bay are described on page 148.

Chesapeake Lightship, in 63 feet (19.2 m), 15 miles 78° from Cape Henry Lighthouse, off entrance to Chesapeake Bay, has a red hull with "CHESAPEAKE" on the sides, red tubular mast with black lantern and gallery. Light is occulting white, every 4 seconds, shown from foremast. It is 66 feet (20.1 m) above the water and visible 14 miles. A fixed white riding light is exhibited from the forestay. ~~A submarine bell sounds groups of two strokes every 10 seconds.~~ The fog signal is a two tone diaphone, 3-second blast every half minute. (Horn, if diaphone is disabled). A radiobeacon is maintained and is synchronized with the air fog signal for distance-finding. (See p. 28.) Station receives and transmits radio messages. Call WRS.

Fish weirs along the outside coast between Cape Henlopen and Cape Charles are limited by regulation to certain areas. The inner limit of the areas for the entire distance is aproximately ½ mile from shore. The limits of fish traps are shown on the charts 1219 to 1222.

Tides.—The mean range of tides on the outside coast varies from about 4 to 3½ feet, and high and low waters occur at aproximately the same time as at Sandy Hook.

6. INLAND WATERS, CAPE HENLOPEN TO CAPE CHARLES

(Charts 1218 to 1222)

GENERAL

The bays and connecting channels on the coast of Delaware, Maryland, and Virginia form a continuous inland waterway from Lewes, Del., southward to Cape Charles. Except for a small inlet which has been cut through the beach from Indian River Bay to the ocean and which has only about 1 foot (0.3 m) in the entrance at low water.

Ocean City Inlet is the only navigable ocean entrance to the inside waters between Cape Henlopen and Chincoteague Inlet and is about half way along this 61-mile stretch.

This inlet, between stone jetties, is marked by a lighted whistle buoy and range lights. It is subject to frequent change. Southward of Chincoteague Inlet there are several inlets through which the inside waters can be reached. All of the inlets have shifting entrances, in some cases marked by buoys.

The inlets and interior waters give access to the villages and summer resorts on the beaches and the adjacent mainland. They are used by a large number of small craft engaged in the oyster and clam industry and inside and outside fishing, and by some pleasure boats. There is some freight business between points inside, and some coasting trade in sea food, wood, and lumber.

There are fish trap areas along the shores and islands of the inland waterway, and these should be guarded against.

Delaware Bay is connected with the north end of Rehoboth Bay by a canal and creek which lead from just inside the mouth of Broadkill Creek (5 miles northwestward of Cape Henlopen) southeastward in Lewes Creek to Lewes, then by the canal southeastward to Rehoboth Bay.

A project provides for a new entrance channel near Lewes, Del., 6 feet (1.8 m) deep and 200 feet wide protected by two jetties; for a channel of the same depth and 100 feet wide from the Broadkill River to South Street bridge at Lewes, with a basin of that depth at the latter point; for a channel of the same depth and 50 feet wide (40 feet wide through deep cutting) from Lewes to Rehoboth Bay with jetties at the outlet. The dredging in the latter channel has been completed. The controlling depths reported in June, 1936, were 2.4 feet (0.7 m) at the Delaware River entrance of Broadkill River, thence in the Lewes Creek to the highway bridge 4.1 feet (1.2 m), thence in the Lewes and Rehoboth Canal through Gordan Lake to the highway bridge at Rehoboth 3.9 feet (1.2 m), and thence in the canal to Rehoboth Bay 4.2 feet (1.3 m).

The commerce is mostly in motor boats carrying fish. There are wharves at Lewes and Rehoboth. Directions for the inside route are given on page 125.

Supplies.—Gasoline, provisions, and water can be obtained at Lewes, Rehoboth, Ocean View, Ocean City, Franklin City, Chincoteague, Wachapreague, Broadwater, Willis Wharf, and Oyster. Coal can be had in limited quantities at Ocean City, Franklin City, and at Chincoteague. There is communication by telephone at all villages and by telegraph at the railroad stations.

Repairs.—There are three railways at Chincoteague, the largest capable of hauling out vessels of 100 feet length, and 10 feet (3.0 m) draft, and shops for ordinary repairs to hulls and motors. There are also smaller railways at Ocean View, Bishopville, Ocean City, Scott Landing at head of Martin Bay, Girdletree Landing at head of Johnson Bay, Franklin City, Folly Creek (near Accomac), Wachapreague, and Willis Wharf capable of hauling out most of the boats frequenting those places.

Pilots.—There are no regular pilots for the inside passages or the inlets, but all of the local boatmen are competent pilots. In good

weather there are often fishing boats outside the inlets, and strangers can obtain a fisherman for a pilot. There are no towns at the inlets from which a pilot may be obtained on signal, but a member from the Coast Guard station nearest the inlet will usually go out if a signal is set.

Bridges.—Between Delaware Bay and Cape Charles there are eleven bridges crossing the **Inland Route.** The distances in nautical miles from the mouth at Delaware Bay, near Lewes, the width of the openings, and headroom (draw closed) above mean low water, for the bridges, as far as Rehoboth, are as follows:

Lewes, South Street (highway, bascule), 3.4 miles, 46 feet, 10½ feet (3.2 m).
Lewes (railway, swing), 4 miles, 46½ feet, 14 feet (4.3 m).
Rehoboth (railway, swing), 8.7 miles, 40 feet, 16½ feet (5.0 m).
Rehoboth (highway, bascule), 8.8 miles, 49½ feet, 19½ feet (5.9 m).

The four fixed bridges crossing the Assawoman Canal have a least span of 18½ feet and least headroom of 5 feet (1.5 m). The canal is non-tidal, except for wind effect. The fixed highway bridge crossing this canal west of Bethany Beach Coast Guard Station is closed to traffic but has not been removed.

The highway bridges crossing the thoroughfare near Fenwick Island Lighthouse, at Ocean City and at Chincoteague are described on pages 130 and 132.

Communication.—Lewes, Rehoboth, Ocean City, and Franklin City have railroad communication. Points on the beaches from Ocean City southward can be reached only by boat. Points on the mainland adjacent to the interior waters can be reached from the railroad and highway a few miles westward of them. A short truck haul completes the railroad connection with Ocean City as the former railroad bridge has been removed.

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.

Tides.—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 (0.9 m) 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.

At the western end of the inlet cut through from Indian River Bay there is a range of tide of about 1 foot, and at the south end of the bay there is no range. From here to the north end of Chincoteague Bay, before the new inlet was cut through in 1936 at Ocean City, there was no tidal range, the only variation being due to winds as mentioned in the preceding paragraph. It is reported at present that there is about ½ to 1 foot tidal range in the inland waters in the general vicinity of this Inlet.

Under the following stations in Chincoteague Bay and Inlet are given the mean range of tides and the time of high or low water

after high or low water at Assateague Anchorage, Snow Hill Landing, 0.4 foot, 5 hours 30 minutes; Assacorkin Island, 0.4 foot, 3 hours 55 minutes; Franklin City, 1 foot, 2 hours 25 minutes; Chincoteague, 1.9 feet, 55 minutes; Chincoteague Point, 3 feet, 0 minute.

The mean range of tides at Assateague Anchorage and at the entrances of the inlets southward is about 4 feet, and high and low waters occur 15 minutes before they do at Sandy Hook. 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, depending on the distance from the nearest inlet, after high and low waters at the inlets.

Currents.—The currents have considerable velocity in the inlets and 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. In the inland waters from Rehoboth southward to the north end of Chincoteague Bay there are no tidal currents, the only currents being due to winds.

Aids to navigation.—The more important of the navigable inlets are marked by buoys, but the channels are shifting and the buoys can not always be depended upon. Breakers form on the shoal areas even in ordinary weather and are often a good guide. Some of the more important interior channels are marked by beacons and lights, but most of them are marked only by bush stakes maintained by local authorities, which are of little use to a stranger. The sloughs leading through mud flats can best be followed at low water, when the shoals are visible. Strangers drawing near the limit of draft for the interior channels should take a pilot.

DIRECTIONS, INSIDE ROUTE, DELAWARE BAY TO CAPE CHARLES

The directions and description following are written for use with charts 379, 1218, 1219, 1220, 1221, and 1222, published by the Coast and Geodetic Survey.

Delaware Bay to Rehoboth, distance 8½ miles, least depth 2.4 feet, 0.7 m).—See page 122.

Rehoboth to Ocean View, distance 10½ miles, least depth 4 feet (1.2 m).—From the canal 1 mile westward of **Rehoboth**, the waterway follows the canal southward for 1¾ miles to Rehoboth Bay. The south end of the canal leads between two stone jetties and is marked by a beacon (white post) 12 feet (3.7 m) high at the entrance.

From here the best water slightly favors the west side of **Rehoboth Bay**, passes about ½ mile eastward of **Piney Island**, about 300 yards northeastward of **Bluff Point** (marshy and not marked), and close eastward and southward of the large island southeastward of it (marked by an old house in the center and a cedar thicket on the east end). In May, 1936, the limiting depth was along this large island course. The channel then passes through **Big Ditch**, the thoroughfare westward of **Middle Islet**, which lies between **Burton Islands** and **Indian River Neck**. Middle Islet is marked by a single tree and shanty.

From Big Ditch the waterway trends southwestward for 1 mile in **Indian River Bay** to avoid the shoals in its eastern part, then leads south-southeastward to **White Creek**, and then follows White Creek for 1½ miles to the mouth of the canal at Ocean View. There are

shoals, usually marked by bush stakes, making off many of the points in White Creek.

There is a fixed trestle across Indian River Inlet with spans about 21 feet wide and headroom of about 6 feet (1.8 m).

Ocean View to Ocean City, distance 15 miles.—The least depth in 1936 was about 1 foot (0.3 m) and was in the **Assawoman Canal.** From thence, with local knowledge, the controlling depths reported are about 4 feet (1.2 m) to the south end of **Little Assawoman Bay** where it is about 2 feet (0.6 m) for about ¾ mile, thence about 6 feet (1.8 m) through the thoroughfare and Assawoman Bay to the dredged channel beginning about mid way between **Keyser Point** and Reedy Island in **Isle of Wight Bay.** This dredged channel had a controlling depth in June 1936 of 2 feet (0.6 m) deep, 125 to 75 feet wide and 3 miles long extending to the Ocean City Inlet Channel through the bascule bridge. For the bridge clearances see page 130.

With adverse winds Assawoman Canal nearly goes dry and boats have been marooned there for 10 days at a time.

The waterway leads from Ocean View southward through Assawoman Canal crossed by 4 fixed bridges (see p. 124) to Little Assawoman Bay, then southward across the mouth of **Miller Creek,** passing westward of two grassy islets and eastward of a string of islets, and then close along the marsh on the west and south sides to the Narrows.

It favors the west side through the **Narrows,** keeping out of the bight, then leads southward, favoring the west side of Little Assawoman Bay to the thoroughfare connecting it with Assawoman Bay, passes through this thoroughfare and the western fork at its south end, and then favors the west side of **Assawoman** and **Isle of Wight Bays** to the dredged channel described above.

Ocean City to Chincoteague, distance 30 miles.—The least depth from Ocean City to the north end of Chincoteague Bay is 5 feet (1.5 m), and from there to Chincoteague is 3 feet (0.9 m).

There is a dredged channel from Ocean City through **Sinepuxent Bay** to within about 1 mile of **Robins Marsh.** In June 1936, this channel had a controlling depth of 5 feet (1.5 m) with widths 150 feet to **Green Point** and 100 feet to the lower end, for a total of 11½ miles. It is marked by beacons. From the dredged channel to Chincoteague, the controlling depth reported is about 3 feet (0.9 m), and is in the channel immediately northward of **Killick Shoal** light.

After leaving the dredged channel from Ocean City pass ¼ mile either side of Robins Marsh (covered by bushes). Then head a little westward of **Big Bay Point** until about 1 mile from it, and then pass ¼ mile eastward of it. Pass about 250 yards off the southeast end of Big Bay Point, about ¼ mile westward of **White Rock** (bare at extreme low water and usually marked by bush stakes), and about ¼ mile eastward of **Assacorkin Island.** 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 ½ mile; shoals extending a short distance southward from these islets are sometimes marked by bush stakes.

Pass ¼ mile eastward of the islet off Long Point, steer southwestward for about 1¼ miles, and then steer for Killick Shoal light passing 200 to 300 yards westward of light 4 (flashing red) to within

⅓ mile of light 5 (flashing white). Then head for light 5, rounding it close eastward, and steer southwesterly for ⅓ mile. Then head for a position about 200 yards northwestward of **Killick Shoal** Light (flashing white, red sector), red skeleton tower on piles. Pass 75 yards southwestward of the lighthouse and follow the curve of the channel, passing southwestward of light 2 (flashing red) and eastward of lights 3 (flashing white) and 1 (flashing white), to the wharves at **Chincoteague.**

Chincoteague to Wachapreague Inlet, distance 33 miles.—The least depth is not more than ½ foot (0.2 m) (in Bogues Bay dredged channel) at mean low water, and it often goes bare in places. There is 3 to 4 feet (0.9 to 1.2 m) at mean high water, and it is only used at half tide or higher. The deepest draft using it is 3½ feet (1.1 m) and usual draft 2 or 3 feet (0.6 or 0.9 m). There are several lights and beacons, and some bush stakes. Navigation is difficult, and local knowledge is necessary. The shoalest places are found in Bogues Bay, **Cat Creek,** Kegotank (south side), Metomkin (north end), and Floyds Bays, where the controlling depths are about 1½ feet (0.5 m) except in Bogues Bay. Boats from Chincoteague southward can carry the best water by leaving on the last of the ebb tide, and from Wachapreague northward by leaving about 2 hours after the beginning of the flood. A little deeper draft can be carried northward than southward on a single tide. A drawbridge crosses Chincoteague Channel at Chincoteague; width of openings, 59 feet, with 18 feet (5.5 m) headroom at high water.

From the wharves at Chincoteague the route follows **Chincoteague Channel** southwestward to Chincoteague Point, then westward toward the entrance to Cockle Creek, crossing a 4- to 5-foot (1.2 to 1.5 m) bar. Then southward ½ mile, and westward through **Ballast Narrows.**

An alternate route follows Queen Sound to the northern end, thence southwestward in Cockle Creek. The reported controlling depth is 6 feet (1.8 m).

The route then leads through **Island Hole Narrows,** controlling depth 10 feet (3.0 m), and then in a dredged channel across **Bogues Bay,** with a controlling depth, in January 1936, of ½ foot (0.2 m), and through **Cat Creek,** about 1.0 foot (0.3 m) deep; the dredged channel is marked by spoil banks. At the south end of Cat Creek the waterway follows the easternmost narrow slough to **Hog Creek,** and down the latter to **Assawaman Inlet.**

The Government planned to redredge Bogues Bay and Cat Creek during 1936 to project depth of 4 feet (1.2 m).

From Assawaman Inlet the waterway leads northwestward in **Assawaman Creek** for ¾ mile (2½ feet (0.8 m), at eastern end of creek), then westward through a short cut-off, and then follows the most westerly thoroughfare, as shown on the chart, to the northwest end of Kegotank Bay. It passes westward of an islet on the west side of **Kegotank Bay,** and then leads southeastward across the bay (least depth at low water is 1½ feet (0.5 m)) to the easternmost narrow slough at its south end. It then follows this slough and **North Gargathy Creek** southward to **Gargathy Inlet,** (following a channel 2½ feet (0.8 m) deep), and **South Gargathy Creek** westward and south-

westward to Metomkin Bay. There is a shanty on the west side of the thoroughfare at its outlet into Metomkin Bay.

The best water leads westward of two islets just after entering **Metomkin Bay**, then southeastward for about 1/4 mile (least water 1½ feet (0.5 m)), then favors the east side of the bay, where the water is 2 feet (0.6 m) deep, and passes through the middle slough in its southern part, as shown on the chart, to **Folly Creek**. From here it leads westward, and then southward through **Cross Creek** and through the middle of **Cross Broad Water** to its south end (least depth 2½ feet (0.8 m)), westward through **Teagles Ditch**, southwestward near the middle of the north part of **Floyds Bay** (least depth 1½ feet (0.5 m)) for 1 mile, and then in the slough near its west side, as shown on the chart, to the north end of **Hummock Channel**, and then southward in the latter to the entrance of **Finney Creek**, which leads to **Wachapreague**. The waterway continues southward through **Black Rock Reach**, then eastward for 3/4 mile, and then southward across **Wachapreague Inlet**, following the marsh on its west side to avoid the middle ground shown on the chart.

Wachapreague Inlet to Great Machipongo River, distance 15 miles, least depth 3 feet (0.9 m) at low water and about 7 feet (2.1 m) at high water.—The shoalest place is at the south end of Drawing Channel, and the deepest draft will be carried across this point by leaving Wachapreague Inlet at high water. The channels are difficult, and local knowledge is required to avoid the shoals. From Wachapreague Inlet the waterway leads southward along **Horseshoe Lead** and **Drawing Channel**, then westward and southward through the **Swash** and **Little Sloop Channel** to Sandy Island Channel. From here the more direct route, good for a depth of about 2½ feet (0.8 m), leads southwestward along **Sloop Channel** and southeastward along **Cunjer Channel** to **North Channel**; but the deeper and more generally used passage leads southeastward along **Sandy Island Channel** to **Little Machipongo Inlet**, then southwestward and westward along **North Inlet** and North Channel to Great Machipongo River. North Inlet and North Channel are marked by lighted beacons, Cunjer Channel by a beacon, and Great Machipongo River by buoys and lighted beacons.

Great Machipongo River to the southwest end of Smith Island, distance 30 miles, least depth about 6 feet (1.8 m).—The shoalest part is through the Ramshorn, which is very narrow and difficult and can be followed only at low water when the flats show above water. All of the channels are more easily followed at low water.

From the intersection of North Channel and **Great Machipongo River** the waterway leads southward for 3½ miles to the western branch, and then westward through this branch and **The Deeps** to the Outlet. From here a draft of 2½ feet (0.8 m) can be carried southwestward through **The Outlet** and into The Thoroughfare, as shown on the chart; but the deeper and more generally used channel leads westward along the Deeps, then northwestward, northward, and southwestward into **The Thoroughfare**, following the channel lying nearest to the mainland. This part of the waterway is known as **The Ramshorn**. From here the waterway leads southward through The Thoroughfare and the channel in **Magothy Bay** to the southwest end of **Smith Island**, as shown on the chart.

Extending along this route are several beacons, lights, and a buoy.

Boats can leave the waterway through **Smith Island Inlet**, which has a depth of 4 feet (1.2 m) at low water and about 8 feet (2.4 m) at high water, or through **Fisherman Inlet**, which has a depth of about 5 feet (1.5 m) at high water. Smith Island Inlet is dangerous in heavy weather. Further information is given on page 137.

DELAWARE BAY TO CHINCOTEAGUE BAY

Breakwater Harbor and **Lewes.**—See pages 87 to 89. The two bridges crossing Lewes Creek are described on page 124.

Rehoboth is a summer resort with railroad and bus communication, on the beach southward of Cape Henlopen. A coastal highway runs to Bethany Beach, and in summer motor boats connect with this beach and Ocean View. An aluminum painted standpipe is the most prominent mark. The two bridges crossing the canal are described on page 124.

Rehoboth Bay has a depth of 4 to 7 feet (1.2 to 2.1 m) and is much frequented by boats of 3 to 4 feet (0.9 to 1.2 m) draft for pleasure and fishing. There is a landing, to which a depth of 4 feet (1.2 m) can be carried, at the northeast end, westward of Rehoboth Beach Coast Guard station. There is no tidal effect, but the water level is changed from ½ to 1½ feet (0.2 to 0.5 m) by winds.

Love Creek, at the northwest end of Rehoboth Bay, is navigable for small boats to a milldam near the village of **Robinsonville**, 3½ miles above the mouth. It is crossed by a fixed bridge, under which motor boats without houses can pass. In 1936, the controlling depth to the bridge was about 2 feet (0.6 m).

Herring Creek, at the southwest end of Rehoboth Bay, is navigable with a draft of about 2½ feet (0.8 m) to the fork, about 2 miles above the mouth, and with a less draft for a short distance up either fork. It is little used. **Angola** is a post village near the head of navigation.

An inlet has been dredged across the beach from Indian River Bay to the ocean and had a depth at the entrance in May, 1936, of about 1 foot (0.3 m). Local knowledge is required to enter as the channel is subject to change by storms. It is located about 1½ miles south of Indian River Inlet Coast Guard station. The bridge crossing the Inlet is described on page 126.

Indian River Bay has general depths of 6 or 7 feet (1.8 or 2.1 m); except along the eastern end, which is shoal. It is used by boats bound north or south along the waterway, where there is a controlling depth here of about 5 feet (1.5 m), and by local fish boats. The usual draft of boats is 2 to 4 feet (0.6 to 1.2 m). For tidal data see page 124.

Indian River, at the west end of Indian River Bay, has a depth of 3½ feet (1.1 m) in mid-channel to the milldam at **Millsboro**, the upper 1½ miles being a privately dredged channel. **Millsboro** is a town on the railroad 5½ miles above the mouth.

Pepper Creek and **Vine Creek**, on the south side at the western end of Indian River Bay, have a depth of 3 feet (0.9 m) for about 1½ miles above their junction; they have several farm and mill landings.

White Creek, on the south side of Indian River Bay, has a depth of about 5 feet (1.5 m) to **Ocean View**, a village at its head 2 miles above the mouth. It forms a part of the inland waterway.

Assawoman Canal, dredged to a width of 20 feet and depth of 4 feet (1.2 m), but now shoaled to 1 foot (0.3 m), connects White Creek with the north end of Little Assawoman Bay.

Bethany Beach is a small summer resort on the beach, 2 miles southeastward of Ocean View and 4½ miles northward of Fenwick Island Lighthouse. A privately dredged channel, marked by spoil banks, leads from the canal eastward through the south side of **Salt Pond** to near the beach. It has a depth of 1 or 2 feet (0.3 or 0.6 m) and 1 foot (0.3 m) can be brought to it from Indian River Bay. In summer motor boats run to Ocean View, Millsboro, and Rehoboth, There is a **Naval Radio Direction Finder Station** with call letters **NSD.**

Little Assawoman Bay has depths of 2 to 4 feet (0.6 to 1.2 m) and is little used. It is covered with grass in summer, which is an obstruction to navigation for boats not equipped with weedless propellers. **Miller Creek** and **Dirickson Creek**, on the west side of the bay, have a depth of 1½ feet (0.5 m) for about 1½ miles above their mouths and are little used. Little Assawoman Bay and Assawoman Bay are connected by a narrow thoroughfare having a least depth of about 6 feet (1.8 m). The fixed bridge crossing the thoroughfare has a span of 32 feet wide and headroom of 12 feet (3.7 m).

Bayville is a post village 1½ miles northwestward of the bridge.

Assawoman and **Isle of Wight Bays** have general depths of 4 to 6 feet (1.2 to 1.8 m) along their western sides, but only 2 feet (0.6 m) can be brought to them from Little Assawoman Bay. They are frequented by pleasure boats from Ocean City and by boats engaged in traffic between points on the tributaries.

Roy Creek and **Grey Creek** have depths of 3 feet (0.9 m) nearly to their heads, but are little used.

St. Martin River, on the northwest side of Isle of Wight Bay, has a depth of about 3 feet (0.9 m) to the fork, 3½ miles above the mouth, and 2 feet (0.6 m) to the post village of **Bishopville**, at the head of navigation on the north branch (**Bishopville Prong**) 2½ miles above the fork. It is crossed by a drawbridge about 1 mile below Bishopville. The west branch, called **Shingle Landing Prong**, is said to be navigable for small boats for 1½ miles. There is a railroad at Bishopville which can haul a boat about 60 feet long and 5-foot (1.5 m) draft. No repairs are done by the yard. Local knowledge is needed for the best channel in the river.

Sinepuxent Bay has general depths of 3 to 5 feet (0.9 to 1.5 m), but a dredged channel with controlling depths, in June 1936, of 5 feet (1.5 m) extends from Ocean City Inlet southwestward into Chincoteague Bay. Entering from the southward, the controlling depth is 3 feet (0.9 m) just above Chincoteague town. The ruins of a pile jetty, 1 mile long, are close to the eastern shore of the bay about 1¾ miles southward of Ocean City. The bay is frequented by fishing and pleasure boats and boats bound north or south along the inland waterway.

Bridges.—A highway bascule bridge crosses Sinepuxent Bay at Ocean City with a span width of 40 feet and headroom of 5 feet (1.5 m) when closed at high water. The **regulations** on page 52 apply for this bridge. The railroad bridge draw span has been completely removed, and a red light marks each channel side of the trestle remaining.

Ocean City is a summer resort 7½ miles southward of Fenwick Island Lighthouse. Two black elevated tanks are prominent. It is frequented by many small boats in summer, and is the shipping point for a large amount of sea food and produce. There is railroad communication at the mainland, and a short bus connection to the beach. A marine railway can haul out boats 50 feet long and 6-foot (1.8 m) draft, but no repairs are made.

The Inlet project calls for a channel 10 feet (3.0 m) deep, 200 feet wide, protected by stone jetties; and a channel 8 feet (2.4 m) deep and 100 feet wide to Ocean City; a channel 10 feet (3.0 m) deep, 100 feet wide and 3,000 feet long from the inlet to the march area 250 feet south of and parallel to the railroad on the west side of Sinepuxent Bay, with two turning basins of the same depth. For a description of the dredged channels into Isle of Wight and Sinepuxent Bays from the inlet see page 126. The Ocean City Yacht Club is on the islet west of the northern tank, and a 7-foot (2.1 m) dredged channel from the main channel surrounds this islet except on the north side. The Ocean City Inlet is marked by a lighted ~~whistle~~ buoy, and lighted entrance range on white towers. As the channel is subject to frequent changes local knowledge should be obtained to enter. In June, 1936, the controlling depth at the entrance was 5 feet (1.5 m). Many fishing boats use the inlet.

CHINCOTEAGUE BAY AND INLET

Chincoteague Bay, about 20 miles long, has general depths of 5 to 7 feet (1.5 to 2.1 m) along its western side and is shoal along its eastern side. There are general depths of 2 to 3 feet (0.6 to 0.9 m) at its junction with Sinepuxent Bay except for the dredged channel from near Robins Marsh into this latter bay. This channel is marked, and had a depth of 6 feet (1.8 m), in May 1936, to Ocean City Inlet. The controlling depth through Chincoteague Bay is 3 feet (0.9 m). The bay is frequented by a large number of boats up to 5 feet (1.5 m) draft, engaged in the oyster, clam, and fishing industry.

Newport Creek, at the north end of Chincoteague Bay, is said to be navigable with a draft of 2 feet (0.6 m) for about 6 miles to within 1½ miles of the town of Berlin.

Snow Hill Landing has 5 feet (1.5 m) depth. Gasoline can be purchased. A highway leads to Snow Hill on the Pocomoke River a few miles.

There are small marine railways at the head of **Martin** and **Johnson Bays** for boats of about 2½-foot (0.8 m) draft.

Franklin City is a village and railroad terminal on the west side of Chincoteague Bay, 3½ miles northward of Killick Shoal Light. Two white church spires are prominent. A draft of 5 feet (1.5 m) can be carried to the wharves from southward. Boats run regularly to Chincoteague. It is a shipping point for the sea food and produce of this vicinity. A marine railway capable of hauling out boats 60 feet long and 4-foot (1.2 m) draft is located here. Gasoline and ordinary supplies are available.

Sinnickson is a post village about 1 mile westward of **Cockle Point.**

Chincoteague is a town on the west side of **Chincoteague Island,** southeastward of **Killick Shoal Light.** It is marked by a black tank and several buildings. There are depths of 5 to 10 feet (1.5 to 3.0 m) at

the wharves, where all kinds of supplies are obtainable. It is the center of most of the oystering and fishing industry in this vicinity, and has boat connection with the railroad at Franklin City. There is a drawbridge connecting Chincoteague with the mainland; width of openings 59 feet, head room at high water when closed, 18 feet (5.5 m). The marine railways are described on page 123.

Chincoteague Inlet, from the ocean to Chincoteague, had a controlling depth of 10 feet (3.0 m) by the survey of 1934. The entrance is marked but should not be entered without local knowledge. It is used by many boats carrying oysters.

Pilots for the inlet can usually be obtained from one of the Coast Guard stations in the vicinity. There is good anchorage anywhere in the channel inside of Chincoteague Point.

Assateague Inlet, the channel eastward of Chincoteague Island, has a depth of 2½ feet (0.8 m) at its south entrance and deeper water inside. The north entrance is shoal and not used.

Wire Narrows, Queen Sound, and **Cockle Creek** have good depths into them from southward, but are shoal at their outlets into Chincoteague Bay. They are used only by small oyster boats.

The following are the fixed bridges in the highway leading to Chincoteague, with span and headroom at high water:

Black Narrows, 13 feet, 6 feet (1.8 m).
Wire Narrows, 12 feet, 6 feet (1.8 m).
Queen Sound, 32 feet, 14 feet (4.3 m).
Cockle Creek, 29 feet, 11 feet (3.4 m).
Mosquito Creek, 30 feet, 12 feet (3.7 m).

CHINCOTEAGUE INLET TO GREAT MACHIPONGO INLET

Watts, Powells, and **Bogues Bays** are shoal; a draft of 4 to 5 feet (1.2 to 1.5 m) can be carried to them through **Roots, Ballast,** and **Island Hole Narrows.**

Wishart Point is a landing on the mainland between Powells and Bogues Bay. A draft of about 4 feet (1.2 m) can be carried to the wharf at low water through Ballast Narrows.

Assawaman Inlet, 5 miles southwestward of Chincoteague Inlet, had a depth across the bar in 1936 of about 2½ to 3 feet (0.8 to 0.9 m). The channel is unmarked, is changeable in depth and position, and is seldom used; there are usually breakers across the entrance.

Assawaman Creek, leading northwestward from the inlet, is navigable for small boats for about 3½ miles. The entrance to the creek has a reported controlling depth of 2½ feet (0.8 m).

Kegotank Bay has a depth of about 1½ feet (0.5 m) at low water and frequently goes bare over most of its area at extreme low water. There is about 4½ feet (1.4 m) at high water.

Gargathy Inlet, 9 miles southwestward of Chincoteague Inlet, had a depth in 1936 of about 2½ feet (0.8 m). It is not marked, is changeable and dangerous, and used only by an occasional small local boat. The appearance of the water is the best guide.

Kegotank Creek, leading northwestward from Gargathy Inlet, is navigable for small boats at high water for about 4 miles to within about 1 mile of the village of Modest Town.

Metomkin Inlet, 15 miles southwestward of Chincoteague Inlet, had a depth across the bar of 7 feet (2.1 m) in 1934, but the controlling depth is now reported to be about 5 feet (1.5 m). It is used by some

local fishing and oyster boats up to 6 feet (1.8 m) draft. The channel is marked by buoys, but is changeable, and strangers should not attempt to enter without a pilot. The Coast Guard station on the north side of the inlet is being discontinued and a new station is being erected on the southwest side.

Metomkin Bay has several sloughs now reported shoaled leading northward from the inlet, and the north end has a general depth of only 1 to 2 feet (0.3 to 0.6 m). The best water in the north end of the bay leads along its eastern side.

Folly Creek, leading westward from the south end of Metomkin Bay, is said to have a depth of 3 feet (0.9 m) at low water to the landing at its head, 3 miles above the mouth and 1 mile from **Accomac,** a town on the main highway. A marine railway at the head can haul out boats 50 feet long and 4-foot (1.2 m) draft. No repairs are made.

Longboat Creek, leading westward from Metomkin Inlet, has a least depth of about 9 feet (2.7 m).

Cross Broad Water, 2 miles southwestward of Metomkin Inlet, can be crossed with a least depth of 2½ feet (0.8 m) at low water and about 5½ feet (1.7 m) at high water. It is connected with the north end of Floyds Bay by **Teagles Ditch,** which has a least depth of 12 feet (3.7 m).

Floyds Bay, extending northward from Wachapreague Inlet, has several sloughs with good water leading northward from the south end, terminating in shoals at the north end. **Hummock Channel,** marked on the east side by a row of oyster houses on small grassy islets, is the most important. It has a depth of 20 feet (6.1 m) at its south end, gradually shoaling to a general depth of about 1½ feet (0.5 m) in the north end of the bay.

Wachapreague is a post village on the west bank of **Finney Creek,** 4 miles west-northwestward 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 this place, although small, a popular summer resort. A draft of about 7 or 8 feet (2.1 or 2.4 m) can be carried with local knowledge from Wachapreague Inlet through **Black Rock Reach** and Finney Creek to abreast the wharves. About 1 foot (0.3 m) at low water can be carried to the village from southeastward across the flats through the drains and the privately dredged ditches connecting the drains. A white church spire at Wachapreague is prominent from eastward with the sun on it.

Wachapreague Inlet, 20 miles south-southwestward of Chincoteague Inlet and 12 miles north-northeastward of Hog Island Lighthouse, had a depth in 1934 of 8 feet (2.4 m) in the channel which led westward, about 4 feet (1.2 m) in a northern channel which follows the beach on the north side of the inlet, and 5 or 6 feet (1.5 or 1.8 m) in the channel which parallels the beach just southward of the inlet. These latter two channels are reported unchanged in depth in 1936. The northern channel is used most. Many fishing boats use the inlet and a few boats seeking shelter. Strangers should take a pilot, as the channel is shifting and the buoys do not always mark the best water. A single heavy storm may change the channel somewhat, and even the local people frequently find it necessary to sound their

way across the bar. Besides the entrance buoys there are lighted beacons as far as Finney Creek.

The buildings of the Coast Guard station and several other buildings on the north side of Wachapreague Inlet are the most prominent marks in approaching. This point of land is eroding considerably to the northward while the south side of the entrance is slowly moving northward at present. A clubhouse on the point of marsh just westward of Branford Channel light is prominent. There is a wharf at the Coast Guard station inside the entrance.

The best anchorage is in **Horseshoe Lead**, southwestward of the entrance, where there is a depth of 20 to 36 feet (6.1 to 11.0 m) along the east side of the channel. There is a middle ground inside the inlet and northwestward of the entrance; the channel leading eastward and northward of it has a little deeper water, but the other channel southward and westward of it had a least depth of about 12 feet (3.7 m) by the survey of 1934.

Southward of Wachapreague Inlet there is deep water in the channels just westward of Parramore Island as far as the south end of Drawing Channel. Here the controlling depth is 3 feet (0.9 m) at low water in a privately dredged channel.

Little Machipongo Inlet, 4½ miles north-northeastward of Hog Island Lighthouse, had controlling depths in the entrance channels leading across the bar of 6 to 8 feet (1.8 to 2.4 m), with the deepest channel along the shore from the northeast (survey of 1934). Local knowledge is required as the depths change with storms; the entrance is dangerous. In 1936, the controlling depth was reported to be about 5 feet (1.5 m). It is not marked except for a light on the northern point, and only local boats of 5 or 6 feet (1.5 or 1.8 m) draft use it. A house on the point of beach on the south side of the inlet and a clubhouse on the south side of Revel Island are the only marks visible in approaching the inlet. The appearance of the water is the best guide in entering, but strangers should not enter without a pilot.

Quinby is a small post village on the mainland about 5½ miles north-northwestward of Little Machipongo Inlet. A draft of 6 feet (1.8 m) can be carried to within 1½ miles of it, and the remaining distance navigable only for small boats at high water.

Broadwater is a post village of oystermen and fishermen on Hog Island near the lighthouse. The south end of Hog Island has been washing away considerably in recent years and the channel around the south end to the lighthouse wharf on Heather Channel has shoaled to about 3 feet (0.9 m) at high water. The mail and supplies are brought to the island from Willis Wharf through the drains in the flats north of Rogue Island, least depth 3 feet (0.9 m). Coast Guard boats bound to sea from Broadwater are obliged to follow a circuitous route before reaching Great Machipongo River and Inlet.

GREAT MACHIPONGO INLET TO CAPE CHARLES

Great Machipongo Inlet, 2 miles southward of Hog Island Lighthouse, had channel depths across the bar of 8 to 14 feet (2.4 to 4.3 m), in the buoyed channel. The north channel is the deepest (survey of 1934), and is used locally. The buoys in the marked channel

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 each side at all times. In recent years the inlet has been subject to radical changes with gales, and no permanent directions can be given. The north shore of the inlet has eroded considerably, and the south shore has built up. The usual draft of boats using it is 5 or 6 feet (1.5 or 1.8 m), and the deepest draft 10 feet (3.0 m). The prominent mark in approaching the inlet is Hog Island Lighthouse. There is a light also on the south side of the entrance.

Pig Island.—The land formerly known as Pig Island is now part of the northeast end of **Cobb Island.**

Great Machipongo River, leading westward and northward from Great Machipongo Inlet, has a least depth of about 17 feet (5.2 m) for 12 miles above the inlet to the mouth of **Little Machipongo River** (Parting Creek), about 6 feet (1.8 m) for a further distance of 5 miles, and is navigable by small boats at high water for a considerable distance farther. For a distance of 9½ miles from the inlet it leads through mud flats bare at low water. It is marked by buoys and lights, as shown on the chart, but can best be navigated at low water, when the flats show above water. The best water leads eastward of the large island just after entering the mainland.

Willis Wharf is a village on the west side of Little Machipongo River, 1 mile above its junction with Great Machipongo River, and 13 miles by water from Great Machipongo Inlet. It is 2 miles from the railroad station of **Exmore,** and is the most important shipping point for sea food south of Franklin City. A draft of 7 feet (2.1 m) can be brought to the wharves at low water, and schooners loaded to about 8 feet (2.4 m) leave at hight water. There are two marine railways capable of hauling out and repairing boats up to 60 feet long and 8 feet (2.4 m) draft. Supplies may be obtained in moderate quantities.

In entering the mouth of Little Machipongo River, favor the north side to avoid a shoal area about in midstream. The best water leads southward and westward of the island ½ mile above the mouth, then favors the west side to the wharves.

There are several sloughs leading from Great Machipongo River southwestward to Sand Shoal Channel. A draft of about 3½ feet (1.1 m) at high water can be carried from Great Machipongo Inlet southwestward in **Rowes Hole Channel,** then south-southwestward between two large islands and through **Loon Channel** to Sand Shoal Inlet. A better route was reported in 1936, it leads through **Second Channel,** along the west side of Cobb Island and through Loon Channel with a depth of 5 feet (1.5 m).

A draft of about 1 foot (0.3 m) at low water and 4 feet (1.2 m) at high water can be carried up **Gould Marsh Channel,** through a narrow slough into **Eokichy Channel,** and down this to Sand Shoal Channel.

The best and generally used channel is the most westerly one, leading through The Deeps and **The Ramshorn** to the north end of **The Thoroughfare,** as described in the direction for the inside route page 128. These channels are usually marked by bush stakes but local knowledge is required to follow them.

Sand Shoal Inlet (Cobb Inlet), 7½ miles southwestward of Hog Island Lighthouse and 11½ miles northeastward of Cape Charles

Lighthouse, had depths reported in 1936 of 9 or 10 feet (2.7 or 3.0 m) over the bar in the southeast channel about 3 miles southeastward of the south end of Cobb Island. The channel is straight but the bar breaks in heavy weather. The northeast channel marked by buoys, was reported to have about 17 feet (5.2 m) in it. It leads southwesterly about ¼ mile off Cobb Island Beach. It is reported to be the best entrance channel. The southeast and south channels (the latter reported to have a controlling depth of about 12 feet (3.7 m)) 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 (1.5 to 1.8 m) and the deepest draft about 14 feet (4.3 m) The Coast Guard station on the south end of Cobb Island and two houses on the north end of **Wreck Island,** are the only marks visible in approaching the inlet. While the inlet is not subject to radical changes with every gale it has a slow but steady change from year to year and no permanent directions can be given. Local knowledge should be obtained to enter the inlet.

Loon Channel, leading northward from Sand Shoal Inlet close to Cobb Island, can be entered with a draft of about 8 feet (2.4 m). It has a depth of about 20 feet (6.1 m) off the Coast Guard station and is a good boat anchorage.

Sand Shoal Channel, leading westward from Sand Shoal Inlet, has a least width of ¼ mile and a least depth of 30 feet (9.1 m) in midchannel for 5 miles westward from the inlet to its junction with The Thoroughfare. It is marked by buoys, lights, and beacons, as shown on the chart, and is easily followed.

Oyster is a post village on the mainland 1 mile westward of the intersection of Sand Shoal Channel and The Thoroughfare. It is 2 miles from the railroad station of **Cheriton,** and is the shipping point for a large amount of sea food. It can be reached through a narrow, crooked slough which has been deepened but, in 1936, was reported to have shoaled to about 1½ feet (0.5 m) at low water. The channel is marked by lights. The entrance is about ½ mile northwestward of the light at the intersection of Sand Shoal Channel and The Thoroughfare.

New Inlet, 9 miles northeastward of Cape Charles Lighthouse, is shoal and unmarked, is very changeable, and is seldom used even by local boats. A draft of about 7 feet (2.1 m) at high water can be carried over the bar, and then about 11 feet (3.4 m) from the inlet southwestward and southward into Ship Shoal Channel; small boats can also pass westward along **Great Drum Drain** and northward along **Man and Boy Channel** to Sand Shoal Channel with a depth of 7 feet (2.1 m) at this stage of the tide.

Ship Shoal Inlet, 7 miles northeastward of Cape Charles Lighthouse, had a reported depth across the bar in 1936 of about 5 feet (1.5 m). It is unmarked and is used only by local oyster boats of 3 to 5 feet (0.9 to 1.5 m) draft. There is deep water inside, but no connection with the main waterways, except for small boats.

A draft of about 1½ feet (0.5 m) at low water can be carried through **Main Ship Shoal Channel** and then through a very crooked slough through **Drum Hole Flats** to Magothy Bay east of beacon 1. The controlling depth is at the lower end of this course. There are bush stakes but local knowledge is necessary.

Little Inlet, 5½ miles northeastward of Cape Charles Lighthouse, had a depth of about 3 feet (0.9 m) in 1936; it is unmarked and is used only by a few local boats of 2 or 3 feet (0.6 or 0.9 m) draft. Small boats can pass from Little Inlet to Ship Shoal and Smith Island Inlets at high water only.

Smith Island Inlet, entering 2 miles south-southwestward of Cape Charles Lighthouse, had a reported depth in 1936 of about 4 feet (1.2 m). The channel is narrow and changeable, with sand bars and breakers. Strangers should obtain a local pilot to avoid danger. It is the southern outlet to the inside waters, and is used at high water by many local boats of about 3 to 4 feet (0.9 to 1.2 m) draft, carrying sea food to Norfolk, Cape Charles, Crisfield, and other points.

Fisherman Inlet, entering westward of Cape Charles Lighthouse, has a depth of about 1 foot (0.3 m) at low water and 5 feet (1.5 m) at high water; it is used by boats of 2 or 3 feet (0.6 or 0.9 m) draft, and is preferred to Smith Island Inlet when the depth is sufficient, as it has ample width and is protected from heavy seas. There is a perpendicularly striped buoy at the western entrance. From here the best route, 5 feet (1.5 m) at high water, follows the channel northeastward close along the south point of the mainland, into **Raccoon Channel** along the south shore of the mainland to Magothy Bay, then west and north of Long Point Island passing into the main channel north of beacon 1. Raccoon Channel is as narrow as 25 feet in places. Another route crosses the flats from Fishermen Inlet eastward to the channel of Smith Island Inlet but has a little less water and is less used. Both channels are bush staked but local knowledge is necessary.

Magothy Bay, extending 7 miles northward from Smith Island Inlet, is shoal except in the main channel, which has a least depth of about 14 feet (4.3 m) from Smith Island northward to **The Thoroughfare.** From here to Sand Shoal Channel the controlling depth is 8 or 9 feet (2.4 or 2.7 m). These channels are marked by two lights, a buoy, and at frequent intervals by single pile beacons with day mark, but can best be navigated by a stranger at low water, when the flats show above water.

Magotha is a post village on the mainland about 3 miles northwestward of Cape Charles Lighthouse. A draft of about 5 feet (1.5 m) at high water can be carried to the wharf through a private dredged channel leaving the main channel due eastward. The channel is bush staked. Gasoline can be purchased.

There is a long wharf in ruins on the northwest side of **Smith Island** abreast the lighthouse. A dredged channel to the shore south of this has filled in, and the depth is about 2½ feet (0.8 m).

7. CHESAPEAKE BAY

(Charts 77, 78, 1222 to 1226)

GENERAL

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 by vessels of 12 feet (3.7 m) draft through the Chesapeake & Delaware Canal, at the north end of the bay; and from Albemarle Sound by vessels of 7 feet (2.1 m) draft through the Dismal Swamp Canal, and 11 feet (3.4 m) draft (in 1936) through the Albemarle & 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 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 frequent by many vessels engaged in the bay trade.

The **entrance channel** to the Bay for deep-draft vessels is in the proximity of Cape Henry. The channel has a distinctive deep reaching to a depth of 102 feet (31 m). 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.

(946) 41
(1171) 41
CII
(1670) 41
(1671) 41
(946) 41

Channels.—The main channel of Chesapeake Bay had a least depth of 33.3 feet (10.2 m) in September 1935 from the entrance to 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, where a depth of [a] 37 feet (11.3 m) along the center existed in March, 1933. From Sandy Point to Baltimore the channel is a dredged one with a least depth of 33.3 feet (10.3 m) in September, 1935. The channel in the bay has ample room, is well marked and easy of navigation by day or night. It leads close to middle grounds just inside the entrance, but above here the mid-channel is clear, although shoals make off for a long distance from many of the points. See page 248.

A natural channel of about 20 feet (6.1 m) 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 fairway lighted bell buoys. Two unlocated railroad cars lie sunk in this channel off the northern end of the Tail of the Horseshoe.

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.

[a] A survey in Jan. 1937 shows a controlling depth of 35½ feet (10.8 m) in York Spit Channel.

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 cruising outside the entrance of the bay, 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's 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	$2.80	$2.05
501 to 1,000 N. R. T. do	3.30	2.35
1,001 to 1,500 N. R. T. do	3.75	2.70
1,501 to 2,000 N. R. T. do	4.25	3.05
Over 2,000 N. R. T. do	4.70	3.40

	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	12.50

Detention after six hours later than sailing time $1 per hour, but not to exceed $7.50 for any 24-hour day.

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.—~~Towboats will sometimes be found cruising in the lower part of the bay near the entrance, and sometimes in the bay between the entrance and the mouth of Patapsco River~~. At Old Point Comfort tugs may be ordered by telegraph to Hampton Roads from Norfolk and Baltimore. ~~Towboats from Baltimore seldom cruise below Sandy Point Lighthouse unless previously notified~~.

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 (6.1 to 8.5 m); Hampton Roads is a secure anchorage in all weather for vessels of any draft; York River above Tue Marshes Lighthouse affords good anchorage in 6 to 11 fathoms (11 to 20 m), protected from all but easterly winds; Mobjack Bay has secure anchorage westward of New Point Comfort in depths of 10 to 24 feet (3 to 7.3 m); Rappahannock River has anchorage within its mouth in depths of 3 to 10 fathoms (5.5 to 18.3 m); Great Wicomico River affords secure anchorage in depths of 15 to 20 feet (4.5 to 6.1 m); anchorage secure from northerly winds can be had in depths of 15 to 30 feet (4.6 to 9.1 m) 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. There are several good anchorages on the eastern side of the bay, but they are seldom used by strangers.

The anchorages prescribed for Hampton Roads are given on page 354 in the appendix, and for Baltimore Harbor on page 254.

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 dry docks and marine railways is given on page 4.

A list of storm warning display stations of the United States Weather Bureau within the limits covered by this column is given on page 39.

Fog.—See page 37.

The **reporting station** for vessels entering Chesapeake Bay is at 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.

Quarantine.—See page 9.

Speed trial course.—A speed trial course 1 nautical mile long bearing 1½° true (N. ¾ E. mag.) has been established on the western side of Kent Island, 5 miles northward of Bloody Point Bar Lighthouse. The ranges are masts with white day marks. A line joining Bloody Point Bar and Sandy Point Lighthouses leads at right angles to the ranges. Buoys have been established to mark the ends of the mile course. These buoys are rather close to **Brickhouse Bar** which makes out from Kent Island.

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 above 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 striped spar buoys.

Duck blinds may be found in the fish trap areas. The blinds generally have the appearance of a 3-pile beacon 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. To vessels bound to and from Baltimore, ice sufficient to interfere with navigation of vessels is most often found in the vicinity of Seven Foot Knoll Lighthouse, 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.

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 for the Atlantic Ocean, published annually by the Coast and Geodetic Survey.

CURRENTS, CHESAPEAKE BAY

The tidal currents in the bay and its tributaries are greatly influenced by the winds, which also affect the rise and fall of the tides to a marked extent, especially near the head of the bay. Strong northly winds will increase the velocity of the ebb current and may, for a period, interrupt the flood current, while a strong southerly wind will increase the velocity of the flood current and may interrupt or retard the ebb current. Under average conditions the velocities of the flood and ebb strengths are 1 knot and 1½ knots, respectively, at the Tail of the Horseshore; ¾ knot off Sandy Point;

and 1¼ knots and 1½ knots, respectively, off Worton Point. In the entrance of the bay and between the Middle Ground and the Tail of the Horseshoe and in the channels eastward of the Middle Grounds the currents have a somewhat greater velocity than at the Tail of the Horseshoe, and under the influence of strong winds the shoals will sometimes be marked by rips. The effects of the flood and ebb currents are marked at the entrance of the principal tributaries, the effect being felt sometimes for a considerable distance from the entrances. Off the mouths of York, Rappahannock, and Potomac Rivers, especially the latter, a considerable set by ebb or flood currents is often experienced.

At Tail of the Horseshoe Lighted Whistle Buoy TH.—Daily predictions of the times of slack water and the times and velocities of the strength of current in this part of the entrance are included in the Atlantic Coast Current Tables. Under average conditions slack water before flood occurs approximately 2 hours 50 minutes before the time of high water at Hampton Roads and slack water before ebb approximately 2 hours 40 minutes after the time of high water at Hampton Roads. The mean velocity of the current at strength of flood is 1 knot, and at strength of ebb is 1.5 knots. These velocities are influenced to a considerable extent by winds. A westerly gale will at times cause a very strong ebb current and will greatly diminish, or even overcome the flood current, and an easterly gale will at times cause a very strong flood current and will greatly diminish or overcome the ebb current. During 10 months of observations in the summer and fall the greatest ebb current measured was 3.0 knots during a northwester, and the greatest flood current observed was 2.6 knots in an easterly gale.

At Middle Ground Lighted Whistle Buoy 10.—Slack water before the flood occurs about ½ hour after the time when the current turns northwest at Chesapeake Bay entrance (or approximately 2¼ hours before the time of high water at Hampton Roads), and slack water before the ebb occurs about ½ hour after the time when the current turns southeast at Chesapeake Bay entrance (or approximately 3 hours after time of high water at Hampton Roads). The mean velocity of the current at strengths of flood or ebb is approximately 1 knot.

Off Wolf Trap Lighthouse.—Slack water before the flood occurs about 1¾ hours after the time when the current turns northwest at Chesapeake Bay entrance (or approximately 1 hour before time of high water at Hampton Roads), and slack water before the ebb about 1¾ hours after the time when the current turns southeast at Chesapeake Bay entrance (or approximately 1¾ hours before time of low water at Hampton Roads). The mean velocity of the current at strength of flood (northerly) is 1 knot and at strength of ebb (southerly) is 1½ knots.

Southeast of Windmill Point Lighthouse.—Off the mouth of the Rappahannock River a set to the eastward, due to an ebb current, and to the westward (to a less extent), due to a flood current, is often experienced.

Off Windmill Point.—The time of greatest strength of the flood and ebb currents and the times of slack water are about 2½ hours after the time of the corresponding strengths and slacks at Chesapeake

Bay entrance. The approximate times of the four phases of the current referred to the time of tide at Hampton Roads, are as follows:

Slack water before flood, ¼ hour before high water.
Strength of flood, 2½ hours after high water.
Slack water before ebb, 1¼ hours before low water.
Strength of ebb, 2½ hours after low water.

Off Smith Point Lighthouse.—Slack water before the flood occurs about 3¼ hours after the time when the current turns northwest at Chesapeake Bay entrance (or approximately ½ hour after high water at Hampton Roads), and slack water before the ebb occurs about 3¼ hours after the time when the current turns southeast at Chesapeake Bay entrance (or approximately ½ hour before low water at Hampton Roads).

Between Smith Point and Point Lookout.—A considerable set to the eastward due to an ebb current and to the westward due to a flood current is frequently experienced. The strengths of flood and ebb current occur about 3¾ hours after the corresponding strengths at Chesapeake Bay entrance (or approximately 3¾ hours after high water and 2½ hours before high water, respectively, at Hampton Roads or ½ hour before low water and ¼ hour before high water, respectively, at Baltimore). The approximate mean velocity at strength of flood is ½ knot and at strength of ebb 1 knot.

Off Point No Point.—The current is inclined to be irregular and velocities at strength are generally less than 1 knot. On the average the slack waters occur about 5 hours after the corresponding slacks at Chesapeake Bay entrance. Referring to the tide at Hampton Roads the slack before flood occurs about 2¼ hours after high water and the slack water before ebb occurs about 1½ hours after low water. Referred to the tide at Baltimore the slack water before flood occurs about 2¼ hours before low water and the slack water before ebb about 2½ hours before high water. Strengths of flood or ebb have average velocities of about ½ knot.

Off Hooper Island Lighthouse.—All phases of the current occur about 5½ hours after the times of the corresponding phases at Chesapeake Bay entrance. The slack before flood occurs about 1¾ hours before low water at Baltimore, and the slack before ebb occurs about 2 hours before high water at Baltimore. Strengths of both flood or ebb have average velocities of about ½ knot.

Off Cove Point.—All phases of the current occur about 5¾ hours after the coresponding phases of the current at Chesapeake Bay entrance. The slack water before flood occurs about 1½ hours before low water at Baltimore and the slack water before ebb occurs about 1¾ hours before high water at Baltimore. The average velocity of the current at strength is about ¾ knot for both flood and ebb.

Off Sharps Island Lighthouse.—The slack waters and strengths of flood and ebb current occur about 7 hours after the corresponding slacks and strengths at Chesapeake Bay entrance. Slack water before flood occurs about ¼ hour before the time of low water at Baltimore and slack water before ebb occurs about ½ hour before the time of high water at Baltimore.

Off Sandy Point Lighthouse.—Daily predictions of the times of slack water and the times and velocities of strengths of flood and ebb current for this locality are given in the Current Tables under the

name, Baltimore Harbor Approach (off Sandy Point). The slack before flood occurs about 1¼ hours after low water at Baltimore and the slack after ebb occurs about 1¾ hours after high water at Baltimore. The average velocity of the current at strength of flood or ebb is about ¾ knot. Proceeding from Sandy Point toward Baltimore the velocity of the current diminishes rapidly. At Seven Foot Knoll the average velocity at strength of flood or ebb is about ½ knot.

At Fort McHenry.—The tidal current is very weak and the velocity and direction of flow depends mainly upon the wind.

Off Worton Point.—The slack water and the strengths of the flood and ebb occur about 1¼ hours after the time of the corresponding slacks and strengths at Baltimore Harbor Approach. The slack before the flood occurs about 2½ hours after the low water at Baltimore and the slack before ebb occurs about 3 hours after high water at Baltimore. The average velocity of the strength of flood is about 1¼ knots and the average velocity of the strength of ebb is about 1½ knots.

Further current information for Chesapeake Bay is given in the current tables for the Atlantic coast of the United States. 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 and the Chesapeake and Delaware Canal (railroad bridge), 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, its tributaries, and in Chesapeake and Delaware Canal, may be obtained. These tables may be purchased for 10 cents per copy from the Coast and Geodetic Survey or its sales agents.

GENERAL REMARKS, APPROACHES TO CHESAPEAKE BAY

The prominent landmarks visible in approaching Chesapeake Bay entrance are described on page 148.

From northward.—General remarks and directions for the outside coast from New York to Chesapeake Bay are given on page 55. Currents for the outside coast are described on page 43.

From eastward.—The entrance may be approached boldly, as there are no outlying dangers. Twenty fathoms (36.6 m) 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 gas and whistling buoys followed to Chesapeake Bay. In thick weather vessels should keep outside the 10-fathom (18.3 m) curve unless the lightship is sighted.

In rough weather vessels of deepest draft should enter the bay through the channel about 2½ miles off the shore south of Cape Henry. This channel, extending from the proximity of the lighted whistle buoy 2CB to the proximity of Cape Henry, has depths greater than 50 feet (15.2 m) 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 (18.3 m) 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 and avoid the vicinity of the 22-foot (6.7 m) spot near lighted buoy 2A. The depth in the neighborhood of 100 feet (30 m) should be avoided as these are dangerously close to the shoal.

From southward.—Between Cape Henry and Cape Hatteras, a distance of about 105 miles, there are no dangerous outlying shoals over 5 miles from the beach; with the exception of a few places, 5 to 9 fathoms (9.1 to 16.5 m) 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 (183 m) 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 (55 m) curve is about 5 miles inside of the 100-fathom (183 m) curve. Abreast of Cape Henry 20 fathoms (36.6 m) 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 (27.4 m) 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.)

DIRECTIONS, CHESAPEAKE BAY ENTRANCE TO BALTIMORE

Directions for entering Hampton Roads are given on page 162, and for Patapsco River and Baltimore Harbor on page 146.

The least depth in the channel between Chesapeake Bay entrance and the entrance to the dredged channel leading to Baltimore is in the dredged channel eastward of York Spit, which was 37 feet (11.3 m) deep along the center and 1,000 feet wide in 1933. Between the entrance to the bay and this point the channel leads between Middle Ground Shoal and Tail of the Horseshoe and is well marked by buoys. Northward of York Spit the bay is clear in mid-channel, but shoals extend a long distance off many of the points and islands. Strangers, unless in small boats, should keep outside the buoys and lighthouses marking the ends of the shoals.

The following table gives courses and distances from Chesapeake lightship, or entrance buoy 2 CB., to Baltimore. They lead in a least depth of 33.3 feet (10.2 m), which was in the Fort McHenry dredged channel in 1935. Between Tail of the Horseshoe lighted whistle buoy and Wolf Trap Lighthouse vessels of less than 20-feet (6.1 m) draft often pass westward of York Spit channel. Many deviations from these courses are possible for light-draft vessels, but for these the chart is the guide.

Courses and Distances—Chesapeake Bay Entrance to Baltimore

For reverse direction, read upward	Course (Reverse course in *Italics*) True	Course (Reverse course in *Italics*) Magnetic	Distance
1. Chesapeake Lightship bearing 0° true, distant 0.2 mile. Passing ½ mile south of lighted whistle buoy 2, and ½ mile north of *Cape Henry Junction Lighted Whistle Buoy.*	°	*Points*	*Nautical Miles*
Direct	259	W. ⅜ S	12.7
Reverse	*79*	*E. ⅜ N*	*12.7*
(Or, Buoy 2 CB to position 2—steer 309° true for 6.9 miles. See General Remarks on page 144.)			
2. Cape Henry Lighthouse bearing 257° true, distant 2.3 miles. Passing ¼ mile northeast of *Tail of the Horseshoe Lighted Whistle Buoy TH.*			
Direct	321	NNW. ⅞ W	14.1
Reverse	*141*	*SSE. ⅞ E*	*14.1*
3. Middle Ground Lighted Whistle Buoy 10 bearing 90° true, distant 0.9 mile. Passing 0.4 mile east of *York Spit Channel Entrance Lighted Whistle Buoy 1A.*			
Direct	352	N. ⅛ W	4.0
Reverse	*172*	*S. ⅛ E*	*4.0*
4. Entrance York Spit Dredged Channel, midway between lighted buoys 1 and 2.			
Direct	17	NNE	3.5
Reverse	*197*	*SSW*	*3.5*
5. North End York Spit Channel abreast of lighted bell buoy 9. Wreck 1½ miles 103° true from Wolf Trap Lighthouse.			
Direct	2	N. ¾ E	9.0
Reverse	*182*	*S. ¾ W*	*9.0*
6. Wolf Trap Lighthouse bearing 270° true, distant 3 miles.			
Direct	354½	N. ⅛ E	23.1
Reverse	*174½*	*S. ⅛ W*	*23.1*
7. Tangier Island Shoal Lump Lighted Bell Buoy 12 TL bearing 90° true, distant 0.3 mile. A 23-foot (7.0 m) spot lies 0.95 mile, 15° true from above buoy, and is a menace to deep draft vessels passing close eastward of the buoy. The course passes between two sunken wrecks which have a least charted depth of 40 feet (12.2 m).			
Direct	5	N. by E. ⅛ E	6.3
Reverse	*185*	*S. by W. ⅛ W*	*6.3*
8. Smith Point Lighthouse bearing 270° true, distant 1 mile. Passing 1½ miles eastward of Point No Point Lighthouse, 0.6 mile eastward of *Cedar Point Lighted Bell Buoy 19 A*, and 1.1 miles eastward of Cove Point Lighthouse. The latter is a day service vessel-reporting station by telephone to Baltimore.			
Direct	343	N. ⅞ W	42.5
Reverse	*163*	*S. ⅞ E*	*42.5*

(1277) 41

(944) 41

(1171) 41

43.3

Courses and Distances—Chesapeake Bay Entrance to Baltimore—Continued

For reverse direction, read upward	Course (Reverse course in *Italics*) True	Course (Reverse course in *Italics*) Magnetic	Distance
9. Sharps Island Lighted Bell Buoy 18 A bearing 90° true, distant 0.1 mile. Passing 2½ miles westward of Sharps Island Lighthouse.		*Points*	*Nautical miles*
Direct	357	N. ⅜ E	11.8
Reverse	*177*	*S. ⅜ W*	*11.8*
10. Poplar Island Shoal Lighted Bell Buoy 20 A bearing 90° true, distant 0.2 mile. Passing 1.6 miles westward of Bloody Point Bar Lighthouse.			
Direct	6	N. by E. ⅛ E	8.8
Reverse	*186*	*S. by W. ⅛ W*	*8.8*
11. Thomas Point Shoal Lighthouse bearing 270° true distant 0.9 mile.			
Direct	16	NNE. ⅛ E	7.3
Reverse	*196*	*SSW. ⅛ W*	*7.3*
12. Sandy Point Lighthouse, bearing 270° true and distant 0.5 mile. Passing between Craighill channel entrance lighted buoys, and passing 0.4 mile east of Baltimore Lighthouse.			
Direct	343	N. ¾ W	3.4
Reverse	*163*	*S. ¾ E*	*3.4*
13. Craighill Channel Lighted Range, mid-between lighted buoys 5C and 6C.			
Direct (range ahead)	0	N. ¾ E	3.4
Reverse (range astern)	*180*	*S. ¾ W*	*3.4*
14. Junction Craighill and Cut-off Channel Ranges, southwest of lighted buoy 2K.			
Direct (latter range ahead)	329½	NNW	3.6
Reverse (latter range astern)	*149½*	*SSE*	*3.6*
15. Junction Cut-Off and Brewerton Channel Ranges, southwest of lighted buoy 14K.			
Direct (latter range ahead)	291	NW. by W. ⅜ W	3.9
Reverse (latter range astern)	*111*	*SE. by E. ⅜ E*	*3.9*
16. Junction Brewerton and Fort McHenry Channel Ranges, northeast of lighted buoy 1M.			
Direct (latter range ahead)	321	NNW. ¾ W	4.4
Reverse (latter range astern)	*141*	*SSE. ¾ E*	*4.4*
17. Lazaretto Point Light, bearing 0° true, distant ¼ mile. Thence being guided by the chart.			
Alternate route passing westward of York Spit Channel. Positions A and C are the same as positions 3 and 6 in the main route.			
A. Middle Ground Lighted Whistle Buoy 10 bearing 90° true, distant 0.9 mile. Passing 0.1 mile eastward of lighted whistle buoy 1A.			
Direct	347	N. ½ W	4.1
Reverse	*167*	*S. ½ E*	*4.1*
B. York Spit Channel Lighted Buoy 1 bearing 90° true, distant ¼ mile.			
Direct	8	N. by E. ¼ E	12.5
Reverse	*188*	*S. by W. ¼ W*	*12.5*
C. Wolf Trap Lighthouse bearing 270° true, distant 3 miles.			

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 several minor channels lead.

The channel south of **Nautilus Shoal** and between Fisherman Island and Inner Middle Ground, and thence through either North or Beach Channel, had a depth by the last survey of 24 feet (7.3 m), but with spots of 16 and 17 feet (4.9 and 5.2 m) close to its southern side. The shoals on the north side have shifted southward and it has become necessary to add two more buoys to mark the channel there. It is used by fish steamers and tugboats up to 12 feet (3.7 m) draft, but is not recommended for strangers.

The most prominent landmarks seen in approaching the entrance to Chesapeake Bay are Cape Charles Lighthouse 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 Lighthouse, Cape Henry old tower, and the Cavalier Hotel at Virginia Beach, on the south side. Cape Charles Lighthouse is described on page 122.

(804)41

Cape Henry is a prominent bold range of sand hills 80 feet (24.4 m) high, with lower ones near the water. On the beach near the point of the cape is Cape Henry Lighthouse, and 340 feet southwestward of it is a white unused light tower; near the lighthouse are a storm-warning display station and a seacoast telegraph station of the United States Weather Bureau, from which vessels are reported to Norfolk and Baltimore, and with which they may communicate by the use of International code signals by day or the Morse code by night.

White spar mooring buoys, maintained by Virginia and Maryland pilot associations, are placed in 29 feet (8.8 m) and 35 feet (10.7 m) of water about ¾ mile north-northwestward of Cape Henry Lighthouse.

Cape Henry Lighthouse is an octagonal pyramidal tower, upper and lower half of each face alternately black and white. The light is group flashing white (group of 3 flashes every 20 seconds), with a red sector between 155° true (S. by E. ¾ E., mag.) and 233° true (SW. by W. ¼ W. mag.), 157 feet (47.9 m) above the water, and visible 19 miles. The fog signal is an air oscillator, blast 3 seconds, silent 17 seconds repeated for 2 minutes. Every third minute signal is blast 1 second, silent 1 second, blast 5 seconds, following a silence of 53 seconds. Siren, blast 3 seconds, silent 17 seconds, if oscillator is disabled. The radiobeacon is equipped for *distance finding* (see p. 30).

Lynnhaven Roads, an open bight extending from 2 to 5 miles westward from Cape Henry Lighthouse, is sometimes used as an anchorage and is protected from southerly winds. Outside of the dumping ground area it has depth of 20 to 28 feet (6.1 to 8.5 m). The shoaling is abrupt eastward of Lynnhaven Inlet, and the 18-foot (5.5 m) curve lies nowhere more than ⅜ mile from shore. Westward of

the inlet the shoaling is gradual, and depths of 18 feet (5.5 m) can be found ¾ mile from shore. The dumping ground in the western part of Lynnhaven Roads is of unknown depth. The area as established is indicated on the chart.

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 (0.7 m) 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 (0.6 to 3 m) and they are frequented by many small craft engaged in oystering and fishing. There are two drawbridges together at the entrance to Lynnhaven Inlet having a horizontal clearance of 30 feet between fenders and a vertical clearance of 4 feet (1.2 m) at high water when the draws are closed. Another drawbridge crosses **Long Creek** about 1 mile from the entrance having a horizontal clearance of 20 feet between fenders and a high water clearance of 5 feet (1.5 m) when the draw is closed.

Little Creek, 8 miles west of Cape Henry Lighthouse is a terminal of the Pennsylvania Railroad Co. for car ferries operating to Cape Charles. The entrance is between jetties, the outer ends of which are marked by lights. There is also a lighted range for entering. A fog whistle is located at the eastern jetty light (bell if whistle disabled). A lighted bell buoy lies 1 mile off the entrance. In December 1935 terminal officials reported that the controlling depth in the channel to the ferry slips was 18 feet (5.5 m). There are railway and highway connections with Norfolk. Northwest of Little Creek ¾ of a mile is a fixed highway bridge with a 15-foot span and 6-foot (1.8 m) high water clearance.

HAMPTON ROADS AND ADJACENT PORTS

(Charts 1222, 400, and 452)

Hampton Roads, at the south end of Chesapeake Bay, 16 miles westward of Cape Henry, is the approach to Norfolk, Portsmouth, Newport News, and points on the James River to Richmond, and is also one of the important anchorages on the east coast of the United States. 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, and other commodities, and have excellent terminal and railroad facilities. Shipbuilding and repair plants are available for all classes of ship construction and repair work.

Prominent objects.—In approaching Hampton Roads the most prominent objects are: **Thimble Shoal Lighthouse** (red conical tower on pier); **Old Point Comfort Lighthouse** (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; a grain ele-

vator at Newport News; **Newport News Middle Ground Lighthouse** (brown conical tower on pier); 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 September 1935 had a controlling depth of 38½ feet (11.7 m) 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 (8.2 m) on the north side and 28 feet (8.5 m) 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.

The following regulations prescribed by the Government restrict the use of this channel:

1. The use and navigation of Thimble Shoal Channel is hereby restricted to vessels of 20 feet draft or greater, to towboats with tows drawing 20 feet or more, and to passenger ships of less draft. (Reference to the draft of a vessel or tow refers to that at the time of navigating the channel.)
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 Lighthouses, 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 39 feet (11.9 m) in September 1934, the project depth. It is marked by red buoys (flashing red) on the north side and black buoys (flashing white) on the south side. 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 least depths outside of and near the dredged channel are 21 to 24 feet (6.4 to 7.3 m).

The area southward of Newport News Middle Ground is now utilized as an anchorage ground as shown on chart 400, and as described in the appendix, page 355. The old dredged channel here is no longer marked.

The dredged channel leading to Norfolk, Portsmouth and beyond had depths as follows:

Hampton Roads to the junction of Southern and Eastern Branches, 38 feet (11.2 m), February 1936; thence to point 2,000 feet below Belt Line Railroad Bridge, 39 feet (11.9 m), October 1935; thence to Belt Line Railroad Bridge, 32 feet (9.8 m), November 1935; thence to the Virginian Railway bridge 28½ feet (8.7 m), November 1935;

thence to 2,500 feet above the Norfolk & Western Railway bridge, 25 feet (7.6 m), August 1934. From here to the lock in the Albemarle and Chesapeake Canal at Great Bridge, Va., the controlling depth was 11 feet (3.4 m).

In the Eastern Branch, between the mouth and the Norfolk and Berkley highway bridge, 25 feet (7.6 m); thence 24 feet (7.3 m) to the Norfolk and Western Railway bridge and 21 feet (6.4 m) to the Virginian Railway bridge in April 1934.

In the Western Branch, between the mouth and the West Norfolk bridge 16 feet (4.9 m); thence for 3,000 feet above this bridge 18 feet (5.5 m) in April 1934.

Anchorages.—The anchorage areas, prescribed by the War Department, and enforced by the Captain of the Port of Hampton Roads (an officer of the U. S. Coast Guard with office in Norfolk), are described in the appendix, page 354. They are also shown in red on chart 400.

Quarantine.—All vessels subject to quarantine are inspected by the officers of the United States Public Health Service off Old Point Comfort. A quarantine anchorage there is shown on chart 400 and is described in the appendix to this volume.

Hospitals.—There are many public and private hospitals at the larger cities. The most prominent of the public hospitals are as follows:

Norfolk, Va.—United States Marine Hospital, No. 82, Lafayette River; Hospital of St. Vincent De Paul, corner of Church and Wood Streets; Norfolk Protestant Hospital, corner Raleigh and Colley Avenues.

Portsmouth, Va.—The King's Daughters' Hospital, corner Chestnut and Leckie Streets.

Newport News, Va.—Elizabeth Burton Hospital, on boulevard overlooking Hampton Roads; the Wittaker Memorial Hospital, corner of Twenty-ninth and Orcult Avenues; the Riverside Hospital.

Hampton, Va.—The Dixie Hospital.

Supplies of all kinds are obtainable at Newport News and Norfolk, and in limited quantities at Hampton and sometimes at Old Point Comfort. Water can be obtained at the wharves and from water boats. Bituminous coal can be had, through chutes, from the coal wharves at Newport News and the coal piers at Sewall Point and Lambert Point. Anthracite and bitiuminous coal can be obtained at the wharves in Norfolk or from lighters at the anchorage. Water, provisions, and ship chandlery will be delivered by boat to vessels in Hampton Roads.

For general **Bridge Regulations** see page 52 and for special regulations see the text.

Regulations for passing floating plant working in channels (such as dredges, survey boats, etc.) are given on page 347 in the appendix.

Storm warnings are displayed at Cape Henry, Old Point Comfort, Newport News, and Norfolk. (See p. 38.)

Tides.—The mean range of tides in Hampton Roads is 2.5 feet. Daily predictions (Naval Base) are given in the Tide Tables published annually by the Coast and Geodetic Survey.

Currents.—In the center of the channel southward of Old Point Comfort the slack water and strengths of flood and ebb current occur about 1¼ hours before the time of the corresponding slack waters and strengths at Chesapeake Bay entrance. The slack water before flood occurs about 2 hours after the time of low water at

Hampton Roads and the slack water before ebb occurs about 1½ hours after high water at Hampton Roads. The average velocity of the current at strength of flood is about 1¾ knots and at strength of ebb about 2 knots; the currents, however, are influenced considerably by the wind and at times attain a velocity much in excess of these mean values. Along the wharves at Old Point Comfort the currents change about 1 hour earlier than in the center of the channel. In the center of the channel off the shipyard at Newport News the slack waters and the strengths of flood and ebb currents occur approximately ¼ hour before the times of the corresponding slack waters and strengths at Chesapeake Bay entrance. The slack water before flood occurs about 3 hours before the time of high water at Hampton Roads, and the slack water before ebb occurs about 2½ hours after the time of high water at Hampton Roads. The average velocity of the current at strength of flood is about 1¼ knots and at strength of ebb about 1¾ knots.

Ice seldom interferes with navigation in Hampton Roads for full-powered vessels, even in severe weather.

Horseshoe is described under the heading Hampton Roads to York River. **Thimble Shoal**, with depths of 9 to 12 feet (2.7 to 3.6 m), forms the southern edge of the Horseshoe and the north side of the channel into Hampton Roads between Thimble Shoal Lighthouse and Old Point Comfort.

Old Point Comfort 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 there is a depth at the main wharf of about 25 feet (7.6 m). Gasoline, provisions, and water in small quanities are obtainable. Landing at the wharf is often rendered difficult by the strong tidal currents. The first of the ebb tide 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.

Mother Hawkins Hole is an anchorage, with depths of 9 to 12 feet (2.7 to 3.6 m), 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 striped buoy close westward of it and has a depth of 18 feet (5.5 m).

A buoyed channel (**Phoebus Channel**) along the west shore of the Old Point Comfort peninsula also has its entrance between Old Point Comfort Wharf and the horizontally striped buoy. It has depths of 8 to 20 feet (2.4 to 6.1 m) and affords good anchorage for boats. A project provides for a depth of 12 feet (3.7 m) in this channel.

Mill Creek, inside of Old Point Comfort, has large areas bare at low water and several narrow channels. It is crossed by two 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 (0.3 to 1.5 m) over it, extends from 100 yards to 2 miles west-southwestward from Old Point Comfort;

it is marked by red buoys on the south side, horizontally striped buoys at each end including a lighted black and white striped buoy also at the southwest end.

Hampton Creek, 1¼ miles west-northwestward of Old Point Comfort, is the approach to the town of Hampton. There was a depth of 8 feet (2.4 m) in June 1935 across Hampton Flats, from both eastward and southwestward, to the entrance and in the channel in the creek.

A project provides for a dredged channel 200 feet wide and 12 feet (3.7 m) deep from the horizontally striped buoy off Old Point Comfort wharf to the lighted beacon off Hampton Creek, and thence 150 feet wide and 12 feet (3.7 m) deep to the first bridge.

Freight boats from Norfolk and Newport News make regular trips to the State Pier in the creek. There is about 10 feet (3.0 m) at the wharf. It is the headquarters of a large number of boats engaged in oystering and fishing and has some trade by schooners and barges, the deepest draft being 10 feet (3.0 m). Yachts harbor here. The part of the creek between the public wharf and the lower bridge, a distance of ¼ mile, is used as an anchorage for boats. The creek is crossed by several fixed bridges, and there is no navigation above them except in small motor boats. The lower bridge is a fixed trestle with 26-foot span and 10-foot (3.0 m) vertical clearance at high water. 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 (2.7 m) draft aft, and 6 feet (1.8 m) forward.

Hampton Creek may be approached from either end of Hampton Bar, but the larger sailing craft usually approach only from the southwestern end of the bar. Shoals make it advisable to follow sailing directions carefully.

In approaching from the southwestward pass close to the lighted buoy which is about ¼ mile from the southwest end of Hampton Bar and head for the beacon off the entrance to Hampton Creek on course 31° true (NE. ¾ N. mag.) until near the beacon.

In proceeding from the beacon to enter Hampton Creek shape course to pass about 20 yards west of nun buoy 2, thence to pass midway between the shores at the entrance to the harbor, and from there directly to a position midway between can buoy 3 and the wharf on the east shore of the harbor opposite the buoy. Beyond this position proceed up the western half of the harbor.

In approaching from the eastward pass midway between Old Point Comfort Wharf and the reflector (red and black) buoy (the buoy is only about 50 yards from the wharf), and follow course 307° true (NW. ⅛ W. mag.) for about 350 yards, then head for the flashing red beacon off the entrance to Hampton Creek on course 291° true (NW. by W. ⅝ W. mag.) until near the beacon to pass close to the southward and westward of it. Thence as above.

Jones Creek, the eastern arm of Hampton Creek near the entrance, has depths of about 9 feet (2.7 m) in the channel and serves as a protected anchorage for small boats. 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 (1.8 to 3.0 m), and the wharves have depths of 6 to 9 feet (1.8 to 2.7 m).

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 Co. 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 (6.1 to 6.4 m). Both foreign and domestic steamers use pier 8 where there is a depth of 32 feet (9.8 m). The grain elevator is located on pier 8; loading can be done at the rate of 31,250 bushels an hour.

Depths alongside the railroad coal piers 9 and 15 are from 35 to 37 feet (10.7 to 11.3 m) 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 (4.8 to 10.7 m).

The Newport News Shipbuilding & Dry Dock Co. piers have depths of 26 to 35 feet (7.9 to 10.7 m), with general depths of 32 feet (9.8 m). The graving dock has a capacity of 20,000 tons and accommodates vessels up to 802 feet in length. At the municipal pier at the mouth of the small boat harbor there is about 18 feet (5.5 m) alongside but shoaler water in the approach.

There is a railroad car ferry service and railroad passenger boat service to Norfolk. Daily passenger and freight service by ship extends to Richmond, Petersburg, Hopewell, and Norfolk from the Old Dominion Land Co. pier at the foot of 25th Street where there is a depth of about 30 feet (9.1 m) at the face of the wharf. 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 in the mouth of the Newport News Creek at the southern end of Newport News has been constructed by the city. The harbor is 300 feet wide. The best water in approaching the entrance is from the southwestward and leads close along the western side of the municipal pier when entering. The controlling depth is reported as 9 feet (2.7 m) and local knowledge is required. The many bulkhead wharves inside have about 7 feet (2.1 m) alongside except at the boat repair wharf where there is about 5 to 12 feet (1.5 to 3.7 m). 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 percentage of exports 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 2½ miles east-northeastward and is marked off its northeast side by a lighted bell buoy and off the north side by a lighted buoy. Off the east side are a lighted buoy and two red nun buoys the latter for special purposes. This 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 13 feet (3.9 m), which leads south of Willoughby Bank; it is little used except by boats

engaged in dredging operations. 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 8 to 12 feet (2.4 to 3.7 m) in the outer part and 3 to 5 feet (0.9 to 1.5 m) in the eastern end, and serves as an anchorage for small boats. The buildings of the **Naval Operating Base** on the south side are prominent. There is a wharf on the western end of Willoughby Spit at which the ferry from Old Point Comfort lands, and there is an electric road from here to **Ocean View** and Norfolk. The wharf is marked by a light (flashing red). ~~and a fog siren, the latter being maintained by the Ferry Company~~.

A dredged channel 300 feet wide extends in part from Hampton Roads, 3/8 mile westward of Fort Wool, to the vicinity of the wharf at 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 N-4. There was a controlling depth of 10 feet (3.0 m) along the center line of the channel in January 1935.

A channel marked by buoys, has been dredged through Sewall Point Spit along the north side of the Naval Operating Base. This channel has shoaled to a depth of 8 feet (5.5 m). A light marks the northeast corner of the Base.

Mason Creek, on the south side of Willoughby Bay, is nearly bare at the entrance at low water and is little used. It is crossed by a drawbridge just inside the entrance having a draw span 35 feet between fenders and 7 feet (2.1 m) vertical clearance at high water. The draw is hand operated and the city of Norfolk requires 24 hour notice.

Boush Creek is reached through a dredged channel east of the **Naval Air Station**. It is used chiefly by small boats of the Navy. The entering channel favors the Naval Air Station bulkhead on the east and southwest sides. Off the inner end of the southwest side is a small basin carrying 4 to 5 feet (1.2 to 1.5 m) as does the entering channel. The southern half of this basin to the head of the creek is shoal with mud bottom.

Sewall Point Spit, extends about 2 miles north-northeastward from the channel along the north side of the Naval Operating Base. There are depths from 2 to 6 feet (0.6 to 1.8 m). A dolphin about 15 feet high is established on the Spit and on the center line extension of the Newport News channel.

The basin in the north side of the Naval Operating Base is entered under a concrete arch and is used only by small naval boats. There are depths of 6 to 8 feet (1.8 to 2.4 m).

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 & Chesapeake Canal and the Dismal Swamp Canal, both of which lead southward to the sounds of North Carolina.

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Channel.—The controlling depths in the dredged river channel are given on page 150. There are no natural ranges for this channel and some local knowledge is required for vessels of the deepest draft to follow the best water. Range beacons mark the center line of the channel, but at times they are hard to see on account of hazy weather. Otherwise the channel is well marked and easily followed in clear weather, although the channel 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 from Chesapeake Bay to Newport News and Norfolk on page 162.

Tides.—The mean range of tides is 2.6 feet at Craney Island and 2.8 feet at the Portsmouth Navy Yard.

Currents.—In the Elizabeth River and its Eastern Branch the slack waters and strengths of flood and ebb occur about 2¼ hours before the time of the corresponding slacks and strengths at Chesapeake Bay entrance. The slack water before flood occurs about 1 hour after the time of low water at Hampton Roads and the slack water before ebb occurs about ½ hour after the time of high water at Hampton Roads.

In the Southern Branch opposite the navy yard the slack water and strengths of flood and ebb occur about 1½ hours before the time of the corresponding slacks and strengths at Chesapeake Bay entrance. The slack water before flood occurs about 1¾ hours after the time of low water at Hampton Roads and the slack water before ebb occurs about 1¼ hours after the time of high water at Hampton Roads. In the Elizabeth River and in each of its three branches the average velocity of the current at strength is about ¾ knot.

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 is at the eastern side of the mouth of the Elizabeth River. The north end of the point is occupied by the Hampton Roads Naval Operating Base. A fixed white light, 8 feet above the water and visible all around the horizon, has been established at the northeastern corner of the Naval Operating Base. There are piers with depths from 27 to 34 feet (8.2 to 10.4 m) and an inclosed basin 18 feet (5.5 m) deep, affording protection to small naval vessels.

South of the naval base is the ferry slip of a Newport News ferry, and just south of that the two coal piers of the Virginia Railway Co., with depths of 24 to 35 feet (7.3 to 10.7 m) alongside. Loading capacity is 3,600 tons of coal per hour at one pier and 7,200 tons per hour at the other.

South of these are the wharves of the municipal terminal with 35 feet (10.7 m) alongside but only 32 feet (9.7 m) in the approach. There is a municipal grain elevator 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 Co. pier, and two piers (Nos. 1 and 2) with 32 feet (9.8 m) depth, operated by the Norfolk-Tidewater Terminal Co.

Dredged channels lead to all these wharves and are subject to change.

LaFayette River, formerly Tanner Creek, has a depth in the entrance of 4½ feet (1.3 m) and 7 feet (2.1 m) inside to the fork 3½ miles above the entrance, above which there is a depth of 2 feet (0.6 m) in either fork to near the head of navigation. It is frequented only by small boats. The entrance channel is marked by a can buoy with reflector and additional buoys as far as Lawless Point, but is narrow and has extensive shoals on either side. The creek and its branches are crossed by several bridges: the first is a concrete arch with a 50-foot span between fenders and a 26-foot (7.9 m) clearance above mean high water; the second, north of Lafayette Park, is a draw with a 40-foot span between fenders and a 14-foot (4.3 m) vertical clearance at mean high water when closed. A day's notice is required to have this draw opened. There is a submarine cable crossing along the west side of the first bridge.

Craney Island (low and sparsely wooded) is the site of a quarantine station of the cities of Norfolk and Portsmouth. Patients from foreign vessels are cared for here. There is a depth of about 8 feet (2.4 m) 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 (2.6 m) and then a controlling depth to the wharf of 7 feet (2.1 m). Local knowledge is required as the channel is narrow and unmarked. The shoal formerly extending eastward from the island has been bulkheaded and filled, and the southern end of the area 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 (9.1 m) of water. These wharves are used for loading and discharging liquids, such as molasses, crude and refined oils. The car float wharf at the southeast side of the island has about 27 to 28 feet (8.2 to 8.5 m) at the face, and is used for loading liquids into tank cars.

Craney Island lighthouse (white skeleton tower on piles) is off the northeast end of the filled area. 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 Anchorage, southward of the island, had general depths of 26 to 31 feet (7.9 to 9.4 m) in 1934, the deeper water being on the eastern side.

Lambert Point, on the eastern side of Elizabeth River, 1 mile southward of Craney Island lighthouse, 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 (7.6 to 10.6 m) are maintained by dredging alongside the wharves, and vessels load here to a draft of 33 feet (10 m). There are also three piers for overseas, coastwise and intercoastal merchandise belonging to the same company ¾ mile southeastward, at which depths of 32 to 35 feet (9.8 to 10.7 m) 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 & Portsmouth Belt Line, 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 15 miles long with a varying width of from ⅙ to 2 miles.

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, three of which are public for small craft; one at the foot of City Hall Avenue with 8-foot (2.4 m) depth, another at the foot of Main Street with 15-foot (4.8 m) depth, but in poor condition from storm, and the third at the foot of Commerce Street with 18-foot (5.5 m) depth. Depths at other wharves range up to 35 feet (10.7 m), 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 (9.1 m). This wharf is used for an overseas, coastwise and intercoastal freight terminal.

Further information regarding facilities at the several wharves of Norfolk and vicinity can be found in the War Department, Corps of Engineers' publication, Port Series, No. 15, (revised 1934), entitled, The Ports of Norfolk, Porstmouth, Newport News and Hampton, Va. (For sale by Superintendent of Documents, Washington, D. C., price 80 cents).

The Superintendent of Lighthouses for the fifth district has offices in the New Federal Building. Mariners are requested to report direct to him by radio 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, Del., and Cape Lookout, N. C. The latest information pertaining to all aids to navigation in these waters is available here. Recommendations as to aids to navigation or their improvement may be submitted to him or to the Commissioner of Lighthouses at Washington, D. C. Light List and Buoy Lists of the United States Lighthouse Service may be purchased here.

A United States Branch Hydrographic Office is located at the 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. ~~A time ball is dropped at noon,~~ 1940

seventy-fifth meridian time, and is visible from anywhere in the harbor.

Berkley, a part of the city of Norfolk, is on the point between the Eastern and Southern Branches of the Elizabeth River. The main freight terminus of the Norfolk Southern Railroad, and several tobacco, lumber, and fertilizer wharves, and a coal bunkering wharf with 20-foot (6.1 m) depth are located here. There are also several shipyards and marine railways.

Western Branch on the west side of Elizabeth River, is frequented by vessels up to 18 feet (5.5 m) 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 (4.2 m). The channel is well marked, as shown on the chart.

For a distance of 3½ miles above West Norfolk to just above the third bridge, Western Branch has a controlling depth of 7 feet (2.1 m) in a narrow unmarked channel. It is shoal in places above the third bridge, but is navigable for small boats for a further distance of about 3 miles. There is considerable traffic above West Norfolk in small vessels to farm landings. The chart is the only guide for strangers.

Five 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 (1.4 m) high water clearance (south opening obstructed by piling); **Waterview**, 60-foot span between fenders, 4¾ foot (1.4 m) high water clearance (eastern opening shoal); Atlantic Coast Line Railroad, 50 and 51-foot spans, 4-foot (1.2 m) high water clearance; fourth bridge, 32-foot span between fenders, 5½ foot (1.7 m) high water clearance; chained draw always open, 28-foot span, 2⅓ foot (0.7 m) high water clearance when closed.

West Norfolk, on the north side, at the entrance of Western Branch, is the site of a smelting plant to which ore vessels go. The deeper draft vessels usually employ a towboat when entering. There is a shipyard and railway just above the bridge, which can take out vessels of 90 feet length and 10 feet (3.0 m) draft. Wharves both at smelting plant and shipyard have depths of 12 to 18 feet (3.4 to 5.5 m).

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 (4.5 to 4.9 m) can be taken to the wharf. Piling ruins remain of a former pier, just westward of the ferry slip.

Pinner Point, 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. Railroad passenger ferries connect with Norfolk. There are depths at the wharves of from 15 to 30 feet (4.5 to 9.1 m).

Scott Creek, between Pinner Point and Hospital Point, had a 10-foot (3.0 m) controlling depth in 1934 in the dredged channel about 100 feet wide. The entrance channel is marked by bush stakes to the

bridge. The drawbridge, opened by hand, has two 35 foot spans with 3-foot (0.9 m) high water 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.

Hospital Point is the site of a naval hospital. It is wooded. A black water tank and the dome of the main hospital building are visible above the trees. The pier has 15 feet (4.6 m) at the face 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 (3.0 m) in the entrance and inside along the wharves. Depths at the wharves are generally from 8 to 15 feet (2.4 to 4.6 m). There are marine railways and repair yards 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 motor boats. It is crossed at the mouth by a drawbridge (western side open to navigation) 49 feet wide and with a high-water clearance, when closed, of 5 feet. The bridge is opened from 5 a. m. to midnight upon signal of three blasts of a whistle.

Portsmouth, on the west side of Elizabeth River, opposite Norfolk and Berkley, is the site of a **United States navy yard** and is the main terminus of the Seaboard Air Line Railroad. Wharves have depths from 10 to 31 feet (3.0 to 9.4 m) the latter depth being at the Sinclair Refining Co. terminal at Paradise Creek. The Seaboard Air Line bulkhead pier 3 just above the ferry landings has 30 feet (9.1 m). The naval wharves have 30 to 35 feet (9.1 to 10.7 m). It has several other commercial wharves and has considerable trade in foreign and coastwise vessels.

Eastern Branch, extending eastward along the south side of the city of Norfolk, has been improved by dredging a channel, the depths of which are given on page 151.

Above the fourth bridge the branch has a natural channel (usually marked by bush stakes) with a depth of 10 feet (3 m) to the fork, 3⅓ miles above the entrance.

The north fork (**Broad Creek**) has a depth of 2 feet (0.6 m) for 1⅜ miles, and the south fork a depth of 2 feet (0.6 m) for about 2 miles. Below a point ¼ mile above the third bridge there is an extensive traffic to the wharves at Norfolk and Berkley, but above that point the branch is little used except by small local craft.

Four drawbridges cross Eastern Branch between the entrance and the fork. The Berkley bridge, ⅝ mile above the entrance is a double-leaf bascule draw, with a clear opening between fenders of 126 feet, and a headroom of 35 feet (10.7 m) at high water when closed. The Norfolk & Western Railroad bridge, ⅞ mile above the entrance, has a lift opening 140 feet wide between fenders and a headroom of 4 feet (1.2 m) at high water when closed. The Campostella Bridge, 1⅜ miles above the entrance has a double-leaf bascule draw, 140-foot span between fenders and a high water clearance of 9 feet (2.7 m) when closed. Between the hours of 7:35 a. m. and 7:50 a. m., on week days only, the draw span of this bridge need not be opened, except for the passage of tugs with tows. The Virginian Railway bridge, 2½ miles above the entrance, has a center pier draw, each opening 60 feet wide between fenders, with a headroom of 6 feet (1.8 m) at high water when closed. The ebb current

through the latter bridge has a southerly set. Three bridges cross the north fork (Broad Creek). The first two, just above the fork, have draw openings about 28 feet wide, and the third, 1⅛ miles above the fork, is a fixed bridge.

Indian River, on the south side of Eastern Branch, 2½ miles above the entrance, has a depth of 3 feet (0.9 m) for ¾ mile above the mouth.

Southern Branch of Elizabeth River (Chart 452) forms the southern 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 and other manufactories at which vessels load, and the commerce using the canals also passes through the branch. The inside route through the canals is described in United States Coast Pilot, Section D, Cape Henry to Key West; and Inside Route Pilot, New York to Key West. The controlling depths as far as the entrance to the Albemarle & Chesapeake Canal are given on page 151.

The channel for its whole length of 10½ miles is marked by buoys and is not difficult to navigate as far as the entrance to Deep Creek with the aid of the chart. Above this, to the lock of the Albemarle & Chesapeake Canal, some local knowledge is needed to follow the channel.

Bridges, Southern Branch.—The whistle signal for all bridges across Southern Branch is three long blasts (see p. 52).

Belt line Railroad bridge, 1¾ miles above the entrance, has a center pier draw, each opening 110 feet wide between fenders, with a headroom of 12 feet (3.7 m) at high water when closed.

Norfolk and Portsmouth highway bridge is located ¼ mile south of the Belt Line bridge, has a lift span 220 feet between fenders with clearance of 15 feet (4.6 m) at mean high water when closed and clearance of 145 feet (44.2 m) when raised.

Virginian Railway bridge, 2¾ miles above the entrance has a center pier draw, each opening 110 feet wide between benders, with a headroom of 9 feet (2.7 m) at high water when closed.

Norfolk & Western Railroad bridge, 5 miles above the entrance, has a single lift opening 125 feet wide between fenders, and a headroom of 7 feet (2.1 m) at high water when closed.

The railroad bridge across Southern Branch, ¾ mile above the mouth of Deep Creek, has a center pier draw, each opening 80 feet wide between fenders, with a headroom of 7½ feet (2.3 m) at high water when closed.

The highway bridge ¾ mile farther up has a center pier draw, each opening 80 feet wide between fenders, with a headroom of 6 feet (1.8 m) at high water 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 7¼ miles long and had a controlling depth of 11 feet (3.4 m) in September 1936. 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 (0.6 m) or more below or above the normal.

Deep Creek, which empties into Southern Branch about 6 miles above Norfolk, is 2½ 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 (3 m) deep from the Southern Branch to the canal lock. An examination March 1936 showed a controlling depth of 8 feet (2.4 m). On the south side at the entrance of the creek there 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 8½ miles above Norfolk. This canal is about 19 miles long, 60 feet wide, and had a controlling depth of 7 feet (2.1 m) in September 1936. There are turnouts at distances of about 3 miles where vessels may pass each other; the two locks each 225 feet long and 37 and 38 feet wide, with the wider lock at the Deep Creek end. There is 9 feet (2.7 m) over all miter sills.

Courses and Distances—Chesapeake Bay Entrance to Newport News and Norfolk

For reverse direction, read upward	Course (Reverse course in *Italics*)		Distance
	True	Magnetic	
1. Cape Henry Lighthouse bearing 257° true, distant 2.3 miles. Passing through Thimble Shoal Dredged Channel. (See p. 150 for restricted use of this channel. Vessels with drafts within the restrictions should parallel this course just outside the lighted aids.)	°	*Points*	*Nautical miles*
Direct	287½	NW. by W. ⅛ W.	14.5
Reverse	*107½*	*SE. by E. ⅞ E.*	*14.5*
325 ~~**2. Thimble Shoal Lighthouse bearing 45° true, distant 0.45 miles. Passing 100 yards north of sunken wreck with least charted depth of 45 feet (13.7 m). (Fish State Limits about 0.2 miles northward-chart 1222.)**~~			
Direct	259	W. ½ S.	1.1
Reverse	*79*	*E. ½ N.*	*1.1*
3. Old Point Comfort Lighthouse bearing 263° true, distant 1.8 miles. Passing 300 yards north of *Willoughby Bank Lighted Buoy 17*. Thimble Shoal Lighthouse astern.			
Direct	249	WBW. ⅝ W.	2.1
Reverse	*69*	*ENE. ⅝ E.*	*2.1*
4. Old Point Comfort Lighthouse bearing 18° true, distant 0.55 miles. (Anchorage A west of Old Point Comfort is for Quarantine. Charted wreck in anchorage is marked by buoy. Chart 400.) Caution: Course leads along Quarantine and Naval Anchorage limits.			
Direct	229	SW. ⅝ W.	1.7
Reverse	*49*	*NE. ⅝ E.*	*1.7*

Courses and Distances—Chesapeake Bay Entrance to Newport News and Norfolk—Continued

For reverse direction, read upward	Course (Reverse course in *Italics*) True	Course (Reverse course in *Italics*) Magnetic	Distance
5. Sewall Point Shoal Lighted Bell Buoy 3 bearing 160° true, distant 300 yards. Entrance to dredged channel leading to Norfolk. Anchorage can now be made in Hampton Roads as desired.		Elizabeth River Lighted Bell Buoy 1	
TO NEWPORT NEWS	°	*Points*	*Nautical miles*
Direct	222	SW. ¼ W	1.4
Reverse	*42*	*NE. ¼ E*	*1.4*
6. Newport News North Channel Lighted Buoy 2 bearing 310° true, distant 150 yards. Through Newport News dredged channel.			
Direct	264	W	2.8
Reverse	*84*	*E*	*2.8*
7. Newport News North Channel Lighted Buoy 8 bearing 66° true, distant 0.2 mile. Thence being guided by the chart.			
Direct	310	NW. ⅛ N	1.1
1140 *Reverse*	*130*	*SE. ⅛ S*	*1.1*
8. Newport News, Railway Pier bearing 70° true, distant 250 yards. Fog bell on outer end of pier. (For James River courses see page 172.)			
TO NORFOLK			
5A. Sewall Point Shoal Lighted Bell Buoy 3 bearing 160° true, distant 300 yards. Through dredged channel.			
Direct (Sewall Point Channel range ahead).	184	S. ⅞ W	3.4
Reverse (same range astern)	*4*	*N. ⅛ E*	*3.4*
6A. Bush Bluff Lighted Bell Buoy 13 BB bearing 90° true, distant 150 yards. Off Pier 2. Passing 200 yards eastward of Craney Island Light with fog bell. Lambert Point fog bell on outer end of pier.		ER Lighted Bell Buoy 2	
Direct (Craney Island Channel range ahead).	352	N. ⅛ W	2.8
Reverse (same range astern)	*172*	*S. ⅛ E*	*2.8*
7A. Western Branch Shoal Buoy 18 bearing 243° true, distant 150 yards. Off Lambert Point Piers. Heading for Town Point.		ER Buoy 22	
Direct (Pinner Point Channel Range astern).	131	SE. ⅛ S	2.2
Reverse (same range ahead)	*311*	*NW. ⅛ N*	*2.2*
8A. Channel Buoy 28 bearing 235° true, distant 150 yards. Thence being guided by the chart to the Norfolk Piers.		ER Buoy 30	

Courses and Distances—Chesapeake Bay Entrance to Newport News and Norfolk—Continued

For reverse direction, read upward	Course (Reverse course in *Italics*)		Distance
	True	Magnetic	
TO PORTSMOUTH OR BERKLEY	°	*Points*	*Nautical miles*
Direct	155	S. by E. ¾ E	0.5
Reverse	*335*	*N. by W. ¾ W*	*0.5*
9A. **Railway wharves, north end Portsmouth Waterfront** bearing 270° true, distant 180 yards. Thence being guided by the chart to the Portsmouth or Berkley wharves.			
Vessels bound for the **Dismal Swamp or Albemarle and Chesapeake Canals** continue along the Southern Branch via directions given in the U. S. Coast Pilot, Section D, Cape Henry to Key West; or U. S. Inside Route Pilot, New York to Key West.			

Vessels approaching from northward.—Deep-draft vessels pass ¼ mile eastward and southward of *Tail of the Horseshoe Lighted Whistle Buoy TH*, then steer 265° true (W. ⅛ N. mag.) for 4 miles to Thimble Shoal dredged channel lighted entrance buoys.

With a smooth sea a draft of 19 feet (5.8 m) can be carried between the Horseshoe and Tail of the Horseshoe by steering 178° true (S. ⅜ W. mag.) from the southern entrance of York Spit Channel to ¾ mile southward of the *Horseshoe Crossing Lighted Bell Buoy* west of Tail of the Horseshoe; then when Old Point Comfort Lighthouse bears 266° true (W. ⅛ N. mag.) it may be steered for on that course, passing close southward of two red buoys marking the channel, and north of *Willoughby Spit Lighted Bell Buoy No. 15*, on the north side of Willoughby Bank, to a junction with course 3 in the preceding table. See page 138.

(567)42 (997)42

Nansemond River (Chart 529), on the southwest side of Hampton Roads, between Pig Point and **Barrel Point**, and 2 miles southwestward of Newport News Middle Ground Lighthouse, is the approach to the city of Suffolk, 18 miles above the mouth. At **Pig Point** a long partly ruined wharf leads out to a depth of 12 feet (3.7 m). The river has some trade in small produce boats and oil and gravel barges. There are several small landings, mostly in ruins, below Suffolk from which farm produce is shipped. The channel has been improved by dredging and in 1932 had a controlling depth of 12 feet (3.7 m) from the mouth to a point 0.45 mile above the bridge at Suffolk and 7 feet (2.1 m) from there to the head of navigation, a further distance of ½ mile. The deepest draft using the river up to 1933 was 8 feet (2.4 m). It was reported in January 1936 that 9½ feet (2.9 m) can be carried as far as the oil wharves just above the bridge at Suffolk. Small boats can go several miles above Suffolk.

119 36

From the entrance 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.

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. There is a dike on the eastern side of the channel opposite the mouth of Western Branch; the northern end is submerged at extreme high water and unmarked. Strangers up to 6 feet (1.8 m) 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 high-water clearance when closed of 20 feet (6.1 m). A center pier drawbridge with each span 80 feet between fenders and a high-water clearance of 8½ feet (2.6 m) when closed crosses at **Holiday Point.**

Bennett Creek, on the south side of Nansemond River, 2¾ miles above Nansemond River lighthouse, has a depth of about 3 feet (0.9 m) on the bar at the entrance and 6 feet (1.8 m) 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 (1.2 m). A buoyed channel carries 3 feet (0.9 m) over the bar into the creek.

Western Branch, on the west side of Nansemond River, had a controlling depth of 10 feet (3.0 m) in 1932 as far as the village of Reids Ferry, and was reported to be the same in January 1936. It is said to have a depth of 5 feet (1.5 m) 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 (2.7 m) clearance at high water when closed. The channel is through the south span.

Suffolk, a city at the head of navigation for vessels on Nansemond River, is an important railroad center. Gasoline and provisions are obtainable, and there is water on the wharves. A double leaf bascule bridge, having a draw opening 40 feet wide between fenders and 4-foot (1.2 m) clearance above high water when closed, crosses the river here. There are wharves above and below the bridge. There is a small marine railway on the south bank just above the bridge capable of hauling a 40-foot boat with 3-foot (0.9 m) draft. It was not in use in 1935.

Tides.—The mean range of tides is 2.6 feet at the entrance and 3.4 feet at Suffolk.

JAMES RIVER

(Charts 529, 530, and 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, 89 miles above Newport News. The river has a large trade in coal, oil, chemicals and fertilizer, farm and wood products, and general merchandise carried in barges, schooners, and the regular steamers. The deepest draft vessel using the river drew 20 feet (6.1 m), but the majority drew 18 feet (5.5 m) or less by the records of 1933.

The Channel has been improved by dredging, so that in June 1936, there was a least depth of 25 feet (7.6 m), from the mouth to Hopewell off City Point, thence in December, 1935, 17 feet (5.2 m) to

Buxton Line—wharf at Richmond, and in June 1936, 16 feet (4.9 m) to the outer lock gate. The Canal is reported to have depths of 12 to 14 feet (3.7 to 4.3 m) and is about ⅓ mile long. In the main channel off the factory piers east of Hopewell, and north of Jordan Point there is probably a scant 25 feet (7.6 m) at present. The recommended channel is by way of Turkey Island Cut-off and **Dutch Gap-Aiken Swamp Cut-off.**

The existing project provides for a channel 25 feet (7.6 m) deep and 300 feet wide from the mouth to Hopewell; thence the same depth and 200 feet wide, following the cut-off route between Hopewell and the proposed Richmond deep-water terminal; and a channel 18 feet (5.5 m) deep and 200 feet wide from the deep water terminal to the Richmond Lock gates, 3.8 miles. The turning basin project at Richmond is to be 18 feet (5.5 m) deep and 400 feet wide by 600 feet long. A cut-off through Jones Neck of 25 feet (7.6 m) depth is projected.

Regulations for passing floating plant working in channels (such as dredges, survey boats, etc.) are given on page 347 in the appendix.

The ordinary fluctuations of stage at Richmond due to floods are 6 to 12 feet (1.8 to 3.7 m) above mean low water. The extreme fluctuations are 16 to 32 feet (4.9 to 9.8 m). The flood heights below Richmond diminish rapidly, the extreme being about 11 feet (3.3 m) lower at Dutch Gap. The cut-offs have reduced the flood heights considerably. (See p. 177.)

There are several wharves along the main channel of James River, many of them with a store and post office but no settlement near them. They are used as shipping and receiving points for farm and wood products and supplies for the surrounding country. Regular steamers between Norfolk and Richmond make stops at most of them, and there is regular freight service to New York. Many wharves are in ruins and neglected 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 produce boats and by barges and small sail vessels carrying wood and lumber. Local knowledge is generally necessary to keep in the best water, although the creeks are usually bush staked.

The James River is crossed by a highway toll 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 of 145 feet (44.2 m) when raised and 50 feet (15.2 m) 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. (See p. 52.) An airway beacon (fixed red) 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, has a vertical clearance of 25 feet (7.6 m) and span of 82 feet between fenders.

Chuckatuck Creek, 4 miles southwestward of Newport News, has a depth of 3½ feet (1 m) across the bar at the entrance and deeper water inside to the village of Crittenden, just above the entrance. There is a depth of 3 feet (0.9 m) to the village of Chuckatuck, 5 miles

above the entrance. There are several shipyards and railways at Crittenden one of which is capable of hauling out boats up to 100 foot length and 5-foot (1.5 m) draft. The channel in the approach leads northward and westward of the light (~~fixed~~ white) in the entrance of Ragged Island Creek, then southward of the light (~~fixed~~ red) in the entrance of Chuckatuck Creek.

Chuckatuck Creek is crossed by a double bascule highway toll bridge near its lower end; width between fenders 80 feet, high-water clearance 21 feet (6.4 m) when 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. There are channels on either side of the shoal.

Pagan River, on the southwest side of James River, southwestward of White Shoal, has been improved by dredging a channel 10 feet (3.0 m) deep and 80 feet wide to the town of Smithfield, 5 miles above the entrance. In 1933, there was a controlling depth of 6½ feet (2.0 m) to Smithfield but the head of small boat navigation is Cofer Landing 4 miles farther. The deepest draft entering by the records of 1933 was 8 feet (2.4 m), and usual draft not over 7 feet (2.1 m). The river trade is mostly meat, gasolene, and wood products. There is a black bell buoy on the southwest side of the main channel of James River, in line with the entrance cut of Pagan River. The channel is also marked by buoys and several lights. Navigation by vessels is rendered difficult on account of the narrow channel and the sharp turns, but there are usually bush stakes. The remains of the old wharf south of **Day Point** leading to Briggs wharf light are no longer visible above water. There are two marine railways just above **Battery Park** capable of hauling out boats 65 feet long and 5 feet (1.5 m) draft. All small boat repairs can be made. The new concrete highway bridge just above Smithfield wharves has a fixed span 30 feet between fenders, and 15 feet (4.8 m) clearance at high water. The old bridge has been removed. Low overhead telephone wires cross the river about ⅛ mile below the bridge but a submarine cable is planned here. The mean range of tides is 2.5 feet.

Jones Creek, on the south side of Pagan River, just inside the entrance, has a depth of 3 feet (0.9 m) across the flats at the entrance and deeper water inside for 3½ miles. It is crossed by two bridges: The first is ½ mile above the mouth and is a swing bridge, 40 feet between fenders with 7 feet (2.1 m) high water clearance, the west opening is used; the second is 2½ miles above the mouth and is a fixed bridge, 28 feet between fenders with 8 feet (2.4 m) high water clearance. A new fixed bridge is soon to replace the swing bridge. It is to have a span of 30 feet between fenders and 10 feet (3.0 m) clearance at high water.

There is a marine railway just below the first bridge which can haul out a boat up to 40 feet length and 3 feet (0.9 m) draft. All small boat repairs can be made.

Battery Park is a post village on the south side of Pagan River just inside the entrance. There are two marine railways here, the largest

capable of hauling out boats of 100 feet length, and 8 feet (2.4 m) draft, it is stated. Gasolene and supplies can be obtained at the wharf. The easterly wharf at Battery Park is now in bad repair with piling alone standing which should be guarded against.

Cypress Creek, a tributary of Pagan River from southward just below Smithfield, has a depth of 4 feet (1.2 m) for about 3 miles above the mouth. A highway bridge with a single clear opening 40 feet wide and 4½ feet (1.4 m) high water clearance crosses the creek at the entrance.

Smithfield is a town at the head of steamboat navigation on the Pagan River. There are depths of about 10 feet (3.0 m) at the wharves. There is little use of the river above the bridge. Gasolene, provisions, and water are obtainable.

Deep Creek, at the entrance to Warwick River, has been recommended by the Army Engineers to be dredged 80 feet wide and 6 feet (1.8 m) deep to a proposed turning basin ¼ mile above the entrance.

Warwick River, on the north side of James River, 7 miles above Newport News, has a depth of 6 feet (1.8 m) in a narrow unmarked channel for 2 miles above the entrance, 2½ feet (0.7 m) for the next ¾ 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 5 feet (1.5 m). There are unmarked shoals with depths of 3 to 5 feet (0.9 to 1.5 m) off the entrance. A 351° true (N. ¼ W. mag.) course, with White Shoal tower astern, will lead to the entrance. Gasoline and supplies can be obtained.

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 Burwells Bay, and this channel is now marked only by buoys. In 1929 a new channel was dredged across Rocklanding Shoal east of Point of Shoals, and in 1934 it had a controlling depth of 25 feet (7.6 m). This is the main channel. It is well marked by buoys, most of which are lighted.

Fergusons Wharf, on the western side of James River westward of Point of Shoals, is now in complete ruins but the piling show above high water.

Mulberry Point, on the east bank of the river, is low, being of marsh formation. The cluster of piles about ½ mile southsouthwest of this point and near the main channel stands about 3 feet (0.9 m) above high water.

Lawns Creek, 1¾ miles westward of Deep Water Shoals Lighthouse (fixed white with 2 red sectors), has a depth of about 3 feet (0.9 m) across the bar, and this depth can be carried for 4 miles above the entrance. The deepest draft entering is about 5 feet (1.5 m).

A new prominent long wharf on the east side of the river, ¾ mile southward of Deep Water Shoals Lighthouse is the landing for Camp Eustis. Groups of decommissioned vessels are moored off the wharf on either side of the main river channel.

or Fort Eustis?

Skiff Creek, 2 miles northeastward of Deep Water Shoals Lighthouse, has a depth of 2 feet (0.6 m) across the flats at the mouth and deeper water inside for about 3 miles. It is little used.

Hog Point, 23 miles above Newport News, is low, with scattered clumps of trees. Homewood wharf, marked by a light and post office, is on the east side of the point. This wharf, and the one near the point, are in ruins; the piling show above high water (1935).

College Creek, on the north side of James River, northward of Hog Point, has a depth of 2 feet (0.6 m) across the flats at the mouth, 6 feet (1.8 m) inside for 2 miles, and 2½ feet (0.7 m) for a farther distance of ½ mile to **Williamsburg Landing,** 1 mile from the town of **Williamsburg.** The channel is difficult without local knowledge.

The Thoroughfare and Back River, northward of Jamestown Island, have a depth of about 2 feet (0.6 m) at the eastern and western ends and 7 to 20 feet (2.1 to 6.1 m) 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 12 feet, and high water clearance about 3½ feet (1.1 m).

Jamestown Island is on the north side of James River, 27 miles above Newport News. **Jamestown** has two wharves and a post office. An auto and passenger toll ferry runs to Scotland on the other side of the river. A white monument and the wharves are prominent.

A shoal with a least depth of 2 feet (0.6 m) has been reported on the Goose Hill range ~~about 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 ¼ mile to the eastward. One mile northwestward is **Scotland wharf** (about 11 feet (3.4 m) alongside) and post office, from which there is railroad communication with the Norfolk & Western Railroad at **Wakefield,** and ferry communication with Jamestown Island. A large amount of lumber and wood is shipped in schooners and barges. Gasoline and Diesel oil may be obtained here. The tanks for the above are painted an aluminum color and are very prominent.

Just westward of Scotland is **Grays Creek,** which has a depth of 3 feet (0.9 m) across the flats at the entrance and deeper water inside for about 4 miles.

Chickahominy River (Chart 530) is on the north side of James River, 33 miles above Newport News and 5 miles above Jamestown Island. It was improved several years ago by dredging a channel 14 feet deep across the bar at the entrance and 8 feet (2.4 m) deep to Windsor Shades, but the project is abandoned and the channels have shoaled. By the last survey several years ago there was a depth of about 11 feet (3.4 m) at the entrance, 10 feet (3.0 m) to **Binns Bar,** 20 miles above the entrance, and 6 to 7 feet (1.8 to 2.1 m) for a farther distance of 2 miles to **Windsor Shades.** Small boats can go several miles farther, but navigation is difficult. The principal trade in the river is in wood and lumber, carried in barges and an occasional schooner. The deepest draft loaded in the river at or below Windsor Shades is about 9 feet (2.7 m).

The channel of Chickahominy River is crooked, narrow, and obstructed by shoals, and local knowledge is necessary to keep in the

best water. Two red spar buoys mark the entrance ¾ mile south of **Barrets Point**. A red spar buoy off the north side of the channel leading to the river marks a submerged wreck about 2¼ miles northwest of Jamestown Island wharf. Towboats are always employed and are usually obtained from Norfolk. The best water in the approach leads along the north shore from Jamestown Landing to the buoys at the mouth. The mean rise and fall of tides is 1.9 feet at the mouth and 2.4 feet at Windsor Shades. Chickahominy River has several narrow tributaries with a good depth of water for several miles. **Gordons, Morris,** and **Yarmouth Creeks** are the ones most often entered by barges and schooners. A State free vehicular ferry crosses the river just above the mouth at Barrets Ferry. Both ferry landings have about 10 feet (3.0 m) at their outer ends.

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 (1.8 m) draft. Repairs can be made.

In December 1935, the **wreck** ¾ mile west of **Dancing Point** showed only two masts and part of the engine above high water.

Claremont is a village and post office on the south side of James River, 38 miles above Newport News. There are wharves, with depths of 7 to 15 feet (2.1 to 4.6 m), but there is little business here. Gasoline and provisions are obtainable. A vehicular toll ferry runs from here to Sandy Point wharf (Téttington post office) on the north side of the river, opposite Claremont.

Chippoak Creek is on the south side of James River, 1½ miles westward of Claremont. It has a depth of about 4 feet (1.2 m) for 4 miles and 2 feet (0.6 m) to near the head of navigation. The best water in the entrance leads close along the south side. There is a private wharf on the south side at the entrance, with 6 or 7 feet (1.8 or 2.1 m) at the end. Southeast 300 yards are two wharves in ruins. A wreck not covered at any stage of the tide lies in 33 feet (10.1 m) of water off Chippoak Point. The smokestack stands about 40 feet above water.

Between Chippoak Creek and the bend, 3½ miles northward, are **Brandon wharf** (marked by a flashing white light) and post-office and **Ritchie wharf** (store and post office) on the west side and **Trees Point wharves** (ruins) and **Oldfield wharf** on the east side. Just north of the latter wharf occasional piles of a former wharf show 1 foot above high water.

On the north side of the river, opposite Kennon Marsh, are two wharves in ruins. There is a brickyard at the upper wharf. On the south side are ruined wharves at **Upper Brandon** and a new wharf at **Brandon Farms**, ¼ mile east of Stanley wharf, the latter being in ruins.

Kittewan Creek, on the north side, 1¼ miles westward of Kennon Marsh, is nearly bare at the mouth at low water and has deeper water inside. There is a cluster of pile stumps awash at high water in shoal water off the mouth. **Wards Creek**, on the south side, ¾ mile southeastward of Weyanoke Point, has a depth of 1 to 2 feet (0.3 to 0.6 m) across the flats at the mouth and deeper water inside for 3 miles. The ruins of a pier, submerged at extreme high water, are on the edge of the main channel at the entrance of the creek.

Fort Powhatan is marked by a ruined wharf and a light inshore about 15 feet.

Ruffins wharf is dilapidated but standing, and the two wharves immediately above are in ruins with piling stumps only.

Wilcox wharf, dilapidated but usage by loggers, and post office are on the north bank of James River, northward of Windmill Point. **Buckland wharf** is in ruins with piling stumps above high water. The ruined wharf, ⅓ mile westward, has piling stumps awash at high water. Off these wharves but northward of the dredged channel, are moored a group of several decommissioned vessels.

Herring Creek, on the north side, 2 miles westward of Windmill Point, has a depth of 2 feet (0.6 m) across the flats at the entrance and is used by boats of 4 feet (1.2 m) draft at high water. A wharf and prominent water tank lie ½ mile westward of the creek and ¾ mile farther westward are **Westover wharf** and post office. On the south side of the river at **Coggins Point** and at the next two points to the eastward there are wharf ruins at each of the three points.

Powells Creek, just eastward of Coggins Point, has a depth of 4 feet (1.2 m) for 3 miles above the entrance and is entered by boats of 6 feet (1.8 m) draft at high water.

Jordan Point light on the end of Jordan Point is prominent from up or down the river.

A channel for a vehicular ferry has been dredged 6 to 8 feet (1.8 to 2.4 m) deep, between landings at **Jordan Point** and the opposite side of the river. Shoaling has taken place and in 1935 there was but 2 or 3 feet (0.6 or 0.9 m) at either landing. The ferry channel is privately marked.

Hopewell is composed of the former villages of **City Point** and Hopewell and has now a population of approximately 13,000. 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. There are a small rayon-silk plant, paper-pulp works, and the large plant of the Atmospheric Nitrogen Corporation here. The latter has a large concrete wharf with 24 feet (7.3 m) on the north side. A privately dredged channel, with 24 feet (7.3 m) least depth, leads from the main channel of the river to the north side 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. There is 18 feet (5.5 m) on the channel side of the wharf except toward the eastern end where it has shoaled to about 6 feet (1.8 m). Trucks now haul the wood, and the wharf is not in use. There is a private light 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.

There are wharves at the point for the regular freight steamers, also for sand and gravel barges. The depths are from 15 to 20 feet (4.6 to 6.1 m). 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 28 miles below Richmond, is navigable for vessels

to the head of navigation at Petersburg, 10 miles above the mouth. The river has been improved by dredging, and the construction of training walls to obtain a channel in June 1936, 80 feet wide and 10 feet (3.0 m) deep to Petersburg. It is used by freight steamers, barges, and schooners of about 7 feet (2.1 m) draft. The difficult part of the channel, through the flats at the mouth (marked by lighted beacons and buoys), has a least depth of about 11 feet (3.4 m). From **Point of Rocks** to 1 mile above it the channel is marked by buoys and two lighted beacons. 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 to take a draft of 7 feet (2.1 m) to Petersburg with the aid of Chart 531. A pilot can be obtained at Hopewell.

A highway swing bridge crosses the river at Hopewell with 8 feet (2.4 m) clearance. A railway swing bridge (hand power) 1¼ miles above Hopewell, has a 9-foot (2.7 m) 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.

Courses and Distances—James River, Newport News to Hopewell and Richmond

For reverse direction, read upward	Course (Reverse course in *Italics*)		Distance
	True	Magnetic	
1. Newport News, railway pier bearing 70° true, distant 250 yards. Fog bell on outer end of pier:			
Caution: Fish Net Stake Buoys are established as far as the James River Bridge, and chart 529 shows the limiting areas:	°	*Points*	*Nautical miles*
Direct	322	NNW. ¼ W	2.8
Reverse	*142*	*SSE. ¼ E*	*2.8*
2. Lift Span, James River Highway Bridge.			
Direct	299	NW. ¼ W	1.9
Reverse	*119*	*SE. ¼ E*	*1.9*
3. White Shoal Channel Lighted Buoy 2 bearing 0° true, distant 300 yards. Passing ½ mile off White Shoal tower bearing 226°:			
Direct	307	NW. ¼ W	3.2
Reverse	*127*	*SE. ¼ E*	*3.2*
4. Between White Shoal Channel Lighted Buoys 1 and 4. Passing between lighted buoy 1A and buoy 4A. (Burwells Bay channel not now maintained.):			
Direct	277	WNW. ¼ W	1.6
Reverse	*97*	*ESE. ¼ E*	*1.6*
5. Rocklanding Shoal Channel Entrance Lighted Bell Buoy 6 bearing 0° true, distant 150 yards. Continuing on course 0.4 mile above lighted bell buoy 16:			
Direct (Rocklanding Shoal Lighted Channel)	330	NNW. ¼ W	4.9
Reverse (Rocklanding Shoal Lighted Channel)	*150*	*SSE. ¼ E*	*4.9*

Courses and Distances—James River, Newport News to Hopewell and Richmond—Continued

For reverse direction, read upward	Course (Reverse course in *Italics*)		Distance
	True	Magnetic	
6. Rocklanding Shoal Channel Lighted Bell Buoy 16 bearing 149° true, distant 0.4 mile. Mulberry Point bearing 90° true.			
Caution: Several ships are bunched and moored either side of channel abreast the wharf north of above point:	°	*Points*	*Nautical miles*
Direct	3	N. ¾ E	1.4
Reverse	*183*	*S. ¾ W*	*1.4*
7. Deep Water Shoals Lighthouse bearing 90° true, distant 300 yards:			
Direct	15	N. by E. ⅞ E	1.2
Reverse	*195*	*S. by W. ⅛ W*	*1.2*
8. Between Tribell Shoal Lighted Buoy 17 and Buoy 18. Following aids in Tribell Shoal Channel:			
Direct	Various	Various	3.7
Reverse	*Various*	*Various*	*3.7*
9. Between Tribell Shoal Lighted Buoy 29 and Buoy 30. Lighted bell buoy 33 close aboard south of course:			
Direct	247	WSW. ½ W	2.3
Reverse	*67*	*ENE. ½ E*	*2.3*
10. Between Goose Hill Channel Lighted Buoy 37 and Buoy 36:			
Direct (Goose Hill Channel Lighted Range ahead)	228	SW. ¾ W	1.7
Reverse (same range astern)	*48*	*NE. ¾ E*	*1.7*
11. Goose Hill Channel Lighted Bell Buoy 42 bearing 287° true, distant 525 yards. Making sharp right turn between [redacted] buoy 43 and lighted bell buoy 42, and passing not more than 200 yards south of buoy 42 and between lighted buoy 44 and buoy 45 (See p. 169.):			
Direct	296	NW. by W. ⅛ W	0.9
Reverse	*116*	*SE. by E. ⅛ E*	*0.9*
12. Goose Hill Channel Lighted Buoy 44 bearing 104° true, distant 500 yards. Passing Church Point Light bearing 45° true, distant 0.2 mile:			
Direct	319	NW. ⅞ N	3.0
Reverse	*139*	*SE. ⅞ S*	*3.0*
13. Swann Point Shoal [redacted], distant 0.2 mile. Swann Point Shoal Channel Range astern and Dancing Point Shoal Channel Range ahead. Channels marked:			
Direct	264	W	5.0
Reverse	*84*	*E*	*5.0*

Courses and Distances—James River, Newport News to Hopewell and Richmond—Continued

For reverse direction, read upward	Course (Reverse course in *Italics*)		Distance
	True	Magnetic	
14. Between Dancing Point Shoal Lighted Buoy 54 and Buoy 59. Rounding to next course, and passing between lighted bell buoy 61 and buoy 56 which mark the end of the dredged channel:	°	*Points*	*Nautical miles*
Direct	300	NW. ¾ W	2.7
Reverse	*120*	*SE. ¾ E*	*2.7*
15. Claremont Wharf bearing 150° true, distant 600 yards. Brandon Wharf Light ahead and Dancing Point Shoal Channel Front Range Light astern. Passing 400 yards off wreck off Chippokes Point. Wreck showing above high water in 1935:			
Direct	308	NW. ⅛ W	1.8
Reverse	*128*	*SE. ⅛ E*	*1.8*
16. Brandon Wharf Light bearing 128° true, distant 0.3 mile. Brandon Point ahead:			
Direct	336	N. by W. ⅝ W	0.6
Reverse	*156*	*S. by E. ⅝ E*	*0.6*
17. Brandon Wharf Light bearing 178° true, distant 0.4 mile. Bachelor Point Light ahead and Brandon Wharf Light astern:			
Direct	358	N. ⅜ E	1.8
Reverse	*178*	*S. ⅜ W*	*1.8*
18. Bachelor Point Light bearing 358° true, (ahead) distant 530 yards. Rounding Kennon Marsh in mid-channel passing 175 yards off Bachelor Point and Sturgeon Point Lights:			
Direct	Various	Various	1.9
Reverse	*Various*	*Various*	*1.9*
19. Milton Point Light bearing 315° true, distant 300 yards. Heading for *Weyanoke Point Lighted Buoy 65* and keeping at least 150 yards off eastern shore:			
Direct	219	SW	2.1
Reverse	*39*	*NE*	*2.1*
20. Weyanoke Point Buoy 63 bearing 135° true, distant 50 yards. Dredged channel. Passing between *Weyanoke Point Lighted Buoy 65 and Buoy 64:*			
Direct	Various	Various	0.6
Reverse	*Various*	*Various*	*0.6*
21. Weyanoke Point Buoy 67 bearing 180° true, distant 50 yards. Heading for Fort Powhatan Light:			
Direct	271	W. ⅝ N	0.6
Reverse	*91*	*E. ⅝ S*	*0.6*
22. Fort Powhatan Light bearing 271° true, distant 450 yards. Rounding Weyanoke Point mid-channel and passing 100 yards east of lighted buoy:			
Direct	Various	Various	1.4
Reverse	*Various*	*Various*	*1.4*

Courses and Distances—James River, Newport News to Hopewell and Richmond—Continued

For reverse direction, read upward	Course (Reverse course in *Italics*)		Distance
	True	Magnetic	
	°	*Points*	*Nautical miles*
23. Minzie Middle Ground Lighted Buoy bearing 210° true, distant 300 yards:			
Direct	0	N. ½ E.	0.9
Reverse	*180*	*S. ½ W.*	*0.9*
24. Between Windmill Point Lighted Buoy 71 and Buoy 68, Rounding Windmill Point:			
Direct	Various	Various	0.4
Reverse	*Various*	*Various*	*0.4*
25. Between Windmill Point Lighted Buoy 73 and Buoy 72. Dredged channel. Rounding Windmill Point:			
Direct	Various	Various	0.4
Reverse	*Various*	*Various*	*0.4*
26. Between Windmill Point Lighted Buoy 77 and Buoy 74. Dredged channel:			
Direct	249	WSW. ⅝ W.	1.9
Reverse	*69*	*ENE. ⅝ E.*	*1.9*
27. Between Harrison Bar Lighted Buoy 81 and Buoy 78:			
Direct (Jordan Point Lighted Range ahead).	279	WNW. ⅝ W.	2.4
Reverse (same range astern)	*99*	*ESE. ⅝ E.*	*2.4*
28. Between Harrison Bar Lighted Buoy 87 and Buoy 84. Following dredged channel passing between lighted buoy 86 and buoy 89, thence abreast buoy 88, and thence between lighted buoy 90 and buoy 93:			
Direct	Various	Various	2.0
Reverse	*Various*	*Various*	*2.0*
29. Between Jordan Point Lighted Buoy 92 and Buoy 95. Heading for lighted buoy 96:			
Direct	246	WSW. ⅜ W.	0.7
Reverse	*66*	*ENE. ⅜ E.*	*0.7*
30. Eppes Island Flats Lighted Buoy 96 bearing 246°, distant 500 yards. At junction with North Flats range:			
Direct (North Flats Range astern).	237	SW. by W. ⅝ W.	0.5
Reverse (same range ahead)	*57*	*NE. by E. ⅝ E.*	*0.5*
31. Abreast Bailey Creek Flats Light, thence following the marked channel. (The aerial cable wharf has a privately maintained fixed white light at its outer end):			
Direct	Various	Various	1.7
Reverse	*Various*	*Various*	*1.7*
32. Hopewell (City Point) Wharf:			
Direct	Various	Various	22.5
Reverse	*Various*	*Various*	*22.5*
33. Richmond Wharves: Proceeding to Richmond, Chart 531, supplemented by information on pages 176 and 177 is the best guide but strangers of deep draft should take a pilot.			

The northern branch of Appomattox River, entering the main channel at **Point of Rocks**, is shallow in places and has no traffic. It is used as a diversion channel.

Petersburg has communication by railroad and by steamboat with Richmond, Hopewell, and Norfolk. All kinds of supplies are obtainable. Ice and freshets do not interfere with navigation. The wharves have available depths of about 8 feet (2.4 m). A railroad siding, extending for almost the entire length of the wharf front, furnishes a means of transfer between the wharves and the railroads.

Bermuda Hundred is a post office on the west bank of James River, 1½ miles above Hopewell. The wharf has depths of 5 to 9 feet (1.5 to 2.7 m). A flashing white light is shown from the outer end. Opposite Bermuda Hundred is **Shirley wharf** (delapidated but standing) and post office. **Hardens Landing** is on the east bank, 2¼ miles above Bermuda Hundred.

Turkey Island Cut-off is a dredged channel about a mile long extending along a curved line across Turkey Island just above Bermuda Hundred. There was a controlling depth of 27 feet (8.2 m) through the Cut-Off in 1934. Both ends are well lighted and buoyed. An auto ferry crosses the Cut-Off just above the lower entrance. The lights and buoys around Turkey Island north of the Cut-Off have been removed.

There are several farm wharves between ~~Hardens~~ Kapall landing and Richmond but no villages. The shores are generally wooded on both sides and present no characteristic features.

Curles Swamp Creek, on the west side, 6 miles above Hopewell, has a depth of 1 foot (0.3 m) at the entrance and deeper water inside.

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.

A project has been approved for a cut-off at **Jones Neck**, with a depth of 25 feet (7.6 m) but funds have not yet been appropriated.

Woodson Rock is bare at low water, and the Woodson Rock Range leads clear of it. The range shows through a narrow opening in the trees, on top of a bluff.

Dutch Gap-Aiken Swamp Cut-Off is a dredged channel extending in a direction 294° true (NNW. ⅝ W. mag.) across the marsh flats just westward of Dutch Gap. In 1934, there was a depth of 25 feet (7.6 m). Two lights, one on either side, mark both ends of the cut-off.

Richmond, at the head of navigation on the James River, has considerable trade in regular steamers and barges, the deepest draft being 18 feet (5.5 m), and the usual draft not over 16 feet (4.8 m). It is connected with Norfolk and intermediate points and New York by steamers. 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. Two oil wharves are on the west side of the river. The canal wharf is 3,450 feet long and is reached from the river through a masonry lock, lift of 15 feet (4.6 m). The lock chamber is 168 feet long and 35½ feet wide. The depth in the canal is reported to be 12 to 14 feet (3.7 to 4.3 m). The canal is now used principally by fish and tobacco boats. 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. See page 166 for turning basin project and additional data. The wharves in the river front have from 10 to 18 feet (3.0 to 5.5 m) alongside.

The principal products handled by boat from or to Richmond are fertilizers, 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.

Anchorage out of the way of traffic is permitted in the channel at Richmond, but vessels usually go to the wharves. Small boats anchor on the flats or in the yacht basin (depth, 4 feet (1.2 m)). 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.

Freshets occur irregularly in the fall, winter, and spring, their height at Richmond ranging from 6 to 32 feet (1.8 to 9.8 m) though the latter is exceptional. (See p. 166.) 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 (1.8 m) 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 rise of water level due to freshets rapidly decreases below Richmond and is not felt at Hopewell. The two new cut-offs have reduced the freshet heights at Richmond about one foot.

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 (4.6 m) draft.

The following information is given to supplement Chart No. 531:

Wing dams which show above water extend out to the edge of the channel in places. Shoals between these dams have been raised by deposit and now show above water or by the grass covering them. The deepest water in the river follows along the outside bank of all the curves. However, two of the curves have been eliminated as part of the channel by cut-offs.

Follow the range to clear Woodson Rock and then a mid channel course between the wing dams above.

Two lights serve as leading marks through Kingsland Reach and the channels below and above it. A light marks the turn near Chaffins Bluff. There is a wharf light at Falling Creek 2 miles above the old fortifications at Drewrys Bluff, and between here and Richmond a few lights and spar buoys.

Supplies.—All kinds of supplies are obtainable at Newport News, Hopewell, and Richmond. Gasoline, Diesel oil, provisions, and water may be obtained at many 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, and Lanexa; but the nearest dry dock is at Newport News, 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.—There is some drift ice 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 2 days at one time on account of ice.

Tides.—The mean rise and fall of tides is 2.5 feet in Hampton Roads, 2.8 feet at Hopewell, 3.4 feet at Dutch Gap, and 3.7 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. The times of slack water also vary to a considerable extent, due principally to freshets, especially in the upper reaches of the river. The strength of current and the times of slack water in the following list are for normal conditions, and under abnormal conditions may differ, therefore, sometimes to a considerable extent.

Currents, James River.—*Off Hog Point.*—In the center of the channel the slack waters and the strengths of flood and ebb occur about 1¾ hours after the time of the corresponding slack waters and strengths at Chesapeake Bay entrance. The slack water before flood occurs about 1 hour before the time of the high water at Hampton Roads and the slack water before ebb occurs about 2 hours before the time of low water at Hampton Roads. The average velocity of the current at strength of flood is about 1 knot and at strength of ebb about 1½ knots.

Off Claremont Landing.—The slack waters and the strengths of flood and ebb currents occur about 2¾ hours after the time of the corresponding slack waters and strengths at Chesapeake Bay entrance. The slack water before flood occurs about the time of high water at Hampton Roads and the slack water before ebb occurs about 1 hour before the time of low water at Hampton Roads. The average velocity of the current at strength of flood or ebb is about 1½ knots.

Off Wilcox Wharf.—The slack waters and the strengths of flood and ebb current occur about 3¼ hours after the times of the corresponding slack waters and strengths of current at Chesapeake Bay entrance. The slack water before flood occurs about ½ hour after the time of high water at Hampton Roads and the slack water before ebb occurs about the time of low water at Hampton Roads. The usual velocity at strength of flood or ebb is about 1¼ knots.

Off Hopewell.—The slack waters and strengths of flood and ebb occur about 4 hours after the time of the corresponding slack waters and strengths at Chesapeake Bay entrance. The slack water before flood occurs ¼ hour before about 1 hour after the time of high water at Hampton Roads and the slack water before ebb occurs about ¼ hour after the time of low water at Hampton Roads. The approximate average velocity of the current at strength of flood is 1¼ knots and at strength of ebb 1½ knots.

Above Hopewell the velocity of the current and times of slack water are variable. At Richmond the currents are chiefly nontidal.

HAMPTON ROADS TO YORK RIVER

(Charts 1222 and 494)

Horseshoe is a shoal with depths less than 18 feet (5.5 m), which extends 6 miles from the shore between Old Point Comfort and Back River Lighthouse, its southern edge bordering the north side of the channel into Hampton Roads. This shoal has depths of 13 to 18 feet (4.0 to 5.5 m) over its eastern half; its western half has a least depth of 8 feet (2.4 m) if the shore be given a berth of ½ mile, but there are depths of 6 to 7 feet (1.8 to 2.1 m) ¾ to 1 mile southeastward of Back River Lighthouse. The eastern extension is marked by a lighted bell buoy.

Local steamers and small craft of 7 feet (2.1 m) 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.

A clear channel between fish-trap limits is as follows:

Courses and Distances—Hampton Roads to York River

For reverse direction, read upward	Course (Reverse course in *Italics*) True	Course (Reverse course in *Italics*) Magnetic	Distance
FOR VESSELS OF 8 FEET (2.4 M) DRAFT OR LESS			
1. **Old Point Comfort Lighthouse** bearing 0° true, distant 0.2 mile. Fish trap limits 300 yards northward. Course is north of ship track to Hampton Roads.	°	*Points*	*Nautical miles*
Direct	75	E. ¾ N	1.7
Reverse	*255*	*W. ¾ S*	*1.7*
2. **Old Point Comfort Lighthouse** bearing 262° true, distant 1.6 miles. Passing between fish stake buoys.			
Direct	13	N. by E. ¾ E	5.7
Reverse	*193*	*S. by W. ¾ W*	*5.7*
3.[1] **Back River Tower** (former lighthouse) bearing 243° true, distant 1.3 miles. Passing between fish stake buoys. At lighted bell buoy 1 turn left for Back River being guided by the chart and the aids.			
Direct	342	N. by W. ⅛ W	7.5
Reverse	*162*	*S. by E. ⅛ E*	*7.5*
4. **York Spit Lighthouse** bearing 100° true, distant 3,800 yards. Between lighted bell buoy 2 and buoy C1.			
Direct	306	NW. ¼ W	1.4
Reverse	*126*	*SE. ¼ E*	*1.4*
5. **York Spit Bell Buoy 2A** bearing 45° true, distant 0.3 mile. At this position turn left for Poquoson River, or Bennet, Cheeseman, and Back Creek, being guided by the chart and the aids.			
Direct	286	WNW	3.3
Reverse	*106*	*ESE*	*3.3*
6. **True Marshes Lighthouse** bearing 196° true, distant 0.5 mile. Mouth of the York River.			

[1] A wreck marked by a lighted buoy lies 2.1 miles 139° true from Back River Tower. (March 1937.)

Approaches to York River from the northward.—Vessels of 15 feet (4.6 m) 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 buoy 27 W., and steering a 225° true (SW. ½ W. mag.) course to a junction with the main-channel course, ¼ mile southwest of lighted bell buoy 2.

Buckroe Beach is a summer resort on the shore 2½ miles north-northeastward of Old Point Comfort Lighthouse. It has communication by electric road with Old Point Comfort, Hampton, and Newport News. The lights at night during the summer are prominent.

Back River, having its entrance 6½ miles north-northeastward of Old Point Comfort, has a depth of about 9 feet (2.7 m) across the bar at the entrance and 7 feet (2.1 m) 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 (2.4 m) at the wharf, but the controlling depth to the wharf is 7 feet (2.1 m) 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 ½ mile up the road. There is telephone communication. 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 (1.8 m) for ¾ mile above the entrance and 2 feet (0.6 m) to near the head. **Southwest Branch** has a depth of 4 feet (1.2 m) for 1½ 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 (7.6 m) deep made in filling swamp land for the flying field. It is bush staked but local knowledge is required. About ¼ mile northeast of the tank there is a red light on the end of a large water level pipeline extending offshore about 400 feet. A new fixed concrete bridge with 39-foot span between fenders and high water clearance of 6 feet (1.8 m) is about 1½ miles southwest of Willoughby Point. Just above this about 100 feet is a street railway fixed bridge with 14-foot span and 6 feet (1.8 m) vertical clearance. It is reported that 4 feet (1.2 m) 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 (0.9 m) for ¾ 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, and is also frequented by many produce boats, the deepest draft being 7 feet (2.1 m). **Back River Lighthouse** (flashing white), white tower showing against the trees, and a wharf and house on the western end of **Northend Point** are the most prominent marks 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 buoys is kept clear of fish traps in the

approach, the south edge of this channel extending from the black buoy at the entrance through the perpendicularly striped bell buoy lying 2 miles eastward of Back River Lighthouse. The mean rise and fall of tides at the mouth is 2.4 feet.

There are shoals, covered with scattered oyster rocks nearly bare at low water, extending from 1 to 2 miles offshore between Back River and Poquoson River entrances. Strangers, even in small boats, should keep outside of the 6-foot (1.8 m) curve.

Poquoson River, on the south side of York River entrance, westward of York Spit Lighthouse, has a depth of 7 feet (2.1 m) to the village of **Yorkville**, and 2 feet (0.6 m) to near the heads of all its tributaries. The river is frequented by small produce boats and a few schooners and barges loading wood, the deepest draft being 9 feet (2.7 m). There are no wharves on the main branch except for small boats. 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. The mean range of tides at the mouth is 2.4 feet.

Bennett Creek, on the southeast side, at the entrance of Poquoson River has a depth of 6 feet (1.8 m) for 1¼ miles above the entrance and is marked by a light, and by buoys for ¾ mile. There is a marine railway near the head, in the branch leading south and easterly of the red and black horizontally striped buoy, capable of hauling out boats of 75 tons and 6 feet (1.8 m) draft. All kinds of small boat repairs are done. Opposite the railway gasoline can be obtained at a small wharf. A post office is at **Jeffs** about a mile from the wharf and provisions are available.

Cheeseman Creek, on the north side of Poquoson River, just inside the entrance, has a depth of 6 feet (1.8 m) in a narrow channel for 2 miles, and 3 feet (0.9 m) nearly to the head. It is unmarked. There is an old red fish factory on the northeast side ½ mile west-northwestward of **York Point**, with a submerged wharf piling extending to the 7-foot (2.1 m) depth curve. Gasoline and some provisions from **Dare**, one mile inland, can be obtained near the head of the creek, and there is a railway reported capable of hauling out boats of 100 feet length and 10-foot (3.0 m) draft on the south side of the creek about one mile above **Ship Point**.

Back Creek, having its entrance 2 miles southward of Tue Marshes Lighthouse, has a depth of 8 feet (2.4 m) to abreast Slaights wharf, now piling only above high water, on the south side westward of **Clarkston Creek**, and 2 feet (0.6 m) to near the head. The most prominent mark is an old dilapidated fish factory with pilings of a wharf in ruins on the south end of **Goodwin Islands**. The creek is frequented by fish steamers of 9 feet (2.7 m) or less draft, and by many smaller oyster and produce boats. A marine railway capable of hauling out small boats up to 70-foot length and 7-foot (2.1 m) draft is located about ¼ mile above Slaights wharf (in ruins). Deck and engine repairs can be made. Gasoline, Diesel oil, and some provisions are obtainable from the small shipyard wharf. **Seaford**, formerly called Crabneck, ½ 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° true (W. ½ N. mag.) course with York Spit Lighthouse astern will lead to the first red buoy.

(896)41

(896)41

The Thoroughfare, connecting Back Creek with York River westward of Goodwin Islands, had a controlling depth in 1935 of 1½ feet (0.5 m) for a width of 15 feet and is extensively used by small local boats. The channel is usually marked by bush stakes, but is difficult without local knowledge. The Thoroughfare will be improved by dredging to a depth of 7 feet (2.1 m).

YORK RIVER

(Charts 492, 494, 495, and 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 in June, 1936, of 19½ feet (5.9 m) to West Point, and 14 feet (4.3 m) in the basin there. It is marked by lights and buoys and is easily followed by day with the aid of the chart.

The river has some trade, carried mostly in the regular steamers from Baltimore and in schooners and barges. The deepest draft ordinarily taken to West Point is 15 feet (4.6 m). The tributaries have a large trade in wood products carried in schooners and barges.

York Spit Swash, the slough loading through York Spit 5 miles northwestward of York Spit Lighthouse and 1¼ miles southeastward of the marshy islands between York River and Mobjack Bay, had a least depth of 8 feet (2.4 m) by the last survey, and is used by local vessels up to 7 feet (2.1 m) 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.

Sedger Creek (Perrin River), on the north side, 2 miles northwestward of Tue Marshes Lighthouse has a depth of 8 feet (2.4 m) from the entrance to the inner beacon, a pole with flashing red light on it. From this beacon, 6½ feet (2.0 m) can be carried in the narrow channel to Brown's Wharf at the bend, ⅜ mile above the entrance. There is a store at the wharf where gasoline, Diesel oil, provisions, and fishermen's supplies are obtainable. The post office is inland about ½ mile at Perrin. There are a marine railway, capable of hauling out a 100-foot boat with 9-foot (2.7 m) draft, and a machine shop adjoining the wharf. The channel is marked by lights and buoys. The red sector of Tue Marshes Light covers the entrance. Local fishermen may be obtained to pilot strangers. It is reported that with local knowledge 9 feet (2.7 m) can be taken as far as the marine railway.

Wormley Creek and West Branch, on the south side, 4 miles westward of Tue Marshes Lighthouse, have a common entrance with a depth of 4 feet (1.2 m) across the bar and 2 feet (0.6 m) in both creeks nearly to the heads. They are little used except by oyster boats. Callis wharf with 6 feet (1.8 m) alongside is ½ mile from the entrance on the west side of Wormley Creek. Boats drawing 3 feet (0.9 m) use this creek.

(945)41

A naval fuel-oil dock, with 30 feet (9.1 m) of water alongside, is located on the York River about ¾ mile westward of Wormley Creek.

Sarah Creek, on the north side, 1 mile eastward of Gloucester Point, has a depth of about 7 feet (2.1 m) in the entrance and for a short

distance up the west branch and 3 feet (0.9 m) in either branch for about ¾ mile. The entrance is marked by two lights and a buoy. The deepest draft using it is 7 feet (2.1 m).

There is a small railway ¼ mile above the entrance on west side. The railway handles boats up to 65 feet long and 7 feet (2.1 m) draft. Repairs are made. Gasoline and provisions can be obtained.

West of Sarah Creek are several docks and a large group of cottages extending as far as Gloucester.

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 an unwatched fixed white light), some conspicuous gasoline tanks, and several buildings. There is ferry communication with Yorktown for passengers and vehicles.

Yorktown is on the south side of York River, 6 miles above Tue Marshes Lighthouse. 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. A large wharf below the monument has depths alongside of more than 16 feet (4.9 m). There are several wharves at the west end of town, some used by fishermen and one used by the regular steamer. Some provisions, gasoline, Diesel oil, water, and ice may be obtained here.

A naval mine depot, wharf, long and prominent, is located 1⅜ miles above Yorktown at Stony Point. The depth alongside the wharf was 30 feet (9.1 m). ~~An aviation light is about 1⅜ miles inland.~~ (2344)41

Anchorage.—Vessels can anchor anywhere in the wider part of the channel of York River where the depth is suitable. A good anchorage for deep-draft vessels is westward or northwestward of Gloucester Point, on the north side of the channel. The areas eastward of Yorktown are used by naval vessels.

The **Colonial National Monuments highway** follows a fill adjacent to the shore line for about one mile southeastward from **Sandy Point.** A fixed concrete bridge in this highway crosses Indian Field Creek at Sandy Point having a 46½-foot span and 4½-foot (1.4 m) vertical clearance. Another similar bridge with same span and 3¾-foot (1.1 m) vertical clearance crosses Felgates Creek at **Poley Point.** Neither bridge has fenders; above clearances are at high water. **Felgates Creek,** on the southwest side, 4 miles above Yorktown, has a controlling depth of 5 feet (1.5 m) across the flats at the entrance and deeper water inside. Local knowledge is necessary for the best water.

Kings 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 1¼ miles above the entrance with 46½-foot span, no fenders, and 14½-foot (4.4 m) high water clearance.

Queens Creek, on the southwest side, 1½ miles west-southwestward from Pages Rock Lighthouse, has a depth of 2½ feet (0.7 m) across the flats at the entrance, which is bush staked, 4 feet (1.2 m) inside for 2½ miles, and 1½ feet (0.5 m) for a farther distance of 2 miles to a fixed bridge 1½ miles from the town of **Williamsburg.** It is used by a few produce boats in the lower end and 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 feet (1.7 m) draft enters Queens Creek at high water. Some pulp wood is handled on the creek.

The outer half of Clements wharf off **Carmines Islands**, is not visible but the inner half piling still show above high water (1935). A red buoy marks the outer end of the former wharf.

Timber Neck, Cedarbush, Carter, and **Aberdeen Creeks,** between Carmines Islands and Claybank wharf are shoal and frequented only by small local boats.

Claybank and **Almondsville** have long wharves and post offices. They are on the northeast side of the river 8¼ and 11¾ miles, respectively, above Gloucester Point. The Baltimore boat stops at both wharves. There is a light on the end of Almondsville wharf.

Poropotank Creek, 4 miles above Almondsville Wharf and eastward of Poropotank Creek Light, has a depth of about 6½ feet (2.0 m) at high water in the entrance. In 1933 a channel in **Morris Bay** was dredged to 6 feet (1.8 m), and above this 5 feet (1.5 m) can 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 feet (1.2 to 1.8 m) 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.

West Point, at the junction of Mattaponi and Pamunkey Rivers, is the terminus of a branch of the Southern Railway and is connected by steamer with Baltimore and the intermediate landings on York River three times a week. It has considerable trade in bay and coasting vessels, the deepest draft being 15 feet (4.6 m). Gasoline, Diesel oil, provisions, water, and coal in limited quantities are obtainable. Towboats and pilots for Mattaponi and Pamunkey Rivers can be obtained. There 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 feet (2.4 m) draft. At the southeast end of the face of the railroad wharf is 20 feet (6.1 m) but shoals to 8 or 9 feet (2.4 or 2.7 m) at the northwest end.

Anchorage can be made off the wharves on either side of West Point in depths of 18 to 40 feet (5.5 to 12.2 m).

Mattaponi River (Chart 504) 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 (3.7 m) to **Mantapike,** 18½ miles above West Point, and 7½ feet (2.3 m) to Walkerton. With local knowledge 7½ feet (2.3 m) can be carried across Sandy Point bar, ½ mile west of Sandy Point. Between Walkerton and Aylett the river has been improved by dredging a channel 5½ feet (1.7 m) deep and 40 feet wide, but considerable trouble is usually experienced in maintaining it. The last dredging accomplished was a small amount in 1933 between Walkerton and Aylett. In 1935 the controlling depth to **Pointers Landing** was 5½ feet (1.7 m). It is reported that there is 5½ feet (1.7 m) to **Kellys Bar,** about ½ mile below **Jones Landing,** and 4 feet (1.2 m) on the bar; thence the same depth to Aylett. There is a depth of about 2 feet (0.6 m) for a distance of 2½ miles above Aylett, where there is a fixed bridge, 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.

A highway bridge crosses the river at West Point. It has a bascule span 80 feet wide between fenders and a high-water clearance of 7 feet (2.1 m) when closed. A swing bridge crosses the river at Walkerton, 47 feet wide between fenders, and a high water clearance of 6½ feet (2.0 m) when closed. The north channel should be used as the south channel has shoaled. During 1936 a new bridge was to be built 150 feet below the existing bridge having 50 feet between fenders and 6½ feet (2.0 m) high water clearance when closed. The fixed bridge at Aylett has a span of 119 feet, no fenders, and high water clearance of 20 feet (6.1 m). The fixed bridge at Dunkirk is reported to have a span of about 50 feet and 6 feet (1.8 m) high water clearance.

There is considerable trade in wood products carried in schooners and barges, the deepest draft being 14 feet (4.3 m). The river is unmarked and navigation is difficult without local knowledge. Pilots and towboats can be obtained at West Point. Schooners usually carry a gasoline boat to assist them in the narrow channels. Supplies can best be obtained at West Point, though gasoline and provisions are usually obtainable at many of the landings.

Freshets occur at irregular intervals, being more severe during March and April, and have reached a height of 17½ feet (5.3 m) above mean low water at Aylett and 5 feet (1.5 m) at Walkerton, though this is exceptional, but are little felt at West Point or below. The river is not fresh below West Point. The mean tidal range during low stages of the river is 2.9 feet at West Point, 3.9 feet at Walkerton, and 2.8 feet at Aylett.

Pamunkey River (Chart 504) had, in 1935, a depth of 15 feet (4.6 m) to **Lester Manor**, 9 feet (2.7 m) to the railroad bridge at **White House**, 6 feet (1.8 m) to **Skidmore Bar**, near **Bassett Ferry**, and about 5 feet (1.5 m) to **New Castle Bridge**, 24, 28, 43, and 45 miles, respectively, above **West Point**. It is navigable for small lighters and rafts for a farther distance of about 7 miles to **Hanovertown**. The channel between White House and Bassett Ferry has been improved by dredging to a depth of 7 feet (2.1 m) and width of 80 feet. There was some dredging done in 1932.

There are no towns on Pamunkey River, but there are many landings, from which considerable wood products and grain are shipped in schooners and barges, the deepest draft being 15 feet (4.6 m). There are post offices and railroad stations at **Sweethall** and Lester Manor, and a railroad station at White House.

From West Point to Sweethall 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. There are several narrow cut-offs with sufficient depth for small boats, but local knowledge is usually necessary. **Cumberland Thorofare** is used extensively by local boats. It is reported that bush stakes mark the northeast side of the upper entrance of this thoroughfare.

The highway swing bridge at West Point crossing the Pamunkey River has an 89½-foot span between fenders and a 5-foot (1.5 m) high-water clearance when closed. The northeast channel in the bridge is obstructed by piling. There is a small boat opening just west of the swing with a span of 18½ feet and a vertical clearance of 6½ feet (2.0 m) at high water. Across the **Eltham Marsh Thorofare** there is a wooden culvert with 19-foot span, no fenders, and 3½-foot (1.1 m) high water clearance.

The railroad bridge at White House has a draw opening 53 feet wide and a headroom of 4½ feet (1.4 m) at high water when closed. The east opening is fended and must be used.

The fixed bridge at New Castle has a span 40 feet wide and a headroom of 9 feet (2.7 m) at ordinary stage of the river.

Freshets occur at irregular intervals in Pamunkey River, being more severe during March and April. The mean range of tides during low stages of the river is 2.9 feet at West Point and 2.0 feet at New Castle.

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.—Sailing vessels seldom take a towboat, but usually carry a small motor boat to assist them. Towboats for York River can be obtained at Hampton Roads.

Bridge Regulations for the Mattaponi and Pamunkey Rivers are given on page 52.

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 (see p. 4).

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 tides is 2.3 feet at the entrance, 2.4 feet at Yorktown, and 2.9 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.

At York Split Lighthouse.—The slack waters and strengths of flood and ebb occur about 1¼ hours before the time of the corresponding slacks and strengths at Chesapeake Bay entrance. The slack water before flood occurs about 2 hours after the time of low water at Hampton Roads and the slack water before ebb occurs about 1½ hours after the time of high water at Hampton Roads. The velocities at strengths of flood or ebb average about 1 knot.

Between Tue Point and Yorktown.—The slack waters and strengths of flood and ebb occur about 1 hour before the times of the

corresponding slacks and strengths at Chesapeake Bay entrance. The slack water before flood occurs about 2¼ hours after the time of low water at Hampton Roads and the slack water before ebb occurs about 1¾ hours after the time of high water at Hampton Roads. Off Tue Point the average velocity at strength of flood or ebb is about 1 knot. Off Yorktown the average velocity at strength of flood is about 1¼ knots and at strength of ebb 1¾ knots.

Off Claybank.—The slack waters and the strengths of flood and ebb occur at about the times of the corresponding slacks and strengths at Chesapeake Bay entrance. The slack water before flood occurs about 2¾ hours before the time of high water at Hampton Roads and the slack water before ebb occurs about 2¾ hours after the time of high water at Hampton Roads. Between Yorktown and West Point the average velocity at strength of flood is about 1¼ knots and at strength of ebb 1½ knots.

In the Mattaponi River at West Point.—The slack waters and the strengths of flood and ebb current occur about ¾ hour after the times of the corresponding slacks and strengths at Chesapeake Bay entrance. The slack water before flood occurs about 2 hours before the time of high water at Hampton Roads and the slack water before ebb occurs about 3 hours before the time of low water at Hampton Roads. At the bridge near West Point the average velocity of the strength of the flood current is about 1¼ knots and of the strength of the ebb current 1½ knots.

In the Mattaponi River at Mattaponi.—The slack waters and the strengths of flood and ebb current occur about 1½ hours after the corresponding slacks and strengths at Chesapeake Bay entrance. Slack water before flood occurs about 1¼ hours before the time of high water at Hampton Roads and slack water before ebb occurs about 2¼ hours before the time of the low water at Hampton Roads. Between West Point and Walkerton average velocities at strength of current range from 1 to 1½ knots.

In the Pamunkey River at West Point.—The slack waters and strengths of flood and ebb current occur about 1½ hours after the corresponding slacks and strengths at Chesapeake Bay entrance. The slack water before flood occurs about 1¼ hours before the time of high water at Hampton Roads and the slack water before ebb occurs about 2¼ hours before the time of low water at Hampton Roads. At the bridge, near West Point, the average velocity of strengths is about 1¾ knots and at strength of ebb about 2 knots.

In the Pamunkey River at White House railroad bridge.—The slack waters and the strengths of flood and ebb current occurs about 3 hours after the time of the corresponding slacks and strengths at Chesapeake Bay entrance. Slack water before flood occurs about ¼ hour after the time of high water at Hampton Roads, and the slack water before ebb occurs about ¾ hour before the time of low water at Hampton Roads. Between West Point and Bassett Ferry the average velocity at strength of current is about 1 knot.

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Courses and Distances—York River from Eastward (Main Ship Channel)

For reverse direction, read upward	Course (Reverse course in *Italics*) True	Course (Reverse course in *Italics*) Magnetic	Distance
	°	*Points*	*Nautical miles*
1. Middle Ground Lighted Whistle Buoy 10 bearing 90° true, distant 0.9 mile. (Same as position 3 p. 146.)			
Direct	294	NW. by W. ⅝ W	3.1
Reverse	*114*	*SE. by E. ⅜ E*	*3.1*
2. York Spit Channel Entrance Lighted Whistle Buoy 1A bearing 49° true, distant 2.6 miles. Between *Fish Net Stake Buoys 44W* and *50W*. Passing between fish trap limits to York River entrance, and close aboard *York River Entrance Buoy*.			
Direct	320	NW. by N	4.8
Reverse	*140*	*SE. by S*	*4.8*
3. York Spit Lighthouse bearing 45° true, distant 0.8 mile. (Same as position 4 p. 179.) Passing lighted bell buoy 2 bearing 45° true, distants ¼ mile.			
Direct	306	NW. ¼ W	2.9
Reverse	*126*	*SE. ¼ E*	*2.9*
4. York Spit Bell Buoy 2A bearing 45° true, distant 0.3 mile. (Same as position 5 p. 179.)			
Direct	285	WNW. ⅛ W	3.3
Reverse	*105*	*ESE. ⅛ E*	*3.3*
5. Tue Marshes Lighthouse bearing 196° true, distance 0.5 mile. (Same as position 6 p. 179.)			
Direct	261	W. ¼ S	4.7
Reverse	*81*	*E. ¼ N*	*4.7*
6. Naval Fuel Depot Wharf bearing 180° true distant 575 yards. Mid-channel off Gloucester Point ahead.			
Direct	297	NW. by W. ⅛ W	1.4
Reverse	*117*	*SE. by E. ⅛ E*	*1.4*
7. Gloucester Point Wharf Light bearing 27° true, distant 425 yards. Passing 200 yards off Sandy Point Shoal Light and 230 yards off Poplar Creek Buoy 6. Aero light about 3 miles west of Gloucester Point.			
Direct	313	NW. ⅝ N	5.1
Reverse	*133*	*SE. ⅜ S*	*5.1*
8. Pages Rock Light bearing 349° true, distant 0.65 miles. Passing 325 yards off this light and 225 yards off buoy 9.			
Direct	335	N. by W. ¾ W	2.6
Reverse	*155*	*S. by E. ¼ E*	*2.6*
9. Claybank Wharf End bearing 335° true, distant 0.5 mile. Passing 350 yards off Middle Ground Light and 200 yards off Purtan Bay Light.			
Direct	321	NNW. ⅛ W	4.8
Reverse	*141*	*SSE. ⅛ E*	*4.8*
10. Barren Point bearing 90° true, distant 0.6 mile. Passing 225 yards off Purtan Island Light.			
Direct	316	NW. ⅝ N	3.7
Reverse	*136*	*SE. ⅜ S*	*3.7*

Courses and Distances—York River from Eastward—Continued

For reverse direction, read upward	Course (Reverse course in *Italics*) True	Course (Reverse course in *Italics*) Magnetic	Distance
11. **Roanes Flat Light** bearing 45° true, distant 375 yards. Passing 100 yards off bell buoy 13.	°	*Points*	*Nautical miles*
Direct	330	NNW. ⅛ W	2.6
Reverse	*150*	*SSE. ⅛ E*	*2.6*
12. **Bells Rock Light** bearing 107° true, distant 200 yards.			
Direct (Bells Rock Light slightly on starboard quarter).	298	NW. by W	1.6
Reverse (same light slightly on port bow).	*118*	*SE. by E*	*1.6*
13. **Fillbates Creek Flats Light** bearing 160° true, distant 300 yards. West side of the channel well marked. Timber dike parallels the channel about 300 yards west of the buoys.			
Direct	333	N. by W. ⅞ W	1.3
Reverse	*153*	*S. by E. ⅞ E*	*1.3*
14. **Abreast Buoy 23**, 100 yards distant. Draw span of bridge ahead.			
Direct	330	NNW. ⅛ W	0.7
Reverse	*150*	*SSE. ⅛ E*	*0.7*
15. **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 12 feet (3.7 m) can be carried across the above shoal.			

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 (6.7 m) in the entrance and 15 feet (4.6 m) through the bay and for a considerable distance in the tributaries.

The entrance is marked on the north side by New Point Comfort Lighthouse (flashing white), white tower, and on the south side by York Spit Lighthouse (group flashing red, 2 white sectors), white house on piles, and these are the only prominent marks in the approach. Many of the shoals in the bay and tributaries are marked by buoys and lights.

A 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.

New Point Comfort, marked by a lighthouse, is low and sparsely wooded. The wharf at the west end of the point is in ruins.

Bay Side Wharf is a long wharf on the northeast side of Mobjack Bay, 1¾ miles northwestward of New Point Comfort Lighthouse. Some provisions, ice and gasoline are obtainable.

Pepper Creek, marked by two lighted beacons, has a controlling depth by report of 7 feet (2.1 m) for about ½ mile above the entrance, with the shoalest spot near the outer beacon. On the west side of the creek a marine railway can haul out a boat 60 feet long and 4 feet (1.2 m) draft; all small boat repairs are made. No supplies are obtainable.

East River, emptying into Mobjack Bay from northward, has a narrow channel with a depth of 13 feet (4.0 m) for 4 miles above the entrance and 4 feet (1.2 m) for a farther distance of 2 miles to near the head. The entrance is marked by **Pultz Bar** light (fixed white), and Pond Point Shoal light (fixed white), 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 the points be given a good berth.

There are four wharves with post offices on East River: **Philpots** (Mobjack post office), on the west side; **Diggs,** on the east side, just inside the entrance; and **Williams** and **Hicks Wharves,** about 3¼ miles above the entrance. Gasolene and provisions can be obtained at the four wharves.

A burned wreck above high water is beached just above Hicks Wharf with the outer end in 10 feet (3.0 m) of water but inside the wharf-face line. A tidal mill about 150 years old is still in use at the slough entrance southwest of Williams Wharf.

North River, emptying into the head of Mobjack 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. **Auburn Wharf,** on the north bank, 4 miles above the entrance, is the principal landing and has a depth of 7 feet (2.1 m) at the end. There is a depth of 12 feet (3.7 m) in the channel to abreast Auburn Wharf.

Ware River, emptying into the head of the bay from northwestward, has a depth of 15 feet (4.6 m) to the mouth of **Wilson Creek,** 3 miles above the entrance, and 7 feet (2.1 m) for a farther distance of 2 miles. Shoals, some of them marked by buoys, extending for a long distance off many of the points. The landings are **Bailey Wharf,** in bad condition, on the west side, and the Texas Oil Company wharf on the east side, distance 4¼ and 4¾ miles, respectively, above the entrance. There is a post office and store at Schley, ½ mile inland from the latter wharf. A wreck in 16 feet (4.8 m) of water in mid-channel just west of Windmill Point shows two tall masts and davits above high water.

Severn River, emptying into Mobjack Bay from southwestward, has a depth of 15 feet (4.6 m) to the junction of Northwest and Southwest Branches, and 8 feet (2.4 m) for 1¼ miles in Southwest Branch and 1¾ miles in Northwest Branch. The most prominent shoals are marked by buoys. Greenway Wharf is on the north side of Southwest Branch 1⅛ miles above the fork. A marine railway here hauls

and repairs boats up to 75-foot length and 7-foot (2.1 m) draft. There is a store and gasolene is obtainable. The post office is at **Glass**, ½ mile inland. Severn wharf is in ruins but a small new wharf extends northeastward from the foot of the former wharf and has 4 feet (1.2 m) at the end. There are small wharves, used by local boats, on the Northwest Branch about 1 and 2 miles above the entrance.

Browns Bay, just south of Severn River, has a light and buoys at the entrance, farther inside the channel has bush stakes. Gasolene can be obtained at the wharf where the depth is 4 feet (1.2 m). A store and post office are inland at Severn about 1 miles westward of the wharf.

Monday Creek, forming a thoroughfare between Mobjack Bay and York River, has a depth of about 3 feet (0.9 m) 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 without local knowledge.

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 tides is about 2½ feet.

Courses and Distances—Mobjack Bay

For reverse direction, read upward	Course (Reverse course in *Italics*)		Distance
	True	Magnetic	
1. **Middle Ground Lighted Whistle Buoy 10** bearing 90° true, distant 0.9 mile. (Same as position 3 p. 146). Passing lighted whistle buoy 1A bearing 90° true, distant 1.2 miles.	°	*Points*	*Nautical miles*
Direct	327	NNW. ⅜ W	5.6
Reverse	*147*	*SSE. ⅜ E*	*5.6*
2. **Between Fish Net Stake Buoys 41W and 42W.** York Spit Lighthouse bearing 290° true, distant 2.3 miles. Passing 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.)			
Direct	320	NW. by N	10.2
Reverse	*140*	*SE by S*	*10.2*
3. **East River Entrance Bell Buoy 6** bearing 0° true, distant 660 yards. Passing Pultz Bar Light and buoy 2 on range bearing 45° true, distant 0.8 miles.			
Direct	319	NW. ⅞ N	3.6
Reverse	*139*	*SE. ⅞ S*	*3.6*
4. **Ware Point Shoal Light** bearing 162° true, distant 500 yards. Passing 175 yards off buoy 1.			
Direct (Ware Point Shoal Light astern)	342	N. by W. ⅛ W	2.4
Reverse (same light ahead)	*162*	*S. by E. ⅛ E*	*2.4*

Courses and Distances—Mobjack Bay—Continued

For reverse direction, read upward	Course (Reverse course in *Italics*)		Distance
	True	Magnetic	
NORTH RIVER			
5. **Lone Point Light** bearing 83° true, distant 470 yards.	°	*Points*	*Nautical miles*
Direct	286	WNW	1.7
Reverse	*106*	*ESE*	*1.7*
6. **Cradle Point Light** bearing 0° true, distant 100 yards.			
EAST RIVER			
3. **East River Entrance Bell Buoy 6** bearing 0° true, distant 660 yards. Passing close westward of buoy 6 and 515 yards eastward of Pultz Bar Light.			
Direct	357	N. ¼ E	1.9
Reverse	*177*	*S. ¼ W*	*1.9*
4A. **Pultz Bar Buoy 2** bearing 90° true, distant 230 yards.			
Direct	19	NNE. ¼ E	0.7
Reverse	*199*	*SSW. ¼ W*	*0.7*
5A. **Pond Point Shoal Light** bearing 270° true, distant 200 yards. Continue on an approximate mid-channel course being guided to the wharves by the chart and local knowledge.			
SEVERN RIVER			
3. **East River Entrance Bell Buoy 6** bearing 0° true, distant 660 yards. (Clear of fish trap limits.) Course can be laid from position 3 to position 5B. Good water but through fish trap area.			
Direct	310	NW. ⅛ N	1.4
Reverse	*130*	*SE. ⅛ E*	*1.4*
4B. **Pultz Bar Light** bearing 50° true, distant 1 mile.			
Direct (above light astern)	230	SW. by W	1.6
Reverse (above light ahead)	*50*	*NE. by E*	*1.6*
5B. **Severn River Light 1**, bearing 180° true, distant 200 yards.			
Direct	242	WSW	1.1
Reverse	*62*	*ENE*	*1.1*
6B. **Turtle Neck Point** bearing 332° true, distant 500 yards.			
Direct	269	W. ½ N	0.8
Reverse	*89*	*E. ½ S*	*0.8*
7B. **Severn River Light 8**, bearing 180° true, 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.			

Courses and Distances—Mobjack Bay—Continued

For reverse direction, read upward	Course (Reverse course in *Italics*)		Distance
	True	Magnetic	
WARE RIVER			
4B. **Pultz Bar Light** bearing 50° true, distant 1 mile. (Clear of fish trap limits.)	°	*Points*	*Nautical miles*
Direct	293	NW. by W. ⅜ W	3.1
Reverse	*113*	*SE. by E. ⅜ E*	*3.1*
5C. **Ware Point Shoal Buoy 2** bearing 95° true, distant 1,100 yards. (Buoy 2 on range with Junction Buoy.)			
Direct	315	NW. ½ N	0.7
Reverse	*135*	*SE. ½ S*	*0.7*
6C. **Pine Point Shoal Buoy 1**, bearing 180° true, distant 175 yards. Passing Windmill Point Light bearing 180° true, distant 150 yards, and passing north of charted wreck 200 yards.			
Direct	255	W. ¾ S	0.9
Reverse	*75*	*E. ¾ N*	*0.9*
7C. **Island Point Shoal Light** bearing 0° true, distant 150 yards. Thence following chart, and rounding the light, passing close eastward of buoy 3, and continuing to the wharf northwest of Schley.			

MOBJACK BAY TO PIANKATANK RIVER

(Charts 494, 534, 1222, and 1223)

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 controlling depth of 3 feet (0.9 m) in the entrance and somewhat deeper inside. It is bush staked but local knowledge is necessary.

Horn Harbor, 3 miles northward of New Point Comfort Lighthouse, has a depth of about 3 feet (0.9 m) across the bar at the entrance and 6 to 9 feet (1.8 to 2.7 m) 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 lighted aids. 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 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. Gasoline is obtainable, and a store and post office are at **New Point**. A project

has been approved to dredge the entrance bar 100 feet wide and 7 feet (2.1 m) deep.

Winter Harbor (chart 494) and the other sloughs and creeks having their entrance 4½ miles north-northeastward of New Point Comfort have depths of 2 to 4 feet (0.6 to 1.2 m) inside. The entrance bar generally has a controlling depth of 2 feet (0.6 m). 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 bush stakes and local knowledge is necessary. The large bay northward of Winter Harbor has depths of 2 to 4 feet (0.6 to 1.2 m).

Garden Creek, 3 miles northward of Winter Harbor has an entrance improved by timber jetties about 800 feet long. The entrance depth is 4 feet (1.2 m) and there is 2 to 3 feet (0.6 to 0.9 m) inside the creek.

PIANKATANK RIVER

(Charts 534 and 1223)

Piankatank River, just south of Rappahannock River entrance, has a depth of 12 feet (3.7 m) to within 2½ miles of the village of Freeport, and 6 feet (1.8 m) to Freeport. Small boats and lighters can go several miles above Freeport. Steamers from Baltimore drawing 8 feet (2.4 m) make landings in Milford Haven, Fishing Bay, and at ~~Green Point wharf~~. River landings above this point are served by connecting gasoline launches. Schooners up to 12 feet (3.7 m) draft carrying wood products also make use of the river.

The river is marked by **Stingray Point Lighthouse** (fixed white with red sector) white house on piles, on the north side at the entrance, and by several lights and buoys, but the channel is obstructed by many shoal spits and middle grounds. Strangers should have no trouble in taking a draft of 10 feet (3 m) 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. Schooners and barges usually complete their loadings from lighters about 2½ miles below Freeport. Gasoline and provisions can be obtained at **Green Point** (Dixie post office), southward of Wilton Point, and at Freeport.

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 (0.9 m) and is used by small local boats, but is ~~unmarked, except for~~ bush stakes, exposed to a heavy sea, and difficult without local knowledge. The main entrance, at the northwest end, has been improved by dredging a channel 10 feet (3.0 m) deep and 200 feet wide from Hills Bay to **Callis wharf** (**Grimstead** post office), on the north side ¾ mile above the entrance, and by the construction of a jetty 1,200 feet long on the north side at the entrance. The controlling depth in October 1934, to Callis and New Cricket Hill wharves was 9 feet (2.7 m) with the limiting depth at the Middle Grounds. The latter wharf is on the north point of **Lanes Creek** entrance. There is

a depth of 6½ feet (2.0 m) to **Stutts Creek**. Fitchetts wharf on the south entrance point of the creek is in ruins. Steamers from Baltimore make regular calls at the first two wharves mentioned above, only small local boats use the harbor beyond. The entrance to the dredged channel is marked by buoys and a light. The steamboat company maintains three daymarks on the Middle Grounds, and there are usually bush stakes. A small marine railway is on the north side of the entrance. Gasoline, Diesel oil and supplies can be obtained at Callis Wharf. There is an ice plant at New Cricket Hill wharf, and a free vehicular ferry connects these two wharves.

In **entering Milford Haven** a 185° true (S. by W. ⅛ W. mag.) course with Stove Point Light 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 old **Cricket Hill Wharf**, now in ruins and dangerous. From off this wharf steer 45° true (NE. ⅝ E. mag.) 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 then bring Callis Wharf well on the starboard bow until close to it to avoid a shoal making off the southern shore, nearly bare at extreme low water and marked by the three daymarks above. From the latter wharf steer 154° true (S. by E. ¾ E.) for New Cricket Hill Wharf.

Queens Creek, at the southern end of Hills Bay, is obstructed by a bar with a depth of 2 feet (0.6 m) at the mouth. It is frequented only by small local boats and is unmarked.

Jackson Creek, on the north side of the Piankatank River entrance, has about 1 foot (0.3 m) over the bar and 8 to 10 feet (2.4 to 3.0 m) inside. With local knowledge 4 feet (1.2 m) can be carried around the bar. A Federal project is authorized for dredging the entrance channel to a depth of 8 feet (2.4 m). There are three marine railways, the largest is capable of hauling and repairing boats up to 50 feet in length and 4 feet (1.2 m) draft. Supplies and gasoline can be obtained. The post office is at **Deltaville**.

Fishing Bay, on the north side, has depths of 19 to 20 feet (5.8 to 6.1 m), and at its head is a marine railway capable of hauling and repairing vessels of 12-foot (3.7 m) draft, 200 feet length, and 500 tons weight. The Baltimore boat lands at **Ruarks wharf**, which has 12 feet (3.7 m) alongside, and is just above the shipyard. Ruark postoffice is near the wharf. Ice and supplies can be obtained from about a mile inland.

Ice.—Piankatank River is closed by ice for short periods only, during severe winters.

Tides.—The mean range of tides is 1.2 feet 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° true.

From midway between these buoys head for Stove Point on course 246° true (WSW. ½ W. mag.), passing between the fish-trap buoys, to 0.3 mile westward of buoy No. 3, then steer 189° true (S. by W. ⅜ W. mag.), passing 200 yards westward of Cherry Point Light (flashing white), and around Stove Point light (flashing red) at the same distance. When west of it follow a northwesterly course to a position 300 yards north of buoy No. 5, then steer 289° true (NW. by W. ¾ W. mag.) with Roane Point light (flashing white) slightly

on the starboard bow until off Iron Point, crossing a shoal with least depth of 11 feet (3.3 m), then haul around to course 307° true (NW. ⅛ W. mag.) and pass midway between the light and the northshore. 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, and 1223)

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. Steamers from Baltimore of 7 to 10 feet (2.1 to 3.1 m) draft make regular trips to the principal wharves on the river and its tributaries as follows: Westland, North End, Stiffs, Irvington, Weems, Burhans, Urbanna, West Urbanna, Bowlers, Sharps, Tappahannock, and Carters. Freighters with 11½-foot (3.5 m) draft go to the Sylvania Industrial Corporation wharf at Deep Run about 1 mile below Fredericksburg but drag through mud at mean low water over Mangoright, Nanzatico, Millbank and Farleyvale Bars, the river pilot reports. Fuel barges drawing 9 to 10 feet (2.7 to 3.0 m) go to the wharves at Fredericksburg. In the upper reach the river is lowered by northwest winds 1 to 1½ feet (0.3 to 0.5 m) below normal stages, it is reported.

The lower end of the river is frequented by fish steamers of 9 to 11 feet (2.7 to 3.4 m) draft, and by many smaller craft engaged in the oystering and fishing industry. The tributaries have some trade in farm and wood products, carried in barges, lighters, and schooners.

Channel.—Rappahannock River has a natural channel 30 feet (9.1 m) deep for 26 miles, and 14 feet (4.2 m) deep to the town of Tappahannock, 39 miles above the entrance. Above Tappahannock the river is being improved. The controlling depth was 20 feet (6.1 m) for about 36 miles above the mouth and in February 1935, 9½ feet (2.9 m), with a width of 200 feet to Port Royal, and 100 feet upstream to Fredericksburg. The authorized project depth calls for a channel 200 feet wide and 12 feet (3.7 m) deep from the mouth to Port Royal, and thence 100 feet wide and 12 feet (3.7 m) deep to Fredericksburg.

Fish net stake buoys, with white and black horizontal bands, mark the clear channels for navigation at the mouth of the river.

Westland ~~wharf~~ and post office is on the north side, ¾ mile westward of Windmill Point. Gasoline and provisions can be obtained.

Windmill Point Creek has a new natural channel about ¾ mile west of Westland Wharf, 1½ feet (0.6 m) deep at the entrance, and 8 to 10 feet (2.4 to 3.0 m) deep inside. The channel is bush staked but local knowledge is necessary. A shoal channel connects with **Oyster Creek**, near Fisherman post office, at the head of the creek.

North End Wharf (Grinels post office) is on the south side, 3 miles westward of Stingray Point. There are several white buildings on the end of the wharf. The wharf is said to have 10 feet (3.0 m) depth.

Mill Creek and **Locklies Creek**, on the south side of Rappahannock River 6 miles westward of the entrance, have depths of 5 feet (1.5 m) 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 and a private daymark between them on the west side of the channel. Mill Creek Wharf, eastward of the entrance to Mill Creek, is in ruins, the piling standing. **Stiffs Wharf**, with 10 feet (3.0 m) at the end, is 300 yards southwest of the inner light. To enter, give the edge of the shoal northeastward of **Parrot Island** a good berth, steer 231° true (SW. by W. ⅛ W.) 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 in approaching Stiffs Wharf (New Mill Creek Wharf). Clarks Wharf and the wharf on the south side of Parrot Island are no longer visible. The controlling depth to Stiffs Wharf in September 1935, was 9 feet (2.7 m). An authorized project calls for a channel 11 feet (3.4 m) deep to Stiffs Wharf with turning basin there.

Locklies Creek is easily approached by passing midway between the light off **Grey Point** and Parrot 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 marking a shoal off the northern point.

In 1928, the channel between Locklies and Mill Creeks southwest of Parrot Island was dredged to 4½ feet (1.4 m). It has shoaled to 4 feet (1.2 m) but with local knowledge 5 feet (1.5 m) was taken through in 1935. There are spoil banks on both sides of the cut and bush stakes beyond.

There is a marine railway in Locklies Creek capable of hauling out boats 30 feet long and 4 feet (1.2 m) draft. Gasoline and provisions can be obtained, and there are post offices at **Locklies** and **Regent**. There are no supplies in Mill Creek but the post office is at **Bushy**.

Adams Wharf, south of Grey Point, is destroyed. A ferry landing is on the north side of Grey Point; the ferry connects with Irvington in Carter Creek across the river.

Whitestone Wharf, now in ruins (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**.

Carter Creek, on the north side of Rappahannock River 9½ miles above Stingray Point, is the approach to the villages of **Weems** and **Irvington**. The channel has been improved by dredging several years ago. In April 1935, there was a controlling depth of 16 feet (4.9 m) in the entrance channel to Weems, and 13½ feet (4.1 m) in the Eastern Branch to the vicinity of the ferry wharf at Irvington. With local knowledge 14 feet (4.3 m) can be carried in this latter channel. **Carter Cove** had a controlling depth of 8 feet (2.4 m).

To enter Carter Creek, pass between the flashing white light and buoy 2, on a 10° true (N. by E. ½ E. mag.) course, pass close westward of buoy 4 and the fixed red light and steer for the wharf at Weems. From Weems Wharf steer toward the locality a little to the southward of Galley Hook Point light (fixed white), then toward the point south of Irvington, and when the main wharf at Irvington bears about 51° true 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. There are three marine railways, the largest one being capable of hauling vessels of 1,000 tons, 180 feet length and 12 feet (3.7 m) draft. There are well equipped machine shops. Gasoline, fuel oil and provisions can be obtained at Weems or Irvington. A toll vehicular ferry runs across the river between Irvington and Grey Point. The mean range of tides is 1.4 feet.

Corrotoman River, on the north side of Rappahannock River 12 miles above the entrance, has a depth of 18 feet (5.5 m) to the junction of Eastern and Western Branches, 4 miles above the entrance. **Eastern Branch** has a depth of 9 feet (2.7 m) for 2½ miles and 6 feet (1.8 m) for a farther distance of ¾ mile. **Western Branch** has a depth of 12 feet (3.6 m) for 2½ miles and 6 feet (1.8 m) 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 ½ mile above in Western Branch, are marked by buoys and lights. **Taylor Creek** has 5 feet (1.5 m) for about ¾ mile above the entrance. **Millenbeck** Wharf and post office, on the western side 1½ miles above the entrance, and **Ottomans Wharf** and **Merry Point** Wharf and post office, on Western Branch, ¾ and 1 mile, respectively, above the fork, are the principal landings. There are stores at Millenbeck and Merry Point. A county ferry (day service) crosses Western Branch between Ottomans Wharf and Merry Point Wharf. The wharf on the north side of Corrotoman Point is destroyed, and only the outer and inner ends of Camp Wharf remain. The mean range of tide is 1.4 feet.

Directions, Corrotoman River.—Head for Millenbeck Bar buoy 1 on any course between 357° and 33° true. Round it to the eastward at 100 yards distance and, when north of it, steer 287° true (NW. by W. ⅞ W. mag.) until Millenbeck Wharf bears 337° true. Then steer for the wharf and, when west of Corrotoman Point Light (fixed red), steer 40° true (NE. ⅛ E. mag.) 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 (fixed white) and the point opposite. When West Point Light (fixed red) bears 318° true (NW. ⅞ N. mag.), steer for it, rounding it to the westward at a distance of 100 yards, 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) is on the south side of Rappahannock River southwestward of the entrance to Corrotoman River. There is 10 feet (3.0 m) at the wharf end.

Urbanna Creek, on the southwest side of Rappahannock River, 15 miles above the entrance, has been improved by dredging a channel with a project depth of 10 feet (3.0 m) and 150 feet wide across the bar at the entrance, and to the steamboat wharf at Urbanna, ½ mile above, near the bridge, with a turning basin of the same depth off the wharf. In 1935, there was a controlling depth of 9½ feet (2.9 m) and 100 feet width to the wharf. Above, there was 6 feet (1.8 m) depth for a distance of about 1 mile; small craft can go another 2½ miles upstream. The creek is extensively used as a harbor for small

vessels. There is excellent anchorage for a limited number of vessels of 9 feet (2.7 m) or less draft, and depths of 4 to 9 feet (1.2 to 2.7 m) at the wharves. It is frequented by passenger steamers, schooners, and barges of 10 feet (3.0 m) or less draft. There is a railway at Urbanna for hauling out boats of 50 feet length and 5 feet (1.5 m) draft, and a machine shop for ordinary repairs to motors. A post-office and stores are available.

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 mean range of tide is 1.6 feet.

To enter, approach the outer light (fixed red) on a westerly course, pass 100 feet southward of it and the red buoy near the inner end of the jetty, pass about midway between the wharf just westward of the red buoy and the inner light, and then keep in mid-channel to the steamboat wharf at the north end of the bridge. The bridge crossing Urbanna Creek has a sliding draw with an opening 30 feet wide between fenders, and a high water clearance when closed of 6½ feet (2.0 m). The draw is opened upon a signal of three blasts at any time between sunrise and sunset, daily except Sunday, from September 16th to May 31st, and from sunrise until 9:30 p. m. daily from June 1st to September 15th.

There is a long wharf at **West Urbanna (Remlik)**, ¾ mile northwestward of the entrance to Urbanna Creek, at which the Baltimore steamer makes regular landings. A water tank on shore and the white buildings and smokestacks on the end of the wharf are prominent.

Robinsons Creek, just northward of West Urbanna, has a depth of 5 feet (1.5 m) in the entrance and 3 feet (0.9 m) to the head.

On **Balls Point** there is a prominent white flagpole and a water tank showing above the trees.

La Grange Creek, 1¾ miles northward of Urbanna Creek, has a depth of 7 feet (2.1 m) in the entrance and 3 feet (0.9 m) for 1½ 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 (0.6 m) and is seldom used.

Greenvale Creek, 2½ miles north of Rogue Point, was dredged in 1934 to a depth of 5 feet (1.5 m). Shoaling has taken place but with local knowledge 4 feet (1.2 m) can be taken to the entrance points, above which there is 2 feet (0.6 m) in a narrow unmarked channel in the north prong. A timber jetty with dolphins along its upstream side, extends ⅕ mile south-southwest from the northern entrance point. About 100 feet southeastward of the end of the jetty is a sunken object with about 2 feet (0.6 m) over it. The channel lies between this object and the jetty. Gasoline can be obtained at the shore end of the jetty. The east prong has about 2 feet (0.6 m) depth.

Monaskon is a post office and wharf on the northeast side of the river, 5½ miles above Urbanna Creek. Gasoline and oil may be purchased.

Waterview is a wharf and post office on the southwest side of the river 6 miles above Urbanna Creek. Just west of Waterview is **Parrotts Creek**, which has a depth of 4 feet (1.2 m) in the entrance and 2 feet (0.6 m) to near the head. There is an oyster dock inside the point to which 3 feet (0.9 m) 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 8 miles above Urbanna Creek, has a depth of 2 feet (0.6 m) across the flats at the entrance and 4 to 6 feet (1.2 to 1.8 m) inside to several branches. There are bush stakes but local knowledge is necessary. The deepest draft using it is about 4 feet (1.2 m). Boer post office is located on the east side of the inner entrance.

Mulberry Creek, on the northeast side of the river 9½ miles above Urbanna Creek, is an important shipping point. In 1935, there was a depth of 5 feet (1.5 m) in a dredged channel across the creek entrance to the wharf at **Morattico**; this depth can be carried eastward 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 an islet awash near the end of the wharf. A post office is at Morattico. Gasoline and provisions can be obtained.

Just westward of Whealton Wharf (in ruins) is **Lancaster Creek**, which has a depth of 5 feet (1.5 m) for 1 mile and 2 feet (0.6 m) to **Woodhouse Landing**, 4½ 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 (1.2 m) 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 (0.9 m) at the entrance and 2 feet (0.6 m) to near the head. **Farnham Creek**, 3½ miles northwestward of Whealton, has a depth of 2½ feet (0.8 m) at the entrance and for a distance of 3 miles above. About one mile above the entrance there is a bridge with span of about 30 feet and high water clearance of 6 feet (1.8 m). The dimensions of the upper bridge span are reported to be about the same. All of these creeks are frequented by many motor boats and lighters carrying farm and wood products and general merchandise.

Bayport Wharf, in ruins, is on the southwest side of the river opposite Morattico. On the northeast side 4 miles above is **Sharps Wharf**, and alongside a gasoline and oil station with prominent white tanks on the end of the wharf. On the southwest side just westward of Bowlers Rock Lighthouse (flashing white, red sector) is **Bowlers Wharf**. A draft of 8 feet (2.4 m) can be taken to the latter from north-northwestward and 9 feet (2.7 m) east-southeastward. A foul area containing numerous uncharted rocks is reported to exist on the west side of the channel from ¼ mile southeastward of Bowlers Rock light to 1¾ miles northwestward of the light. This area should be avoided in approaching Bowlers Wharf.

Corbins Creek, about 3 miles above Sharps Wharf, is on the northeast side of the river. It is shoal. A private farm bridge crosses the entrance with a span of about 10 feet and high water clearance of 6 feet (1.8 m).

Totuskey Creek, on the northeast side of Rappahannock River, 3 miles above Bowlers Rock Lighthouse, had a controlling depth in

1935 of 4 feet (1.2 m) across the bar at the entrance and 5 feet (1.5 m) inside to a fixed bridge, 4½ miles above the entrance. The deepest draft using it is 6 feet (1.8 m). The channel is narrow in places and difficult without local knowledge. At **Booker Bar**, just above **North Bend Landing**, there is a timber and brush dike at the northeast side of the channel 4 feet (1.2 m) above low water. The bridge has a 24-foot span and a clearance of 10 feet (3.0 m) above high water.

Wellfords [redacted], is on the northeast side of Rappahannock River 4 miles above Bowlers Rock Lighthouse, and **Wares Wharf** is directly opposite on the southwest side. The former has 9 feet (2.7 m) of water at the outer end and the latter 10 feet (3.0 m). There are prominent gasoline tanks on shore at the latter wharf.

Piscataway Creek, on the southwest side 2½ miles below Tappahannock, has a depth of 3½ feet (1.0 m) across the flats at the entrance and 6 feet (1.8 m) inside for a distance of 5 miles; the deepest draft using it is 6 feet (1.8 m). It is crossed by a new fixed bridge 4 miles above the entrance, having a 30-foot span between fenders and a high-water clearance of 8½ feet (2.6 m). The piling of the old bridge remains 100 yards upstream. Directly opposite Piscataway Creek is **Little Carters Creek**, having a depth of 3½ feet (1.0 m) at the entrance and 2 feet (0.6 m) for a distance of 3 miles.

Hoskins Creek, just below Tappahannock, has a depth of 2½ feet (0.8 m) across the bar at the entrance and deeper water inside for a considerable distance. It is crossed by a fixed bridge ⅝ mile above the entrance with a 34-foot span between fenders and a high water clearance of 8½ feet (2.6 m). There is a small marine railway capable of hauling a boat about 30 feet long with a 3-foot (0.9 m) draft.

Tappahannock is a village on the western side of Rappahannock River 39 miles above the entrance. There is a steamer wharf with conspicuous red buildings on the end and a depth of 9 feet (2.7 m) alongside. Just south of this dock is an oil dock with about 7 feet (2.1 m) 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.

A highway bridge crosses the river at Tappahannock. It has two draw spans 102 feet wide, with a high-water clearance of 9½ feet (2.9 m). 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**.

The channel for 2 miles above the Tappahannock bridge is narrow and shallow. It had a controlling depth of about 11 feet (3.4 m) in February 1933, in the channel a short distance above buoy 20 (see p. 202 under Fredericksburg). 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 bad repair but standing.

The channel above here is marked by a light, several buoys and generally by bush stakes.

Cat Point Creek, on the northeast side 2½ miles above Tappahannock, has a depth of about 5 feet (1.5 m) across the bar at the entrance and deeper water inside for 7 miles. The deepest draft using it is 6 feet (1.8 m). A drawbridge crosses the creek just inside the entrance with a span 31½ feet wide between fenders and 7-foot (2.1 m) clearance at high water when closed. Another drawbridge 6½ miles above the latter has a span 30 feet wide between fenders and 3½-foot (1.1 m) clearance at high water when closed.

Mount Landing Creek, on the southwest side 2 miles above Tappahannock, has a depth of 1½ feet (0.5 m) across the flats at the entrance and deeper water inside for 3½ miles. There is a fixed bridge across the entrance with a span 30 feet between fenders and 9-foot (2.7 m) clearance at high water. The creek is used for fishing.

Occupacia Creek, on the western side 7 miles above Tappahannock, has a depth of 2 feet (0.6 m) across the bar at the entrance and 4 feet (1.2 m) for 5¾ miles above in the main branch. The eastern branch has a depth of 2 feet (0.6 m) to a fixed bridge 1¼ 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.

Carters Wharf, on the east bank about 10 miles above Tappahannock Bridge has some conspicuous cannery buildings.

Layton Wharf, on the west bank 4 miles above Carters, has two wharves; one, from which lumber and ties are shipped, is in fair condition. The lower wharf is now in ruins.

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 1935 the controlling depth to Port Royal was 9½ feet (2.9 m) and 200 feet wide (see below). A drawbridge crosses the river just above the Port Royal wharf, both spans are 100 feet wide with 8-foot (2.4 m) clearance at high water when the drawbridge 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.

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 shore line 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 steamers, and in barges of 8 to 10 feet (2.4 to 3.0 m) draft. Steamer navigation terminates at the wharves at the southern end of the city, though small boats can go about 1 mile farther. In December 1935, the following wharf depths were reported: Sylvania Industrial Corp. at Deep Run, 11 feet (3.4 m); Gulf Refining Corp., 12 feet (3.7 m); Steamboat wharf, 12 feet (3.7 m); Standard Oil Co., 9 feet (2.7 m). The river pilot reports in 1935 that during ordinary weather he regularly takes acid barges drawing 11½ feet (3.5 m), up the river to the Sylvania plant, but pushes through mud on several of the bars in doing so. 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 52 feet (15.8 m), and the upper highway bridge has a span of 152 feet and vertical clearance of 50 feet (15.2 m) at high water. Anchorage room is limited and vessels generally make fast to the wharves.

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 and provisions can be obtained at Irvington, Weems, Urbanna, Tappahannock, Port Royal, Port Conway, and Fredericksburg, and there are stores at many of the other landings where some supplies are obtainable. 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 limited quantities from the fish factories in Carter Creek.

Repairs to hulls of vessels up to 1,000 tons, 180 feet length, and 12 feet (3.7 m) draft, can be made in Carter Creek, and to boats of 50 feet length and 5 feet (1.5 m) 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 these 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 (10 m) above mean low water at Fredericksburg, but the usual height due to freshets is not over 9 to 12 feet (2.7 to 3.7 m) 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 tides at the mouth of the river is 1.2 feet; at Tappahannock, 1.6 feet; and at Fredericksburg, 2.8 feet. It is high water at the mouth of the river 1 hour 30 minutes after high water at Hampton Roads, and at Tappahannock 3 hours 15 minutes later than at the mouth of the river.

Currents.—The currents follow the general direction of the channel. In the upper reaches of the river the velocities of the currents and

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the times of slack water vary to a considerable extent, due principally to freshets, but also to some extent to winds; they vary in a similar manner in the lower part of the river, but to a much less extent.

Off Mosquito Point.—The slack waters and strengths of flood and ebb current occur about ¾ hour after the time of the corresponding slack waters and strengths at Chesapeake Bay entrance. The slack water before flood occurs about 2 hours before the time of high water at Hampton Roads and the slack water before ebb occurs about 3 hours before low water at Hampton Roads. The average velocity at strength of flood or ebb is about ¾ knot.

At Tappahannock.—The slack waters and strengths of flood and ebb current occurs about 3¾ hours after the time of the corresponding slack waters and strengths of current at Chesapeake Bay entrance. The slack water before flood occurs about 1 hour after the time of high water at Hampton Roads and the slack water before ebb occurs about the time of low water at Hampton Roads. At Tappahannock Bridge the average velocity at strength of flood or ebb is about 1¼ knots.

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 Lighthouse (group flashing white, red sector) and Stingray Point Lighthouse (fixed white, red sector), both white houses on piles.

Rappahannock Spit, extending 4.4 miles east-southeastward from Windmill Point, is marked by Windmill Point Lighthouse near the center, and a red and black lighted bell buoy ¾ mile south of the outer end. Vessels of 10 feet (3 m) draft can cross the spit anywhere between the lighthouse and the gas buoy provided it is clear of fish traps. A clear passage is always maintained through the traps in a northeasterly direction passing ½ mile east of the lighthouse. It is marked on the eastern side by white and black striped 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.

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 (3.0 m) 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 (2.4 m) to Fredericksburg with the aid of the chart, but with a deeper draft are advised to take a pilot at Tappahannock.

Regulations for passing floating plant working in channels (such as dredges, survey boats, etc.) are given on page 347 in the appendix.

Courses and Distances—Rappahannock River Entrance to Tappahannock

For reverse direction, read upward	Course (Reverse course in *Italics*) True	Course (Reverse course in *Italics*) Magnetic	Distance
1. **Stingray Point Lighthouse** bearing 274° true, distant 6 miles. (This position is between positions 6 and 7, courses from Chesapeake Bay Entrance to Baltimore, p. 146.) Passing 950 yards south of *Rappahannock Spit Lighted Bell Buoy*, and continuing clear of fish traps areas, for which see chart 1223. And passing 500 yards north of Sturgeon Creek Shoal Light. Other suitable courses may be laid in Chesapeake Bay to this position off the bell buoy.			
From here courses may be laid clear of fish trap areas into the Piankatank River:	°	*Points*	*Nautical miles*
Direct	284	WNW. ⅛ W	10.3
Reverse	*104*	*ESE. ⅛ E*	*10.3*
2. **Mosquito Point Shoal Buoy 2** bearing north, distant 0.4 mile:			
Direct	299	NW. ¾ W	4.8
Reverse	*119*	*SE. ¾ E*	*4.8*
3. **Spinhouse Point Shoal Light** bearing north, distant 1 mile:			
Direct	265	W. ¼ N	3.0
Reverse	*85*	*E. ¼ S*	*3.0*
4. **Towles Point Shoal Lighted Bell Buoy** bearing north, distant ¼ mile:			
Direct	300	NW. ¾ W	2.4
Reverse	*120*	*SE. ¾ E*	*2.4*
5. **Urbanna Creek Outer Light**, on range with Inner Light, distant 0.9 mile:			
Direct	346	N. ¾ W	4.5
Reverse	*166*	*S. ¾ E*	*4.5*
6. **Smoky Point Buoy 1A** bearing west, distant ½ mile:			
Direct	317	NW. ¾ N	3.1
Reverse	*137*	*SE. ¾ S*	*3.1*
7. **Punch Bowl Shoal Buoy 3** bearing southwest, distant 300 yards:			
Direct (Jones Point ahead)	292	NW. by W. ½ W	2.3
Reverse (same point astern)	*112*	*SE by E. ½ E*	*2.3*
8. **Tarpley Point Shoal Buoy 6** bearing northeast, distant 200 yards:			
Direct	321	NNW. ⅞ W	1.2
Reverse	*141*	*SSE. ⅞ E*	*1.2*
9. **Jones Point Light** bearing southwest, distant 400 yards:			
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	NW. ¼ W	1.4
Reverse	*126*	*SE. ¼ E*	*1.4*

Courses and Distances—Rappahannock River Entrance to Tappahannock—Con.

For reverse direction, read upward	Course (Reverse course in *Italics*)		Distance
	True	Magnetic	
	°	*Points*	*Nautical miles*
10. Dumpling Shoals Buoy 7 bearing southwest, distant 150 yards. Passing 100 yards south of buoy 8:			
Direct (Bowlers Rock Light ahead)	308	NW. ⅛ W	1.7
Reverse (same light astern)	*128*	*SE. ⅛ E*	*1.7*
11. Bowlers Rock Buoy 10 bearing north, distant 250 yards. Fish trap areas shown on chart 535:			
Direct	327	NNW. ⅜ W	2.6
Reverse	*147*	*SSE. ⅜ E*	*2.6*
12. Between Muddy Gut Upper Entrance Buoy 9 and Fish Net Stake Buoy 7 AW:			
Direct	321	NNW. ⅞ W	0.8
Reverse	*141*	*SSE. ⅞ E*	*0.8*
13. Between Fish Net Stake Buoys 7 CW and 7 BW. Bearing somewhat west of course off and above buoy 12			
Direct	338	N. by W. ⅜ W	1.8
Reverse	*158*	*S. by E. ⅜ E*	*1.8*
14. Between Lowry Point Shoal Buoy 1 and Fish Net Stake Buoy 7 DW. Latter buoy bearing east-northeast, distant 100 yards. Passing *Ross Rock Lighted Buoy 12 A* and Buoys 14 and 16:			
Direct	308	NW. ⅛ W	2.4
Reverse	*128*	*SE. ⅛ E*	*2.4*
15. Between Jones Point Buoy 13 and Fish Net Stake Buoy 7 EW. Passing buoy 18 and *Fish Net Stake Buoy 7 FW*, and heading between the draw span of the river bridge and the ends of the wharves:			
Direct	299	NW. ⅞ W	1.7
Reverse	*119*	*SE. ⅞ E*	*1.7*
16. Abreast the wharves at Tappahannock: Anchorage can be had in 13 to 17 feet (4.0 to 5.2 m) 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.			

RAPPAHANNOCK RIVER TO GREAT WICOMICO RIVER

(Charts 534 and 1223)

The western shore of Chesapeake Bay between Rappahannock River and Great Wicomico River is generally low and presents no prominent features. It is indented by numerous creeks and by Great Wicomico River. The creeks have numerous small villages and landings, but no large towns. Fish factories are located on most of them, and they are frequented by fish steamers of 8 to 12 feet (2.4 to 3.7 m) 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 outer limit of fish traps between Smith Point Lighthouse and Rappahannock Spit bell buoy is shown on chart 1223. The outer limit is marked by a line of black and white horizontally striped buoys. Inside this limit 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 their width between shores. On account of the fish traps, strangers should not attempt to enter at night.

The mean range of the tide in all the tributaries is about 1.1 feet.

Fleets Bay, just northward of the entrance to Rappahannock River, forms the approach to Little Bay and Tabbs, Dymer, and Indian Creeks. See page 146

Little Bay and **Antipoison Creek**, emptying into Fleets Bay from southward, have a depth of 8 feet (2.4 m) in a narrow channel for 2½ miles above the entrance. A prominent shoal in Little Bay is marked by a buoy. The creeks are frequented only by local boats. There is an ice and fish packing plant and wharf with 6 feet (1.8 m) alongside on the north shore of Antipoison Creek ¾ mile above Clarks Point. On the south shore, opposite, is **Harpers Creek**, into which 5 feet (1.5 m) can be carried to a small marine railway capable of hauling out and repairing a boat 50 feet long and 4-foot (1.2 m) draft. There is a fish factory and wharf just east of Harpers Creek and a cable crossing. Many fish stakes are in the creek. The post office is at Palmer.

Tabbs Creek has a reported controlling depth of 3 feet (0.9 m) in the entrance and 7 feet (2.1 m) to near the head. It is unmarked and frequented only by small craft.

Dymer Creek has been improved by dredging a channel to a depth of 17 feet (5.2 m) and width of 200 feet in the approach through Fleets Bay, and has a natural channel 15 feet (4.6 m) deep for 1 mile above the mouth and 8 feet (2.4 m) to near the head. In 1935, the controlling depth on the bar at the entrance was 15½ feet (4.7 m). It is reported that a depth of 12 feet (3.7 m) extends 135 yards westward of the light. The approach channel is marked by a red buoy and a light on the north side. The entrance to the creek is marked by a light on each side. Fish steamers drawing 12 feet (3.7 m) are the deepest draft entering. There is a railway in Poplar Neck Creek capable of hauling out boats of 40 feet length and 4 feet (1.2 m) draft, and making deck repairs. There is a wreck visible above high water in the entrance to Johnsons Creek. C II

Ocran, a village and post office on the south side of Dymer Creek ⅝ mile above the entrance, is the principal landing, and a fish factory here is the most prominent mark in the vicinity. Gasoline, provisions, and water are obtainable, and coal in limited quantities from the fish factory. 1140

Directions, Dymer Creek.—From 3 miles off the entrance steer 236° true (SW. by W. ⅝ W. mag.) to pass 100 yards north of buoy No. 3, change course to 300° true (NW. ¾ W. mag.) when the two lights at Dymer Creek entrance are in range, and pass about 60 yards south of the flashing light in Fleets Bay. When 135 yards beyond this light steer 313° true (NW. ½ N. mag.) to pass between the two lights at the entrance of the creek, and then follow a mid-channel course in the creek.

Indian Creek has a depth of 10 feet (3 m) to Kilmarnock Landing and 6 feet (1.8 m) to near the head. The principal wharf, with 12 feet (3.7 m) alongside, is at **Kilmarnock Landing**, on the west side, 2½ miles above the entrance, and is at the foot of a road leading to the village of **Kilmarnock** (post office). There is a fish factory and sawmill at Kilmarnock Landing, and Diesel oil, gasoline, coal, provisions, and water are obtainable. There are two oil company wharves with 6 feet (1.8 m) alongside at the creek entrance southwest of Kilmarnock Landing. The fish factory and wharf at **Byrdton** are in ruins. In **Pitmans Cove** there is a small marine railway capable of hauling out a boat 40 feet long and 5-foot (1.5 m) draft. No repairs are made. There are two lights on the north side at the entrance between the shoals, and four beacons to mark the ends of shoals for two miles above the entrance. The water tank at Kilmarnock is visible down Indian Creek.

Directions.—Keep southward of the shoals with depths less than 18 feet (5.5 m) lying eastward of Cotton Patch Bar Light (flashing white), entrance to Indian Creek, and when the light is on range with Old Toms Light (flashing red), steer 305° true (NW. ¼ W. mag.) to pass 50 yards south of them; when beyond Old Toms Light bring it astern on course 300° true (NW. ¾ W. mag.) and run to mid-channel off Longs Creek; beyond this point a mid-channel course may be followed.

Dividing Creek has its entrance between shoals 7¼ miles 343° true (N. ⅞ W. mag.) from Windmill Point Lighthouse. It has a depth of 12 feet (3.7 m) to **Hardings** and **Harveys Wharves** (the latter in ruins), 1¾ miles above **Hughletts Point**, at the entrance, and 6 feet (1.8 m) for a farther distance of ¾ 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. A prominent white house and brown fish factory are located on the point on the south side of **Prentice Creek**, ¼ mile above its entrance, and are visible from outside. Gasoline, provisions in very limited quantities are obtainable.

Directions.—A channel clear of fish traps can be navigated with Windmill Point Light astern on course 344° true (N. ¾ W. mag.) to a position 0.2 mile east-northeastward of Dividing Creek Lighted buoy (flashing white), then steer 278° true (WNW. ⅝ W. mag.), passing 250 yards north of the lighted buoy to 250 yards south of Hughletts Point Flats Light (flashing red); then 309° true (NW. ⅛ W. mag.) to close northward of Jarvis Point Shoal Light (flashing white); and 329° true (NNW. ⅛ W. mag.) to mid-channel between Hughletts Point and the point north of Prentice Creek. Beyond this a mid-channel course leads to the wharves above.

GREAT WICOMICO RIVER

(Charts 534 and 1223)

Great Wicomico River, 6 miles southwestward of Smith Point Lighthouse, is a good and convenient harbor and is extensively used by small vessels. It is also frequented by fish steamers, the regular passenger steamers, and schooners and barges carrying wood products. The draft of vessels entering it does not ordinarily exceed

12 feet (3.7 m). It has a depth of 18 feet (5.5 m) for 5¾ miles above **Great Wicomico River Lighthouse,** 10 feet (3.0 m) for 2½ miles farther to abreast Sampson Wharf (ruins), and is navigable for small craft for a farther distance of 2½ miles.

The channel is marked by lights and buoys to **Rogues Point,** 4¼ miles above Great Wicomico River Lighthouse. The principal landings on the main channel of Great Wicomico River are **Mila,** 12 feet (3.7 m) alongside, **Blackwells,** and **Tipers Wharves.** About ¼ mile east of **Horn Harbor** there is a brickyard wharf with 8 feet (2.4 m) and a lumber wharf with 10 feet (3.0 m) alongside. The river at Glebe Point is crossed by a highway swing bridge with about 100-foot span between fenders and 7½-foot (2.3 m) high-water clearance when closed. The northeast span only is fended and must be used. The principal marks for the entrance are Great Wicomico River Lighthouse (white house on piles) and a group of buildings, a church spire, and an iron stack at Fleeton, on **Fleets Point.** The shoals outside the entrance are generally covered by fish stakes, the limits of the fish traps being shown on chart 1223.

Ingrams Bay and **Mill Creek,** west-southwestward of Great Wicomico River Lighthouse, have a depth of 12 feet (3.7 m) for 3 miles above the lighthouse and 8 feet (2.4 m) for a farther distance of 1 mile. The channel is narrow and unmarked and a local pilot may be advisable.

Cranes Creek, just south of **Sandy Point,** has a depth of 2 feet (0.6 m) at the entrance and 3 feet (0.9 m) inside. It is little used.

Cockrell Creek, 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. In 1930 the controlling depth was 15½ feet (4.7 m) on the entrance bar and 14 to 17 feet (4.3 to 5.2 m) as far as Reedville. There are depths of 8 to 15 feet (2.4 to 4.6 m) at the wharves. **Fleet Point** Light (fixed red) is the principal guide to the entrance. 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 (2.1 m) 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 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 (4.6 to 6.1 m). 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 tides is 1.1 feet 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° true (NW. by W. 7/8 W. mag.) course, passing 300 yards north-northeastward of Dammeron Marsh Shoal buoy 3, 350 yards southward of the lighthouse 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 33° true (NE. 1/2 N. mag.) 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° true (NNW. 3/8 W. mag.) for Sandy Point light (fixed white), until off Cockrell Point light (fixed red), then steer 336° true (N. by W. 1/2 W. mag.), rounding Sandy Point light at a distance of 200 yards until north of the light, then steer 298° true (NW. 7/8 W. mag.) for **Haynies Point** light (fixed red), round this light at a distance of 100 yards, and steer 331° true (NNW. mag.) to the eastward of Rogue Point light (fixed white). Beyond this point the chart is the guide.

POTOMAC RIVER

(Charts 77, 78, 557, 558, 559, and 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 and Norfolk to the landings, and a large number of small craft engaged in oystering, fishing and obtaining gravel from the river bed.

Fish Net Stake spar buoys (white and black) extend up the river as far as Blakistone Island. Fish net stake limits are shown on charts 557 and 558.

Channels below Washington.—The controlling depths in the dredged channel sections in the Potomac River below Washington were as follows: Naval Magazine Shoal section (N. by W. of Bellevue), 23.5 feet (7.2 m) in November 1935; Marshall Hall Shoal section, 21.7 feet (6.6 m) in March 1935; Mattawoman Shoal section, 23.0 feet (7.0 m) in March 1935; Upper Smith Point Shoal section, 23.2 feet (7.1 m) in March 1935; and Lower Smith Point Shoal section (Maryland Point (March 1936) and Kettle Bottom (March 1935)), 24 feet (7.3 m). The project depth for these sections is 24 feet (7.3 m).

For dredged channels at Washington see pages 229 and 230.

Smith Point, on the south side of the entrance to Potomac River, is low and inconspicuous. Off it the water is shallow, there being depths of 11 feet (3.4 m) 2 miles off shore. There is also **Smith Point Shoal**, with a least depth of 18 feet (5.5 m), marked on its east side by Smith Point Lighthouse (flashing white, every 10 seconds), white tower and dwelling on a brown pier. A red sector, from 3° to 156° true, covers the shoal water off the point. The fog signal is a diaphone, blast 8 seconds, silent 12 seconds. A bell will be struck in case

the diaphone is disabled. For information regarding the radiobeacon see page 28.

Little Wicomico River, entering the south side of Potomac River ⅞ mile northwestward of Smith Point, in April 1936 had a controlling depth of 2 feet (0.6 m) on the entrance bar. The entrance is subject to change. In 1934 a temporary wooden jetty was built out northeastward from the western point at the entrance; this jetty is now in ruins. The general depths in the river are said to range from 6 to 15 feet (1.8 to 4.6 m), but only 3 feet (0.9 m) can be taken to the upper reach. There is little traffic to and from the river, and shipments are made by way of Great Wicomico River. **Sunnybank** is a postoffice 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 3½ miles above the entrance, capable of hauling a boat 45 feet long and 4-foot (1.2 m) draft. Repairs are made.

A project calls for a channel dredged 8 feet (2.4 m) deep at the entrance with projecting jetties and bulkheads.

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.

Coan River is on the south side of Potomac River, 14 miles above Smith Point Lighthouse and 6½ miles 251° true WSW. ⅞ W. mag.) from Point Lookout Lighthouse. Passenger steamers in the summer and freighters the year round from Baltimore drawing 9 feet (2.7 m) or a little over make regular trips to the landings. The entrance is marked by aids, some of which are lighted, and is easy of access. Above the entrance, pile beacons with slatted day marks or bush stakes are maintained by the steamboat company in a depth of about 6 feet (1.8 m) on the principal shoals as far as the landings, but some difficulty may be experienced in taking a greater draft than 8 feet (2.4 m) to Coan and Bundicks. The mean range of tides is 1.4 feet.

The landings are **Lewisetta, Walnut Point, Lake, Coan,** and **Bundicks,** and these landings are post offices. The bight on the south side of Walnut Point is used as an anchorage by small craft. There are stores at the landings, and artesian water and gasoline can be had at all of them. Cowarts wharf is in ruins. The new landing at Lewisetta is in the bight southwest of the village. Ice and supplies can be obtained.

There is a marine railway west of Cowarts Wharf, capable of hauling boats up to 50 feet length and 4 feet (1.2 m) draft, and a machine shop on the south side of **Honest Point** with 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 (2.4 m) draft for a distance of ¾ mile above the wharf at Lewisetta. Shoals extend halfway across the entrance from the west side northward of Cowarts 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 (2.7 m) draft for a distance of 1½ miles above Cowarts Wharf; the mid-channel is clear, except for a

shoal which extends well off from the point on the south side ¾ mile above Cowarts Wharf. The south arm at the head of the Glebe has a channel depth of 8 feet (2.4 m) for a distance of ½ mile above the entrance.

There is 9 feet (2.7 m) of water at each of the wharves mentioned above. At Bond Wharf (Nokomis) there is 7 feet (2.1 m) and at Coan Hall Wharf, ¾ mile above Walnut Point, there is 6 feet (1.8 m). There is a post office at **Nokomis** and gasoline and supplies can be obtained.

Directions, Coan River.—A channel 500 yards wide is kept clear of fish stakes in the approach to Coan River; passing ⅝ mile southeastward of Coan River lighted bell buoy, the center line of this channel trends 229° true (SW. by W. mag.) to a position 250 yards northwestward of Coan River [redacted]. Pass 100 yards westward of Coan River [redacted], steer 169° true (S. ⅜ E. mag.) and pass eastward and southward of Travis Point Light (fixed red), rounding it at a distance of 200 to 300 feet. Then steer 271° true (W. ¾ N. mag.) toward Cowarts Wharf. Lewisetta Wharf may be steered for when it bears north. Bush stakes mark the channel but are hard to follow as they do not indicate on which side they should be passed.

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, 17 miles above Smith Point Lighthouse and 9 miles 269° true (W. ½ N. mag.) from Point Lookout Lighthouse. It has a depth of 13 feet (4.0 m) in the entrance and 9½ feet (2.9 m) to **Lodge Landing** on **South Yeocomico River** and to **Kinsale** on **West Yeocomico River**. Small freight vessels to Baltimore drawing 7 feet (2.1 m) make regular trips to several landings on the river. Lynch Point Light (flashing red), on the north side, is the principal guide to the entrance. Barn Point Light (fixed white) and a red buoy mark the entrance to West and South Yeocomico Rivers. The mean range of tides is 1.4 feet.

The landings in Yeocomico River are **Kinsale, Mundy Point, Harryhogan Point,** and **Lodge**, the latter partly in ruins. There is a post office at each. Kinsale is the principal village, and ice, Diesel oil, gasoline, and provisions are obtainable there and at Mundy Point. Some supplies can also be obtained at the other landings. Water can be obtained at Kinsale. There are two marine railways on Harryhogan Point, south of **Mill Creek**, the larger capable of hauling a boat 100 feet long and 7-foot (2.1 m) draft. All small boat repairs can be made. There are also machine shops for repairs near Kinsale and Lodge landings. The above wharves have 12 to 14 feet (3.7 to 4.3 m) alongside.

White Point Creek, the northwestern branch of Yeocomico River, has a depth of 9 feet (2.7 m) for 1 mile above the entrance. **White Point** is a landing on its southwest side. Opposite it on the point north is **Corn Patch Wharf**, used for loading lumber. A sawmill and wharf with 6 feet (1.8 m) is located at **Gum Point** on the north point of **Shannon Branch**.

To enter White Point Creek, bring Barn Point Light (fixed white) astern on a 315° true (NW. ⅝ N. mag.) and head for White Point.

When off White Point, follow a mid-channel course which is clear except for a shoal which extends northeastward to mid river from the point on the north side of Mill Branch. Lumber, tomatoes in season, and general merchandise are the principal freight.

Directions, Yeocomico River (passing through the channel clear of fish traps).—From a point nearly 2 miles 68° true (ENE. 5/8 E. mag.) from Lynch Point Light (flashing red), steer 243° true (WSW. 1/4 W. mag.) to a position 325 yards southward of Lynch Point Light, and then 261° true (W. 1/8 S. mag.) to a position 325 yards northward of Barn Point Light (fixed white). Pass 200 yards northward and westward of Barn Point Light, steer southward for the red buoy westward of Barn Point, and pass eastward of it.

West Yeocomico River.—Pass close southward of the red buoy off Barn Point and steer about 272° true (W. 3/4 N. mag.) passing midway between the points. A depth of 9 feet (2.7 m) can be taken to Kinsale, or anchorage may be had in a depth of 10 feet (3 m) in the mouth of **Hampton Hall Branch,** just below the wharf. There is a drawbridge just above Kinsale with a span of 29 feet between fenders and 9 feet (2.7 m) high water clearance when closed. The western channel through the bridge should be used. A fixed bridge near the head of Hampton Hall Branch has a span of 22 feet and high water clearance of 3 1/2 feet (1.1 m).

South Yeocomico River.—With the red buoy off Barn Point astern steer 183° true (S. 7/8 W. mag.) toward Harryhogan Point, and when up to the wharves on the north side of Mill Creek, follow a mid-channel course to Lodge Landing, giving the points a good berth. There is a depth of 3 feet (0.9 m) for 3/4 mile above the landing.

Point Lookout Lighthouse (group flashing white), on the north side of Potomac River entrance, is a white dwelling with a lantern. The fog signal is a horn blast every 20 seconds. The light is 41 feet (12.5 m) above water and visible 12 miles. A black water tank and a hotel on Lookout Point are prominent.

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 the lead a good guide except off **Cornfield Point,** and at the south end of the shoal (marked by a bell buoy with white prismatic reflector) extending 3/4 mile southward from Point Lookout, where it is abrupt and the bottom hard sand. There are several spots with 18 feet (5.5 m) over them about a mile west of Point Lookout. A 10-foot (3.0 m) spot lies between them and the shore. It is marked on its south side by a red spar buoy. There is a wharf just west of the lighthouse extending 330 feet out from the shore and with a depth of 12 feet (3.7 m) at its end. Point Lookout and Cornfield Point have post offices.

Point Lookout Creek has a depth of about 2 feet (0.6 m) in its entrance. The entrance bridge has been completely removed.

The small creeks between Cornfield Point and Smith Creek are shoal and little used; most of them can not be entered at low water.

Smith Creek, on the north side of Potomac River, 5 1/2 miles northwestward of Point Lookout, has a depth of 11 1/2 feet (3.5 m) in 1935

across the bar at the entrance [project calls for 12 feet (3.7 m)] and 17 feet (5.2 m) inside to the junction of the northern and eastern branches. Both branches have a depth of 12 feet (3.7 m) for ¾ mile and 8 feet (2.4 m) to near their heads. Freighters from Baltimore drawing 7 feet (2.1 m) make regular trips to **Potomac View Wharf** (Wynne post office) on the eastern shore near the entrance, and many small boats make use of the creek as a harbor. There is 12 feet (3.7 m) at the wharf. Engine repairs, gasoline, provisions, ice and water can be obtained at this wharf which is on the eastern side at the entrance. There is a marine railway at **Fox Harbor,** 1½ miles northeastward of the entrance capable of hauling a boat 45 feet long and 5-foot (1.5 m) draft, and making hull repairs. Millers Wharf is in ruins.

Directions, Smith Creek.—The channel is narrow and difficult at the entrance, but well marked. To keep clear of fish traps enter on a 356° true (N. ¼ E. mag.) course, with the middle of the creek ahead, to 300 yards true west of spar buoy 2 GP (white reflector). Then steer 20° true (NNE. ⅜ E. mag.) to 80 yards east of a black buoy; pass the same distance east of Kitts Point Light (flashing white), and round it, passing midway between it and buoy 2. Steer 296° true (NW. by W. ⅛ W. mag.) to 100 yards west of Smith Creek Light (flashing red), then 354° true (N. ⅛ E. mag.) to a position 150 yards west of Potomac View Wharf, and then head for it. The chart is the 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 (7.3 m) or more to Priests Point, 21 feet (6.4 m) to St. Marys, and 8 feet (2.4 m) to Lynch Island, distant 3½, 6, and 8½ miles, respectively, above the entrance. It is 2 miles wide at the entrance and has a channel width of ½ to ¾ 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. The mean range of tides is 1 foot.

A shoal extends 1¼ miles southeastward from St. George Island and is marked by a lighted bell buoy, which is the principal guide to the entrance. There is a buoy with horizontal bands ½ mile south-southeastward of Cherryfield Point, marking the point of a shoal, with depths of 12 to 17 feet (3.7 to 5.2 m) ½ mile southeastward of it. **Priests Point** is marked by a large white building and water tank. **Windmill Point** is a low yellow bluff, with a cluster of trees at the end. On **St. Marys Point** is a low church spire visible above the trees, and a monument on the end of the point. delete

The landings are [redacted] (St. Marys City post office) and **Portobello** (in ruins, on St. Marys River, and **Grayson Landing** (in ruins), on the south side of **St. Inigoes Creek,** 1 mile above its mouth. There is daily auto service between St. Marys and Washington. Gasoline, some provisions, and water can be obtained at St. Marys.

Directions, St. Marys River (clear of fish traps).—Approach the entrance on course 346° true (N. ⅝ W. mag.) passing ⅝ mile east of the entrance lighted bell buoy to ¾ mile northeast by east of Cherryfield Point Shoal buoy, then steer 355° true (N. ⅛ E. mag.), with Windmill Point ahead, to 400 yards west of Priests Point Light (fixed white). From this point a mid-channel course leads up the

river in good depth of water, except off Horseshoe Point, which should be given a berth of ¼ mile.

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 River. 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 ~~River~~ Creek has a narrow, crooked channel with a depth of 10 feet (3 m) 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 (0.9 to 1.5 m) is the usual draft of boats frequenting it, though vessels of 8 to 10 feet (2.4 to 3 m) draft sometimes load with wood products. The red and black horizontally banded buoy southeastward of Cherryfield Point is ~~the only mark, and~~ local knowledge is required to carry the best water above the entrance. A channel 600 yards wide is kept clear of fish traps in the entrance, the north edge of the channel trending 310° true (NW. ⅛ N. mag.) ~~to the buoy.~~

St. George River can be entered with a depth of 3 feet (0.9 m) at low water through **the Straits**, at the northwest end of St. George Island. Headroom is limited to 5 feet (1.5 m) and span to 9 feet by a bridge crossing the Straits. There is a post office (Piney Point) on the southwest side of St. George River just above the Straits. **Swann Wharf** with 6 feet (1.8 m) alongside is located here. Gasoline and supplies can be obtained.

Piney Point is marked by **Piney Point Lighthouse** (fixed ~~yellow~~), a white tower. There is a wharf with a depth of 10 feet (3 m) ¼ mile northeastward of the end of the point, and gasoline and provisions may be obtained. There is a summer hotel here. 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.

Ragged Point, on the southwest side of 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 Lighthouse** (flashing white), white house on piles. Deep-draft vessels should give the lighthouse a berth of ¼ mile or more.

Lower Machodoc River, 2½ miles westward of Ragged Point Lighthouse, has a depth of 12 feet (3.7 m) for 1½ miles, 9½ feet (2.9 m) in a dredged channel through the narrows 2 miles above the entrnace, and 6 feet (1.8 m) above to near the head of navigation. Supplies and gasoline can be obtained at Coles Point, Tidwell and Meter Wharves, and water from an artesian well. A post office is near these wharves. 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. **Coles Point wharf** has 3½ feet (1.1 m) and is located in the bight southeast of the entrance. **Tidwell wharf** is on the west side of the narrows, and **Meter wharf**, with 5 feet (1.5 m), is in bight east of the narrows. **Parham Point wharf** has a depth of 6 feet (1.8 m). Edgewater wharf is in ruins. Cables cross the river from Barnes Point to a point south of Cabin Point, and the Potomac River from Ragged Point Lighthouse to Piney Point Lighthouse. Vessels are cautioned not to anchor in cable areas.

Directions, Lower Machodoc River.—Approach the river on course 173° true (S. mag) with Barnes Point Shoal Light (flashing white) ahead, then round it to the westward at a distance of 150 yards, pass midway between the spar buoys southeastward of it, and follow a mid-channel course to Plumb Point light (fixed red). 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 3½ miles 165° true (S. ¾ E. mag.) from Blakistone Island, has depths of 15 to 19 feet (4.6 to 5.8 m) 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. In August, 1933, there was a depth of 9.8 feet (3.0 m) and width of 100 feet in the entrance channel.

The creek has a natural depth of not less than 8 feet (2.4 m) to Deep Point and not less than 7 feet (2.1 m) to Nomini, 6 feet (1.8 m) to a bridge at Prospect Hill 1¾ miles above Nomini, and 3 feet (0.9 m) for a further distance of ½ mile.

The landings are **Beales, McGuires,** and **Mount Holly,** on the southeast side, and **Jenkins, Deep Point** and **Nomini** on the west side. Mount Holly is a post office. Gasoline, provisions, and water obtainable in several places. A center pier drawbridge with west span 39 feet wide between fenders and with a headroom of 5 feet (1.5 m) at high water when closed, crosses the creek at Nomini. The east span should not be used. The new fixed bridge at Prospect Hill has a span of 37½ feet and a high water clearance of 5 feet (1.5 m). The old bridge just beyond the new one is to be entirely removed. In **Matthews Cove,** opposite **White Oak Point,** there is a marine railway capable of hauling out a boat 50 feet long and 4-foot (1.2 m) draft. General repairs, gasoline, and supplies are available. North of Ice House Point light (fixed white) 2 feet (0.6 m) can be carried into Buckners Creek at the entrance and 5 or 6 feet (1.5 or 1.8 m) inside to about the head. There are bush stakes usually in both creeks. The mean range of tides is 1.8 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 ½ mile and head for the outer end of the jetty. Pass 100 yards westward of it, and steer 152° true (S. by E. ⅞ E. mag.) in the dredged channel, following the buoys, and passing 100 feet westward of White Point Light (fixed white) and 250 feet westward of Ice House Point Light (~~fixed white~~). Bring the latter light astern on a 171° true (S. ⅛ E. mag.) course, follow the dredged channel, and pass eastward of the red 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 (2.4 m) at its eastern entrance and 7 to 10 feet (2.1 to 3 m) anywhere in mid-channel to near the head. It is separated

from the river by 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. Currioman wharf and the wharf north of **Poor Jack Creek** entrance are in ruins. There is a wreck awash at low tide in 5 feet (1.5 m) of water about 150 yards northeast of **Poor Jack Creek** entrance and 100 yards offshore. About 2 feet (0.6 m) can be carried into Poor Jack and **Currioman Creeks** and **Coal Harbor**.

To enter, pass 200 yards westward of the north end of the jetty at the head of Nomini Bay, steer 205° true (SSW. 7/8 W. mag.) for 400 yards and then 270° true (W. 5/8 N. mag.) 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 Bretons Bay are shoal and unimportant, 1 or 2 feet (0.3 or 0.6 m) can be taken into most of them at low water, but they are little used. Two wooden jetties have been built 100 feet off the northern entrance of **Herring Creek**, and a channel dredged to 5 feet (1.5 m), but in 1935 the entrance had shoaled to 2 feet (0.6 m). Inside, the depths are from 4 to 6 feet (1.2 to 1.8 m) and the channel is bush staked, however, 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 Blakistone Island, and is a favorite anchoring ground for yachts. There is a depth of 13 feet (4.0 m) or more for 3½ miles above the entrance to Lovers Point Light. 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. The latter is reached through a dredged channel 150 feet wide and 10½ feet (3.2 m) deep, in March 1935, and there is a turning basin 10 feet (3.0 m) deep and 300 feet wide off the wharf. There are post offices, and gasoline, ice, and provisions can be obtained at Leonardtown and **Abell** and gasoline at Ewells Wharf; the latter is inside the entrance of Cooms Creek, on the north side of Breton Bay, 2 miles above the entrance. A channel with a depth of about 6 feet (1.8 m) leads into the creek to the landing at **Ewells** (Compton P. O.). The entrance is narrow between shoal spits marked by stakes. There are two marine railways near the entrance to the creek, each capable of hauling out a boat 60 feet long and 7-foot (2.1 m) draft. There is about 12 feet (3.7 m) depth at Abell wharf and 10 feet (3.0 m) at the Leonardtown wharves. Leonardtown has daily auto bus communication with Washington. The mean range of tides in Breton Bay is 1.8 feet.

A shoal with little depth extends ¾ mile southwestward from Higgins Point, on the east side at the entrance, and is marked by a lighted beacon (flashing white).

Directions, Breton Bay.—Keep clear of the shoal off Heron Island, passing eastward of the horizontally banded buoy, then, with this buoy astern, steer 14° true (N. by E. 7/8 E. mag.) until buoy 4 is on range with Lovers Point, then change course to 62° true (ENE. 1/8 E. mag.) 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 (flashing red) bears 27° true, steer 18° true (NNE. ¼ E. mag.) to abeam of the light, round it at a distance of 125 yards to course 125° true (SE. ¼ E. mag.) and when Lovers Point is abeam steer for Abell wharf; or continue up the bay on a mid-channel course entering the dredged channel on a 37° true (NE. ⅛ N. mag.) course, heading 75 yards to the eastward of Buzzard Point Light (flashing white). Round the light at a distance of 100 yards and steer 305° true (NW. ¼ W. mag.) for the wharves at Leonardtown.

St. Clement Bay is on the north side of Potomac River, north-northeastward of Blakiston Island. There are three entrances. The eastern or main entrance, between Heron Island Shoal and Newtown Neck, is ½ mile wide with a depth of 18 feet (5.5 m), and is easily followed by day; the middle entrance, between Heron Island Shoal and Blakiston Island, is narrow and crooked, is marked by beacons and buoys, and is easily followed in the daytime; the western entrance, called Dukeharts Channel, require some local knowledge. Coburns and Stone wharves are in ruins.

St. Patrick Creek is bush staked at the entrance. Palmers is a post-office on the south side. All kinds of supplies and gasoline are available. About ½ mile above there is a marine railway capable of hauling out a boat 40 feet long and 3-foot (0.9 m) draft; repairs are made.

Canoe Neck Creek has a depth of 6 feet (1.8 m) for about 1 mile. **Morris Point Landing** (11 feet (3.4 m) at wharf is just inside the creek. Gasoline, provisions, and water can be obtained. The mean range of tides in St. Clement Bay is 1.8 feet.

Directions, St. Clements Bay—From southeastward.—Pass ¼ mile northeastward of the horizontally banded buoy off the east end of Heron Island Shoal, and steel 310° true (NW. ⅛ N. mag.) to a position 200 yards west of buoy 2 off Newtown Neck.

From southward.—Pass 100 yards northeastward of buoy 1, east of Blakiston Island, and 100 yards northeastward of Blakiston Island Shoal Light (flashing white) on a 316° true (NW. ¾ N. mag.) course with buoy 3 ahead. When 250 yards from buoy 3, steer 0° true (N. ⅝ E. mag.) to midway between that buoy and Heron Island Bar buoy, then 24° true (NNE. ¾ E. mag.) to 200 yards west of buoy 2, off Newtown Neck.

From westward—Through Dukeharts Channel.—Pass close to buoy 6 on course 39° true (NE. ⅛ E. mag.), and round buoy 5 to the northward. Bring Cobb Point Bar Light (fixed white, 3 red sectors (astern on course 114° true (SE. by E. ¼ E. mag.), pass 60 yards south of buoy 4, steer 78° true (E. ½ N. mag.) heading toward Higgins Point Light (flashing white) until clear of the north point of Blakiston Island, then 89° true (E. ½ S. mag.) passing close northward of buoy 3 to position midway between that buoy and Heron Island Bar beacon, thence on course 24° true (NNE. ¾ E. mag.) to 200 yards west of buoy 2.

Above this point a mid-channel course leads in deep water except at Cedar Point Bar Light (fixed white), which must be passed 100 yards or more to the eastward. Approach Stones Wharf (ruins) on a 7° true (N. by E. ¼ E. mag.) course to avoid shoals on either side.

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 horizontally banded buoy and at the western end by a red spar buoy.

Blakiston Island is sparsely wooded and is marked at the south end by the discontinued lighthouse (no light), white dwelling. Shoals extend from it in all directions, the southern limit of the shoal area being marked by a red buoy.

Wicomico River, on the north side of Potomac River, 28 miles above Point Lookout, has a depth of 24 feet (7.3 m) or more for 3½ miles above Cobb Point Bar Light, at the entrance, and 12 feet (3.7 m) for a further distance of 1½ miles. Above this point there are many detached shoals which render navigation difficult for boats of a greater draft than 5 feet (1.5 m), though with local knowledge a draft of 8 feet (2.4 m) can be taken 8 miles above the entrance, and 3 feet (0.9 m) 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 **Cobb Point Bar** Light (fixed white, 3 red sectors), white house on piles, and by several buoys. The river channel above buoy 1 has been marked by eight buoys to Stoddards Point. The mean range of tides is 1.9 feet.

The main Bushwood (**Blakiston** P. O.) wharf is in ruins but a smaller one accommodates small boats. Rock Point (P. O.) wharf has a depth of 9 feet (2.7 m). Gasoline and provisions can be obtained at both wharves, and water is piped on the latter. The chief business in the river is oyster tonging. About ½ mile south-southwest of Mill Point there is a dangerous tree stump bare at half tide. It is marked by a stake and white rag.

St. Catherine Sound, on the east side of Wicomico River, at the entrance, has depths of 5 to 9 feet (1.5 to 2.7 m) through the middle, but there are extensive shoals close to the channel. The channel is bush staked but local knowledge is needed. A depth of 2½ feet (0.8 m) can be carried through it into Wicomico River. **River Springs** post office is on the north side at the entrance to **White Neck Creek.**

Neal Sound, on the west side of Wicomico River, southward of Rock Point, has a depth of 6 feet (1.8 m) in the entrance and 7 to 11 feet (2.1 to 3.4 m) inside, and forms a secure anchorage for motor boats. The entrance is endangered by rocks close to the channel and a stranger should proceed with caution. Bush stakes are maintained by local boatmen. The outlet into Potomac River, near the head, has a depth of about 1 foot (0.3 m) at low water. About ½ mile above the eastern entrance there is a highway bascule bridge with span 22 feet wide, between fenders, and high water clearance when closed of 8½ feet (2.6 m). The draw is *closed* from sunset to sunrise. About ¼ mile above here there is a submarine telephone cable crossing.

Charleston Creek is used as an anchorage for oyster boats. There are no supplies here.

Chaptico Bay, on the east side of Wicomico River, 6½ miles above the entrance, has a depth of 2 to 5 feet (0.6 to 1.5 m). It has no wharves and little business by water.

Directions, Wicomico River.—Enter on course 339° true (N. by W. ¼ W. mag.) passing ¼ mile eastward of the horizontally banded buoy at the entrance, and Cobb Point Bar Light (fixed white, 3 red sec-

tors) (Rock Point church spire ahead) to 150 yards west of buoy 2, off St. Margarets Island. Then head for Rock Point Wharf on course 342° true (N. by W. mag.), keeping clear of the shoal off the east point of Cobb Island, or to Bushwood Wharf on a 29° true course (NE. ¾ N. mag.), or up the river on course 10° true (N. by E. ½ E. mag.) with the island off White Point ahead, to a position 100 yards east of buoy 1. Above this point follow a 339° true (N. by W. ¼ W. mag.) course and be guided by the chart.

Pope Creek, on the southwest side of Potomac River, 4 miles below Colonial Beach, leads to Wakefield, Washington's birthplace. The controlling depth, in 1934, was 1½ feet (0.8 m) 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 (1.5 m) in a narrow, crooked channel to **Wirts** and **Masseys Wharves** both now in ruins, 2 miles above the entrance, and 4 feet (1.2 m) for a farther distance of 2 miles to a concrete highway bridge (fixed). 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 (1.8 m). Old bridge piling with span about 8 feet are just above the new bridge, above which there is no traffic although it is reported 4 feet (1.2 m) 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. It is connected with Washington by excursion steamer in summer, and by vehicular ferry with Morgantown, on the north side of the river. There is a wharf with 10 feet (3.0 m) alongside, but there is no place for boats to get water or gasoline ~~except in~~ Monroe Creek. Boats must go inside

Monroe Creek, having its entrance at the south end of Colonial Beach, is extensively used as an anchorage for boats. The channel at the entrance and inside has been dredged, and in March 1935, there was a controlling depth of 7½ feet (2.3 m) to abreast of **Trotts Point**, and 6½ feet (2.0 m) to the turning basin at **Robins Grove Point**. The basin had a depth of 7 feet (2.1 m) and beyond there was 3 feet (0.9 m) to the head of the creek. The channel is marked by buoys.

Ice, gasoline and provisions are obtainable, and water is piped to several wharves. There is a marine railway just above Robins Grove Point capable of hauling out a boat 40 feet long and 3-feet (0.9 m) draft.

To enter, give the east and south shore of Colonial Beach a berth of over ¼ mile, round Monroe Creek entrance buoy 2 (white reflector), 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 is a post office and landing on the south side of Potomac River southeastward of the mouth of Rosier Creek. Oil tankers use two of the wharves and pipe gasoline and oil to some large tanks inshore. A channel has been dredged 10 feet (3.0 m)

deep, 75 feet wide and 1,100 feet long to these wharves with a turning basin abreast them. Some provisions can be obtained.

A vehicular ferry from Potomac Beach connects with Popes Creek on the *north* side of the river.

Rosier Creek, 3 miles above Colonial Beach, has a depth of 4 feet (1.2 m) in the entrance and 3 feet (0.9 m) 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 Lighthouse. It has been improved by dredging a channel 15 feet (4.6 m) deep from deep water to **Dahlgren** in July 1933. Former dredging provided a channel 6½ feet (2.0 m) deep and 100 feet wide to **Little Ferry Landing,** 4 miles above the entrance, and 6 feet (1.8 m) deep and 50 feet wide to **Milford Landing,** 6¾ miles above the entrance, with a turning basin at each place. The entrance is also extensively used as an anchorage by small boats during the oystering and fishing season. There are stores at Williams and Hoge Wharves, 1½ miles above the entrance, where gasoline, water, and some provisions are obtainable. The buildings and checkered water tank at Dahlgren are prominent. The mean range of tides is 1.8 feet.

North of the dredged channel at the entrance to Upper Machodoc Creek, is a seaplane target range surrounded by a circular group of piles about 200 yards in diameter. Just eastward a channel 100 feet wide and 6 feet (1.8 m) deep has been dredged to the seaplane landing.

Directions.—Enter on course 282° true (WNW. ¼ W. mag.) just north of lighted buoy 13 (flashing white) on range ahead (channel buoyed on the north side). Follow the buoys to the wharf at Dahlgren.

If bound up the creek, pass close southward of the range beacons and through the 6½-foot (2.0 m) dredged channel on a 289° true (NW. by W. ¾ W. mag.) course, with Beabors Point Light (flashing white) astern, then 280° true (WNW. ½ W. mag.) for Berrys Wharf (in ruins). Local knowledge is needed to proceed beyond this point.

Caution.—The lower Potomac, from Dahlgren to the mouth, is used extensively by the Navy as a firing range and torpedo speed trial course. Buoys and barges will be found anchored in various localities, of which notice will be given in the Notices to Mariners. (948) 41

The firing range of the United States Naval Proving Ground, Lower Station, Dahlgren, Va., involves the entire portion of the Potomac River below a line joining Persimmon Point, Va., with the entrance to Popes Creek, Md., and constitutes a danger zone. Firing over this range will normally take place between the hours of 9 a. m. and 4 p. m. on all days except Saturday and Sunday.

Any vessel propelled by mechanical power at a speed greater than 5 miles per hour may proceed directly through the danger zone without restriction, except when especially notified to the contrary.

When firing is in progress, all vessels in or near the danger zone will be duly met by representatives of the inspector of ordnance in charge, suitably warned, and given the necessary instructions and orders to insure their safety. During the period from February 15

to May 15 the area between Smith Point and Ragged Point, the authorized fish-stake line, and the Virginia shore will not be fired into.

These regulations shall be enforced by the inspector of ordnance in charge, United States Naval Proving Ground, through such officers, enlisted men, and employees at the United States Naval Proving Ground as may be designated, including always the commanding officer of the range patrol, using all 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.

Between Cobb Point and Swan Point about ¼ mile offshore there are three 18-foot dolphins, another is close to shore east of Bluff Point. These are used for fire control.

Cuckold Creek, 3 miles southeastward of Lower Cedar Point, is said to have a depth of 2½ feet (0.7 m) at the entrance and deeper water inside. It is unmarked except for bush stakes and little used.

Piccowaxen Creek, 1¾ miles southeastward of Lower Cedar Point, can be entered only by small boats at high water.

There are two ferry wharves at Morgantown, eastward of **Lower Cedar Point** with year-round service to Potomac Beach on the south side of the river. A navy ferry (passenger) runs between here and Dahlgren. Gasoline, water, and some provisions can be obtained, and there is autobus communication with Washington and Baltimore. A channel 10 feet (3.0 m) deep and 150 feet wide, with a turning basin 300 feet wide and 400 feet long, has been dredged to the wharf (in ruins), from the westward and is marked by buoys on both sides and a lighted range. The lights (front light on this wharf and the rear light on a white skeleton tower on shore) lead through the channel on a 61° true (ENE. mag.) course to this wharf. There is a strong cross current on both the ebb and flood tide. A depth of 6 feet (1.8 m) can be taken to the 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 a flashing white light.

Popes Creek, 3¼ miles above Lower Cedar Point, is a post village, the terminus of a railroad from Baltimore and Washington, and is connected with Potomac Beach by ferry. The creek is not navigable, but a depth of 10 feet (3.0 m) can be taken to the wharf at the railroad. There is a ferry wharf southeast of the railroad wharf. Gasoline and provisions are obtainable and there are telephone and telegraph connections. A buoy marks a 3-foot (0.9 m) 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 (2.7 m) to the entrance, 7 feet (2.1 m) for 1¾ miles above, and 3 feet (0.9 m) 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 new wharf on the south side. During summer months an excursion steamer runs to Washington.

The generally used route in entering, which leads in a depth of 8 feet (2.4 m), is to pass ¼ mile eastward of Port Tobacco River Flats Light (flashing white) and steer 27° true (NE. by N. mag.) for

1½ miles to a position ⅜ mile from the eastern shore at the entrance. Steer about 341° true (N. by W. mag.) 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 (3.2 m) deep, 100 feet wide and 9,800 feet long. It is bush staked but local knowledge is required. The mean range of tides is 1.5 feet.

Mathias Point landing, in ruins, is on the northwest side of Mathias Point ½ mile southwestward of Mathias Point Lighthouse (fixed white, red sector).

Upper Cedar Point Lighthouse (fixed white, red sector), 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 (0.9 m) shoal extending out from the lighthouse.

Nanjemoy Creek, 1½ miles westward of Upper Cedar Point Lighthouse, has a depth of 7 feet (2.1 m) in the entrance and is navigable by small vessels for about 7 miles. It has considerable trade in wood products. The best water favors the east side at the entrance, as shown on the chart. Friendship Landing wharves are in ruins. Riverside Landing (flashing white light on end of wharf, in ruins) and post office is 3 miles west-southwestward of Upper Cedar Point Lighthouse. Gasoline and supplies may be obtained. On the south side, ½ mile southwestward of Metomkin Point, is Stuarts Wharf (in ruins).

Somerset Beach is a landing (in ruins) on the south side, 1 mile southeastward of Maryland Point Lighthouse (flashing white, two red sectors). There is a store and post office about 1 mile distant at **Ambar.**

Potomac Creek, 4 miles westward of Maryland Point Lighthouse, has a depth of 7 feet (2.1 m) at the entrance and 3 feet (0.9 m) 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 Lighthouse, has been improved by dredging a channel 6 feet (1.8 m) deep and 100 feet wide to a railroad bridge 3½ miles above the entrance, 6 feet (1.8 m) deep and 60 feet wide to Coals Landing, 5¾ 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 September 1934 the controlling depth was 3 feet (0.9 m), with a width of 60 feet and 100 feet, upstream and downstream of the railroad bridge, respectively.

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 beacons off Brents Point mark the channel. The buoy is on the end of the shoal extending ⅞ mile southward from **Brents Point,** on the north side, at the entrance. Above **Thorney Wharf** (in ruins) there are no marks, and strangers may have difficulty in keeping in the dredged channel. A straight course from Thorney Wharf to the draw span of the railroad bridge leads through the dredged channel. The channel between the two entrance beacons has

shoaled to about 6 feet (1.8 m). There is some fishing but no other business in the creek.

The railroad bridge crossing Aquia Creek has a draw opening 30.7 feet wide, and a headroom of 15 feet (4.6 m) at high water. The draw will be opened at all times between 7 a. m. and 5 p. m. on signal of three blasts, unless a train is due within 15 minutes. The mean range of tides at the entrance is 1.2 feet.

Clifton Beach (**Dent Landing**, in ruins) is on **Smiths Point**, 5½ miles above Maryland Point Lighthouse, Smiths Point is marked by a flashing white light. A fog signal is maintained from September 15 to June 15 annually.

A former restricted anchorage ground, located between Brents Point and Widewater, west of the 12-foot (3.7 m) curve, should be avoided because of possible submerged ship remains.

The main channel, marked by lights and buoys, west of Maryland Point to **Douglas Point** had a dredged depth of 26 feet (7.9 m) and 200 feet wide, in January 1936.

Liverpool Point, on the east side of the river, 4 miles above Smiths Point, is a summer excursion steamer landing. There is about 14 feet (4.3 m) at the 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 red spar buoy in 24 feet (7.3 m) marks the channel off the danger area. The southern part of the bay is clear for a depth of 5 feet (1.5 m) to the submerged wreck near the head.

A wharf for an aviation field, on the west side, is located ¾ mile south of **Chopawamsic Island**. About ½ mile north of the wharf is a diversion canal 10 feet (3.0 m) deep, connecting **Chopawamsic Creek** with the river. The former outlet has been filled. There are two fixed bridges with least span width of 10 feet and 10 feet (3. 0 m) high water clearance.

A channel dredged to 6 feet (1.8 m) deep in 1933, extends around Chopawamsic Island from the Potomac River. It has shoaled to 4½ feet (1.4 m). The channel is marked by bush stakes.

Quantico, on the south side of the creek at the entrance, is a town and the site of the United States Marine Barracks. A pier with depths of 24 to 26 feet (7.3 to 7.9 m) and launch harbor, with 8½ feet (2.6 m) at low water, just south of the mouth of the creek fronts the location of the marine barracks. The lights are prominent at night.

A fog signal (bell sounding 2 strokes every 20 seconds) is established on the end of the pier at Quantico.

The following regulations are prescribed to govern the use and navigation of the waters of the Potomac River, within the **firing range** of U. S. Marine Barracks, Quantico, Va.:

1. 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, Virginia, and a line running from Marlborough Point, Virginia, to Maryland Point, Maryland.

2. 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.

3. 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.

4. Any vessel propelled by mechanical power at a speed greater than five miles per hour may proceed directly through the danger zone without restriction, except when especially notified to the contrary.

5. 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.

6. During the period October 15 to May 15 the range area will not be fired into.

7. 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.

Quantico Creek has a depth of 7 feet (2.1 m) in a narrow crooked channel in the entrance, and about 2 feet (0.6 m) for about 2 miles above. It is crossed by a railroad bridge at the entrance having a draw opening 29 feet wide and a high water clearance of 8 feet (2.4 m) when closed. The draw is locked, and has not been opened for several years.

Chicamuxen Creek, on the east side, opposite Quantico Creek, has a depth of 5 feet (1.5 m) in the entrance and to **Poseys Wharf** (in ruins), but shoals up rapidly above. It is little used except by boats carrying wood products.

Mattawoman Creek, on the east side of Potomac River, 3 miles below Indianhead, has a depth of 7 feet (2.1 m) across the flats at the entrance, deeper water for 4 miles above, and 6 feet (1.8 m) for a farther distance of 2 miles. The creek is clear in midchannel for a distance of ¾ 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 bush 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 high water clearance when closed of 4 feet (1.2 m). The mean range of tides is 1.6 feet at the entrance.

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 (1.2 to 1.5 m) to within ⅓ mile of a railroad bridge at the entrance and 1 to 2 feet (0.3 to 0.6 m) for a short distance above. The fixed railroad bridge has an opening 40 feet wide, with a headroom of 26 feet (7.9 m) at high water. 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.

Occoquan Bay and Creek, on the west side of 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 has considerable trade, carried mostly in scows and schooners.

The creek has been improved by dredging and in 1935 the controlling depth was 6.6 feet (2.0 m), with a width of 150 feet downstream of **Taylors Point** and a width of 100 feet upstream to Occoquan.

There are depths of 10 to 14 feet (3.0 to 4.3 m) anywhere in mid-channel off the wharves at Occoquan. Three stone dikes are being built in the river below this town. The channel is marked by lights and buoys to the bridge. To enter steer 341° true (N. by W. ⅛ W. mag.) 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. The bay is used as an ice harbor for local boats when the channel of the river above is closed.

In the center of the bay west of the dredged channel entrance buoys there is a made rocky islet above high water. **Belmont Bay** is reported rocky thruout but the dangers are covered at low water except during northwest wind.

Occoquan Creek is crossed by two fixed bridges 2¼ miles above the entrance, having a least span of 115 feet and least high water clearance of 66 feet (20.1 m); and by a fixed highway bridge just above the wharves at Occoquan with a span about 205 feet wide and high water clearance of 16 feet (4.9 m). The mean range of the tide at the entrance is 1.6 feet.

Neabsco Creek, a tributary of Occoquan Bay at its south end, has depths of 2 to 4 feet (0.6 to 1.2 m). It is crossed, at its mouth by a fixed-span railroad bridge, having a navigable span 30 feet wide and 36 feet (11.0 m) high water clearance.

The buoyed dredged channel in the Potomac River off Mattawoman Creek was 23 feet (7.0 m) deep, in March 1935.

Indian Head is a prominent, high, wooded bluff on the southeast side of the river 21 miles below Washington.

(1445) 41

An electrically operated bell on the oil wharf (lower wharves) serves as a fog signal. It strikes once every 10 seconds.

Glymont is a landing (in ruins) on the southeast side of the river, 1½ miles above Indian Head. There is a light (flashing red) on shore. A fog signal (bell) is maintained from September 15th to June 15th.

Craney Island, northward of Glymont, is an islet marked by a clump of trees. It is surrounded by an extensive shoal, and there is a narrow unmarked channel, but usually bush staked, with a depth of 7 feet (2.1 m) northward of it.

Pamunkey 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 (0.9 to 1.4 m) across the bar, the deeper water favoring the southwest side. Above the bar there is a depth of 6 feet (1.8 m), except near the shores, to the junction of **Accotink** and **Pohick Bays**, and 2 to 4 feet (0.6 to 1.2 m) in both bays for about ½ mile. Accotink Bay for 0.6 mile above the mouth is a **Danger Zone** of the **Fort Belvoir** firing range. It is patrolled by boat during rifle practice. A submarine cable crosses the mouth. **Gunston Cove** is dangerous due to submerged duck blind and fish net stakes; local knowledge is needed to avoid them. A ruined wharf is on the north side of the cove just inside the entrance.

Dogue Creek, on the west side of Potomac River, opposite **Marshall Hall**, has depths of 2½ to 5 feet (0.8 to 1.5 m), but is covered with

grass and 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. White Stone Point Light (occulting white) is at the southern entrance of the creek. The fog signal is an electric bell, two strokes every 10 seconds. **Marshall Hall**, on the east side, 14 miles below Washington, is an excursion resort. The wharf has a depth of 10 feet (3.0 m).

Mount Vernon, the home of Washington, is on the west side, 13 miles below Washington, with which it is connected by steamer and autobus. A channel 10 feet (3.0 m) deep has been dredged across the flats to the wharf, but considerable shoaling has occurred and the present depth is about 7 feet (2.1 m). The entrance is marked by buoys. The wharf is not open to the public. **Bryan Point** is marked by white and brown houses and brown water tank. The wharves are in ruins.

Little Hunting Creek, opposite Bryan Point, has a depth of about 4½ feet (1.4 m) in a narrow dredged channel leading to a brickyard 1¼ miles 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 center clearance of 19½ feet (5.9 m) above high water. An abandoned railroad bridge having an opening 27 feet wide and a headroom of 19 feet (5.8 m) crosses the creek just below the brickyard.

Piscataway Creek, on the east side, 11 miles below Washington, has depths of 2 to 4 feet (0.6 to 1.2 m), but is covered with grass in summer and little used. Considerable sand dredging is done in the creek, and there is a dredged channel 8 feet (2.4 m) deep to about ¾ mile above the entrance. This channel is usually bush staked. There are no wharves.

Sheridan Point is marked by a light (flashing white) ¼ mile off the point on the edge of the river channel. Passing vessels should give the light a good berth.

The point on the east side of the river just north of Piscataway Creek has a wharf (**Fort Washington**) with a fixed red light on the end. A fog bell sounds one stroke every 10 seconds. Opposite this point the dredged channel leading to a wharf on the west side of the river has filled up so that the depth is now but 2 or 3 feet (0.6 or 0.9 m). This channel is marked by a black buoy on the south side of the entrance. A cable crosses the river here and vessels should not anchor near it.

Swan Creek has a depth in the entrance of 2 feet (0.6 m). ~~**River View**~~ is an excursion resort just north of this creek. There is a light (flashing red) on the wharf. There is a small wreck 2 feet (0.6 m) below mean low water about 500 yards northwest of **Hatton Point**.

Broad Creek, on the east side, 8 miles below Washington, has depths of 2 to 4 feet (0.6 to 1.2 m). The creek is covered with grass in summer and is little used except by gravel dredges. These have dredged a channel 8 feet (2.4 m) deep from lighted buoy 62 east-northeastward into the bay. There are bush stakes but local knowledge is necessary.

About ½ mile northwest of **Indian Queen Bluff** a channel 9 feet (2.7 m) deep has been dredged (for gravel), from the river channel due west to a basin 15 feet (4.6 m) deep near the bank. This channel is bush staked.

Rosier Bluff is a prominent wooded bluff on the east side, 2 miles below Alexandria. A wharf at the southern end is marked by a flashing white light.

Hunting Creek, on the south side of Alexandria, has depths of 1½ to 4 feet (0.5 to 1.2 m), 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 11¼-foot (3.4 m) high water clearances; the upper bridge is fixed, but motor boats without houses can pass under it.

The channel between grass covered spoil banks leading to the gravel basin off **New Alexandria** has about 9 feet (2.7 m) depth.

Another channel, bush staked, and 8 feet (2.4 m) deep, leads due east from the main channel to the slough about ½ mile north of Rosier Bluff. This slough has been dredged for gravel to a depth of 15 feet (4.6 m). It forms a good anchorage.

Alexandria has considerable trade, mostly in river and bay vessels and a few coasting vessels, the deepest draft being 18 feet (5.5 m). The area in front of the wharves from 20 feet outside of the pierhead line has been dredged to a depth of 24 feet (7.3 m), and this depth existed in July 1935. *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 they form a menace to vessels approaching or leaving the waterfront. Coal, water, gasoline, ice, and general provisions are obtainable.

Oxon Creek, eastward of the northern end of Alexandria, has depths of 1 to 3 feet (0.3 to 0.9 m), but is little used except by sand dredgers. 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 a controlling depth of about 3 feet (0.9 m). There is a sunken wreck on the west edge of the islet. The channel leading to **Fox Ferry** has a depth of about 10 feet (3.0 m). The wharf is in ruins and only piling and rock remain; these are dangerous. The marsh strip at the upper arm of the slough south of Fox Ferry has been cut through and the slough has been dredged to about 40 feet (12.2 m) for gravel. Local knowledge should be obtained in navigating in this area.

Shepards Landing is in ruins. There is a 7½-foot (2.3 m) channel, bush staked, to Marbury Point on the north side of the head of the Landing.

A ¾-mile stretch along the east bank of the **Potomac River** southward of the junction of the river channels off **Haines Point,** is infested with dangerous stump piling, being the remains of several former wharves. These old piling extend about 150 feet from the bank to the channel.

In the narrow neck extending across **Fourmile Run** there are two culvert spans, both 24 feet wide and 9-foot (2.7 m) clearance at high water.

Extending from the channel off **Gravelly Point** and following close along the bank north of **Hunter Point** there is a dredged channel 50 feet wide with a depth of about 8 feet (2.4 m). It is partly bush staked but several wrecks at the northern end make it dangerous. Local knowledge should be obtained before entering. It is used by gravel boats. There is no entrance at the south end. East of this

channel and northeast of Hunter Point there is an area, outlined by spoil banks, about ¾ mile long and ¼ mile wide, which is tentatively planned for an airport.

Washington Harbor consists of three parts—Washington Channel, Virginia Channel, and Anacostia River.

Washington Channel leads between the sea wall of Potomac Park and the wharves of the city. It has been dredged to a depth of 20 feet (6.1 m) over nearly the entire area and 24 feet (7.3 m) along the eastern side to the head. In April 1936, there was a controlling depth of 18½ feet (5.6 m) in the channel. The principal wharves of Washington are on the east side of this channel. The existing project calls for a channel 24 feet (7.3 m) deep and 400 feet wide.

Virginia Channel, the main channel of the Potomac River, leads to the wharves at Georgetown (West Washington), 4 miles above the junction with the Washington Channel. The channel has been improved by dredging to a present controlling depth, of 17 feet (5.2 m) in April, 1936, and width of 400 feet. The depth in the channel is liable to some change due to freshets. The existing project calls for a channel 24 feet (7.3 m) deep and 400 feet wide from Giesboro Point to Key Bridge.

The channel is crossed by three bridges below Georgetown; the lower, a railroad bridge, has a center-pier draw, each opening 104½ feet wide, with a headroom of 18 feet (5.5 m) at high water when closed. The second, a highway [redacted] bridge, has a center-pier draw, each opening 97½ feet wide, with headroom of 18 feet (5.5 m) at high water when closed. The third is the Arlington Memorial Bridge, a concrete arch bridge with a bascule lift span 140 feet long, between fenders, and high water clearance of 32½ feet (9.9 m) over the center 80-foot width.

The Francis Scott Key Bridge crosses the river at **Georgetown**. It has a width between fenders of 207 feet and height of 61 feet (18.6 m) above high water in the navigable span for a center width of 80 feet.

The Aqueduct Bridge, east of the above bridge, now with deck dismantled, has a navigable span of 109 feet. Gravel barges go within ½ mile of Chain Bridge but local knowledge is necessary. There are rapids above Chain Bridge.

The channel is well marked with buoys to Georgetown.

The **General Bridge Regulations** (see p. 52), 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 (5.1 m), the draws shall be opened on signal at any time except between 8:20 and 9:00 a. m. and between 4:30 and 5:15 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 (5.1 m) 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. The clearance is indi-

cated 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 signalled 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 8:20 and 9:00 a. m. and between 4:30 and 5:15 p. m., during which times the bridge will not be opened except for the passage of Government vessels.

Anacostia River has been improved by dredging. In April 1936 the channel was 18½ feet (5.6 m) deep and 400 feet wide to the United States Navy Yard at Washington, 1½ miles above the mouth. It is marked by buoys and easily followed to this point. Above the Navy Yard the controlling depths are as follows: 14 feet (4.3 m) to the Pennsylvania Avenue Bridge (1934), 16 feet (4.9 m) to Pennsylvania Railroad Bridge (1929), 6 feet (1.8 m) to Benning Bridge (1932), 5 feet (1.5 m) to the Magruder Bridge (Pa. R. R.) (1933), and 2 feet (0.6 m) to Bladensburg, Md., 7¾ miles above the entrance. Small boats and lighters go to this town.

The existing project calls for a channel 24 feet (7.3 m) deep and 400 feet wide to the Anacostia bridge with turning basin off the Navy Yard, and the same depth and 200 feet wide above this bridge ½ mile to 15th street to a turning basin.

The Anacostia River is crossed by several bridges between the Navy Yard and Bladensburg; Anacostia Bridge, just above the Navy Yard, has a draw opening 100 feet wide and a headroom of 21½ feet (6.6 m) at high water; Pennsylvania Avenue Bridge, ¾ mile above, is fixed and has a span 75 feet wide and headroom of 28½ feet (8.7 m) at high water; Pennsylvania Railroad Bridge, ¼ mile above, has a vertical lift span 32 feet wide and a headroom of 6 feet (1.8 m) at high water when down, and a span 35 feet wide and a headroom of 28 feet (8.5 m) at high water when raised; Benning Bridge, 1 mile above, is fixed and has a span 40½ feet wide and a headroom of 16½ feet (5.0 m) at high water; Magruder Bridge, 1½ miles above, is fixed and has two spans each 68 feet wide with 12 feet (3.7 m) headroom. The draw in the Anacostia Bridge will be opened at any time during the hours 9 a. m. to 5 p. m.

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 horizontally striped white and black buoys, or by similarly marked posts on the shore.

Harbor Regulations.—Every vessel coming to anchor in the Potomac River between the junction of the Washington and Georgetown 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.

Regulations for passing floating plant working in channels (such as dredges, survey boats, etc.) are given on page 347 in the appendix.

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 (4 m) at the foot of Seventeenth Street, and the deposit in the dredged channels decreased the depth from 20 feet to 14 feet (6.1 to 4.3 m) 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 on the river keep a channel open, but sailing vessels usually require the assistance of steam when bound to Alexandria or Washington.

Tides.—The mean range of tides is 1.3 feet at Point Lookout, 1.5 feet at Yeocomico River entrance, 1.9 feet at Blakistone Island, 1.4 feet at Lower Cedar Point, 1.1 feet at Maryland Point, 1.7 feet at Indianhead, and 2.9 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 published annually by the Coast and Geodetic Survey.

Currents, Potomac River.—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 strength of current and times of slack water in the following list are for mid-channel under normal conditions.

Point Lookout to Piney Point.—The slack water and strengths of flood and ebb occur about 4 hours after the corresponding slacks and strengths at Chesapeake Bay entrance. The slack water before flood occurs about 2 hours after high water at Washington and the slack water before ebb occurs about 1 hour after low water at Washington. The average strength of flood and ebb is approximately ½ knot.

Off Blakistone Island.—The slack waters and strengths of flood and ebb occur about 5 hours after the corresponding slacks and strengths at Chesapeake Bay entrance. The slack water before flood occurs about 3 hours after high water at Washington and slack water before ebb occurs about 2 hours after low water at Washington. The average strength of flood is about ½ knot and of ebb about 1 knot.

Off Colonial Beach.—The slack waters and strengths of flood and ebb occur about 6½ hours after the corresponding slacks and strengths at Chesapeake Bay entrance. The slack before flood occurs about 2 hours before low water at Washington and slack before ebb occurs about 2½ hours before high water at Washington. The average strength of flood is about ½ knot, and of ebb about ¾ knot.

Off Persimmon Point.—The slack waters and strengths of flood and ebb occur about 7 hours after the corresponding slacks and strengths at Chesapeake Bay entrance. The slack before flood occurs about 1½ hours before low water at Washington and slack before ebb occurs about 2 hours before high water. The average strength of flood is approximately 1 knot, and of ebb approximately 1¼ knots.

Off Maryland Point.—The slack waters and strengths of flood and ebb occur about 7¼ hours after the corresponding slacks and strengths at Chesapeake Bay entrance. The slack before flood occurs about 1¼ hours before low water at Washington and slack before ebb occurs about 1¾ hours before high water. The average strength of flood is approximately 1 knot and of ebb approximately 1¼ knots.

Off Quantico.—The slack waters and strengths of flood and ebb occur about 7½ hours after the corresponding slacks and strengths at Chesapeake Bay entrance. The slack before flood occurs about 1 hour before low water at Washington and the slack before ebb about 1½ hours before high water. The average strength of flood or ebb is approximately ¾ knot.

Off Hallowing Point.—The slack waters and strengths of flood and ebb occur about 8½ hours after the corresponding slacks and strengths at Chesapeake Bay entrance. The slack before flood occurs at about the time of low water at Washington and slack before ebb about ½ hour before high water. The average strength of flood or ebb is approximately 1 knot.

Off Alexandria.—The slack waters and strengths of flood and ebb occur about 8¾ hours after the corresponding slacks and strengths at Chesapeake Bay entrance. The slack before flood occurs at about

the time of low water at Washington, and slack before ebb about the time of high water. The average strength of flood or ebb is approximately 1 knot.

At Washington.—In Virginia Channel the average current at strength of ebb is about ½ knot. There is seldom a flood current. In Washington Channel there is practically no current. In the Anacostia River the current is irregular with an average strength on flood and ebb of less than ½ knot.

Courses and Distances—Potomac River, Chesapeake Bay to Washington

For reverse direction, read upward	Course (Reverse course in *Italics*)		Distance
	True	Magnetic	
1. Smith Point Lighthouse bearing 208° true, distant 2,700 yards. (This position is between position 8 and 9, courses from Chesapeake Bay Entrance to Baltimore, p. 146.) Passing 2.3 miles southwest of Point Lookout Lighthouse, and continuing clear of fish trap areas, shown on charts 1224, 557 and 558:	°	*Points*	*Nautical miles*
Direct	307	NW. ⅛ W	22.2
Reverse	*127*	*SE. ⅛ E*	*22.2*
2. Piney Point Lighthouse bearing north-east, distant 1 mile:			
Direct	315	NW. ⅝ N	3.5
Reverse	*135*	*SE. ⅝ S*	*3.5*
3. Ragged Point Lighthouse bearing southwest by south, distant 1,300 yards:			
Direct (*Blakistone Island Shoal Lighted Bell Buoy* ahead).	286	WNW	7.3
Reverse (same buoy astern)	*106*	*ESE*	*7.3*
4. Blakistone Island Shoal Lighted Bell Buoy close aboard, north side. Passing between *Kettle Bottom Shoals Channel Entrance Lighted Buoy 1 KB* and Bell Buoy 2 KB:			
Direct	295	NW. by W. ⅛ W	8.5
Reverse	*115*	*SE. by E. ⅛ E*	*8.5*
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 (7.3 m) at mean low water and is marked by buoys.			
5. Between Kettle Bottom Channel Lighted Buoy 9 KB and Buoy 10 KB. Passing south of buoy 20, marking a 19-foot (5.8 m) spot, and close aboard *Mid-Channel Buoy F:*			
Direct	296	NW. by W. ⅛ W	3.1
Reverse	*116*	*SE. by E. ⅛ E*	*3.1*

Courses and Distances—Potomac River, Chesapeake Bay to Washington—Con.

For reverse direction, read upward	Course (Reverse course in *Italics*) True	Course (Reverse course in *Italics*) Magnetic	Distance
	°	*Points*	*Nautical miles*
6. **Kettle Bottom Shoals Upper Lighted Buoy**, close aboard south side. Bell ~~Buoy alongside the Lighted Buoy:~~			
Direct	327	NNW. ¼ W	2.1
Reverse	*147*	*SSE. ¼ E*	*2.1*
7. **Upper Machodoc Flats Lighted Buoy 13** bearing west, distant 350 yards. Passing *Lower Cedar Point Light* bearing east, distant 510 yards. Aero light at Dahlgren:			
Direct	2	N. ¾ E	1.9
Reverse	*182*	*S. ¾ W*	*1.9*
8. **Lower Cedar Point Lighthouse** bearing west, distant 475 yards. Passing **Persimmon Point Shoal Light** bearing west, distant 400 yards:			
Direct	350	N. ¼ W	3.0
Reverse	*170*	*S. ¼ E*	*3.0*
9. **Persimmon Point Shoal Light** bearing 181° true, distant 1.1 mile:			
Direct (Port Tobacco River Flats Light ahead).	307	NW. ⅛ W	1.9
Reverse (same light astern)	*127*	*SE. ⅛ E*	*1.9*
10. **Port Tobacco River Flats Light** bearing 307° true, distant 0.4 mile. Passing 175 yards north of **Mathias Point Shoal Lighthouse**, 475 yards south of **Upper Cedar Point Lighthouse**, and 200 yards north of *Mid-Channel Lump Buoy 21 A*. (Small boats should not hug Upper Cedar Point Lighthouse too close as the 3-foot (0.9 m) shoal makes out somewhat to the southward):			
Direct (**Riverside Wharf Light** ahead).	255	W. ¾ S	5.0
Reverse (same light astern)	*75*	*E. ¾ N*	*5.0*
11. **Riverside Wharf Light** bearing 255° true, distant 0.5 mile:			
Direct	229½	SW. by W	2.9
Reverse	*49½*	*NE. by E*	*2.9*
12. **Midway between Buoys 30 and 23.** Passing 540 yards north of **Maryland Point Lighthouse** and 130 yards north of Buoy 23 A:			
Direct (*Maryland Point Shoal Buoy 25* ahead)	261	W. ⅛ S	1.3
Reverse (same buoy astern)	*81*	*E. ⅛ N*	*1.3*
13. **Maryland Point Shoal Buoy 25** bearing 261° true, distant 600 yards: Direct (**Maryland Point Lump Buoy 23 A** astern)	283	WNW. ¼ W	1.0
Reverse (same buoy ahead)	*103*	*ESE. ¼ E*	*1.0*
14. **Maryland Point Channel Buoy 32** bearing north, distant 50 yards. Entrance to dredged channel:			
Direct	303	NW. ½ W	0.9
Reverse	*123*	*SE. ½ E*	*0.9*

Courses and Distances—Potomac River, Chesapeake Bay to Washington—Con.

For reverse direction, read upward	Course (Reverse course in *Italics*) True	Course (Reverse course in *Italics*) Magnetic	Distance
	°	*Points*	*Nautical miles*
15. **Maryland Point Channel Lighted Buoy 27** bearing west. In dredged channel. Passing *Thomas Point Buoy 38* at edge of channel:			
Direct	335	N. by W. ⅝ W	2.5
Reverse	*155*	*S. by E. ⅝ E*	*2.5*
16. **Smiths Point Channel Lighted Buoy 29** bearing west. Dredged channel extends to buoy 48. Pass close aboard buoys 31 and 50 A, and 150 yards west of **Sandy Point Light.** Aero light on Brents Point:			
Direct	356	N. ¼ E	5.6
Reverse	*176*	*S. ¼ W*	*5.6*
17. **Sandy Point Buoy 33** bearing west, distant 200 yards. Passing 500 yards off buoy 33 A. Aero light about 1¾ miles west:			
Direct	11	N. by E. ⅝ E	2.1
Reverse	*191*	*S. by W. ⅝ W*	*2.1*
18. **Chicomuxen Creek Shoal Lighted Buoy 52** bearing east, distant ¼ mile:			
Direct	42	NE. ⅜ E	2.4
Reverse	*222*	*SW. ⅜ W*	*2.4*
19. **Between Mattawoman Shoal Lighted Bell Buoy 35 and Buoy 52 A.** Entering the dredged channel:			
Direct	39	NE. ⅛ E	2.7
Reverse	*219*	*SW. ⅛ W*	*2.7*
20. **Between Mattawoman Shoal Buoys 39 and 52 B.** Leaving dredged channel. Hallowing Point ahead. Fog bell on Indian Head Lower Pier. See chart. Aero Lights about 2½ miles northwest and 1¼ miles southeast:			
Direct	53	NE. by E. ⅜ E	1.3
Reverse	*233*	*SW. by W. ⅜ W*	*1.3*
21. **Indian Head Buoy 52 C** bearing 115° true, distant 350 yards:			
Direct (Glymont Light ahead)	83	E	1.5
Reverse (same light astern)	*263*	*W*	*1.5*
22. **Glymont Light bearing east,** distant 0.4 mile. Chapman Point ahead:			
Direct	61	ENE	0.6
Reverse	*241*	*WSW*	*0.6*
23. **Glymont Light** bearing 210° true, distant 0.3 mile:			
Direct (Glymont Light astern)	30	NE. ¾ N	0.9
Reverse (same light ahead)	*210*	*SW. ¾ S*	*0.9*
24. **Midway between Buoys 43 and 54:**			
Direct	349	N. ⅜ W	2.2
Reverse	*169*	*S. ⅜ E*	*2.2*
25. **Brent Shoal Lighted Buoy 56** on range with **White Stone Point Light,** distant 575 yards. Passing 175 yards off Buoy 45:			
Direct	10	N. by E. ½ E	0.3
Reverse	*190*	*S. by W. ½ W*	*0.3*

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Courses and Distances—Potomac River, Chesapeake Bay to Washington—Con.

For reverse direction, read upward	Course (Reverse course in *Italics*) True	Course (Reverse course in *Italics*) Magnetic	Distance
	°	*Points*	*Nautical miles*
26. Brent Shoal Lighted Buoy 56 bearing southeast, distant 100 yards:			
Direct	32	NE. ½ N	1.0
Reverse	*212*	*SW. ½ S*	*1.0*
27. Between White Stone Point Light and Buoy 58:			
Direct	55	NE. by E. ½ E	0.6
Reverse	*235*	*SW. by W. ½ W*	*0.6*
28. Dogue Creek Buoy 45 A bearing northeast, distant 100 yards. Entering dredged channel to buoy 45 C:			
Direct	73	E. ⅞ N	2.8
Reverse	*253*	*W. ⅞ S*	*2.8*
29. Sheridan Point Shoal Lower Buoy 47 bearing north, distant 200 yards. Passing 110 yards off **Old Fort Hunt Wharf Light:**			
Direct (**Fort Washington Light** ahead)	53	NE. by E. ⅝ E	0.8
Reverse (same light astern)	*233*	*SW. by W. ⅝ W*	*0.8*
30. Fort Washington Light bearing 53° true, distant 300 yards:			
Direct	23	NNE. ⅝ E	0.7
Reverse	*203*	*SSW. ⅝ W*	*0.7*
31. Midway between Riverview Wharf Light and Buoy 51:			
Direct	348	N. ½ W	1.0
Reverse	*168*	*S. ½ E*	*1.0*
32. Broad Creek Lighted Buoy 62 bearing east, distant 150 yards:			
Direct	7	N. by E. ¼ E	1.8
Reverse	*187*	*S. by W. ¼ W*	*1.8*
33. Rosier Bluff Buoy 53 bearing west, distant 75 yards. Passing 225 yards off **Fort Foote Wharf Light and Jones Point Light.** (Aero light to west 2¼ miles):			
Direct	352	N. ⅛ W	1.7
Reverse	*172*	*S. ⅛ E*	*1.7*
34. Jones Point Light bearing 191° true, distant 750 yards. (100 yards off Alexandria waterfront):			
Direct (**Jones Point Light** astern)	11	N. by E. ⅝ E	1.8
Reverse (same light ahead)	*191*	*S. by W. ⅝ W*	*1.8*
35. Bellevue Magazine Pier Light bearing east, distant 180 yards. On outer end of pier with fog bell. Aero Light ashore. Dome of War College ahead:			
Direct	16	NNE	1.5
Reverse	*196*	*SSW*	*1.5*
36. Junction Lighted Bell Buoy bearing 9° true, distant 300 yards. Junction of Anacostia River, Washington and Virginia Channels. (Guarding 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.			

ST. JEROME CREEK

(Charts 557 and 1224)

St. Jerome Creek is on the western side of Chesapeake Bay 5 miles north of Point Lookout and 2½ miles 253° true (W. ⅞ S. mag.) from Point No Point Lighthouse. 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. The channel is subject to change. There are a buoy and two beacons in the entrance and a light on Deep Point, the south entrance point. There are a store and post office at the landing on **Otter Point**, just inside the entrance. The controlling depth in the entrance channel to this landing is 4 feet (1.2 m) and the general depths in the creek are 4 to 7 feet (1.2 to 2.1 m) as shown on the chart. The channel between the two points is bush staked. 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 (9.1 m) into the entrance and 23 feet (7 m) to Benedict, 12 feet (3.7 m) to Jones Point, 9 feet (2.7 m) to Lyons Creek Wharf, and 7 feet (2.1 m) to Bristol Landing, at distances of 18½, 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. A steamer from Baltimore connects with Solomons at the river mouth. 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.

Cedar Point Lighthouse, on the end of the point on the south side at the entrance is a flashing light on a white wooden tower. A water tank back of the point is prominent. Storms have washed through the neck of land, and the site of the lighthouse is now an island.

The entrance to the river is easy of access either by day or by night for vessels of 24 feet (7.3 m) draft without a pilot, and vessels of 28 feet (8.5 m) can enter by following the directions on page 241. 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 (6.1 m) to Benedict in the daytime 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 followed by strangers.

The most prominent mark in approaching Patuxent River from southward is the tall tank on Cedar Point, and from northward is Cove Point Lighthouse (flashing white) and the high bluffs at Little Cove Point, 1½ miles southward. In the entrance the most prominent marks are Drum Point Lighthouse (fixed white, three red sec-

tors), white house on piles, and the fish factories and other buildings at Solomons Island.

Cove Point Lighthouse gives fog signals on an air diaphone, blast 3 seconds, silent 12 seconds, or on a bell if diaphone is disabled. It also has a radiobeacon with distance finding facilities, particulars for which are given on page 28. It serves as a vessel reporting station, for day service, reporting by telephone to Baltimore.

Drum Point Lighthouse has red sectors covering shoals off Drum Point, Hog and Fishing Points, and Sandy Point. Fog signal is given on a bell, 2 strokes every 15 seconds.

The wreck shown on the chart about ½ mile southeast of the lighthouse is reported clear to 32 feet (9.8 m) depth.

Solomons Island, 1¾ miles west of Drum Point, is the site of a village (Solomons post office) composed mostly of fishermen and oystermen. There is a depth of 18 feet (5.5 m) at low water at the steamer dock on the northeast end of the island and 12 feet (3.7 m) at the gasoline station wharf in the cove on the north side of the village. There is 15 feet (4.8 m) generally in the cove, except off the southward of the small island near its center. It is used as an anchorage by many yachts and by the fishermen. Gasoline, water, ice, and provisions may be obtained.

Solomons Island is connected with the mainland by a causeway which prevents navigation around the western end except by small boats.

Mill Creek, opposite Solomons Island, has a depth of 22 feet (6.7 m) in the entrance and 12 feet (3.7 m) for 1¼ miles above in the main branch and ¾ mile above in the western branch (Back Creek).

The approach to Mill Creek is marked by a lighted beacon 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° true (NNW. mag.) course, passing eastward of the beacon and entering the creek in mid-channel. A draft of 12 feet (3.7 m) 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 200 tons, 125 feet length, and 10 feet (3 m) draft above the last buoy at the entrance to the creek on the east side.

Millstone Landing is about 2 miles southeastward of Solomons Island and connected with it by a vehicular ferry operating the year round. There is a post office.

Town Point is low and bare and has a landing (Spencers Wharf) and several buildings on the north side. The end of the shoal off this point is marked by a buoy.

Opposite this buoy on the north side of the channel, are moored several decommissioned Government vessels.

Mill Creek and Cuckold Creek have a common entrance with a depth of 15 feet (4.6 m), 1 mile northwestward of Point Patience. Cuckold Creek has a depth of 12 feet (3.7 m) for ¾ mile and 8 feet (2.4 m) for a farther distance of ¾ mile, and Mill Creek has a depth of 12 feet (3.7 m) for ¾ mile and 8 feet (2.4 m) for a farther distance of ¼ mile. The deepest draft entering are schooners drawing 10 feet (3 m). A black 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.

Hellens Creek, 1¾ miles above Point Patience, has a depth of 3 feet feet (0.9 m) across the bar at the entrance and 10 feet (3 m) inside for ¾ mile. It is principally used as a harbor for small boats. The best water favors the eastern side in entering. **Hellen Gut** has a marine railway capable of hauling out a boat 50 feet long and 3 feet (0.9 m) draft. No repairs nor supplies are available.

St. Leonards Creek, on the northeast side 7½ miles above Drum Point, has a depth of 16 feet (4.9 m) into the entrance and 10 feet (3 m) for 2½ miles above. The lower end of the creek forms a safe anchorage in any weather in depths of 16 to 23 feet (4.9 to 7 m). **Petersons Point Light** (flashing white) 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 2½ miles above.

Sotterley Wharf is on the southwest side of the river westward of the entrance to St. Leonards Creek.

Broome Island is a low bare point marked by Broome Island Light (flashing white). Broome Island post office is a small village northward of the point. **Island Creek,** on the east side of Broome Island, is marked by Island Creek light (flashing red) at the eastern entrance point.

It has a depth of 10 feet (3 m) for ¾ 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 and 3 foot (0.9 m) draft. Provisions and gasoline are available. Repairs can be made.

Parkers Wharf is on the north side 1½ miles north-northwestward of Broome Island Light. The best water in approaching Parkers Wharf is from south-southeastward. Give the western side of Broome Island a berth of ⅜ mile.

Forrest Wharf is on the southwest side of the river 2⅝ miles above Broome Island Light.

Battle Creek, on the north side northward of Forrest Wharf, is marked by Battle Creek Shoal light (flashing white) off the southeastern entrance point. It has a depth of 10 feet (3 m) for 2 miles above the entrance, and is navigable for small boats for a farther distance of about 2 miles. The deepest draft entering are schooners drawing 10 feet (3 m). The entrance should be approached on a northeasterly course to avoid unmarked shoal spots on either side. The ruins of a wharf and freight house are on the eastern side at the entrance.

Dukes Wharf is on the south side of **Sheridan Point** 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 (1.5 m) in the entrances and 3 feet (0.9 m) to near the heads.

Benedict is a village on the western side of Patuxent River 18½ miles above the entrance. A cannery with twin stacks and a church

spire are prominent. Schooners of 10 to 17 feet (3 to 5.2 m) draft sometimes ascend the river to this point. There is a 6-foot (1.8 m) 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.

Hallowing (Holland) Point is a vehicular ferry landing directly opposite Benedict. Polk Shoal Light (flashing white) is on the west side of the channel about ½ mile southeast of Point Judith.

There are numerous landings on both sides of Patuxent River between Benedict and the head, but the only villages are **Lower Marlboro** on the east side and **Nottingham** on the west side, distance 10 and 15 miles, respectively, above Benedict.

Swanson Creek, on the west side 1½ miles above Benedict, has depths of 2 to 4 feet (0.6 to 1.2 m) and is little used.

Hunting Creek, just above on the east side, has a depth of 3 feet (0.9 m) across the flats at the entrance and for a distance of 3 miles above. It is frequented by motor boats and lighters.

A railroad bridge having a draw opening 74 feet wide, between fenders, and 4-foot (1.2 m) high water clearance, when closed, crosses the river ¼ 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, 1¾ miles westward of the fixed bridge (Hills Bridge) at the head of navigation on the Patuxent River. The bridge has a high water clearance of 7.7 feet (2.3 m) and the single span bridges the river.

Anchorage.—Deep-draft vessels frequently anchor in the mouth of the river for the night. Shelter from westerly winds is found in 3½ to 4 fathoms (6.4 to 7.3 m) from 2¼ to 3½ miles southward of Cove Point Lighthouse and quite close in to the shore. If seeking shelter from easterly winds, stand into the entrance and anchor in 5 to 10 fathoms (9.1 to 18.3 m) in the channel about 1½ miles above Drum Point Lighthouse. Good anchorage for light-draft vessels is found close into the north bank westward of Drum Point Lighthouse, taking care not to get aground on the oyster bank, which is marked by buoys and bush stakes. Small local vessels up to 10 feet (3 m) draft anchor in Mill Creek or in the cove north of Solomons Island, but there is little room to swing at this anchorage. St. Leonards 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 and provisions are obtainable at Solomons, Island Creek, Benedict, Lower Marlboro, and Nottingham. There is artesian water near the wharves at Solomons and Benedict. Coal in limited quantities can sometimes be obtained from the fish factories or canneries.

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 tides is 1.2 feet at the entrance, 1.6 feet at Benedict, and 2.5 feet at Nottingham.

Courses and Distances—Patuxent River

For reverse direction, read upward	Course (Reverse course in *Italics*)		Distance
	True	Magnetic	
1. Cedar Point Lighthouse bearing 225° true, distant 2.2 miles. (Between positions 8 and 9, Chesapeake Bay Entrance to Baltimore courses, p. 146):	°	*Points*	*Nautical Miles*
Direct (Drum Point Light ahead)	265	W. ⅛ N	3.0
Reverse (same light astern)	*85*	*E. ⅛ S*	*3.0*
2. Hog Island Shoal Buoy 3 bearing south, 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 (7.9 to 8.5 m):			
Direct	254	W. ¾ S	2.8
Reverse	*74*	*E. ¾ N*	*2.8*
3. Sandy Point Shoal Buoy 4 bearing north, distant 0.2 mile. Several ships are moored and bunched north of channel, east of Point Patience:			
Direct	321	NNW. ⅞ W	1.3
Reverse	*141*	*SSE. ⅞ E*	*1.3*
4. Town Point Buoy 7 bearing 225° true, distant 320 yards:			
Direct	280	WNW. ½ W	0.7
Reverse	*100*	*ESE. ½ E*	*0.7*
5. Point Patience Light bearing northeast, distant 250 yards:			
Direct	0	N. ⅝ E	1.2
Reverse	*180*	*S. ⅝ W*	*1.2*
6. Hawks Nest Buoy 9 bearing 200° true, distant 600 yards:			
Direct (Petersons Point Light ahead)	336	N. by W. ½ W	1.5
Reverse (same light astern)	*156*	*S. by E. ½ E*	*1.5*
7. St. Cuthbert Shoal Buoy 11 bearing south-southwest, distant 0.4 mile:			
Direct	308	NW	1.7
Reverse	*128*	*SE*	*1.7*
8. Satterley Point Flats Buoy 13 bearing southwest, distant 500 yards:			
Direct	296	NW. by W. ¼ W	1.5
Reverse	*116*	*SE. by E. ¼ E*	*1.5*
9. Broome Island Light bearing northeast, distant 200 yards. Passing 350 yards off **Battle Creek Shoal Light**:			
Direct	305	NW. ¼ W	3.7
Reverse	*125*	*SE. ¼ E*	*3.7*
10. Battle Creek Shoal Light bearing 108° true, distant 1180 yards. Passing 300 yards off buoy 8:			
Direct (Sheridan Point ahead)	330	NNW	1.7
Reverse (same point astern)	*150*	*SSE*	*1.7*

Courses and Distances—Patuxent River—Continued

For reverse direction, read upward	Course (Reverse course in *Italics*)		Distance
	True	Magnetic	
11. Sheridan Point bearing 330° true, distant 1450 yards. Long Point ahead. Passing 260 yards off buoy 15:	°	*Points*	*Nautical miles*
Direct	322	NNW. ¾ W	0.8
Reverse	*142*	*SSE. ¾ E*	*0.8*
12. Sheridan Point bearing east-southeast, distant 300 yards. **Benedict Light** slightly to right of course ahead:			
Direct	333	N. by W. ¾ W	1.5
Reverse	*153*	*S. by E. ¾ E*	*1.5*
13. Buzzards Island Buoy 10 bearing northeast, distant 75 yards:			
Direct	326	NNW. ⅜ W	0.9
Reverse	*146*	*SSE. ⅜ E*	*0.9*
14. Benedict Light on range with Town Point, and distant 570 yards from the light. Light bearing 2° true:			
Direct (Long Point astern)	350	N. ¼ W	0.3
Reverse (Long Point ahead)	*170*	*S. ¼ E*	*0.3*
15. Benedict Light bearing east, distant 100 yards:			
Direct	11	N. by E. ⅝ E	0.2
Reverse	*191*	*S. by W. ⅝ W*	*0.2*
16. Abreast Benedict Wharves, Town Point ahead.			
Approach to wharves on a westerly course to avoid the 6-foot (1.8 m) 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 (2.7 m) 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 (1.5 m), over it, near the center of this broad section.			

PATUXENT RIVER TO SEVERN RIVER

(Charts 550 and 1225)

The western side of Chesapeake Bay for a distance of 23 miles northward from Cove Point is unbroken by tributaries, and is generally high and wooded. The 5-fathom (9.1 m) curve is nowhere more than 1⅝ miles from shore. The outer limit of possible fish traps is marked by a line of black and white buoys shown on chart 1225.

Governors Run is a landing (in ruins) 9 miles above Cove Point Lighthouse.

Chesapeake Beach is a summer resort 20½ miles above Cove Point. A stack and a water tank showing above the trees and several buildings showing against the trees are prominent. Gasoline and pro-

visions are obtainable, and there is bus communications with Washington.

Herring Bay, westward of Poplar Island and 8 miles 232° true (SW. by W. ¼ W. mag.) from Bloody Point Bar Lighthouse (fixed white, 2 red and 1 dark sectors), is extenively used as an anchorage. Long Bar shoal having depths of 2 to 5 feet (0.6 to 1.5 m) extends from the north side south-southwestward nearly across the bay, and is marked at its south end by Parkers Island Shoal Light (flashing white). There is a depth of 12 feet (3.7 m) around the south end. There is good anchorage in westerly weather eastward of the shoal in depths of 15 to 20 feet (4.6 to 6.1 m). Small vessels usually anchor westward of the shoal, where there are depths of 7 to 12 feet (2.1 to 3.6 m), protected against easterly winds to a considerable extent by the shoal outside. Small boats find shelter in **Rockhold Creek** at the northwest end, which has a dredged channel at the entrance, in May 1935, 2½ feet (0.8 m) deep, and a natural depth of 3½ feet (1.1 m) inside to a fixed highway bridge 1 mile above. This bridge, and the one crossing **Tracy Creek,** have fixed spans 20 feet wide and 10-foot (3.0 m) clearances at high water. Gasoline and provisions are obtainable in the creek. There are four marine railways capable of hauling out boats up to 60 feet long and 5 feet (1.5 m) draft. All kinds of repairs can be made. There are post offices at Deale, Nutwell and Fairhaven. The mean range of the tides is 0.9 feet.

To enter Herring Bay, pass northward of Holland Point Bar buoy and head for Parkers Island Shoal Light on a 245° true (WSW. ⅜ W. mag.) 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 (3 to 3.4 m).

The dredged channel into Rockhold Creek is marked by three lighted beacons. About 40 yards north of the entrance beacon there is a dangerous wreck bare at low water. The channel is between the beacon and this wreck.

West River, 31 miles below Baltimore and 3 miles southwestward of Thomas Point Shoal Lighthouse (flashing white, 2 red sectors), has a depth of 15 feet (4.6 m) in the entrance, gradually decreasing to 7 feet (2.1 m) 4½ miles above. Shoals extend nearly to mid-channel off many of the points. Those near the entrance are marked by a buoy (reflector) and a light (flashing red), and those above the entrance by buoys.

Gasoline and provisions are obtainable at **Galesville** and there is a railway capable of hauling out small motor boats 50 feet long and 6-foot (1.8 m) draft. Repairs can be made. The post office is Galloway. The Corinthian Yach Club is located at Galesville.

Directions, West River.—Approach a position 400 yards north-northwestward of buoy 1, reflector, on any course between 234° and 284° true, round the buoy at a distance of 400 yards, steer 200° true (SSW. ⅜ W. mag.) to southeast of West River Entrance Light (flashing red), round it at a distance of 400 yards and then with the light astern steer 252° true (W. by S. mag.) to northward of buoy 3. From this point be guided by the buoys and the chart.

Parish Creek, on the east side of the entrance to West River, is to be dredged (1936) 8 feet (2.4 m) deep to the head of the south fork

off **Shadyside**. Up to June of that year the controlling depth was about 1 foot (0.3 m). The mean range of tide is 2.0 feet.

Rhode River, on the north side of West River, has a depth of 10 feet (3 m) for 1¾ miles above the entrance. There is a railway on **Bear Creek** capable of hauling out boats of 4 feet (1.2 m) draft and 40 feet length. **Cadle Creek**, on the north side, has a depth of 4 feet (1.2 m) to the post village of **Mayo** near the head, where gasoline and provisions are obtainable. There is a railway capable of hauling out boats of 3 feet (0.9 m) draft and 40 feet length. All repairs can be made in both yards. A shoal marked at its end by a flashing red 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.

South River (chart 550, 1936), just westward of Thomas Point Shoal Lighthouse, has a narrow channel with a depth of about 14 feet (4.3 m) for 6½ miles above the entrance and 9 to 12 feet (2.7 to 3.7 m) into the tributaries. A shoal extends 350 yards northeastward from Turkey Point. At this point the channel is only 110 yards wide due to a long shoal extending from the opposite shore. The principal shoals for a distance of 4 miles above the entrance are marked by buoys.

A highway drawbridge, with openings 70 feet wide and a high water clearance when closed of 13 feet (4.0 m), crosses the river 6 miles above the entrance. A mile above, another drawbridge has openings 40 feet wide and high water clearance of 8 feet (2.4 m), when closed. For **bridge regulations see page 52.**

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.

Edgewater and **Riva** are post villages near the bridges. Gasoline and provisions are obtainable.

Directions, South River.—To approach and enter make good the following courses (1) 315° true (NW. ¾ N. mag.) to about 30 yards south of buoy 4, with Bloody Point Bar Light (fixed white, 2 red and 1 dark sectors) directly astern. (2) 322° true (NNW. ⅝ W. mag.) until large white house on Turkey Point bears W. by S. mag.), passing northward of buoy 1, and with south tangent of Hill Point directly ahead. (3) 308° true (NW. ⅛ N. mag.) to close southward of buoy 8, passing between buoys 6 and 3. Then be guided by the chart.

Thomas Point Shoal extends 1¼ miles southeastward from the point, and is marked by **Thomas Point Shoal Lighthouse** (white house on piles) and a black buoy. The fog signal is a diaphone blast 2 seconds and silent 13 seconds.

SEVERN RIVER AND ANNAPOLIS HARBOR

(Charts 385, 550, 566, and 1225)

Severn River, on the west side of the Chesapeake Bay 124 miles above the entrance and 26 miles below Baltimore, is the approach to Annapolis, the capital of Maryland. The river is frequented by many small local craft and by small naval vessels as far as Annapolis,

the deepest draft being 16 feet (4.9 m) and usual draft not exceeding 12 feet (3.7 m). There is little business by water above Annapolis except in small boats seldom exceeding 6 feet (1.8 m) in draft.

A channel has been dredged and buoyed from deep water in Chesapeake Bay to abreast the docks of the Naval Academy. In 1935, there was a depth reported of 28 feet (8.5 m) in this channel to Annapolis.

A project calls for a dredged channel 15 feet (4.6 m) deep from the river into Spa Creek below the bridge.

The 12-foot (3.7 m) curve on the southwest side of the river is marked by spar buoys as far as Annapolis. The river has a natural channel with a depth of 18 feet (5.5 m) for 7 miles above Annapolis and 6 feet (1.8 m) for 2 miles farther. The channel above Annapolis is only partially marked, but is broad and easily followed with the aid of the chart.

Tolly Point, on the south side of the entrance to 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, 5/8 mile west-northwestward of the buoy, through which boats of 6 feet (1.8 m) draft pass, but it is unmarked and strangers should not attempt to use it.

Lake Ogleton, 1/2 mile westward of Tolly Point, has 9 to 10 feet (2.7 to 3 m) of water in it but, in 1932, only 2 feet (0.6 m) in the entrance. The wharf of Annapolis Roads Club is about 1/4 mile northwestward of the entrance to Lake Ogleton. There is a depth of 10 feet (3.0 m) at the end of the wharf. The club building halfway up the steep wooded shore is prominent.

Greenbury Point Shoal extends southward and southeastward from Greenbury Point, and is marked by **Greenbury Point Shoal Light** (flashing white), red skeleton tower on piles, and a row of red channel buoys along the southwest side. The 18-foot (5.5 m) curve lies 250 yards southwestward of the lighthouse, and there is abrupt shoaling to the 3-foot (0.9 m) curve about 250 yards westward of the light. A naval radio station is on Greenbury Point. The six tall towers are prominent over a large area up and down the bay.

Back Creek, a tributary of Severn River on the southeast side of Eastport, has a depth of 3 1/2 feet (1.1 m) in the entrance and 9 feet (2.7 m) inside, shoaling to 7 feet (2.1 m) near the head. The entrance, subject to change by easterly storms, is very narrow and has extensive shoals on either side. 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 long and 4 feet (1.2 m) 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 long and 11 feet (3.4 m) 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 3/8 mile on the southeast side are a part of the Naval Academy. The steamboat landing and

private wharves are on the northwest side of Spa Creek, between the Naval Academy grounds and the bridge across the creek.

Market Slip, 250 yards below the bridge over Spa Creek, is 1/8 mile long and 40 yards wide and has a depth of 8 feet (2.4 m) to near the head. It is open to the public and extensively used by small craft. The mouth of Spa Creek below the bridge has depths of 10 to 13 feet (3 to 4.0 m) and is extensively used as an anchorage. Gasoline, provisions, ice, coal, and water can be obtained at Annapolis, and there are machine shops for ordinary repairs to motors. Storm warnings are displayed. A passenger and automobile ferry runs from Annapolis to Matapeake and Claiborne on the eastern shore of Chesapeake Bay.

Spa Creek is crossed by a highway bridge just above the wharves having a center pier draw, each opening 40 feet wide with a headroom of 4 feet (1.2 m) at high water when closed. Favor the southeast side in approaching the draw to avoid a shoal on the northwest side. The creek has a depth of 8 feet (2.4 m) for 3/4 mile above the bridge and the midchannel is clear.

Dorseys Creek, known locally as **College Creek**, on the northwest side of Annapolis, has a depth of 11 feet (3.3 m) in the entrance and 8 feet (2.4 m) to near the head. It is crossed by four bridges, all having draw openings, the least width of opening being 40 feet wide, with high water clearances when closed of 5 feet (1.5 m), 6½ feet (2.0 m), 6 feet (1.8 m), and 11 feet (3.4 m), respectively. The three lower bridges are bascule type and the upper, a swing. Bridges will be opened from sunrise to sunset (for additional **Regulations** see p. 52). The best water in entering leads along the south side to near the lower bridge.

Weems Creek, 1½ miles above Annapolis, has a depth of 12 feet (3.7 m) for 1 mile above the entrance and 6 feet (1.8 m) to the head. It is crossed by a highway bridge having a center pier draw, each opening 28 feet wide and 6-foot (1.8 m) high water clearance when closed. There is a small marine railway in Weems Creek and another in **Cove of Cork** both capable of hauling out a boat about 40 feet long and 3-foot (0.9 m) draft. Hull repairs can be made at either yard.

Round Bay, an expansion of Severn River 4 miles above Annapolis, has depths of 17 to 22 feet (5 2 to 6.7 m) and is frequented by motor boats.

Anchorage.—Deep-draft vessels anchor off the mouth of the Severn in 18 to 45 feet (5.5 to 13.7 m), sheltered from westerly winds. There is good anchorage in the river northeastward of the Naval Academy in a depth of 21 to 28 feet (6.4 to 8.5 m) but vessels must not anchor in the pipe line area extending 67° true from the mast near the east corner of the academy grounds to the other side of the Severn River. Small vessels anchor in and off the mouth of Spa Creek where the anchorage areas are marked by buoys (chart 566). **Regulations** forbid vessels, except in great emergency, to anchor outside these established anchorage areas in Annapolis Harbor westward of the dredged channel and northward of buoy 5, which is located eastward of Horn Point.

Bridges.—Two bridges cross the Severn just above Annapolis. The lower, a highway bridge, has a bascule span with an opening 71 feet wide and a headroom when closed of 15½ feet (4.7 m); the

other is a railway bridge with a swing span 62 feet wide in either opening and a headroom of 5 feet (1.5 m) when closed.

Both bridges are opened at any time of day, or night on a signal of three blasts (see p. 52).

Pilots.—Local boatmen who are competent pilots will be found near the entrance if a pilot is desired.

Ice seldom interferes with navigation, except in severe winters, and then only for a limited time.

Tides.—The mean range of tides is 0.9 foot and is greatly influenced by winds. The tidal currents seldom exceed ½ knot in strength.

Directions, Severn River.—The following directions are for vessels of not over 16 feet (4.9 m) 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 ½ mile northeastward of Tolly Point Shoal lighted bell buoy, steer 316° true (NW. ¾ N. mag.) 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° true (N. by W. ¾ W. mag.) for ¾ mile until southwestward of buoy 14; on this course the lighthouse depot 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 305° true (NW. ⅛ W. mag.) course will lead to the dredged anchorage basin off the Naval Academy.

From northward.—Vessels of suitable draft may steer course 237° true (SW. by W. ¾ W. mag.) from buoy 33 to buoys 5 and 6 on the dredged channel, picking their way through the fish traps. Thence up the channel as above.

SEVERN RIVER TO PATAPSCO RIVER

(Charts 549, 550, 566, 1225, and 1226)

The cove between Greenbury Point and Hackett Point has depths of 10 to 14 feet (3 to 4.3 m) in the north end. The channel at the entrance is narrow and leads between extensive flats, and is marked on the eastern side by a red buoy. The cove and the creeks at the head are frequented by motor boats and small vessels carrying farm and wood products. ~~Mill Creek~~ has a depth of 5 feet (1.5 m) at the entrance in a very narrow unmarked channel and 8 feet (2.4 m) to near the head. **Whitehall Creek** has a depth of 12 feet (3.7 m) at the entrance and 7 feet (2.1 m) to near the head; the channel at the entrance is narrow and crooked and is usually marked by a post or bush stake. **Meredith Creek** has a very narrow entrance, with a depth of about 2 feet (0.6 m) and deeper water inside.

Sandy Point Lighthouse (group flashing white, red sector) is a red dwelling on brown cylindrical base. The red sector of the light covers the shoal water westward of the light. The fog signal is an air whistle blast 3 seconds, silent 12 seconds. A bell is struck by hand if the whistle is disabled. A radiobeacon and distance finding facilities have been installed (see p. 28). Deep-draft vessels should pass ⅛ mile or more eastward of this light.

Magothy River, westward of Baltimore Lighthouse, has a depth of 13 feet (4.0 m) at the entrance and for a distance of 5½ miles above, but has many shoal spits and middle grounds of less depth close to the channel. The usual draft of boats using it is 3 to 5 feet (0.9 to 1.5 m) and deepest draft 10 feet (3.0 m). There are no wharves except for small craft. **Deep Creek**, on the south side just inside the entrance, has a depth of 7 to 9 feet (2.1 to 2.7 m) in mid-channel and is sometimes used as an anchorage for small craft. **Mountain Point**, on the north side at the entrance, is a high, wooded bluff with a bare sandy point outside of it. A privately marked channel with 12 feet (3.7 m) of water, leads into **Magothy Narrows** 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 the island of that name is reached through the above channel. There are many excellent anchorages for small boats in the numerous tributaries to Magothy River, and this locality is a favorite cruising ground for local yachts. The wreck about 220 yards southeast of Magothy River Light is covered at high water, and caution is necessary. Gasoline and supplies can be obtained at several places in the river. There is a marine railway for small boat repairs in **Cypress Creek** near the upper end of the river.

The entrance to Magothy River is narrow, but is marked. **Approaching the entrance from northward**, a 243° true (SW. ¾ W. mag.) course from buoy 5C on the Craighill Channel will lead ½ mile northwestward of Baltimore Lighthouse and to the buoy at the entrance. **Approaching from southward**, strangers should pass eastward of Sandy Point Lighthouse and give the shore on the southwest side a berth of ½ mile until up to the red buoy at the entrance. Either course leads through an area of possible fish traps. Pass 100 yards southward of the buoy and steer northwestward into the river, passing northward of Magothy River Light (flashing white).

There are three buoys between Ulmsteads Point and South Ferry Point, and beacons in the Cypress Creek entrance.

(1199) 37 **Baltimore Lighthouse** (flashing white, ~~dim sector~~ red sector), on the western side at the entrance of the dredged channel leading to Baltimore, is a white octagonal house on brown pier. Fog signal is a bell, one stroke every 30 seconds.

PATAPSCO RIVER AND BALTIMORE HARBOR

(Charts 545, 549, and 1226)

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 3½ miles wide at the mouth, but the entrance is obstructed by extensive shoals. The main channel extends from the 37-foot (11.3 m) curve in Chesapeake Bay near Sandy Point, to Fort McHenry at the junction of the Northwest Harbor and Ferry Bar Channel of the Patapsco River at Baltimore. The channel is about 17 miles long. In 1935 there was a controlling depth of 37 feet (11.3 m) in the main channel from its lower end to Sparrows Point Channel and a controlling depth of 33.3 feet (10.2 m) to Ferry Bar Channel entrance. **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 have been widened

at the turns and three anchorage basins about 33 feet (10.1 m) deep in 1935 have been dredged on the sides of the Fort McHenry Channel. The project provides for a channel 37 feet (11.3 m) deep and 600 feet wide to Sparrows Point Channel and thence 35 feet (10.7 m) deep and 600 feet wide to Fort McHenry. For depths in the branch channels leading from the main channel to Sparrows Point, Curtis Bay, Ferry Bar, Middle Branch, and Northwest Harbor (The Basin) see pages 249 to 253. For depth in Chesapeake Bay from the bay entrance to Patapsco River, see page 138.

The old extension of the Brewerton Channel, leading directly into the bay, has a depth of about 17 feet (5.2 m) and is used by local vessels.

Directions, Patapsco River.—A table of courses leading from Chesapeake Bay entrance to Baltimore is given on page 146.

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 depth of 11 feet (3.4 m) at the entrance and 7 to 9 feet (2.1 to 2.7 m) 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. The smokestack of a garbage disposal plant on the point between **Main Creek** and **Back Creek** is prominent from the bay. The draft of boats using the creek does not usually exceed 6 feet (1.8 m), and strangers entering should be cautious with a greater draft. From the black spar buoy at the outer end of Rock Point Shoal a 137° true (SE. ⅞ S. mag.) course for 2½ 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.

North Point, on the north side of Patapsco River at the entrance, is wooded and marked by a large and a small water tank. A recreation park just eastward of the entrance to Shallow Creek is marked by a pier with pavilion at the end. The railway crossing this creek is in ruins.

Old Road Bay, just westward of North Point, has a depth of 7 to 14 feet (2.1 to 4.3 m). A rock, nearly bare at low water, near the middle of the entrance is marked by a red nun buoy with white reflector, and above this point the only mark is a black buoy on the point of shoal east of Cut-off Channel rear range light.

North Point Creek and **Jones Creek,** emptying into the bay from northward, have depths of 6 to 8 feet (1.8 to 2.4 m), but are unmarked and frequented only by small produce and pleasure boats. The bridges crossing both creeks near their entrances have draw openings 40 feet wide and clearances at high water when closed of 3½ feet (1.1 m). There is a marine railway for small boat repairs in the latter creek.

Sparrows Point, a town on the north side 2¼ miles west-northwestward of North Point, is the site of large iron and steel works and a shipbuilding plant. Several factory buildings and many chimneys and tanks are prominent. A dredged channel, with a controlling depth in 1933 of 33 feet (10.1 m) and marked by a lighted range and buoys, leads to the wharves on the south side on a 354° true

(N. 1/8 E. mag.) course. Channels have also been dredged to several wharves on the west side. The controlling depths in these are from 20 to 22 feet (6.1 to 6.7 m), and they are well marked. Sparrows Point is the terminus of a railroad.

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 (3.7 m) for 3½ miles above the entrance. The principal shoals for a distance of 1½ miles above the entrance are marked by buoys. There are no marks above, and the shoals extend for a considerable distance from many of the points. The creek is frequented principally by small produce and pleasure boats. There are no wharves except for small boats. Two bridges, close together, each having center-pier draws, across the creek just above the entrance; the least width of opening is 81½ feet and least high-water clearance is 5½ feet (1.7 m) when draw is closed. Three additional bridges cross the creek, as follows: South of Long Point, Lynch Cove and Schoolhouse Cove, respectively, with least spans 129, 80 and 68 feet respectively, and least high water clearance when closed of 15 feet (4.6 m), 9 feet (2.7 m) and 4½ feet (1.4 m) respectively. There is a marine railway and repair yard in **Peach Orchard Creek** capable of hauling out boats 80 feet long and 9 feet (2.7 m) draft.

The main entrance to the creek is just north of lighted bell buoy 4 M in the dredged channel. Thence up the channel on the lighted range, course 38° true (NE. 1/8 E. mag.), 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.

Humphreys Creek, a tributary of Bear Creek just above the lower bridges, has a depth of 13 feet (4.0 m) in the entrance and 7 feet (2.1 m) in mid-channel for 1¼ miles. There is a fixed bridge at the entrance with a span 30 feet wide and high water clearance of 8 feet (2.4 m).

Rock Creek, on the south side of Patapsco River 4 miles above Bodkin Point, has a depth of 11 feet (3.4 m) to near the head, except at the narrows westward of Fairview, where the channel has a depth of 8 feet (2.4 m) 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 (1.5 m) over it lies just west of buoy 4 at the narrows. A prominent black water tank is located near Rock Point. A small marine railway is located in this creek and is capable of hauling out boats 40 feet long and 5 feet (1.5 m) draft. Repairs can be made and supplies are available including gasoline. White Rocks, on the eastern side of the entrance to the creek, show about 15 feet (4.6 m) above high water, and are prominent when entering from eastward. Boats of 6 feet (1.8 m) or more draft should pass northward of them. The creek is frequented by many pleasure boats in summer. To enter Rock Creek from northwestward, a 160° true (S. by E. 1/8 E. mag.) course from the black buoy at the intersection by 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 (3 to 4.3 m) 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 (4.6 m) and width of 70 yards and is marked by buoys. 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. The creek has several landings and summer resorts and is frequented by many pleasure boats in summer. A highway bridge having a center-pier draw, each opening 50 feet wide, with a headroom of 6 feet (1.8 m) at high water, crosses it ¾ mile above the entrance. Gasoline and supplies may be obtained. At the head of **Back Cove** is a marine railway capable of hauling out boats 45 feet long and 6-foot (1.8 m) draft. Repairs can be made.

Fort Carroll is a stone and concrete structure with Fort Carroll Light (flashing white red sector) white structure, on the southwest side. The center of Fort McHenry Channel leads 400 yards southwestward of the light.

Hawkins Point is marked by a water tank and a large pile of slab. **Leading Point** is the site of the quarantine stations. A buoyed channel leads to the quarantine wharf in **Thoms Cove** where there are 7 to 10 feet (2.1 to 3.0 m) depths alongside.

Curtis Bay and Curtis Creek, on the southwest side of Patapsco River 1¾ miles west-northwestward of Fort Carroll, are the approaches to large coal and oil wharves and several industrial plants at **South Baltimore**, and to the Coast Guard depot on Arundel Cove. A channel reported, in September 1935, to be 400 feet wide and 35 feet (10.7 m) deep, with a turning basin at the head, has been dredged from the main channel of Patapsco River across Curtis Bay to the wharves at South Baltimore, where are located the coal piers of the Baltimore & Ohio Railroad, having a depth of 28 to 35 feet (8.5 to 10.7 m) alongside, and several other wharves with depths of 25 to 27 feet (7.6 to 8.2 m). The channel is marked by buoys on each side and a lighted range, which is hard to pick up during the day.

Curtis Creek has a natural depth of 20 feet (6.1 m) to abreast the entrance of Arundel Cove, 1¾ miles above South Baltimore, and 16 feet (4.9 m) for a farther distance of 1 mile into Marley Creek. A highway bascule bridge having a span of 150 feet wide between fenders and clearance of 17.8 feet (5.4 m) at high water when closed crosses the creek ¾ mile above Sledds Point. A railroad bridge, having center-pier draw spans 150 feet wide between fenders and clearance of 14 feet (4.3 m) at high water when closed, is 1 mile above. The channel above Curtis Bay has ample width and is easily followed with the aid of the chart. Shoals extend southeastward from **Ferry Point** on the north side of Cabin Branch, and northwestward from **Walnut Point** just below the bridge; except at these points the mid-channel is clear for 3 miles above Curtis Bay. A channel dredged to 24 feet (7.3 m) leads from just above the drawbridge to the piers opposite Arundel Cove, but there are depth of less than 19 feet (5.8 m) to the docks.

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Cabin Branch, on the west side of Curtis Creek just above South Baltimore, has a depth of 14 feet (4.3 m) to a fixed bridge, with a span 20 feet wide and high water clearance of 8 feet (2.4 m), ⅜ mile above the entrance. There are depths of 14 to 24 feet (4.3 to 7.3 m) at the industrial wharves on the north side. In entering, vessels should pass southward of the buoy marking the end of the shoal extending south-southwestward from Ferry Point, and head in on a 296° true (NW. by W. mag.) course through the dredged channel to the wharves, thence favoring the northern side to the bridge.

Arundel Cove is the site of the Coast Guard depot. There is a depth of 17 feet (5.2 m) at the face of the wharf just outside the cove, and 16 feet (4.9 m) to the bulkhead wharf inside. The entrance to the cove is marked by several buoys.

To enter Curtis Bay, pass southward of lighted buoy 7 M and buoy 2, and steer 268° true (W. ½ N. mag.) in the Curtis Bay dredged channel, leaving the buoys at a distance of 50 yards; the coal piers and a brick chimney at South Baltimore will be ahead on this course. There is a lighted range ahead on this course, but it is hard to see in the day. Anchorage can be had eastward or east-northeastward of the coal piers in depths of 24 to 30 feet (7.3 to 9.1 m), being careful to give the north shore a berth of 300 yards, or in mid-channel southward of the coal piers in depths of 23 to 26 feet (7.0 to 7.9 m). If bound up Curtis Creek, pass midway between **Sledds Point** and the ends of the coal piers, favor the eastern side of Curtis Creek until past Ferry Point, then the western side to the bridge. Pass through the highway bridge draw and eastward of the red buoy just southward of it and follow a general mid-channel course above through the railroad bridge draw. An 18-foot (5.5 m) spot lies 175 yards north-northwest of the west draw span off Stahl Point. Follow the chart above here.

Colgate Creek, on the north side of Patapsco River, northeastward of Curtis Bay, has a depth of 13 feet (4.0 m) in a narrow channel to a drawbridge at Sutton. A bridge having a draw opening 40 feet wide and a headroom of 4 feet (1.2 m) crosses the creek at the entrance. The draw will be opened on a signal of three 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 drawbridge at Sutton has spans 32 feet wide and high water clearance of 6 feet (1.8 m) when closed. Draw is opened at anytime. **Point Breeze,** on the west side of the entrance, is the site of a manufacturing plant. The two large brick factory buildings and a large brick smokestack are prominent.

Enter Colgate Creek by passing between buoy 1 and the airport, and then keep a short distance off the concrete bulkhead on the left. Head for the draw span of the bridge.

An extensive river bed area bordering Colgate Creek entrance has been filled to form **Baltimore Municipal Airport.** An aerial light is about ¼ mile inland from the airport.

Northwest Harbor of 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** is on a point, marked on the east side by Fort McHenry Lighthouse (occulting green), steel skeleton tower. This lighthouse now forms the front range of Fort McHenry Channel Range.

Lazaretto Point is marked by Lazaretto Point Lighthouse (fixed red), white skeleton tower. Northwest Branch has depths of 20 to 35 feet (6.1 to 10.7 m) in the eastern end and 21 feet (6.4 m.) to the head, with a few areas of less depth near the shores. The best water favors the southwest side from the entrance to Locust Point, and the northeast side from Locust Point to the head. There are depths of 12 to 35 feet (3.7 to 10.7 m) at the principal wharves. The Baltimore & Ohio Railroad wharves, extending from Fort McHenry northwestward for ¾ mile, have depths of 20 to 35 feet (6.1 to 10.7 m) and the Pennsylvania Railroad wharves, northward of Lazaretto Point, have depths of 25 to 35 feet (7.6 to 10.7 m). The wharves along the western side at the head of the harbor are used by passenger and freight steamers to points on Chesapeake Bay. The wharves from the northwest corner of the harbor eastward to Jones Falls are municipal wharves and have depths of 19 to 24 feet (5.8 to 7.3 m) alongside, the three easterly ones being public wharves and used for the discharge of lumber, sea food, and produce.

Ferry Bar Channel and **Middle Branch** of the Patapsco River (the branch is also called **Spring Garden Channel**) extends from southward of Fort McHenry westward and northward for a distance of 3 miles. It has been improved by dredging. Ferry Bar Channel, marked by a lighted range and buoys, leads westward through the middle of the river, with a reported depth of 35 feet (10.7 m) in September 1935, for 1 mile. At this point a channel leads northwestward to the Western Maryland Railway piers (**Port Covington**). Ferry Bar Channel continues westward to **Ferry Bar Point**, thence into Spring Garden Channel through Hanover Street bridge and to the Western Maryland Railway bridge. In 1935, the reported controlling depth to Hanover Street bridge was 27 feet (8.2 m). These dredged channels are all well marked by buoys. A dredged channel leads from just above the Hanover Street bridge to the docks in **Smith Cove** and has a controlling depth of 19 feet (5.8 m).

The principal wharves in the Ferry Bar and Middle Branch section have depths of 10 to 35 feet (3.0 to 10.7 m), the deepest draft being found at the Western Maryland Railway wharves (Port Covington). A fog signal (siren) has been placed on the southwest corner of Pier 8. The channel is used by many barges, large schooners, and steamers.

Directions, Ferry Bar Channel.—Enter between lighted buoy 3 and buoy 2, passing up the channel on a 270° true (W. ¾ N. mag.) course between the buoys, range ahead, to east of the front range light, then 298° true (NW. ¾ W. mag.) to the draw span of Hanover Street Bridge, then about 310° true (NW. ¼ N. mag.) through Spring Garden Channel, passing close southward of buoy 4 to between buoys 6 and 9, then steer 4° true (N. by E. ⅛ E. mag.) through the draw span of the railroad bridge and on to the head of navigation, being guided by the chart.

To go to the wharves of the Western Maryland Railway Co., Port Covington, leave Ferry Bar Channel between lighted buoys 7 and 8, and steer northwesterly, being guided by the buoys.

Middle Branch is crossed by two bridges. Hanover Street Bridge, ⅜ mile above Ferry Bar Point, has a draw opening 150 feet wide and a headroom of 33 feet (10.1 m) at high water when closed. Western Maryland Railway bridge, 1 mile above Hanover Street

Bridge, has a center-pier draw, each opening 85 feet wide, with a headroom of 8 feet (2.4 m) at high water when closed. The draw of the Hanover Street Bridge will be opened upon notice by 3 blasts of a whistle or horn blown on the vessel at any time between 5 a. m. and 9 p. m. At any other time notice of intention to pass through the draw should be given the superintendent of the bridge by telephone or otherwise, either at the bridge before 9 p. m. or at his residence thereafter.

PORT OF BALTIMORE

GENERAL

Anchorage.—Vessels anchoring in Baltimore Harbor are subject to the rules and regulations of the harbor board and the orders of the harbor master.

The Quarantine Anchorage is on the southwest side of the main channel, opposite the quarantine station at Leading Point. It is 3,500 feet long and 600 feet wide outside of channel limits. Vessels carrying explosives are required to anchor within the limits of the quarantine anchorage and are subject to the regulations of the port governing the loading and discharging of explosives.

Fort McHenry Anchorage is located south of Fort McHenry near the upper end of the main channel and southward thereof. It is 3,500 feet long and 400 feet wide outside of channel limits. Riverview Anchorage is located west of the airport on the east side of the main channel. It is 4,500 feet long and 1,500 feet wide outside of channel limits. The above anchorages had reported depths, in September 1935, of 35 feet (10.7 m).

Anchorage No. 1 lies to the northwestward of the American Sugar Refining Co.'s wharf (west of Locust Point). It is a rectangular area approximately 1,300 feet long and 425 feet wide, covering about 12½ acres, with available depths of 10 to 17 feet (3.0 to 5.2 m).

Anchorage No. 2 is situated to the southeastward of Hendersons Wharf, Fells Point. It is an irregularly shaped basin, with a maximum length and width of 1,800 feet and 900 feet, respectively, covering an area of approximately 20 acres. A dredged depth of 16 or 17 feet (4.9 or 5.2 m) is maintained over the entire area.

Anchorage No. 3 is located in Canton Hollow, southeast of anchorage No. 2, in front of the piers along Boston and Clinton Streets. It is a triangular basin approximately 2,000 feet along the base, with an extreme width of 2,100 feet, covering about 50 acres. A part of the anchorage extends over the 35-foot (10.7 m) dredged channel in front of the Clinton Street piers, while a depth of 17 or 18 feet (5.2 or 5.5 m) is maintained over the remaining portion.

These three anchorages lie in sheltered sections of the inner Northwest Harbor. There is additional good but less-protected anchorage in from 18 to 24 feet (5.5 to 7.3 m) of water along both sides of the Fort McHenry Channel above Fort Carroll. Vessels using this must keep at least 300 feet from the dredged channel.

General regulations.—The port is open at all hours for the transaction of business. Vessels are usually received between sunrise and sunset, but under extraordinary circumstances they are permitted to enter at other times. The official visits to the vessel are made in the channel opposite quarantine. Following inspection by Public

Health Service officials, the vessel is boarded by an officer of customs and an officer of the Immigration Service.

The usual hours for the clearance of vessels are between 9 a. m. and 4.30 p. m., but under extraordinary conditions a vessel will be cleared outside of these hours and on Sundays and holidays. The formal clearance is effected by the collector of customs within office hours, but the vessel is permitted to sail at any time during the day or night.

Quarantine.—The quarantine station is situated at Leading Point, on the west shore of the Patapsco River at the mouth of Curtis Bay, about 7 miles below the center of the city. The station is thoroughly modern and is equipped with hospital facilities for the detention of contagious and infectious disease cases removed from vessels. Service is maintained from sunrise to sunset and is extended to midnight when necessary.

Hospitals.—In addition to the quarantine station, the Public Health Service operates a marine hospital and a dispensary. The former is United States Marine Hospital No. 1 and is located at Remington Avenue and Thirty-first Street, in the northern section of the city about 3 miles from the water front. The dispensary is located in the basement of the customhouse, within a few hundred feet of the Pratt Street piers.

The city of Baltimore is amply provided with public and private hospitals and dispensaries.

Custom Service.—The customhouse is located at the corner of Gay and Lombard 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 street-railway service.

The customhouse is open from 9 a. m. to 4.30 p. m. on all days but Saturday and Sunday. On Saturday it is open from 9 a. m. until the business of the day is completed, which is usually about 1 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 a. m. to 5 p. m. These hours are extended upon request to any time during the night and Sundays and holidays, but extra compensation is charged by the inspector rendering the service.

Dry docks and marine railways.—There are 4 floating dry docks, 2 graving docks, and several marine railways at Baltimore, including 2 privately owned railways which are not available for general public use. Both graving docks are owned by the Bethlehem Shipbuilding Corporation, and the larger one can accommodate a vessel 576 feet long, 64-foot beam and 22-foot (6.7 m) draft. The largest floating dry dock in the harbor is located at Sparrows Point Works of the Bethlehem Shipbuilding Corporation. It is 600 feet long over all and has a lifting capacity of 20,000 tons.

Of the numerous marine railways at the port, eleven have lifting capacities ranging from 200 tons to 4,000 tons and are equipped to undertake general woodwork, bottom painting, scraping, caulking, and ceiling.

Wrecking and salvaging.—Wrecking and salvaging facilities are limited. Several companies have equipment for this work, but as a general rule it is assigned to other work and is available for duty in wrecking and salvaging only in emergencies.

Railroads.—The Pennsylvania, Baltimore & Ohio, Western Maryland Railway, and Canton Co. of Baltimore each have several piers. These railroads are interconnected by a municipal belt-line railroad.

Commerce.—A large quantity of ore, petroleum products, and molasses form the bulk of the imports. Exports consist of grain, flour, coal, coke, iron, steel, copper, lumber, tobacco, and petroleum products. Domestic coastwise commerce is large in fertilizers, lumber, sugar, dry goods, petroleum, coal, iron, steel, and canned goods.

Internal commerce with Chesapeake Bay ports consists of heavy shipments of general merchandise, and a large trade in vegetable food products and animal food products, principally oyster and oyster shells.

Pilots.—Pilotage for the port of Baltimore is compulsory for foreign vessels, vessels from a foreign port, and all vessels sailing under register, 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 are given on page 139.

Two vessels are operated by the Maryland pilots, and one of these will usually be found cruising outside the entrance of Chesapeake Bay.

Airports.—The Municipal Airport is located about 7 miles southeasterly from the center of the city. Other airports, in the vicinity, are the Curtiss-Wright, the Glenn L. Martin, and the Baltimore Airport, Inc., at Rutherford Field, respectively, 7 miles northwest, 9½ miles northeast, and about 8 miles west, of the city.

Supplies.—All kinds of supplies are obtainable 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.

Storm warnings of the United States Weather Bureau are displayed from the American Building and from the Anchorage Building, corner of Broadway and Thames Street.

A United States Branch Hydrographic Office is established at the 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.

The United States Lighthouse Service.—The headquarters of the Fifth Lighthouse District is in the New Federal Building, Norfolk, Va. A suboffice is maintained at Baltimore in the customhouse.

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 Patapsco River are often closed by ice for extended periods. Ice in the main channel is most often met with in the vicinity of Seven Foot Knoll Lighthouse, where ice packs are of frequent occurrence. Seven foot

Tides.—The mean range of tides is 1.1 feet. Daily predictions for Baltimore are given in the tide tables published by the Coast and

Geodetic Survey. Prolonged winds of constant direction may cause substantial variation in the tide.

Regulations for passing floating plant working in channels (such as dredges, survey boats, etc.) are given on page 347 in the appendix.

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 Hendersons 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.

EASTERN SHORE, CAPE CHARLES TO CHESCONESSEX CREEK

(Charts 1222 and 1223)

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 Lighthouse, 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 Charts 1222 and 1223.

The whole of the northern point of the entrance to Chesapeake Bay is generally known as **Cape Charles**. It includes Smith Island, Fisherman Island, The Isaacs, and the south point of the mainland.

Smith Island and Cape Charles Lighthouse are described under "Coast from Cape Henlopen to Cape Charles," on page 122.

Fisherman Island is low. Several low buildings and a flagstaff are on the northwest side. A flashing white light is exhibited from the end of the wharf.

The Isaacs is a bare, marshy island.

The south point of the mainland is low and bare on the extreme south end but high and wooded back of the point.

Fisherman Inlet is described under "Inside waters, Cape Henlopen to Cape Charles," on page 137.

Old Plantation Creek, 2½ miles southward of the town of Cape Charles and 1½ miles eastward of Old Plantation Flats Lighthouse has a depth of 1½ feet (0.5 m) across the bar at the entrance and for a distance of 2 miles above, and is frequented by local boats of 3½ feet (1.1 m) draft at high water. The channel is narrow, and there are many bars and middle grounds, which usually show discolored. It is usually marked by bush stakes, but is difficult without local knowledge. The best water across the flats is about ⅜ 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. There are no supplies available in the creek.

Cherrystone Inlet, 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. It is marked by **Old Plantation Flats Lighthouse** (fixed white, red sector) and by several other lights and buoys. The fog signal at the lighthouse (white house on piles) is a diaphone blast 3 seconds and silent 17 seconds. Bell is struck if diaphone is disabled. The mean range of tides is 2.3 feet.

A channel reported, in September 1935, to be 16 feet (4.9 m) deep and 200 feet wide, marked by a lighted range, has been dredged across the bar a little northward of Old Plantation Flats Lighthouse, and northward along Cherrystone Inlet to the entrance of Cape Charles Harbor. 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 the steamers and tows. The tidal currents set across the entrance to the channel south of the entrance to Cape Charles Harbor, but follow the general direction of the channel above. 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 and Norfolk 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 sea food and produce brought here in motor boats and small vessels. Gasoline, Diesel Oil, coal and provisions are obtainable, and there is water 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 depth, in September 1935, in the enclosed harbor was reported to be 14 feet (4.3 m). Jetties extend 1,600 feet westward from the north side of the entrance and 230 feet westward from the south side in shoal water. 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.

About ½ mile north there is a lighted and buoyed ferry slip channel. The lights are privately maintained from sunset to midnight.

Cherrystone Inlet has a depth of 11 feet (3.4 m) for about 3 miles above the entrance of Cape Charles Harbor, above which the depths are 2 to 4 feet (0.6 to 1.2 m). It is used by fish steamers up to 10 feet (3.0 m) draft as far as the fish factory on **Cherrystone Island** and by local oyster and produce boats above, their draft seldom exceeding 6 feet (1.8 m). The channel is marked by beacons and buoys to Cherrystone Island, and is sometimes marked by bush stakes above, but the channel is narrow and difficult without local knowledge. Boats of 3 feet (0.9 m) 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** is often bare at low water.

Kings Creek, east-southeastward of Cherrystone Island, has a depth of 3½ feet (1.1 m) across the bar at the mouth and for 1 mile above, and is frequented by boats of 2 to 5 feet (0.6 to 1.5 m) draft. The bridge at the entrance has been removed but some piling below low water are reported. There is a shoal, bare at low water and sometimes marked by bush stakes, 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 well marked by bush stakes but local knowledge is required. The creek is a good small boat harbor and is used extensively by yachtsmen. There is a railway on the creek capable of hauling out boats of 40 feet length and 4 feet (1.2 m) draft. Repairs can be made.

Directions, Cherrystone Inlet.—Cherrystone Inlet can be entered from southward, 2 miles below Old Plantation Flats Lighthouse, with a depth of 16 feet (4.9 m); from westward through the dredged channel north of the lighthouse with the same depth, and across the bar anywhere between Old Plantation Flats Lighthouse and a point ½ mile northward in depths of 12 feet (3.7 m).

The dredged channel across the bar is marked by a lighted range and has a 55° true (NE. by E. ½ E. mag.) trend, leading 520 yards northwestward of Old Plantation Flats Lighthouse. Having crossed the bar on the range, steer 19° true NNE. ¼ E. mag.) for the Cherrystone Inlet Front Range Light (flashing white, red structure) on the south side of the entrance to Cape Charles Harbor in range with the white light on a post with slatted daymark on the middle of the north jetty. This course leads westward of buoy 4, 180 yards eastward of bell buoy 1 A, and to a position 120 yards eastward of Cherrystone Bar Light (skeleton tower, fog bell). Then steer 6° true (N. by E. ⅛ E. mag.), passing eastward of a white light on a black pile structure (1) and midway between the Cherrystone Inlet Front Range light on the east side, and light 3 (single pile with black daymark) on the west side, just southward of the end of the north jetty. Then turn eastward for the entrance to the harbor, passing midway between the light on the end of the north jetty (fog bell) and the red buoy southward. Pass 70 yards southward of the light near the inner end of the north jetty and enter the harbor in mid-channel.

Hungers Creek, on the eastern side of Chesapeake Bay 8 miles northward of Cape Charles, has a depth of about 4 feet (1.2 m) in a narrow channel for 2 miles above the mouth and then 3 feet (0.9 m) to **Floyds Landing** ½ mile from **Bridgetown**. It is entered through a narrow channel which commences in front of a large red-roofed house (beach hotel) 2½ miles southward of the mouth of the creek, and follows close along the eastern shore to the mouth. There is a shoal, bare in places at low water, along the western side of the channel. The inshore flats are covered by marsh grass in summer. A new natural channel through the flats reported to be 4 feet (1.2 m) deep leads directly eastward about 300 yards from the western point at the creek entrance. Both channels are usually marked by bush

stakes but require local knowledge. Produce is shipped in boats of 2 to 5 feet (0.6 to 1.5 m) draft. There are no supplies in the creek.

The Gulf, emptying into the channel leading to Hungers Creek, has a depth of about 1 foot (0.3 m) to near the head and is little used. There are no wharves.

Mattawoman Creek, emptying into Hungers Creek from eastward, has a depth of about 4 feet (1.2 m) for 1 mile in a narrow crooked channel and 2 feet (0.6 m) to the head of navigation. The best water in entering lies close along the eastern shore, northward and eastward of an island marked by two shanties.

Nasawaddox Creek, on the eastern side of Chesapeake Bay 12½ miles northward of the town of Cape Charles, has a depth of 4 feet (1.2 m) across the bar at the entrance and deeper water inside for several miles. The channel at the mouth is marked by an entrance buoy. 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 (1.5 m) or less draft. A wharf is at **Bayford**, 1½ miles above the entrance, and **James** and **Stewarts** landings are about 4 miles above the entrance. There is a depth of 4 feet (1.2 m) to the upper landings. There is a store and post office at Bayford and gasoline is obtainable. The mean range of tides is 1.8 feet.

Church Creek, on the south side of Nasawaddox Creek, has a depth of about 2 feet (0.6 m) to the head and is little used.

Warehouse Creek, on the south side of Nasawaddox Creek, has a depth of 3 feet (0.9 m) to within 1 mile of the post village of **Franktown**. The best water leads close around the point on the east side at the entrance.

Occohannock Creek, on the eastern side of Chesapeake Bay is 18 miles above the town of Cape Charles. In 1935, it was reported that the natural channel was about 7 feet (2.1 m) deep across the bar at the entrance, 6 feet (1.8 m) inside to **Shields Wharf** (in ruins) 5½ miles above the entrance, and 3 feet (0.9 m) for a farther distance of ½ mile to a fixed bridge at the head of navigation. This bridge has a reported span of 40 feet and highwater clearance of 15 feet (4.6 m). The channel across the bar at the mouth is marked by a beacon, buoys and bush stakes, but is narrow and changeable, and difficult without local knowledge. The channel above the entrance is also narrow and difficult, but the ends of the shoals are marked by buoys to near Concord Wharf. The dredged channel (project 9 feet (2.7 m) deep) directly across the bar has filled in at the outer end to 1½ feet (0.5 m). There is a store and post office at **Concord Wharf**, on the south side 2 miles above the entrance, and a post office and store at **Davis Wharf** on the north side 4 miles above the entrance; gasoline is obtainable here, and there is artesian water on the wharf. Small freight boats with produce connect with Baltimore. **Morley Wharf** (in ruins) 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 aids. There is a grassy islet on the north side, just outside the mouth. The mean range of tides is 1.8 feet.

Craddock Creek, just northward of Occohannock Creek, has a depth of 3 feet (0.9 m) across the flats at the entrance and 4 or 5 feet (1.2 to 1.5 m) 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, on the eastern side of Chesapeake Bay, 9 miles southward of Watts Island Lighthouse, has a reported depth of 9 feet (2.7 m) in 1936, in a dredged channel across the flats at the mouth, the same depth in a natural channel to **Cedar View Wharf**, 2¾ miles above, and 6 feet (1.8 m) 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. Small freighters from Baltimore of 5½ to 7 feet (1.7 to 2.1 m) draft make regular landings in the summer for produce at Cedar View Wharf and Nandua. The channel across the flats at the entrance is narrow and shifting and is marked by buoys, and by bush stakes maintained locally. The flats usually show discolored water. The approaches to both wharves are also generally marked by bush stakes and other marks. Gasoline and some provisions are obtainable at Nandua. 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 mean range of tides is 1.7 feet. In entering, strangers may need local knowledge to carry the best water.

Butchers Creek, 2 miles northward of Nandua Creek, has a depth of 2 feet (0.6 m) at the entrance and deeper water inside. There are no wharves, and the creek is little used except for crabbing.

Pungoteague Creek, on the eastern side of Chesapeake Bay, 7 miles southward of Watts Island Lighthouse, has a reported depth of 9 feet (2.7 m) to the town of **Harborton**, 4 miles above the mouth, and 6 feet (1.8 m) to **Boggs Wharf**, 5 miles above the mouth, above which it shoals rapidly. Steamers from Baltimore of 6 to 8 feet (1.8 to 2.4 m) draft make regular trips to Harborton landing and to **Evans Wharf**, on the north side ½ mile eastward of Harborton. There is a produce canning factory at Evans Wharf. Gasoline, small repairs to engines, and provisions are obtainable at Harborton. The channel as far as Harborton is crooked, but is well marked by buoys and beacons. The mean range of tides is 1.7 feet.

The best water in approaching the entrance is from southwestward, eastward of the ~~lighted~~ bell buoy off the mouth of Nandua Creek, but a depth of 7 feet (2.1 m) can be carried across the flats at the mouth, heading for **Pungoteague Creek Light** (flashing white), black cylindrical tower, on any course eastward of 130° true (SE. ⅛ S. mag.).

In entering, pass 200 yards southward and eastward of Pungoteague Creek Light and steer northeastward for **Hack Neck Shoal Light** red pile structure, passing 100 yards westward and northward of it. Then steer eastward, passing southward of buoy C 3; then steer 65° true (ENE. ⅜ E. mag.) to leave buoy 4 a little on the starboard hand; then mid channel following the several charted buoys (all with white reflectors) and beacons to Harborton. The channel between Harborton and Boggs Wharf is marked by bush stakes, but is narrow and difficult without local knowledge.

Underhill Creek, north of Lofland Point lighted beacon, is reported to have a controlling depth of about 4 feet (1.2 m) with local knowledge. There is a wreck, covered at low water, about 75 yards off the entrance eastern point.

There is a depth of about 4 feet (1.2 m) at high water through the Thorofare from Pungoteague Creek to Onancock Creek, close along shore eastward of the marshy islands. A branch of this thorofare follows along the southwest shore of Parkers Island. The channels are difficult without local knowledge.

Onancock Creek, on the eastern side of Chesapeake Bay 4 miles 149° true (SSE. 1/8 E. mag.) from Watts Island Lighthouse, had a controlling depth, in 1936, of 12 feet (3.7 m) over the bar and 7 feet (2.1 m) in the creek to the town of **Onancock**, at the head of navigation 5½ miles above the mouth. The project provides for a channel 12 feet (3.7 m) deep, 200 feet wide across the bar, thence a minimum 100-foot width to Onancock with a turning basin there. Steamers from Baltimore drawing 7 feet (2.1 m) make regular trips to Onancock, and to **Finneys Wharf**, on the south side, and **Poplar Cove Wharf**, on the north side, 1 and 2¼ miles, respectively, below Onancock. Finneys wharf is on the eastern side of a point having a shoal making northward from it and must be approached from eastward. Gasoline, Diesel oil, and provisions are obtainable at Onancock. There is a marine railway capable of hauling out a boat 75 feet long and 5-foot (1.5) draft. Repairs can be made. The mean range of tides is 1.7 feet.

Directions, Onancock Creek. The Creek is marked by a bell buoy, a light (flashing white), buoys, and many beacons. The channel leads from close southward of the light in an east-southeasterly direction, passing south of buoy C1, north of buoy 2A, thence southeasterly, passing south of beacon 3, 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 beacons are so close together and numerous here that strangers should proceed slowly to avoid being confused, then above here the beacons extend to the wharves at Onancock and are easily followed.

Chesconessex Creek, 3½ miles 118° true (SE. 7/8 E. mag.) from Watts Island Lighthouse, has a depth of 12 feet (3.7 m) to south of **Tobacco Island**, 5 feet (1.5 m) for a farther distance of 1 mile to the village of **Chesconessex**, and 2 to 3 feet (0.6 to 0.9 m) for ¾ mile above Chesconessex. The creek is frequented by many small local boats and an occasional schooner up to 7 feet (2.1 m) draft 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. 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. Favor buoy C1 to clear spit on south side of channel. Gasoline and some provisions are obtainable at Chesconessex. The mean range of tides is 1.7 feet.

Pompco Creek, on the north side of Chesconessex Creek, northwestward of Tobacco Island, has a depth of 6 feet (1.8 m) 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 (0.9 m) at high water can be taken from the head around the eastern side of Tobacco Island into Chesconessex Creek.

POCOMOKE SOUND

(Charts 1223 and 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 near their southern end by **Watts Island Lighthouse** (flashing white), white cylindrical tower. 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, by a few schooners and barges, the deepest draft being 9 feet (2.7 m). Small boats can enter through Broad Creek. The mean range of tides is about 2 feet.

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 (0.9 m) and is sometimes marked by bush stakes, but is difficult without local knowledge. Watts Island lighthouse is on an islet, with conspicuous trees, just southward of the island.

Little Fox Island consists of a group of bare, marshy islands. Great Thoroughfare, northward of Little Fox Island, has a least depth of 4 feet (1.2 m) at high water, and is sometimes used by local boats but is difficult without local knowledge.

Great Fox Island is low and marked by a single prominent poplar tree. There is a group of small red oyster houses on the eastern side.

Cedar Straits, northward of Great Fox Island, has a depth of 3½ feet (1.1 m) at high water through a narrow unmarked channel, and is little used even by local boats.

Beach Island off the point at the southern end of Pocomoke Sound is marked by a prominent unpainted house.

Deep Creek is a shallow, unimportant creek on the southeast side of Pocomoke Sound. The main entrance between the shoal is 3½ miles east-northeastward of Watts Island Lighthouse. It has a depth of 7 feet (2.1 m) for 5 miles above the main channel of Pocomoke Sound to the mouth of the creek, through a crooked channel with extensive flats on each side, and 2 feet (0.6 m) to the head of the creek. There are no wharves, and it is used only by small local boats, many of which come from Hunting Creek through the **Notch**, good for a draft of 3 feet (0.9 m) at high water. The channel is marked by a flashing white light at the entrance and by buoys for 5 miles above. Supplies and provisions are available. There is a marine

railway capable of hauling out a boat 30 feet long and 3-foot (0.9 m) draft. Repairs can be made.

Hunting Creek, on the southeast side of Pocomoke Sound, has a depth of 7 feet (2.1 m) to the mouth of **Bagwell Creek**, 2 miles above the mouth, and 4 feet (1.2 m) 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 (1.2 m). The approach to the creek from the main channel of Pocomoke Sound leads eastward along the south side of **Guildford Flats** for 3½ miles, then southward for 1½ miles to the mouth, and is marked by Guildford Flats light (flashing white) and several buoys. Gasoline, fresh water and provisions can be procured at Hopkins. In entering approach midway between the channel aids at the outer end of Guildford Flats on a 70° true (ENE. ⅞ E. mag.) course, to avoid a 6-foot (1.8 m) spot here, and steer 82° true (E. ⅛ N. mag.) for 1⅝ miles until ⅜ mile past buoy 1, then steer 158° true (S. by E. ⅜ E. mag.) for 1¾ 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 is usually marked by bush stakes, but is difficult without local knowledge. There is a prominent house on Sandy Point.

Guildford Creek is 2½ 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 (2.1 m) to the entrance and 2 to 5 feet (0.6 to 1.5 m) inside. There are no wharves, and it is frequented only by local boats of 2 to 4 feet (0.6 to 1.2 m) draft. The channel is marked by a buoy at the entrance and sometimes by bush stakes above.

Messongo Creek, on the eastern side of Pocomoke Sound, southward of Saxis Island, has a depth of 6 feet (1.8 m) for 5 miles above its junction with the main channel of Pocomoke Sound, shoaling gradually to about 1 foot (0.3 m) at the village of **Marsh Market**, 2½ miles above. The creek is frequented only by small local boats. It is marked by buoys at the entrance. To enter, pass ½ mile north-northwestward of Guilford Flats [redacted] and steer 53° true (NE. by E. ⅜ E. mag.) 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 (0.7 to 0.9 m) 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, and many local boats frequently use this passage. The cove at the northwest end of Starling Creek has a depth of 1 to 2 feet (0.3 to 0.6 m) and is much used as an anchorage by small boats. A project calls for a channel 7 feet (2.1 m) deep to lead from the Sound to this cove; a turning basin and bulkhead are included in the project.

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 and provisions are obtainable.

Pocomoke River, at the northeast end of Pocomoke Sound, has a depth of about 4½ feet (1.4 m) across the flats at the mouth (called the **Muds**), though the bottom is generally soft and vessels run with their keels 1 to 1½ feet (0.3 to 0.5 m) in the mud. The river is navi-

gable for vessels to the town of Snow Hill, 25 miles above the mouth. There is a small rock pile (Spooner Rocks) reported to have a depth of 4½ feet (1.5 m) about 300 yards easterly of Pocomoke River Light. After passing the "Muds" the channel has ample depth and width and is easy of navigation for a distance of 20 miles, above which it has been improved by dredging to a present depth of about 8 feet (2.4 m) and width of 100 to 130 feet as far as Snow Hill, with several cut-offs. 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 Rehoboth and can be used in boilers.

The mean range of tides is about 2.2 feet at the entrance, 2.8 feet at Pocomoke City, and 3 feet at Snow Hill, but is considerably affected by the winds. Freshets cause a rise of 1 to 5 feet (0.3 to 1.5 m) at Snow Hill but are not dangerous.

Shelltown is a post village on the west bank of Pocomoke River, 2 miles above Williams Point. There is a store. Provisions and gasoline are obtainable.

Rehoboth is a post village on the west bank, 9 miles above the entrance. Gasoline and provisions are obtainable.

Pocomoke City is a town with railroad communication, 17 miles above the mouth. All kinds of supplies are obtainable. The marine railway has not been used for several years. The railway bridge has a draw span 61 feet wide and a high water clearance when closed of 5½ feet (1.7 m). The best water leads through the western opening. The highway bridge, ½ mile above, is a double bascule with opening 65 feet wide and high water clearance when closed of 3½ feet (1.1 m).

Snow Hill is a town with railroad communication. A bascule bridge with 40-foot span opening and having a headroom of 1.5 feet (0.5 m) at high water when closed, crosses the river just above the wharves, and the river is navigable for 2 miles above. Five-hour notice should be given for opening the bridge. A pilot may be obtained at Pocomoke City for the river to Snow Hill. Local knowledge is necessary. 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, 2½ miles north-northeastward of Saxis Pier, has a depth of 2 feet (0.6 m) for 1 mile above the mouth and is little used.

East Creek, 2½ miles northward of Saxis, has a depth of 1 to 2 feet (0.3 to 0.6 m) and is little used.

Apes Hole Creek, 4 miles west-northwestward of Saxis, has a depth of 2 feet (0.6 m) 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 reported depth in 1935, of 6 feet (1.8 m) in a dredged channel and is extensively used by local boats. There are lights at each entrance and several buoys in addition at the southern entrance.

Courses and Distances—Pocomoke Sound and River

For reverse direction, read upward	Course (Reverse course in *Italics*) True	Course (Reverse course in *Italics*) Magnetic	Distance
FROM THE SOUTHWARD			
1. **Watts Island Lighthouse** bearing 27° true, distant 10 miles. Passing two miles off *Nandua Creek Lighted Bell Buoy 1 NC:*			
Direct (**Watts Island Lighthouse** ahead)	27	NE. by N (*Points*)	6.5 (*Nautical miles*)
Reverse (same lighthouse astern)	*207*	*SW. by S*	*6.5*
2. **Pocomoke Sound Shoal Buoy 2 A** bearing east-southeast, distant 1,350 yards. 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 a lighted bell buoy:			
Direct	60	ENE	3.3
Reverse	*240*	*WSW*	*3.3*
3. **Little Watts Island Shoal Southeast Buoy 3** bearing northwest by west, distant 0.8 mile. Passing 375 yards off **Beach Island Shoal Light:**			
Direct	25	NNE. ⅞ E	5.0
Reverse	*205*	*SSW. ⅞ W*	*5.0*
4. **Upper Watts Island Shoal Buoy 5** bearing 228° true, distant 1,600 yards. If bound for Hunting, Guildford or Messengo Creeks leave at position 4, following the chart and the directions on page —:			
Direct	355	N. ⅛ E	2.3
Reverse	*175*	*S. ⅛ W*	*2.3*
5. **Tunnel Island Spit Light** bearing east, distant 0.4 mile. Passing 0.3 mile off the light and 250 yards off buoy C 7.			
Direct	37	NE. ⅛ N	2.7
Reverse	*217*	*SW. ⅛ S*	*2.7*
6. **Boundary Line Turn Buoy C** bearing northwest, distant 0.5 mile.			
Direct	58	NE. by E. ¾ E	3.0
Reverse	*238*	*SW. by W. ¾ W*	*3.0*
7. **Messengo Point Shoal Buoy 9** bearing northwest, distant 0.2 mile. Passing 50 yards off buoy 8 and 150 yards off **North End Point Light.**			
Direct (Pocomoke River Light ahead).	47	NE. ¾ E	1.6
Reverse (same light astern)	*227*	*SW. ¾ W*	*1.6*
8. **Pocomoke River Light** bearing 47° true, distant 150 yards.			
From this position follow the chart passing either south of light or north of buoy 10, north of Pig Point Light, south of buoy 11, east of Williams Point Light, and thence follow the west bank at a distance of about 200 yards for ¾ mile and then gradually work off to mid-channel. The mid-channel is clear to within 5 miles of Snow Hill where local knowledge should be obtained.			

TANGIER SOUND

(Charts 1223 and 1224)

Tangier Sound on the eastern side of Chesapeake Bay, with its southern entrance about 48 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 and schooners, the deepest draft being 12 feet (3.7 m) and usual draft 6 to 8 feet (1.8 to 2.4 m). 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 Lighthouse** (group flashing white, red sector), white house on piles, and Watts Island Lighthouse (flashing white), white tower. 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 or a pilot may be necessary. The sound is also entered by vessels 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. There is a village **(Tangier post office)** in the center of the island and several smaller settlements, all composed of people engaged in oystering and fishing.

A new channel has been dredged 7 feet (2.1 m) deep and 60 feet wide along the course 234° true (SW. by W. ⅜ W. mag.) leading from Tangier Sound to the turning basin at Tangier. The basin is 400 feet square and has the same depth. Lights, buoys, and beacons with reflectors mark the channel. It is entered from east of Horse Shoe Islet, a small sand cay about awash at high water. With local knowledge 3 feet (0.9 m) can be carried from Tangier southeastward to the Sound. This channel shifts with storms but is usually bush staked. Gasoline, Diesel oil, and provisions are obtainable, and there is communication with Crisfield by motor boat. There is a marine railway capable of hauling out boats 35 feet long and 4-foot draft. Deck repairs can be made.

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 is the name applied to a large group of marshy lands 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.

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A draft of 5 feet (1.5 m) at low water can be carried from Tangier Sound to Tylerton from southward. The best water leads across the flats about 1⅞ miles southward of **Horse Hammock Point**. In entering, head for Herring Island on a west-southwesterly course until ½ mile from it, then follow the slough northward along Tyler~~s~~ Creek to Tylerton. The channel is sometimes marked by bush stakes, but is difficult without local knowledge.

A channel has been dredged 7 feet (2.1 m) deep and 60 feet wide from Tangier Sound through **Big Thorofare** to a point on **Levering Creek** about 800 feet north of the canal at Ewell, and 4 feet (1.2 m) deep and 25 feet wide around the point between Big Thorofare and Tyler~~s~~ ~~Ditch~~. In 1936 the controlling depth to Ewell was about 5 feet (1.5 m). It is marked by several lights, beacons and a buoy and usually by bush stakes but may be difficult to follow in places without local knowledge. There are several thoroughfares with about 2½ feet (0.8 m) depth, navigable by small boats at high water, leading from the interior of Smith Island westward into Chesapeake Bay. The principal entrance is marked by a light, but local knowledge is necessary.

Little Annemessex River, on the eastern side of Tangier Sound, 13 miles northward of the entrance, is the approach to the town of **Crisfield**, a railroad terminus and important shipping point for sea food. It is frequented by a large number of boats of 2 to 6 feet (0.6 to 1.8 m) draft engaged in the oystering and fishing industry, by steamers from Baltimore drawing 6 to 8 feet (1.8 to 2.4 m) and by some schooners, the deepest draft being 12 feet (3.7 m). A channel has been dredged 12 feet (3.7 m) deep and 425 feet wide from the entrance to Somers Cove Lighthouse, and the same depth and 266 feet wide to the Consumers Ice Co. wharf. A basin with a depth of 12 feet (3.7 m) lies off the wharves, and there is a channel 100 feet wide and 10 feet (3.0 m) 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.

Janes Island Light (flashing white, red sector) at the entrance, is on a black skeleton tower on a black base. A lone concrete stack on the north point at the entrance, and the ice plant and other buildings on the water front are prominent. Gasoline, Diesel oil, fuel oil, ice, water, and provisions are obtainable. The mean range of tides is 1.9 feet.

There are two marine railways at Crisfield each capable of hauling out vessels of 125 tons, 6 feet (1.8 m) 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 (3.7 m) in the anchorage basin, the western limit being 150 yards westward of the end of the steamboat 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 (2.1 to 3.7 m) in the cove on the south side of the steamboat wharf and 4 to 8 feet (1.2 to 2.4 m) in the basin eastward of the drawbridge at the eastern end of the cove, which is considerably used as an anchorage. The bridge has a draw opening 24 feet wide and high water clearance when closed of 2 feet (0.6 m). 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 (0.6 to 1.5 m) and is used only as an anchorage for small craft.

Big Annemessex River, on the eastern side of Tangier Sound, 5 miles northward of Janes Island Lighthouse, has a depth of 8 feet (2.4 m) for 5½ miles above the mouth and 4 feet (1.2 m) for a farther distance of 2 miles, above which it is shoal. The river is frequented by small oyster and fishing boats and some schooners, the deepest draft being 8 feet (2.4 m). The mean range of tides is about 2 feet. **Fords Wharf** (in ruins) is on the north side, at the foot of a road 1½ miles from the post village of **Fairmont**. A depth of 6 feet (1.8 m) can be taken to the piling ruins. An oyster house and unpainted shacks are at the shore. There is a wharf and some oyster and crab packing houses on the south side of **Jones Creek**, and a small village (**Colburn Landing**) on the east side of **Colburn Creek**, where there is a store and gasoline is obtainable.

The entrance to Big Annemessex River is marked by Porpoise Point Light (flashing white) on the north side and by buoys. 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 Lighthouse and eastward of Kedges Straits, is navigable to **Princess Anne**, a town on the railroad, 14 miles above the main channel of Tangier Sound. There are several small villages and landings in the tributaries in the lower end, and this part is frequented by many local fishing and oyster boats. The upper end has some trade in small boats and schooners. The mean range of tides is about 2.5 feet.

At **Rumbley** at the head of **Goose Creek** gasoline, provisions and fresh water can be obtained. There is a depth of 3 feet (0.9 m) to the head.

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.

The entrance is broad, but is obstructed by extensive shoals. The main channel, entering along the southeast side, is narrow and crooked and has ample depth at the entrance, gradually shoaling to 7 feet (2.1 m) at **Locust Point**, 9 miles above. It is well marked by buoys and beacons to within 3 miles of Locust Point. For a distance of 2 miles above Locust Point a channel 6 feet (1.8 m) deep and 100 feet wide has been dredged several years ago, but is now reported to be about 2½ feet (0.8 m) deep. The dredged channel is sometimes marked by bush stakes, but leads between mud flats nearly bare at low water and is difficult to follow without local knowledge. From the upper end of the dredged channel the river has a depth of 5 feet (1.5 m) or more in mid-channel to **Dashiells Wharf**, ¾ mile below Princess Anne, above which it is shoal.

Little Island Channel, entering Manokin River along the northwest side, has ample depth, but a middle ground having a depth of 5 feet (1.5 m) must be crossed to reach the main channel of Manokin River. It is buoyed but is narrow and crooked, and difficult without local knowledge.

Little Island is low. There are oysterhouses and a lighted range on the north end. A clubhouse on the western side, just south of the range, is also prominent.

Deal Island, on the eastern side of Tangier Sound between Manokin and Wicomico Rivers, is the center of a considerable oystering and fishing industry. The flats west of the north end of the Island and toward the main channel of Tangier Sound have depth of 10 to 14 feet (3 to 4.3 m) and are used as an anchorage by small local vessels. A flashing white light marks the western extremity of the 6-foot (1.8 m) curve west of **Haines Point.** A breakwater about 350 feet long extends from the north end of Deal Island and converges with another about 460 feet long, which extends from the mainland. A channel dredged 9 feet (2.7 m) deep, extends from Tangier Sound, passes between the ends of the breakwaters and terminates at a turning basin near the fixed bridge. An anchorage basin 6 feet (1.8 m) deep and 150 feet wide lies adjacent to the bridge. The outer channel reach is marked by buoys, a beacon and a lighted range, course: 89½° true (E. ½ S. mag.). The island is connected with the mainland by a fixed bridge. Gasoline and provisions are obtainable at **Wenona,** Deal Island, and at Chance (Haines Point) on the mainland. These villages have post offices. The old steamboat wharf at the northwest end of the island is gone.

Lower Thoroughfare, between Little Island and the south end of Deal Island, has been improved by dredging a channel 80 feet wide, with a reported depth in 1936 of 4½ feet (1.4 m), from westward to the wharf at Wenona, widened to 180 feet in the upper ¼ mile to form an anchorage. From the entrance buoy the channel leads to buoy 3, on a lighted range ahead, both lights fixed red, course 80° true (E. ¼ N. mag.), then east-northeastward toward the north end of Little Island until 180 yards from it, and then northward with the wharf a little on the port bow. There is a depth of 1 foot (0.3 m) around the northeast end of **Little Island.**

Laws Thoroughfare, between Deal Island and the mainland has a depth of 2 feet (0.6 m) from the southward as far as the cove eastward of the northern end of the island, but navigation from northward is obstructed by a fixed bridge having a headroom of 3 feet (0.9 m) at high water, span about 8 feet, and a depth underneath it of 1 foot (0.3 m) at low water.

Kedges Straits is described under a separate heading on page 275.

Island **South Marsh,** on the north side of Kedges Straits, is a low marsh with scattered clumps of trees and no buildings except a few oysterhouses.

Holland Island is low and marshy. There are a few empty houses but no inhabitants.

Holland Straits, leading between Holland and Bloodworth 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 (0.6 to 1.5 m) and the deepest draft 8 feet (2.4 m). It has a depth of 11 feet (3.4 m) from southward to abreast Holland Island and 4 feet (1.2 m) from Holland Island northward and eastward into Tangier Sound. The usual course taken leads between Deep Banks Island and South Marsh. The channel is narrow in places and unmarked, and is difficult with-

out local knowledge. **Spring Island** is low and marked by a shanty and a single tree on the north end.

Bloodworth Island is a marsh with scattered clumps of trees and has a few oyster and crab houses on the eastern side. There are no prominent marks. The waters surrounding it are frequented by many small local boats.

Wicomico River, 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 regular steamers drawing 6 to 8 feet (1.8 to 2.4 m) and many freight schooners, the deepest draft being about 10 feet (3.0 m). The lower end is also frequented by oyster and fishing boats.

The dredged project calls for a channel 100 feet wide and 12 feet (3.7 m) deep from deep water in Monie Bay, near Great Shoals Lighthouse to the Main Street bridge at Salisbury. And 100 feet wide and 9 feet (2.7 m) deep in the North and South Prongs at this town to the head of navigation with a turning basin in each Prong. The controlling depth in the river is reported to have shoaled somewhat at present but the depths in the Prongs are about as projected. Chart 567 of Wicomico River is the best guide for navigating the channel to Salisbury.

The entrance is 1½ miles wide and is obstructed by extensive shoals, through which a narrow, crooked channel leads. It is marked by **Great Shoals Lighthouse** (fixed white), white house on piles, and by lights and buoys as far as Mount Vernon, 7½ miles above its junction with the main channel of Tangier Sound. There are extensive flats bare at low water between Mount Vernon and Salisbury, but they are covered by marsh grass in summer. Strangers of a deeper draft than 8 feet (2.4 m) may need to take a pilot. Strangers of a less draft can enter with the aid of the chart and the aids. Steamers make daily stops at Mount Vernon, Whitehaven and Salisbury from Baltimore. The mean range of tides is 2.5 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. Ice usually forms on the river as far down as Whitehaven. In ordinary winters the channel is usually kept open by the regular steamers, 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 winter 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. Gasoline and supplies can be obtained.

Monie Bay, a cove on the south side of Wicomico River, just inside the mouth, has a depth of 5 feet (1 5 m) in the entrance and 4 feet (1.2 m) in mid-channel to the head. It is frequented only by small local boats. Monie and Little Monie Creeks at the head are unimportant but there is deep water inside the former creek. There is a highway bridge 2 miles above the entrance.

Mount Vernon is a small village on the south side of Wicomico River, 3 miles above Great Shoals Lighthouse. **Mount Vernon Wharf,** at which the steamers land, is 1½ miles east-northeastward of the village.

Whitehaven is a post village on the north side of Wicomico River 6½ miles above Great Shoals Lighthouse. It has several oyster-packing houses and is frequented by many oyster and fishing vessels. Gasoline and provisions are obtainable, and there is a marine railway capable of hauling out vessels of 150 tons, 150 feet length, and 6 feet (1.8 m) draft forward.

Wicomico Creek, on the south side of Wicomico River, 8½ miles above Great Shoals Lighthouse, is navigable for small craft for several miles and is sometimes used by motor boats and small schooners to the farm landings. In entering the creek the best water leads northward of a shoal making northward from the south side of the entrance, then close southward of an islet in the mouth. The entrance channel is usually marked by stakes.

At **Shad Point**, 2 miles below Salisbury, there is a marine railway capable of hauling out vessels 75 feet long, 35 tons and 5 feet (1.5 m) draft with facilities only for minor repairs. Gasoline and provisions can be obtained near here.

Salisbury, at the head of navigation on Wicomico River, has trade in vessels up to about 10 feet (3.0 m) draft. The river forks at the south end of the town. The **North Prong** has been dredged 9 feet (2.7 m) deep and 100 feet wide to a milldam ⅜ 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 39 feet and high water clearance when closed of 1 foot (0.3 m). The **South Prong** has been dredged 100 feet wide and 9 feet (2.7 m) deep, to the head of navigation ½ mile above the fork with a turning basin at the head. It is crossed by two single bascule bridges; the first, having a span 42 feet wide and high water clearance when closed of 1½ feet (0.5 m), the second, having a span 40 feet wide and similar clearance of 8 feet (2.4 m). All kinds of supplies are obtainable at Salisbury, and there is a railway capable of hauling out vessels of 1,000 tons, 160 feet length and 12 feet (3.7 m) draft, and shops for mill and woodwork repairs and ordinary repairs to motors. **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 8½ feet (2.6 m) to the town of Seaford, Del., at the head of navigation, 36 miles above the entrance. A draft of about 11½ feet (3.5 m) can be taken to here at high water. Pilots can be obtained at Roaring Point. A steamer from Baltimore goes as far as Nanticoke. 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 (6.1 m) 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 (2.7 m) and should be used

by strangers. The channel eastward of the middle ground has a depth of 6 feet (1.8 m) 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 8½ feet (2.6 m), and the channel is narrow and unmarked. For a distance of 1¾ miles below Seaford a channel had been dredged 9 feet (2.7 m) deep and 100 feet wide to the county bridge, with a turning basin at the head. The water is fresh above Vienna and can be used in boilers.

Sandy Point, on the west side, at the entrance, is marked by a prominent clump of trees.

Nanticoke is a post village on the east side, 3½ milse above Clay Island Shoal Light. **Nanticoke Wharf**, on the south side of Roaring Point, ¾ mile from Nanticoke, is in ruins.

Bivalve is a post village on the east side, 6½ miles above Clay Island Shoal Light. The wharf is in ruins.

Wetipquin Creek (Tyaskin Creek), on the east side, 8 miles above Clay Island Shoal Light, has been improved by dredging a channel with a present depth of about 4½ feet (1.4 m) and 120 feet wide from Nanticoke River to the wharf at the post village of **Tyaskin**, on the south side, just inside the mouth. A turning basin of about 10 feet (3.0 m) depth has been dredged off the wharf. Gasoline and provisions are obtainable. The channel is marked by bush stakes. The course in the channel is 135° true (SE. ⅝ S. mag.), heading for the white buildings on the wharf, but local knowledge is required.

Nanticoke River Upper Light (flashing white) marks the shoal spit north of the entrance to the creek.

Wetipquin is a post village on the east side of Nanticoke River, 1½ miles above Wetipquin Creek. **Sandy Hill Landing** (in ruins) is at the foot of the road ½ mile from Wetipquin.

Quantico Creek, on the east side, 13 miles above Clay Island Shoal Light, has 4 feet (1.2 m) at the entrance, but 7 feet (2.1 m) at high water for 10 miles and is used by small boats to the farm landings and mills near the head.

Rewastica Creek, on the east side, just above Quantico Creek, has a controlling depth of 6 feet (1.8 m) 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. All kinds of supplies can be obtained. Boat repairs can be made but no hauling out. The railroad bridge has been replaced by a highway double bascule bridge with span of 80 feet, between fenders, and high water clearance of 17 feet (5.2 m) when closed. The draw span of the former bridge lies adjacent to the upper side of the new bridge just clear of the channel leading from the draw.

Riverton is a post village on the east side, just below the junction of Nanticoke River and Marshyhope Creek.

Marshyhope Creek (northwest fork of Nanticoke River) empties into the river 26 miles above the mouth. It has a depth of about 5 feet (1.5 m) for 14 miles above the mouth to within ½ mile of the town of **Federalsburg**, the upper 4¼ miles having been improved by dredging to a depth of 6 feet (1.8 m) and width of 60 feet, with a turning basin at the head. For 1 mile above, 2 feet (0.6 m) can be

carried. The creek has some trade in small vessels, the deepest draft being 7 feet (2.1 m). The lower part is easy of navigation, but the upper end is difficult without local knowledge. **Brookview** is 5 miles above the mouth, and there are several other small villages. Gasoline and provisions can be obtained here. 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 at Brookview with a double bascule span 60 feet wide and high water clearance of 11 feet (3.4 m) when closed, opened only from sunrise to sunset except by notice; at **Harrisons Ferry** with draw span 52 feet wide and high water clearance about 5 feet (1.5 m) when closed; and two fixed bridges, railroad and highway, at Federalsburg.

Sharptown is a town on the east side of Nanticoke River, 28 miles above the mouth. It has several mills and canneries and considerable trade. Gasoline and provisions are obtainable. A bridge having a center pier draw, each opening 75 feet wide with a headroom of 6 feet (1.8 m) at high water when closed, crosses the river at Sharptown.

Broad Creek, emptying into Nanticoke River from eastward 3½ miles above Sharptown, has been improved by dredging a channel about 4 miles long with a controlling depth, ascertained in June 1934, of 8 feet (2.4 m) and 70 feet wide from Portsville Landing to the head of navigation at Laurel, a town on the railroad 6½ miles above the mouth. Several sharp bends in this area have been straightened and widened, and a turning basin has been dredged below the railroad bridge. The dredged channel extends 230 yards above this bridge, and small boats can go to a milldam ¼ mile above.

Laurel has several mills and considerable trade in vessels, the deepest draft being 9 feet (2.7 m). A railroad bridge, having a draw opening 40½ feet wide and a height of 16½ feet (5.0 m) when closed, crosses the creek at the lower end of the town. Three other bridges cross at this town with draw spans respectively, 29½, 37 and 40½ feet wide, all with high water clearances of about 4½ feet (1.4 m), when closed. Gasoline and provisions can be obtained. Repairs can be made which do not require hauling out.

Bethel is a village on Broad Creek, 2½ miles below Laurel. A highway bridge having a draw opening 52 feet wide and high water clearance, when closed, of 3½ feet (1.1 m) crosses the river at **Bethel**.

A vehicular ferry crosses the river at **Woodland**, Delaware, about 3½ miles below Seaford.

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 64 feet wide, a headroom of 2 feet (0.6 m) 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 39 feet wide, and a headroom of 4 feet (1.2 m) at high water when closed. The horizontal clearances given are between fenders. There is a depth of about 7 feet (2.1 m) for 1½ 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. Two plants were in operation building yachts. Repairs can be made but there is no railway for hauling out at this town.

Gasoline and provisions are obtainable and there is water on the wharves.

Tides.—The mean range of tides is 2.5 feet at the entrance, 3 feet at Vienna, 2.6 feet at Marshyhope Creek, 3 feet at Laurel, and 3.4 feet at Seaford.

Fishing Bay, at the north end of Tangier Sound, has a depth of 11½ feet (3.4 m) in a narrow partially marked channel to **Fishing Point,** 6 miles above the entrance, and 7 feet (2.1 m) can be carried anywhere in mid-channel to this point. Above Fishing Point the bay shoals rapidly to 3 feet (0.9 m) in the upper end. **Elliott** is a post village on Fishing Point. Gasoline and supplies can be obtained here as well as at **Crocheron** in Tedious Creek, on the southwest side of the bay. Pilots for Fishing Bay and the tributaries at the head can be had at **Bishop Head** or Fishing Point. There is a prominent white house on Bishop Head point.

Blackwater River, at the northern end of Fishing Bay, has a depth of about 2 feet (0.6 m) at the mouth and deeper water inside. It is said to be navigable for 15 miles or more, and is used by small vessels carrying produce and canned goods.

Transquaking River, emptying into the northern end of Fishing Bay, has a depth of about 2 feet (0.6 m) 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 **Chicacomico River;** both are said to be navigable for several miles and are frequented by small vessels carrying produce.

KEDGES STRAITS

(Chart 1224)

Kedges Straits, connecting Tangier Sound and Chesapeake Bay between Smith Island and South Marsh, has a least depth of 10 feet (3.0 m), and is used by many vessels of 6 to 9 feet (1.8 to 2.7 m) draft bound from northward to points on Tangier Sound southward of Manokin River. It is marked by **Holland Island Bar Lighthouse** (group flashing white), white house on piles (fog signal, an air diaphone); *South March Spit Lighted Bell Buoy 1;* and Solomons Lump Lighthouse (fixed white, 2 red and 1 dark sectors), white house on brown cylinder, fog signal on bell; and by unlighted buoys.

It is easy of navigation by day with the aid of the chart. The islands adjacent to it are low and present no prominent marks. The mean range of tides is 1.7 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 (0.6 m) below the normal. Floating ice in the winter makes the navigation of the straits dangerous, tugs from Baltimore being often employed to tow local vessels through the ice.

HOOPER STRAIT

Hooper Strait, the most northerly entrance to Tangier Sound, leads between Hooper Island and **Bishop Head** on the north and Bloodworth 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 (3.7 m) 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 (2.7 m), the deepest draft usually passing through at high water.

It is marked by *Richland Point Lighted Bell Buoy 1;* **Honga River Light** (flashing white); **Hooper Strait Lighthouse** (flashing white, 2 red sectors), white house on piles, fog signal is an air diaphragm horn; **Bishop Head Shoal Light** (flashing white) and **Sharkfin Shoal Lighthouse** (fixed white, red sector), white house on piles, fog signal on bell; and by unlighted buoys.

Strangers should be able to enter in the daytime by following the directions closely. The mean range of tides is 1.7 feet at Hooper Strait Lighthouse and 2.2 feet at Sharkfin Shoal Lighthouse. 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 (0.6 m) below the normal and this is important to vessels passing through Kedges and Hooper Straits and into Crisfield Harbor.

Courses and Distances—Tangier Sound

For reverse direction, read upward	Course (Reverse course in *Italics*)		Distance
	True	Magnetic	
		See page 146	
1. Tangier Sound Lighthouse bearing 42° true, distant 10 miles (from the main channel in Chesapeake Bay). Passing about 1.2 miles off San Marcos wreck bell buoy and 0.3 mile off buoy 2. (Fish trap limits shown on chart 1223.):	°	*Points*	*Nautical miles*
Direct	45	NE. ⅝ E	10.6
Reverse	*225*	*SW. ⅝ W*	*10.6*
2. Tangier Sound Lighthouse bearing west, distant 1,575 yards. Passing 100 yards off lighted bell buoys 9 and 2A, and about 0.6 mile off Janes Island Light:			
Direct	7	N. by E. ¼ E	10.7
Reverse	*187*	*S. by W. ¼ W*	*10.7*
3. Janes Island Shoal Buoy 4 bearing east, distant 200 yards. Porpoise Point Light on port bow ahead:			
Direct	20	NNE. ⅜ E	2.6
Reverse	*200*	*SSW. ⅜ W*	*2.6*
4. Terrapin Sand Lighted Bell Buoy 11 bearing 210° true, distant 950 yards. Passing 350 yards off buoy 6:			
Direct	328	NNW ¼ W	5.0
Reverse	*148*	*SSE. ¼ E*	*5.0*
5. Solomons Lump Lighthouse bearing 233° true, distant 2.8 miles. Passing 300 yards off lighted bell buoy 8, and passing Haines Point Light and Upper Thoroughfare Front Range Light on range, leaving it slightly open:			
Direct	353	N	6.2
Reverse	*173*	*S*	*6.2*

Courses and Distances—Tangier Sound—Continued

For reverse direction, read upward	Course (Reverse course in *Italics*) True	Course (Reverse course in *Italics*) Magnetic	Distance
6. Sharksfin Shoal Lighthouse bearing 355° true, distant 2800 yards. Passing 400 yards off buoy 10:			
Direct (**Clay Island Shoal Light** ahead)	40	*Points* NE. ⅛ E	*Nautical miles* 1.7
Reverse (same light astern)	*220*	*SW. ⅛ W*	*1.7*
7. Sharksfin Shoal Lighthouse and Bishop Head Light on Range with former light distant 1.2 miles:			
Direct	51	NE. by E. ⅛ E	1.8
Reverse	*231*	*SW. by W. ⅛ W*	*1.8*
8. Clay Island Shoal Light and Bishop Head Light on Range, with former light distant 1100 yards. Passing 200 yards off buoy 2 and 150 yards off buoy 4. Entering the Nanticoke River:			
Direct	7	N. by E. ¼ E	2.6
Reverse	*187*	*S. by W. ¼ W*	*2.6*
9. Roaring Point Light bearing east, distant 150 yards.			
Continue up the *Nanticoke River* following the chart and local information.			
Little Annemessex River:			
Leave course between positions 2 and 3 above; when *Little Annemessex River Lighted Bell Buoy 1* bears 55° true, head for the buoy, and thence follow the aids and chart to Crisfield.			
Big Annemessex River:			
Continue course between positions 3 and 4 above, beyond position 4 to within 700 yards of **Porpoise Point Light,** and thence proceed eastward following the aids and chart.			
Manokin River:			
Leave the course between positions 4 and 5 above, when off the northeast end of Smith Island, steer 39° true (NE. ⅛ E. mag.) so as to pass 300 yards southeast of the *Junction Buoy* and *Piney Island Shoal Lower Buoy 1,* thence follow the aids and chart.			
Kedges Strait:			
Leave the course between positions 4 and 5 above, when **Solomans Lump and Holland Island Bar Lighthouses** are on range, and steer 293° true (NW. by W. ⅝ W. mag.) until north of buoy 2, and thence westerly to Chesapeake Bay, passing south of Holland Island Bar and the fish trap limits (see chart 1224).			
Wicomico River:			
Leave the course between positions 6 and 7 above, when buoy 10 bears 102° true, steer 67° true (ENE. ⅝ E. mag.) to midway between buoys 3 and 4, passing close southerly of **Wicomico River Light,** and thence follow the aids and chart.			

Courses and Distances—Tangier Sound—Continued

For reverse direction, read upward	Course (Reverse course in *Italics*) True	Course (Reverse course in *Italics*) Magnetic	Distance
9. Roaring Point Light bearing east, distant 150 yards—Continued.			
Fishing Bay:			
Leave the course between positions 6 and 7 above, steering 333° true (N. by W. ¾ W. mag.) with buoy 10 astern, passing close to *Sharksfin Shoal Buoy* and *Clay Island Shoal Buoy 2*, and thence follow the aids and chart.			
Hooper Strait:			
Leave the above course 333° true (N. by W. ¾ W. mag.) into Fishing Bay at—			
1B. Sharksfin Shoal Buoy bearing southwest, distant 125 yards:			
	°	*Points*	*Nautical miles*
Direct (Wicomico River Light astern)	280	WNW. ½ W	1.2
Reverse (same light ahead)	*100*	*ESE. ½ E*	*1.2*
2B. Sharksfin Shoal North Side Buoy 8 bearing 115° true, distant 0.3 mile. Passing 250 yards off buoy 6:			
Direct (*Clay Island Shoal Buoy 2* astern).	230	SW. by W. ⅛ W	1.3
Reverse (same buoy ahead)	*50*	*NE. by E. ⅛ E*	*1.3*
3B. ~~**Bishop Head Shoal Light bearing northwest, distant ¼ mile.**~~ Round the Light:			
Direct	various		0.3
Reverse	*various*		*0.3*
4B. Bishop Head Shoal Bell Buoy 1 bearing east, distant 250 yards:			
Direct (Hooper Strait Light ahead)	306	NW. ⅛ W	1.6
Reverse (same light astern)	*126*	*SE. ⅛ E*	*1.6*
5B. Bloodsworth Island Flats North End Buoy 4 bearing southwest, distant 300 yards:			
Direct	292	NW. by W. ⅜ W	1.2
Reverse	*112*	*SE. by E. ⅜ E*	*1.2*
6B. Hooper Strait Light bearing 74° true, distant 0.3 mile. Passing 700 yards off buoy 2 and 1350 yards off bell buoy 1:			
Direct (Hooper Strait Light astern)	74	E. ¾ N	
Reverse (same light ahead)	*254*	*W. ¾ S*	
7B. Chesapeake Bay.			
Honga River:			
Leave the course between positions 6B and 7B above, on a 345° true (N. ¾ W. mag.) course with buoy 2 astern and Crab Point Light ahead, passing 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.)			

HONGA RIVER TO LITTLE CHOPTANK RIVER

(Charts 1224 and 1225)

Honga River, on the eastern side of Chesapeake Bay, north of the western end of Hooper Strait, has a depth of 18 feet (5.5 m) in a narrow crooked channel (marked by lights and buoys) for 11 miles above the mouth to Hunting Ridge Point Light, just north of **Wroten Island.** From here a channel, dredged in 1935 about 5 miles long, 7 feet (2.1 m) deep, and 60 feet wide, leads northwesterly to Honga River Upper Light, then southwesterly through Fishing Creek drawbridge, and continues through **Tar Bay (Barren Island Gaps Channel,** see p. 280) to Chesapeake Bay. The entire dredged channel is marked by lights and usually by bush stakes. Above the dredged channel in Honga River it shoals rapidly to a depth of 2 to 4 feet (0.6 to 1.2 m) at the head. There is a strong current through Fishing Creek except a few minutes at each turn of the tide. 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 1.6 feet.

Fox Creek, on the eastern side of Honga River, 3 miles above the mouth, has a depth of 8 feet (2.4 m) to **Wingate Point Wharf** (in ruins). The channel is marked by a light at the entrance, a day beacon with prismatic reflector on the point of shoal off **Paul Point,** and sometimes by bush stakes. **Wingate** is a post village 1 mile from the wharf.

Hooper Island consists of a row of 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 bridge with two spans about 27 feet wide and high water clearance of 6 feet (1.8 m) when closed; and by **Narrows Ferry** bridge with spans about 25 feet wide and have high water clearance of 2 feet (0.6 m) when closed. About 2½ feet (0.8 m) can be carried 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.

There are two villages on the islands, with a total population of about 1,500. The towns are **Fishing Creek** on the northern island and **Hoopersville** on the middle island. Applegarth on the southern island has been abandoned for several years. The wharf at Hoopersville has a depth of 12 feet (3.7 m) at mean low water. This is one of the most important sea-food shipping centers on Chesapeake Bay, hundreds of boats being engaged in the trade. There are several packing plants, general stores, churches, schools, and a marine railway capable of hauling out and repairing a boat 100 feet long and 5-foot (1.5 m) draft. The latter is located 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 (0.6 m). 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 and Back Creek postoffice is in the village of Fishing Creek.

Barren Island Gaps Channel connects the upper part of the Honga River with Chesapeake Bay as has been described previously. (See Honga River.) This improved channel makes possible a direct inside route for craft of moderate draft between the Upper Bay and Tangier Sound, and thus avoids an exposed reach of the Bay.

Golden Hill is a post village at the northern end of Honga River, and can be reached by boats of 2 feet (0.6 m) draft at low water.

A draft of 3 or 4 feet (0.9 to 1.2 m) 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 4 feet (1.2 m) at high water and span of about 35 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 (0.9 m) at high water and is crossed by a fixed bridge near the entrance having a headroom of about 4 feet (1.2 m) at high water and span of about 25 feet.

LITTLE CHOPTANK RIVER

(Chart 1225)

Little Choptank River, on the eastern side of Chesapeake Bay, 4½ miles southward of Sharps Island, is frequented by local boats, the deepest draft being 9 feet (2.7 m). The river is obstructed by shoals, but has a depth of 14 feet (4.3 m) in a narrow, crooked channel for 8 miles above the mouth and 6 feet (1.8 m) for a considerable distance into most of the tributaries. Some of the shoals are marked by buoys, but strangers may have trouble in taking a greater draft than 6 feet (1.8 m) above the mouth of Slaughter Creek. The channels in the principal tributaries are usually marked by bush stakes, but are narrow and crooked and difficult without local knowledge. A wreck with 8 feet (2.4 m) of water over it lies ¾ mile south-southeast from Hills Point.

Cove

Oyster Bay, on the south side of Little Choptank River, just inside the entrance, has a depth of 3 feet (0.9 m) in mid-channel to near the head, but is little used. There is a depth of 1 foot (0.3 m) 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 been improved by dredging a channel 7 feet (2.1 m) deep and 100 feet wide across the bar at the entrance and has a depth of about 5½ feet (1.7 m) in a narrow channel to the post village of **Taylor Island,** 2½ miles above the entrance, where there are two wharves. It is used by schooners up to about 6½ feet (2.0 m) draft. The dredged channel is marked by lights, buoys, and bush stakes. There are also bush stakes above the entrance, but local knowledge is required to keep in the channel. A drawbridge having a clear opening 26 feet wide and 4-foot (1.2 m) headroom at high water when closed crosses the creek at Taylor Island; the creek shoals rapidly above the bridge, though small boats can pass through into Honga

River or Chesapeake River, at high water. (See p. 280.) Gasoline, water, and provisions are obtainable at Taylor Island.

Brooks Creek, on the north side of Little Choptank River, has a depth of 6 feet (1.8 m) in a narrow, unmarked channel to within ¾ mile of the head. It is frequented only by small local craft.

Hudson Creek, on the north side of Little Choptank River, 6½ miles above the entrance, has a depth of 7 feet (2.1 m) to near the head.

Vessels drawing 6 feet (1.8 m) may go to **Speddens Wharf,** near the head, ½ 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 Speddens Wharf.

Madison Bay, on the southeast side, opposite Hudson Creek, has general depths of 6 to 8 feet (1.8 to 2.4 m) and about 5 feet (1.5 m) at the wharf at the post village of **Madison.** Gasoline can be obtained at the village.

Fishing Creek, on the south side of Little Choptank River, 8 miles above the entrance, has a depth of 6 feet (1.8 m) 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, 2½ miles above the entrance, has a depth of 7 feet (2.1 m) to **Milton Wharf,** near the post village of ~~**Woolford**~~ Milton, 1½ miles above the mouth, and 3 feet (0.9 m) for a farther distance of ½ mile to the foot of a road ½ mile from the post village of **Church Creek.** It is used by schooners of 6 feet (1.8 m) draft as far as Milton Wharf. Gasoline and provisions may be obtained at Milton Wharf and Church Creek.

Phillips, Beckwiths, ~~Gurey~~, and **Lees 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 (3.7 to 5.5 m) in the bight between James Island and Hooper Point if the shores be given a berth of ½ mile or more.

Tides.—The mean range of tides in Little Choptank River is 1.5 feet.

Directions, Little Choptank River.—Keep clear of the fish-trap area along the east shore of Chesapeake Bay, shown on the chart by dashed lines, proceeding to a position 2 miles 74° true from *Sharps Island Lighted Bell Buoy 18A*. Then steer 105° true (ESE. mag.) 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° true (SW. ¾ S. mag.) passing ¼ 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

(Chart 1225)

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 (1.5 to 2.4 m) and the deepest draft 15 feet (4.6 m).

Fish-trap limits are shown on the chart.

Channels.—The main entrance to Choptank River leads southward and eastward of Sharps Island. It has a least depth of 28 feet (8.5 m) and is broad and easy of access. The channel, clear of fish traps, northward of Sharps Island Lighthouse has a least depth of 12 feet (3.7 m), and is used by vessels of 10 feet (3.0 m) 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), 2½ miles west of Tilghman Island, and steer 138° true (SE. ⅞ S. mag.) to a position between lighted bell buoy 3 and the horizontally striped buoy southward of it, then 76° true (E. ⅝ N. mag.) to 100 yards north of lighted bell buoy 6.

The channel is marked by lights and buoys from the mouth to the town of Choptank, 27½ miles above, and is easily followed with the aid of the chart. There are no marks above Choptank, but 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. Steamers from Baltimore make regular landings at Cambridge about 16 miles above the mouth. There is railroad communication at Oxford, Easton, Cambridge, Denton, Greensboro, and Hillsboro.

Sharps Island, a low island marked by a single tree, lies in Chesapeake Bay off the entrance, and **Sharps Island Lighthouse** (fixed white, red sector), brown tower on cylindrical pier, 1 mile north-northwestward of Sharps Island, is the principal guide to the entrance. The island is subject to rapid erosion. There is an obstruction about ¾ mile north-northwest and an ice breaker about ½ mile south by east of Sharps Island Lighthouse.

Tilghman Island, on the north side of the entrance to Choptank River, is the center of 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, has a general depth of 2 feet (0.6 m) in a narrow channel to Fairbank at the head. The Cove, marked by a light is extensively used as an anchorage by small craft. A buoy marks a wreck in the entrance. There is a railway at Fairbanks capable of hauling out a boat 50 feet long and 3-foot (0.9 m) draft. General repairs can be made.

Dogwood Harbor (Tilghman Island Harbor), on the eastern side of the island, has a depth of 10 feet (3.0 m) to the wharf at Avalon.

The harbor is frequented by many local boats 3 to 7 feet (0.9 to 2.1 m) draft. Gasoline, water, and provisions may be obtained, and there is a railway capable of hauling out boats 50 feet long and 3-foot (0.9 m) draft. Repairs can be made.

In entering, leave buoy 1, 100 to 400 yards on the port side, buoy 2 (light marks 6-foot (1.8 m) spot northward), 80 yards on the starboard side, then head for the end of the wharf.

Knapps Narrows, at the northern end of Tilghman Island, has been improved by dredging a channel in 1935, 9 feet (2.7 m) deep, 75 feet wide with additional widening at the bends, between Harris Creek and Chesapeake Bay 9-foot (2.7 m) depth curves. The channel and both entrances are marked by lights. Also bush stakes are at the entrances. There is an anchorage basin, 120 by 320 feet, and 9 feet (2.7 m) deep just southwest of the bridge. The bascule bridge has a span of 50 feet and 8-foot (2.4 m) high water clearance when closed. Draw is closed from ½ hour after sunset to ½ hour before sunrise. Supplies are available. There is a maritime railway capable of hauling out a boat 60 feet long and 4-foot (1.2 m) draft. Repairs can be made.

Harris Creek, on the north side of Choptank River, just inside the entrance, has a depth of 12 feet (3.7 m) in a narrow, crooked channel for 5½ miles above the mouth, 6 feet (1.8 m) for a farther distance of 2 miles, and 1 foot (0.3 m) to **McDaniel** railroad station at the head. It is frequented by oyster and produce boats and small craft bound to the railroad station at McDaniel. 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.

Tripps 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 (5.5 m) for 5 miles above the mouth and 6 feet (1.8 m) to near the heads of most of the tributaries. There is a depth of 3 feet (0.9 m) 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 (1.8 m) 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 8 feet (2.4 m) in the entrance and 6 feet (1.8 m) 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 (4.9 m) for 5 miles above the mouth and 12 feet (3.7 m) for a farther distance of 2 miles, above which it has been improved by dredging a channel 8 feet (2.4 m) 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. The river is frequented by steamers to Oxford and by schooners and motor boats. **Choptank River Lighthouse** (fixed white, 2 red sectors) white house on piles, is on a shoal off the entrance. A draft of 12 feet (3.7 m) at low water can be taken into the entrance on either side of the lighthouse by giving it a berth of 400 yards or more, however, the channel to the eastward is the wider and deeper one of the passages on either side of the light. There are no marks in the lower reach of the river except bush stakes. Buoys mark a section of river channel from **Pecks Point** 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, 1½ miles above the entrance. There is a depth of 15 feet (4.6 m) at the wharves on the north side of the town and 6 to 9 feet (1.8 to 2.7 m) at the railroad wharf at the south end. The town has railroad communication. Storm warnings are displayed here. A white water tank stands well above the trees and can be seen for a considerable distance.

Town Creek, on the eastern side of Oxford, has a reported depth, in 1934, of 10 feet (3.0 m), and is extensively used as an anchorage by local craft. There are two railways on the creek each capable of hauling out boats 100 feet long and 9-foot (2.7 m) draft. Machine shop facilities are available. Gasoline and supplies can be purchased.

Bellevue is a village on the west side of Tred Avon River, ¾ mile northward of Oxford. Several oyster-packing houses are prominent. There is a depth of 8 feet (2.4 m) at the wharf.

Double Mills is a landing on the western side, 3 miles above Oxford.

Island Creek, 1¼ miles eastward of Choptank River Lighthouse, has a depth of 7 feet (2.1 m) in a narrow unmarked channel through the entrance, and this depth can be taken to near the head. The best water favors the eastern side at the entrance.

A white water tank and several large buildings at **Castlehaven** on the south side of the Choptank are prominent.

Lecompte's Bay, on the south side of Choptank River, 3 miles above Choptank River Lighthouse, has a depth of 8 feet (2.4 m) to **Travers Wharf**.

La Trappe Creek, on the north side of Choptank River, 3½ miles above Choptank River Lighthouse, has been improved by dredging a channel 11 feet (3.4 m) deep and 150 feet wide across the bar at the entrance and 8 feet (2.4 m) 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. The depth across the bar is now reported to be about 9 feet (2.7 m). It is frequented by schooners up to 9 feet (2.7 m) 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 1½ miles from Trappe Landing.

Dickinsons Bay, just eastward of **Howells Point**, which is marked by a light, has depths of 3 to 5 feet (0.9 to 1.5 m) and is little used.

Off Hambrooks Bar there is a flashing white light, with red sector, and in the cove east of it there is a good small-boat anchorage.

Cambridge, a town with railroad connections, on the south side of Choptank River, 17 miles above the mouth, has considerable trade in bay steamers and schooners and is the center of a large oystering and fishing industry. The deepest draft going to the town is 13 feet (4.0 m).

Cambridge Harbor is a creek ⅔ mile long on the eastern side of the town. A channel has been dredged to a depth of 12 feet (3.7 m) and 150 feet wide from Choptank River to the bridge, and 10 feet (3.0 m) and 100 feet wide to the head of the harbor, with a turning basin 200 feet square at that point. In March 1936, the controlling depths were 9¼ and 8½ feet (2.8 and 2.6 m), respectively.

The bridge is a center-pier draw, each opening 45 feet wide, between fenders, with a clearance of 1½ feet (0.5 m) at high water when closed. The draw is closed from 8 p. m. to 6 a. m. The entire harbor is considerably congested by small boats during the oyster season. Two marine railways are located at Cambridge, the larger one having a capacity for vessels up to 100 feet long, 9 feet (2.7 m) draft, and 150 tons. Gasoline, Diesel oil, and provisions may 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. There is a strong current across the channel on both ebb and flood.

At the north side below the entrance there is a yacht basin with 3½ feet (1.1 m) depth. The basin entrance is lighted.

A swing bridge with both draw openings 100 feet wide between fenders, and headroom at high water when closed of 18 feet (5.5 m) crosses the Choptank River at the upper side of Cambridge. (See p. 52 for bridge regulations.)

Bolingbroke Creek, on the north side of Choptank River, 1¾ miles eastward of Cambridge, has a depth of 3 feet (0.9 m) across the bar at the mouth and 6 feet (1.8 m) 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 10 feet (3.0 m) deep and 100 feet wide from Choptank River to **Secretary Landing,** including a turning basin at the latter point 1 mile above the mouth, the controlling depth reported in the dredged channel in March 1937 was about 8 feet (2.4 m). The river is frequented by many local craft of 8 feet (2.4 m) draft. There is a red buoy on the south side of the entrance and a black buoy and bush stakes further in, but the channel may be difficult without local knowledge. There is a postoffice at Secretary Landing.

Cabin Creek, on the east side of Choptank River, 7 miles above Cambridge, has a depth of 6 feet (1.8 m) for ¾ mile above the mouth and 2 feet (0.6 m) for a further distance of ¾ mile. There are no wharves, and it is frequented only by a few grain schooners and small local craft.

Hunting Creek, on the east side of Choptank River, just below the village of Choptank, has a depth of 4 feet (1.2 m) in the entrance and about 2 feet (0.6 m) to near the village of **Ellwood,** 2½ miles above the entrance. It is little used.

Choptank is a village on the east side of Choptank River, 10½ miles above Cambridge. It is visited by schooners, the deepest draft being 10 feet (3.0 m). In 1936 it was reported only 3 feet (0.9 m) could be carried alongside the wharf which was in poor condition. **Windy hill** is a landing, in ruins, on the west side of the river, 1 mile above Choptank.

A railroad bridge, having a center-pier draw with openings 64 feet wide and highwater headroom of 2½ feet (0.8 m) when closed, crosses the river 7 miles above Choptank. A highway swing bridge having an opening 80 feet wide and a high water headroom of 10 feet (3.0 m) when closed, crosses the river ¾ mile above. **Dover Bridge** has a landing on the west side, just below the highway bridge.

Tuckahoe Creek, on the west side of Choptank River, 41 miles above the mouth, has a depth of 8 feet (2.4 m) to **Waymans Wharf** (in ruins), 8½ miles above the entrance. The channel from here to **Rolph Landing**, 1 mile above, has been improved by dredging to a depth of 8 feet (2.4 m) and width of 50 feet, with a present depth of about 6 feet (1.8 m), and there is a depth of about 1 foot (0.3 m) at low water and 3 feet (0.9 m) at high water to **Hillsboro**, a town on the railroad 1¾ miles above Rolph Landing. There is very little business on the river. The channel is not marked and is crooked and difficult in places without local knowledge. The flats are covered with marsh grass in summer. A highway bridge, near **Lewistown**, having a single-draw opening 39.6 feet wide and high water clearance when closed of 4 feet (1.2 m), crosses the creek 1 mile above the entrance.

The water is fresh above Choptank and can be used in boilers.

Two Johns and **Williston** are small settlements on the east side of Choptank River, 1¾ and 2¼ miles, respectively, about Tuckahoe Creek.

Denton is a town on the east side of Choptank River, 48 miles above the mouth. There is a controlling depth of 5½ feet (1.7 m) to the town, and the deepest draft going to it is 8 feet (2.4 m). **West Denton** is on the west side of the river opposite Denton, and all of the wharves are on that side. Two drawbridges cross the river at Denton; the lower, a highway bridge, has a single lift opening 43 feet wide and 4 feet (1.2 m) headroom at high water, when closed, and the upper, a railroad bridge, has a center-pier draw, both openings 62 and 65 feet wide, with a headroom of 5 feet (1.5 m) at high water when closed.

There is considerable business in oil tankers to Denton, from which point it is distributed to the surrounding country.

Greensboro is a town at the head of navigation 7 miles above Denton. The controlling depth to the town is reported to be about 5½ feet (1.7 m). The existing project calls for a channel 8 feet deep (2.4 m) and 100 feet wide through Pealiquor Shoal, 2 miles below Denton, and the same depth and 75 feet wide from that town to Greensboro, a distance of about 7 miles.

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, Cambridge, Secretary Landing, Choptank, Denton, and Greensboro, and there are stores at several other places where some supplies are obtainable.

Tides.—The mean range of tides is 1.3 feet at the entrance, 1.6 feet at Cambridge, and 2.2 feet at Denton.

Courses and Distances—Choptank River

For reverse directions read upward	Course (Reverse course in *Italics*)		Distance
	True	Magnetic	
1. Sharps Island Lighted Bell Buoy 18A bearing northwest, distant 0.1 mile. (Position 9, courses "Chesapeake Bay Entrance to Baltimore", p. 147 is to the eastward of this buoy). Passing between buoys 1 and 2 (see chart 1225 for fish trap limits):	°	*Points*	*Nautica miles*
Direct	47	NE. ¾ E	4. 9
Reverse	*227*	*SW. ¾ W*	*4. 9*
2. Midway between Choptank River Buoy 4 and Sharps Island East End Buoy 1A. Passing about 0.9 mile off lighted bell buoy 3:			
Direct	31	NE. ½ N	2. 6
Reverse	*211*	*SW. ½ S*	*2 6*
3. Blackwalnut Point Shoal Lighted Bell Buoy 3 bearing 257° true, distant 1.2 miles. **Choptank River Lighthouse** showing north of **lighted bell buoy 6.** Passing 150 yards off the buoy:			
Direct (Choptank River Lighthouse ahead).	85	E. ¼ S	5. 2
Reverse (same lighthouse astern)	*265*	*W. ¼ N*	*5. 2*
4. Choptank River Lighthouse bearing 85° true, distant 1 mile. (Pass either west or east of the lighthouse guarding against the shoals entering Tred Avon River for Oxford.) Passing close northeast of buoy 8:			
Direct	119	SE. ¾ E	2. 6
Reverse	*299*	*NW. ¾ W*	*2. 6*
5. Castle Haven Shoal Buoy 10 bearing southwest, distant 0.1 mile. Heading into bight east of Chlora Point and keeping ⅛ mile offshore:			
Direct	92	E. ⅞ S	1. 1
Reverse	*272*	*W. ⅞ N*	*1. 1*
6. La Trappe Creek Front Range Light bearing 135° true, distant 0.8 mile. Passing 0.5 mile off this light and 0.1 mile west of buoy 9:			
Direct	172	S	1. 6
Reverse	*352*	*N*	*1. 6*

Courses and Distances—Choptank River—Continued

For reverse direction, read upward	Course (Reverse course in *Italics*) True	Course (Reverse course in *Italics*) Magnetic	Distance
7. Howells Point Shoal Buoy 9 bearing north-northeast, distant 0.3 mile. Passing 0.3 mile off *Howells Point Light:*	°	*Points*	*Nautical miles*
Direct	107	SE. by E. ¾ E	1.6
Reverse	*287*	*NW. by W. ¾ W*	*1.6*
8. The Drumming Ground Shoal Buoy 11 bearing north-northwest, distant 350 yards:			
Direct	91	E. ¾ S	0.7
Reverse	*271*	*W. ¾ N*	*0.7*
9. Hambrooks Bar Light bearing 0° true, distant 350 yards. Heading for the bridge draw and passing close by northeastward of buoy 12:			
Direct	136	SE. ¾ S	1.4
Reverse	*316*	*NW. ¾ N*	*1.4*
10. Cambridge Channel Lighted Bell Buoy 2 bearing southwest and distant 150 yards. Rounding the bell buoy at this distance:			
Direct	------	Various	0.2
Reverse	------	*Various*	*0.2*
11. On **Cambridge Lighted Range** with *Cambridge Channel Lighted Bell Buoy 2* bearing north:			
Direct (Lighted Range ahead)	245	WSW. ½ W	0.6
Reverse (Lighted Range astern)	*65*	*ENE. ½ E*	*0.6*
12. **Entrance Cambridge Inner Harbor.** (See p. 285.) If continuing up the river, pass through the draw from Position 10. The aids and chart are the best guide, and above the Tuckahoe River the channel is narrow, crooked and difficult without local knowledge.			
ROUTE NORTH OF SHARPS ISLAND			
A. **Sharps Island Lighthouse** bearing 157° true, distant 3.2 miles. This position is just west of the red sector of Sharps Island Light and ½ mile south of *Fish Net Stake Buoy 8B.* Course passes between fish trap areas:			
Direct	137	SE. ¾ S	4.0
Reverse	*317*	*NW. ¾ N*	*4.0*
B. **Midway between Blackwalnut Point Shoal Lighted Bell Buoy 3 and Sharps Island Northeast Shoal Buoy:**			
Direct	69	ENE. ¾ E	1.4
Reverse	*249*	*WSW. ¾ W*	*1.4*
C. **Same as Position 3 above.**			

EASTERN BAY AND MILES RIVER

(Charts 548 and 1225)

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 and schooners carrying grain and produce. Regular steamers go to Claiborne, just inside the entrance. The deepest draft of boats entering the bay is 13 feet (4.0 m) 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 (9.1 m) 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 Lighthouse** (fixed white, 2 red and 1 dark sectors), brown cylindrical tower, is the principal guide to the entrance. Vessels of 6 feet (1.8 m) draft can also enter through Poplar Island Narrows and boats of 7 feet (2.1 m) draft through Kent Island Narrows.

Poplar Island, on the south side of the main entrance to Eastern Bay, is low and sparsely wooded except at its northern point where it is heavily wooded. **Poplar Island Harbor**, on the eastern side, has a depth of 5 feet (1.5 m) in the entrance, and there is secure anchorage inside in a depth of 3 to 7 feet (0.9 to 2.1 m).

Poplar Island Narrows, between Poplar Island and the mainland, has a depth of 9 feet (2.7 m), but there are unmarked shoals with little depth close to the channel, and 6 feet (1.8 m) 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 reported depth of 4 feet (1.2 m) in mid-channel to **Lows Wharf** at the head. It is used extensively as an anchorage by local craft.

To enter, pass 100 yards southward of the flashing white light on the north side at the entrance and steer for the end of the wharf on a 96° true (ESE. ¾ E. mag.) course. **Sherwood** is a post village ½ 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 Lighthouse. There is a railroad pier extending 800 feet west-southwestward from the shore and a jetty extending 750 feet west-southwestward from the end of the pier. The pier is little used as busses have superseded the trains. There is an automobile and passenger ferry operating between

Annapolis and Claiborne. The landing is just south of the railroad pier. A black water tank, a white church and spire, and the hotel and railroad buildings are prominent objects at Claiborne. Gasoline, water, and provisions are obtainable. Small boat repairs can be made. The existing project provides for a channel 14 feet (4.3 m) 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 at a turn in the channel. In 1933, the channel had a controlling depth of 12 feet (3.7 m).

In entering, pass northward and eastward of lighted bell buoy 2 A and steer 127° true (SE. mag.), with the buoy astern, to southwestward of the flashing white 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 (3.0 m) for 5 miles above **Long Point** on the western side at the entrance and 6 feet (1.8 m) for some distance into the three tributaries at the head. It is frequented by oyster boats and schooners carrying produce and grain, the deepest draft being 8 feet (2.4 m). There are several farm landings but no villages. The shoals are unmarked and local knowledge is required to avoid them.

Crab Alley Bay, on the north side of Eastern Bay, 2½ miles northward of Tilghmans Point, has a depth of 21 feet (6.4 m) into the entrance and 6 feet (1.8 m) to near the head of navigation in both branches. The shoals are unmarked and local knowledge is required to avoid them. About a mile up the western branch (**Crab Alley Creek**) there is a marine railway capable of hauling out a boat 45 feet long and 4-foot (1.2 m) draft. Repairs can be made and gasoline can be obtained. **Bodkin Island,** on the western side, is thickly wooded and has no buildings visible. **Parsons Island,** on the eastern side, is sparsely wooded, giving it a ragged appearance, and has a red barn showing clear of the woods and a white house visible at times.

Kent Island Narrows, 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 8 feet (2.4 m) at low water in 1935 and is extensively used by local craft. Two drawbridges cross the narrows consisting of 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 high-water headroom of 6 feet (1.8 m) when closed; and, a highway bascule bridge having a single clear opening 50 feet wide and a high-water headroom of 7 feet (2.1 m) when closed. There is a railroad station at the bridges (**Narrows Station**) from which considerable sea food is shipped. Gasoline is obtainable here. 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 can not 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.

To enter Kent Island Narrows from Eastern Bay, pass 0.3 mile eastward of **Parsons Island,** then steer 343° true (N. ¾ W. mag.), passing 0.2 mile westward of **Hoods Point,** then steer 4° true (N. x E. mag.) heading for the pair of channel buoys off **Marshy Creek.** In approaching to pass between these buoys keep close to black can 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 shoal on the south side of the channel. 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.

Tilghmans Creek, on the eastern side of **Tilghmans Point,** has a depth of 9 feet (2.7 m) in the entrance and 11 to 13 feet (3.4 to 4.0 m) inside and is extensively used as a harbor for small local vessels. The entrance is very narrow and is marked by buoys. The outer end of Tilghmans Point is heavily wooded.

Greenwood Creek, on the eastern side of Eastern Bay, 2¾ miles east-northeastward of Tilghmans Point, is reported to have shoaled to 3 feet (0.9 m) across the entrance ¾ mile south of Piney Neck Point, but 6 feet (1.8 m) can be carried for 2 miles above the mouth. The best water leads along the eastern shore in approaching the entrance.

Miles River, the most important tributary of Eastern Bay, has a depth of 18 feet (5.5 m) to abreast the town of St. Michaels 6 miles above Tilghmans Point, 9 feet (2.7 m) to a drawbridge 5½ miles above St. Michaels, and 6 feet (1.8 m) for a farther distance of 2 miles. The river has considerable trade carried in small boats and schooners, the deepest draft being 13 feet (4.0 m). It is reported that boats can go to the bridge with this latter depth at mean low water 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 (1.5 m) at high water underneath the span when closed. Draw opened only between sunrise and sunset except by request. For additional regulations see p. 52.

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 6 feet (1.8 m) at the end and is marked by red and gray oyster-houses and a brick stack. The short wharf on the north side of the inner harbor, known as the steamboat wharf, has a depth of 7 feet (2.1 m) and is marked by white wharf houses. There is a depth of 10 feet (3.0 m) in mid-harbor to near the head. In 1935, the cove at the head was dredged to 4 feet (1.2 m). Gasoline and provisions are obtainable. General repairs can be made. There are two marine railways, the larger one capable of hauling out a boat 40 feet long and 4-foot (1.2 m) draft. A stack, tank and two church spires are prominent. The Miles River Yacht Club is located in the harbor. Many yachts anchor in the inner harbor and it is frequently crowded.

To enter, pass eastward and southward of the red buoy ¾ mile northeastward of the wharves, and bring the southern end of Fairview Point (thickly wooded) astern on a 240° true (WSW. mag.) course, heading for the red houses on the wharf and passing between the flashing red 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 (0.9 m) at the entrance. Two drawbridges with a least span width of 20 feet (6.1 m) and a least headroom when closed at high water of 2 feet (0.6 m) cross the creek at the entrance. From October to May, inclusive, the draws are opened only from sunrise to sunset (see p. 52 for additional regulations). There is a marine railway capable of hauling out a boat 30 feet long and 4-foot (1.2 m) draft.

Hunting Creek, on the north side of Miles River, 3 miles above St. Michaels, has a depth of 8 feet (2.4 m) for 1½ miles above the entrance but is little used. There are no marks, but the mid-channel is clear. Off the entrance there 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 (2.4 m) in mid-channel to the small village of **Tunis Mills**, 2½ miles above the entrance. Schooners of 6 feet (1.8 m) draft go to Tunis Mills. The depth off the village is reported to be 5 feet (1.5 m). The channel at the entrance is marked by buoys, and above the entrance the mid-channel is clear. There is a small marine railway at Tunis Mills capable of hauling out a boat 50 feet long and 5 feet (1.5 m) draft. Deck repairs can be made.

A large red Moorish-type dwelling is located about ¾ 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, 2½ miles southeastward of Tilghmans Point. The river has several branches, which are frequented by small local boats and grain and produce schooners up to 9 feet (2.7 m) draft. There are several farm landings on the creek. The main entrance is eastward of **Herring Island** (a small spot of marsh and sand ~~usually~~ submerged at low water) and has ample depth and width. There is also a depth of 9 feet (2.7 m) across the shoal ⅜ mile northward of Herring Island. The entrance is marked by a light and buoys. There are no marks above, but strangers should have no trouble by keeping in mid-channel and giving the points a good berth.

The river forks 2 miles above Herring Island. The north branch (Wye River) has a depth of 13 feet (4.0 m) for 3 miles above the fork to the western end of Wye Narrows and 8 feet (2.4 m) for a further distance of 3 miles. The eastern branch (**Wye East River**) has a depth of 12 feet (3.7 m) 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 7 feet (2.1 m). It is crossed by a highway drawbridge with a single opening 40 feet wide between fenders and a headroom of 5 feet (1.5 m) 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 requires 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.

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 tides is 1.2 feet at Poplar Island and 1.3 feet at St. Michaels.

Courses and Distances—Eastern Bay and Miles River to St. Michaels

For reverse direction, read upward	Course (Reverse course in *Italics*)		Distance
	True	Magnetic	
FROM SOUTHWARD			
1. **Poplar Island Shoal Lighted Bell Buoy 20A** bearing east, distant 100 yards. (Fish trap limits shown on chart 1225):	°	*Points*	*Nautical miles*
Direct (Bloody Point Bar Lighthouse ahead).	22	NNE. ⅝ E	2.0
Reverse (same lighthouse astern)	*202*	*SSW. ⅝ W*	*2.0*
2. **North End of Poplar Island** bearing 100° true, distant about 2.2 miles. Passing 0.3 mile southeast of *Kent Island Spit Lighted Bell Buoy 1*, 0.3 mile northwest of *Wades Point Shoal Lighted Bell Buoy 2 A*, and close south of buoy 3:			
Direct	54	NE. by E. ½ E	9.5
Reverse	*234*	*SW. by W. ½ W*	*9.5*
3. **Tilghmans Point Shoal Lighted Buoy 4** bearing south, distant 150 yards. Entrance to the Miles River. Continue up the river to St. Michaels by following the aids and chart. (See directions on p. — to enter St. Michael's harbor.)			
FROM NORTHWARD			
Steer 105° true (ESE. mag.) to pass ¼ mile south of **Bloody Point Bar Lighthouse**, 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.			

CHESTER RIVER

(Charts 548, 1225, and 1226)

H6599
H6600

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 schooners carrying grain and produce, besides many smaller boats, the deepest draft being 13 feet (4.0 m).

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 Lighthouse** (fixed white red sector), white house on piles, is the principal guide to the entrance. The entrance has a depth of 24 feet (7.3 m) in a narrow channel, and the width of the channel with a depth of 18 feet (5.5 m) is 1 mile. The river can also be entered through Kent Island Narrows.

The main channel of Chester River has a depth of 18 feet (5.5 m) for 22 miles above Love Point Lighthouse to within 4 miles of Chestertown, 11 feet (3.4 m) to Chestertown, and 7 feet (2.1 m)

for a farther distance of 8 miles to Crumpton. The river above Crumpton has been improved by dredging a channel 6 feet (1.8 m) deep and 60 feet wide for a distance of 6¼ miles to Jones Landing to within ¾ mile of the town of **Millington**. There is a depth of 1 foot (0.3 m) at low water and 3½ feet (1.1 m) at high water to Millington.

The controlling depth in the river proper, reported in November 1929, was 6 feet (1.8 m) to Kirbys Landing, two miles below Jones Landing.

Steamers from Baltimore meet the trains at Love Point. A gas boat makes trips up the river as far as Crumpton.

Love Point, at the north end of Kent Island, is a summer resort. It has railway connections with Cape Charles, Wilmington, and Lewes, Del. The wharf is the landing for the vehicular and passenger ferry from Baltimore. ~~There is a wreck reported sunk in 8 feet (2.4 m) of water about half way between this wharf and buoy 2A, off Kent Island~~.

There is a dumping ground area about ½ mile wide and 2½ miles long in a north-northeast direction outside the 20-foot (6.1 m) curve just west of Love Point in Chesapeake Bay.

Stevensville is a town on the railroad 3 miles southward of Love Point, and **Chester** is a village and railroad station 1½ 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 290.

Jackson Creek, on the south side of Chester River, 1¼ miles eastward of Kent Island Narrows, has a depth of 4 feet (1.2 m) to the wharf at the south end and is used as an anchorage by oyster boats. The channel is marked by buoys.

Winchester Creek, 1¼ miles eastward of Long Point, has a very narrow entrance nearly bare at low water and a depth of 5 to 8 feet 1.5 to 2.4 m) inside. It is used as an anchorage by local craft. ~~Graysonville (Winchester)~~ is a village and railroad station ¼ 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. **Eastern Neck Island Narrows**, at the northern end, has a depth of about 1 foot (0.3 m), is crossed by a fixed bridge, and is little used.

Queenstown Harbor, on the southeast side of Chester River, 7½ miles above Love Point Lighthouse, has been improved by dredging a channel with a depth of 10 feet (3.0 m) and 200 feet wide across the bar at the entrance and has a depth of 10 feet (3.0 m) to the freight wharf (in ruins). The railroad wharf north of it has fallen in and will not be repaired. The dredged channel is marked by a buoy, a flashing white light, and a beacon. The chart and aids are the best guide for entering.

Tilghman Creek, on the eastern side of Chester River, 1 mile northward of Queenstown Harbor, has a depth of 1½ feet (0.5 m) across the bar close along the western end of the island in the mouth and 6 to 8 feet (1.8 to 2.4 m) 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 Lighthouse. There

is a depth of 10 feet (3.0 m) in the entrance, 8 feet (2.4 m) in Reed Creek for 1 mile above the fork, and 6 feet (1.8 m) in Grove Creek for ½ mile above a very narrow entrance. Schooners of 6 to 8 feet (1.8 to 2.4 m) draft enter the creeks, but the channels are not marked and local knowledge is necessary. A house and barn on the east side at the entrance are prominent.

Corsica River, on the east side of Chester River, 13 miles above Love Point Lighthouse, has a depth of 7 feet (2.1 m) to **Centerville Landing**, 5 miles above the entrance and ¾ mile from the town of Centerville. The river for a distance of 1¼ mile below Centerville Landing has been improved by dredging a channel with a controlling depth in 1931 of 8 feet (2.4 m) and 100 feet wide. The shoalest place, except in the dredged channel, is off **Town Bar Point**, just inside the entrance, where the channel is narrow and has a depth of 9 feet (2.7 m). 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.

The project calls for a channel with a depth 8 feet (2.4 m) from the Chester River to the wharf at Centerville with a turning basin at the upper end.

Enter midway between buoy 8 and the horizontally striped buoy east of it, and steer 108° true (SE. by E. ¾ E. mag.) to the red buoy off Town Bar Point. 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, ¾ mile from Centerville Landing, has railroad communication. Gasoline can be obtained at the wharves and provisions from the town.

Church Creek, on the west side of Chester River, at the eastern end of Eastern Neck Island Narrows, has a depth of 4 feet (1.2 m) in the entrance and 6 feet (1.8 m) inside to near the head, but is little used.

Greys Inn Creek, on the west side of Chester River, 12 miles above Love Point Lighthouse, has a depth of 8 feet (2.4 m) to a small settlement on the western side 2½ miles above the entrance. It is frequented by schooners up to 8 feet (2.4 m) 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**, on the south side, on a 315° true (NW. ¾ N. mag.) course until ¼ 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 Lighthouse, has a depth of about 12 feet (3.7 m) across the bar at the entrance and deeper water to the fork 2½ miles above. **East Fork** has a depth of 10 feet (3.0 m) for 3 miles and 6 feet (1.8 m) for a farther distance of 1½ miles, and **West Fork** a a depth of 10 feet (3.0 m) for 2¾ miles and 6 feet (1.8 m) for a farther distance of ¾ mile into either of the two branches at the head.

There are no villages on Langford Creek or its tributaries, except Piney Neck in Long Cove, but there are several farm landings, from which produce and grain are shipped in motor boats and schooners. The principal shoals in the lower reach of the creek are marked by buoys, and strangers of 6 feet (1.8 m) or less draft should have no trouble in following the channel with the 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, 1½ miles northeastward of the entrance to Corsica River, is marked by a symmetrical clump of trees on the end and a wharf on the east side. There is a depth of 8 feet (2.4 m) at the wharf, and the best water in approaching it is from southward, passing a little eastward of the black buoy off the point. Gasoline freight boats make landings at numerous wharves between here and Chestertown.

~~Upper Spanish Point Wharf is in ruins.~~

Southeast Creek, on the east side of Chester River, 21 miles above Love Point Lighthouse, has a depth of 4 feet (1.2 m) in the entrance and 3 feet (0.9 m) 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 motor boats and a few small vessels of 3 to 5 feet (0.9 to 1.5 m) draft. The best water in entering is along the north side. **Island Creek**, on the south side ½ mile above the entrance, has a depth of 3½ feet (1.1 m) in the entrance and 6 feet (1.8 m) inside to a bridge 2 miles above.

Chestertown is a town on the west side of Chester River, 26 miles above Love Point Lighthouse. It is visited by gasoline freight boats up to 10 feet (3.0 m) draft. A double bascule bridge crosses the river here with a span 60 feet wide between fenders and 12-foot (3.7 m) 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 (1.8 m) for 2¾ 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 ¾ mile above the mouth with a span 100 feet wide and clearance of 8 feet (2.4 m) at high water. The creek is entered by vessels of 5 to 7 feet (1.5 to 2.1 m) draft.

Crumpton, on the south side of Chester River, 34 miles above Love Point Lighthouse, is visited by gasoline freight boats and schooners, the deepest draft being 8 feet (2.4 m). A drawbridge having a center-pier draw, either opening 35 feet wide with a headroom of 4 feet (1.2 m) 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 motor boats and has little business by water. Boats of 5 feet (1.5 m) draft can go to within ¾ mile of the town at low water.

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 there.

Towboats are used only during the fruit season.

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 during most of the time.

Tides.—The mean range of tides is 1.1 feet at the entrance, 1.3 feet at Queenstown, 1.9 feet at Chestertown, and 2.4 feet at Crumpton. The water is fresh above Chestertown and can be used in boilers.

Directions, Chester River.—The channel is marked by buoys as far as Harrison Landing above Crumpton. From the mouth to the entrance of Corsica River, 13 miles above, the channel has ample width and is easily followed.

Courses and Distances—Chester River

For reverse direction, read upward	Course (Reverse course in *italics*) True	Course (Reverse course in *italics*) Magnetic	Distance
From Chesapeake Bay enter on any course between 81° true (E. ½ N. mag.) (passing 450 yards off *Swan Point Shoal Lighted Bell Buoy*(22)) and 146° true (SSE. ¼ E. mag.) (passing 1,550 yards off **Love Point Lighthouse**) 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 south, distant ¼ mile. Rounding the buoy.	°	*Points*	*Nautical miles*
Direct	Various		0.4
Reverse	*Various*		*0.4*
2. Love Point Shoal Bell Buoy 2 bearing west, distant ¼ mile. Passing 1,360 yards off **Love Point Lighthouse.**			
Direct	187	S. by W. ⅜ W	2.0
Reverse	*7*	*N. by E. ⅜ E*	*2.0*
3. Wicks Beach Buoy (1) bearing east, distant 350 yards.			
Direct	141	SSE. ¼ E	1.9
Reverse	*327*	*NNW. ¼ W*	*1.9*
4. Long Point Shoal Buoy (4) bearing southwest, distant 280 yards. Passing 0.1 mile off buoy (3)			
Direct	122	SE. ½ E	2.1
Reverse	*302*	*NW. ½ W*	*2.1*
5. Cedar Point Shoal Lighted Bell Buoy (5) bearing north, distant 400 yards.			
Direct	48	NE. by E	1.8
Reverse	*228*	*SW. by W*	*1.8*
6. Hall Point Shoal Buoy (7) bearing west-northwest, distant 700 yards:			
Direct	338	N. by W. ¼ W	2.4
Reverse	*158*	*S. by E. ¼ E*	*2.4*
7. Piney Point Shoal Buoy (8) bearing east, distant 135 yards:			
Direct	5	N. by E. ⅛ E	0.3
Reverse	*185*	*S. by W. ⅛ W*	*0.3*

Courses and Distances—Chester River—Continued

For reverse direction, read upward	Course (Reverse course in *Italics*) True	Course (Reverse course in *Italics*) Magnetic	Distance
		Points	*Nautical miles*
8. **Piney Point Shoal Buoy** 6 bearing south, distant 630 yards:			
Direct	36	NE. ⅛ N	2.0
Reverse	*216*	*SW. ⅛ S*	*2.0*
9. **Nichols Marsh Shoal Buoy** bearing northwest, distant 150 yards:			
Direct	43	NE. ½ E	0.8
Reverse	*223*	*SW. ½ W*	*0.8*
10. **Old Field Bar Buoy** 8 bearing south, distant 150 yards. Off Corsica River. Directions for the latter river are given on page 295.			
Continue up Chester River from position 10 by following the aids and chart. Local knowledge is necessary above Crumpton. See page 296.			

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 (2.4 m) 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. There are buoys above Crumpton as far as Harrison Landing, but local knowledge is required.

SWAN CREEK AND ROCK HALL HARBOR

(Charts 548, 549, and 1226)

Swan Creek is on the eastern side of Chesapeake Bay, 5 miles northeastward of Love Point Lighthouse. The approach, which is also the approach to Rock Hall Harbor, is from southward, eastward of Swan Point Bar. It has a depth of 10 feet (3.0 m) to **Deep Landing** on the east side of the entrance to the creek and 6 feet (1.8 m) for 1¼ miles above in a narrow unmarked channel. The channel is marked by a lighted range and by buoys as far as Deep Landing. A channel 10 feet (3.0 m) deep has been dredged across Swan Point Bar about ⅜ mile southward of Swan Point. The channel is subject to rapid shoaling, and is reported to have filled up and to have a depth of 4 feet (1.2 m) at present. Strangers are advised to use the main entrance around the south end of Swan Point Bar. There is a marine railway in **The Haven** for hauling out small boats but no repairs are made.

Rock Hall Harbor, on the eastern side of the approach to Swan Creek, has been improved by dredging a channel 12 feet (3.6 m) deep and 150 feet wide to **Rock Hall Wharf** at the head of the harbor, but no further work is being done and it is reported the channel has

shoaled to a depth of about 7 feet (2.1 m). It is marked by buoys. The harbor is used by many motor boats and small vessels of 3 to 6 feet (0.9 to 1.8 m) draft. There is a marine railway north of the wharf for general small-boat repairs. **Rock Hall** is a village and post office ½ mile eastward of the wharf; supplies are available. Halfway to the village from the waterfront is a water tank with a white light on it.

Huntingfield Creek, just southward of Rock Hall Harbor, has depths of 1 to 3 feet (0.3 to 0.9 m) and is used only as an anchorage for small craft.

Tavern Creek, just eastward of Swan Point, has a depth of 2½ feet (0.8 m) on the bar at the entrance and 6 feet (1.8 m) inside for ½ 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 81° and 147° true to a position, from ¼ to 1 mile, northward of Love Point buoy 2. Then steer eastward until Love Point light (fixed white, red sector) bears 213° true, and then change course to 33° true (NE. ⅜ N. mag.) and, with Love Point light astern, proceed to Swan Creek lighted range. Head along the range on course 349° true (N. ¼ W. mag.), passing close westward of buoy 2, off Huntingfield Point, and eastward of buoy 7 until the wharf at Deep Landing shows to the left of buoy 4, when it may be steered for.

Courses may be laid for Rock Hall Harbor, leaving Swan Creek lighted range when abeam of the red entrance buoy and steering 55° true (NE. by E. ⅝ E. mag.) to pass 50 feet northwest of buoy 2 and the same distance southeast of buoy 1.

CHESAPEAKE BAY ABOVE PATAPSCO RIVER

(Charts 549 and 1226)

Chesapeake Bay extends for 30 miles above the entrance of Patapsco River to the mouth of the Northeast and Susquehanna Rivers. It is frequented by passenger and freight steamers and tugboats and barges from Baltimore to landings on the tributaries, besides many vessels bound through the Chesapeake & Delaware Canal, the approach to which is through Elk River and Back Creek. The usual draft of boats frequenting this part of the bay is 5 to 8 feet (1.5 to 2.4 m) and the deepest draft 12 feet (3.7 m). 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 can usually be obtained at the entrances of the tributaries who are competent to act as pilots. **Towboats** can be obtained from Baltimore.

There are extensive shoal areas in the northern end 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 broad channel, with a least depth of 18 feet (5.5 m) and well marked by buoys, leads along the eastern side of the bay from Chester River entrance to the mouth of Elk River. Another channel, leading from the mouth of the Patapsco River

east-northeasterly, joins this channel east of Pooles Island. The least depth by this route is 12 feet (3.7 m), but it leads close to 10 and 11 foot (3.0 and 3.4 m) spots.

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 (6.1 m) in depth. The limits of fish-trap areas are shown on chart 1226 by broken lines.

Tolchester Beach is a recreation park on the eastern side of Chesapeake Bay, 5 miles north-northeastward of Swan Point and 7¼ miles, 77° true (E. ½ N. mag.), from Craighill Channel range front light. It is connected with Baltimore by steamer in summer. With local knowledge a draft of 10 feet (3.0 m) can be taken across the shoals from the eastern end of Brewerton Channel northward of Craighill Channel range front light to the wharf, but strangers should not follow this route with a greater draft than 6 feet (1.8 m). It leads across an area of possible fish traps. A fixed white light and fog signal (bell) have been established on a steel tower on the outer end of the Tolchester wharf. Red sectors cover the shoals above and below Tolchester.

Fairlee Creek, on the eastern side of Chesapeake Bay, 2¾ miles east-southeastward of Pooles Island, is reported to have shoaled to 2 feet (0.6 m) across the bar at the entrance. There are 6 feet (1.8 m) 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 produce boats of 3 to 5 feet (0.9 to 1.5 m) draft, and by boats which obtain sand and gravel there. Several old boats have been sunk off the point on the western side of the entrance to serve as a breakwater. These boats have broken up and portions were scattered over the bar, but it is reported that they have been removed. There is a tug and barge wreckage showing at high water in 8 feet (2.4 m) about 500 yards off Stoops Point, about ⅓ of the distance to *Fairlee Shoal Buoy 2*. This is about southeast by south from the buoy.

Worton Creek, on the eastern side of Chesapeake Bay, 3½ miles eastward of Pooles Island, has a depth of 9 to 12 feet (2.7 to 3.7 m) in the broad bight at the mouth and 7 feet (2.1 m) in the creek to **Buck Neck Landing**, 1½ miles above the entrance. The channel is narrow in the upper part of the creek and is unmarked. A flashing white light is located on the north side of the entrance. **Gales Wharf** just inside the entrance on the north side is now in poor condition and is not used. Freight boats and barges in season go to Green Point and Buck Neck Landing for tomatoes and farm produce. The Tri-State Yacht Club is located at Buck Neck. The channel off Gales Wharf (Worton Manor) affords good anchorage in easterly winds for vessels of 10 feet (3.0 m) draft.

Still Pond, a bight on the eastern side of Chesapeake Bay, 6 miles above Pooles Island, has depths of 8 to 11 feet (2.4 to 3.4 m) and is a safe anchorage for small craft in easterly winds. There is a rock pile with 3 feet (0.9 m) depth in 8 feet (2.4 m) of water about ¼ mile north of Kinnaird Point, about due east of Rocky Point. **Still-pond Creek**, emptying into the bight from eastward, has a depth of 1½

feet (0.5 m) across the bar at the entrance and 6 feet (1.8 m) inside for some distance. **Churn Creek**, emptying into the bight from southward, has a depth of 3 feet (0.9 m) in the entrance and deeper water inside. Both creeks are used by small produce boats.

The wharf 1½ miles northeastward of Still Pond is now in ruin.

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 trade in steamers, schooners, and barges, the deepest draft being 10 feet (3.0 m). It has a depth of 12 feet (3.7 m) to Fredericktown, 8½ miles above **Grove Point** on the north side at the mouth, 8 feet (2.4 m) for a farther distance of 1½ miles to **Wilson Point Wharf**, and 5 feet (1.5 m) to a landing 1 mile above. 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 (1.8 m) or less draft should have no trouble in following the channel with the aid of the chart. Strangers of deeper draft should take a pilot at Betterton. The channel above Fredericktown is narrow in places and unmarked and is difficult without local knowledge. The mean range of tides is 1.9 feet at Betterton and 2.3 feet at Georgetown.

Betterton is a summer resort on the south side of Sassafras River, 2¼ miles eastward of **Howell Point**. It is connected with Baltimore, and Philadelphia by steamer. There are depths of 11 feet (3.4 m) 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.

Lloyds Creek, on the south side of Sassafras River, 2 miles east-southeastward of Betterton, has depths of 1 to 3 feet (0.3 to 0.9 m) inside and is seldom entered. It is separated from Sassafras River by a low sand spit.

Turner Creek, on the south side of Sassafras River, 4½ miles above Betterton, has a depth of 7 feet (2.1 m) to a landing at the foot of a road just inside the mouth and 6 feet (1.8 m) in a narrow channel for ½ mile above. Some produce is shipped from here in schooners and barges. The entrance is narrow and unmarked.

Back Creek, on the north side of Sassafras River, 6 miles above Betterton, has a depth of 7½ feet (2.3 m) in the entrance and 5 feet (1.5 m) in a narrow unmarked channel for 1½ miles above. It is little used.

Island Creek, on the south side of Sassafras River, 7½ miles above Betterton, has a depth of 6 feet (1.8 m) in a narrow unmarked channel for ½ mile above the entrance. There are no wharves and little business by water.

Fredericktown and **Georgetown** are towns on opposite sides of Sassafras River, 9½ miles above Betterton. They are connected by a highway bridge having a lift span with an opening 40 feet wide, with a headroom of 5 feet at high water. Gasoline and provisions are obtainable at both places. Tockwock Yacht Club is located at Fredericktown. There are depths of 7 feet (2.1 m) at the wharves at Fredericktown and 12 to 18 feet (3.6 to 5.5 m) at Georgetown. There are two marine railways for small boat repairs.

The ruins of an old wharf north of **Grove Point** are prominent.

Pond Creek and **Pearce Creek**, 3½ 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.

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 & Delaware Canal. It has a depth of 16 feet (4.9 m) (see p. 312) for 7 miles to the mouth of Back Creek and 7 feet (2.1 m) for a farther distance of 6½ miles to the intersection of Elk and Little Elk Rivers, 1 mile below Elkton. Above the fork there is a depth in the Elk River of about 6 feet (1.8 m) at low water through a dredged channel 80 feet wide to the paper mill at Elkton. Little Elk ~~River~~ Creek has a controlling depth of about 4 feet (1.2 m) 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. There is a project for dredging a channel 7 feet (2.1 m) deep and 40 feet wide in the Elk River from that depth in the vicinity of Cedar Point to the bridge at Elkton, and the same depth and 80 feet wide in the Little Elk River about ⅓ mile. In May 1936, a depth of 4 feet (1.2 m) to Elkton was reported. Strangers should have no trouble in taking a draft of 4 feet 1.2 m) at low water to the junction of Elk and Little Elk Rivers with the aid of the chart. Above that point local knowledge may be necessary.

Elkton, at the head of navigation on Elk River, is on the main line of the Pennsylvania Railroad. It has several industrial plants and some water trade. Gasoline, provisions, water, and coal in limited quantities are obtainable. A fixed bridge having a 37-foot span and headroom of 8 feet (2.4 m) at high water crosses the river at Elkton. Motor boats anchor just above and below the bridge in a depth of 3 to 5 feet (0.9 to 1.5 m), and there is no navigation above. A marine railway makes repairs to boats 40 feet long by 3½ feet (1.1 m) draft.

The mean range of tides is 2.1 feet at the entrance and 2.6 feet at Elkton Landing.

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 Lighthouse, a white tower on the highest part of the bluff.

Bohemia River, on the east side of Elk River, 4 miles above the entrance, has a depth of 7 feet (2.1 m) for 3¾ miles to the junction of Little Bohemia and Great Bohemia Creeks and 6 feet (1.8 m) for a distance of 1½ miles in **Little Bohemia Creek** and 2½ miles in **Great Bohemia Creek**. A highway bascule drawbridge crosses the river ½ mile below the fork having a span 40 feet wide and high water clearance when closed of 10½ feet (3.2 m). 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 at the head are frequented by grain and produce boats, the deepest draft being 9 feet (2.7 m) and usual draft 3 to 6 feet (0.9 to 1.8 m).

Town Point Wharf is on the eastern side of Elk River, 5½ miles above the entrance. There is a depth of 10 feet (3.0 m) at the end. Gasoline and water can be obtained between June to September.

Back Creek is the approach to the western end of the Chesapeake & Delaware Canal at Chesapeake City, and is described on page 312.

Northeast River empties into the northern end of Chesapeake Bay 5 miles north-northeastward of Turkey Point. The approach to the river leads westward of Turkey Point and between the western side of **Elk Neck** (high and thickly wooded) and the extensive flats westward. There is a depth of 12 feet (3.7 m) to the mouth of the river and 12 feet (3.7 m) in a dredged channel, buoyed on the east side, to a long wharf one mile west of the town of Northeast. Another branch dredged channel with a controlling depth of about 5 feet (1.5 m) is reported leading from the upper red spar buoy 16 toward the town favoring the eastern bank. Local knowledge is necessary.

The mean range of the tides is 2.5 feet.

Charlestown is a village and railroad station on the western side of Northeast River, 2½ miles above the entrance. Gasoline, water, provisions, and ice may be obtained from the wharf. A marine railway and general repair yard is located here capable of hauling out boats about 60 feet long and with a draft of 8 feet (2.4 m). There is a white light at the shipyard wharf at the upper end of the town which is visible several miles down the river.

There are small marine railways at **Hance Point, Northeast Heights** and at Northeast capable of hauling out boats about 40 to 60 feet long and 4 to 6 feet (1.2 to 1.8 m) draft. Gasoline can be obtained.

Northeast is a town with railroad communication at the head of navigation on Northeast River, 4½ miles above the entrance. Gasoline and provisions are obtainable. It is reported that there is a controlling depth of 6 feet (1.8 m) to Northeast.

To enter Northeast River, pass ½ mile westward of Turkey Point and steer 21° true (NNE. ⅝ E. mag.) to the entrance buoy of the dredged channel, then 16° true (NNE. ⅛ E. mag.) through the channel westward of the buoys to Hance Point, then 31° true (NE ½ N. mag.), passing westward of the buoys, to the last red spar buoy, then 2° true (N. ⅞ E. mag.) to the wharf.

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 has a controlling depth of 12 feet (3.7 m), in 1935, in a dredged channel above Locust Point. Above Havre de Grace this depth holds to Port Deposit. Directions from Chesapeake Bay to Havre de Grace are given on page 305. Above Havre de Grace there 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 (4.6 m) deep from Chesapeake Bay to Havre de Grace, and for the removal of the shoal opposite Watsons Island (Garrett) to a depth of 8 feet (2.4 m).

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 (4.6 to 5.5 m) 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 a period of about three months in winter. The mean range of tides is 2.1 feet.

Fishing Battery Light (flashing white red sector), 350 yards eastward of the dredged channel near the lower end, is a light on a 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 Susquehanna River, is on the main line of the Pennsylvania and Baltimore & Ohio Railroads. There are depths of 6 to 10 feet (1.8 to 3.0 m) at the wharves. Gasoline, Diesel oil, provisions, water, and coal in limited quantities are obtainable. There are two small marine railways for repairing motor boats at Havre de Grace, the larger one capable of hauling out boats up to 60 feet long and 5 feet (1.5 m) draft.

A rock with a depth of 5½ feet (1.7 m) over it, and marked by a black spar buoy at its southern end, lies ⅛ mile off the wharves at Havre de Grace and about ¼ mile 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 9 feet (2.7 m) about 100 yards easterly from the above-mentioned rock is marked by a buoy with red and black horizontal bands.

Bridges.—Three bridges cross Susquehanna River in the vicinity of Havre de Grace. The lower one, a highway bridge ¾ mile northward of Havre de Grace Lighthouse, has a center pier draw across the channel, each opening 98 feet wide, with a headroom of 23 feet (7.0 m) at high water when closed. The Pennsylvania Railroad bridge, 150 feet above the highway bridge, has a center pier draw across the channel, each opening 100 feet wide with a headroom of 52.4 feet (16.0 m) at high water when closed. The east opening in both draws is generally used by vessels bound north and the west opening by vessels bound south. A towboat is stationed at Havre de Grace by the railroad company to assist sailing vessels through the bridges. The Baltimore & Ohio Railroad bridge, ¾ mile above the Pennsylvania Railroad bridge, is fixed on both sides of Garrett Island and has a headroom of 87 feet (26.5 m) at high water. The main channel leads through the second opening from the western side of Garrett Island.

For bridge regulations see page 52.

Perryville is a town on the eastern side of Susquehanna River, opposite Havre de Grace. A draft of about 10 feet (3.0 m) at low water can be carried from the main channel off Havre de Grace, across the middle ground anywhere south of Rock Buoy from 500 yards to ½ 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 Public Health Service Hospital, with two water tanks, including the twin stacks of a power house, near the southern point of the town, are prominent. A short dredged channel leads to a Government landing ¼ mile below the highway bridge, and there is a private wharf just south of the same bridge.

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, 3½ miles above Havre de Grace. It has railroad communication with Baltimore. There is a depth of 12 feet (3.6 m.) to abreast the town and 6 to 9 feet (1.8 to 2.7 m) at the wharves. Gasoline and provisions are obtainable. The deepest draft of vessels going there are tugboats and barges up to 12 feet (3.7 m) draft carrying stone from the quarries in this vicinity. Small boats can go a short distance above Port Deposit, but the channel is obstructed by rocks and should not be attempted by a stranger. Conowingo Dam is about 6 miles above this town.

Directions, Susquehanna River.—From a position 300 yards east of the perpendicularly striped buoy off Turkey Point, steer 321° true (NNW. ¾ W. mag.) to a point 300 yards east of Locust Point lighted buoy, passing eastward of buoy 1. Then steer 280° true (WNW. ⅜ W. mag.), passing 100 yards north of the lighted buoy and heading for buoy 5, to a position 100 yards east of the latter buoy. From here follow the dredged channel, marked by several buoys, passing 300 yards eastward of the light (fixed green) on **Concord Point.**

Swan Creek, on the western side of Chesapeake Bay, 3½ miles below Havre de Grace, has a depth of about 5 feet (1.5 m.) in a narrow, unmarked channel to near the head, and is little used.

Spesutie Narrows, between Spesutie Island and the mainland westward, has a least depth of 2½ feet (0.8 m) and is considerably used by small local craft. The best water leads eastward of an islet near the northern end, and southward of it the mid-channel is clear.

Romney Creek, on the west side of Chesapeake Bay, 6 miles northeastward of Pooles Island, has a depth of 6 feet (1.8 m) in a narrow unmarked channel for 3 miles above the mouth and 2 feet (0.6 m) for a farther distance of 1½ miles. It is used only by small boats. There is a buoyed rocky patch, with a least depth of ½ foot (0.2 m) ¾ mile south-southeastward of the entrance, and the best water in approaching the entrance leads westward of it. A 7° true (N. by E. ⅜ E. mag.) course from Worton Point Shoal lighted bell buoy will lead clear of all dangers to the entrance.

Bush River, on the western side of Chesapeake Bay, 3 miles north-northeastward of Pooles Island, has a depth of 6 feet (1.8 m) to a railroad drawbridge 7 miles above the entrance and is frequented only by small produce and 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 draw opening 35 feet wide and a headroom of 12 feet (3.7 m) at high water. (Bridge regulations—draw will be opened at any time from 7 to 11 a. m. and noon to midnight between June and September, inclusive. From October to May, only on 3 hours' notice. Otherwise, regulations on p. 52 apply.) The river is shoal and little used above. Bush River is a railroad station at the bridge. There is a marine railway at Bush River near the bridge for hauling out small boats. Gasoline can be obtained. The mean range of tides is 1.5 feet.

Pooles Island, on the western side of Chesapeake Bay, 10 miles above the mouth of Patapsco River, is low and covered with trees. **Pooles Island range** (skeleton towers, white daymarks, black round center in

front mark), on the southeast end of Pooles Island, is a guide for crossing the middle ground eastward of the island and is used by all vessels bound northward from Baltimore.

The channel westward of Pooles Island is marked by buoys and has a least depth of 7½ feet (2.3 m) although there is an unmarked 6-foot (1.8 m) spot 600 yards northwestward of Pooles Island Light (flashing white, 5 red sectors), white tower. It is used only by small craft from the tributaries on the western side or boats seeking shelter from westerly winds.

Gunpowder River, Middle River, and Back River have a common entrance westward of Pooles Island, leading between Spry Island on the north and Miller Island on the south. They are frequented mostly by small produce and pleasure boats and an occasional small tugboat, the deepest draft being 7 feet (2.1 m) and usual draft 2 to 4 feet (0.6 to 1.2 m). The mean range of tides is 1.2 feet.

Gunpowder River has a depth of 11 feet (3.4 m) for 2 miles above **Spry Island** in the mouth, 6 feet (1.8 m) to within 1 mile of a railroad bridge 6½ miles above Spry Island, and 4 feet (1.2 m) to the bridge. The bridge has a draw opening, but the river is shoal and there is no navigation above. Spry Island is a bare marsh. The main entrance leads southward and westward of the island, and is narrow as far as **Carroll Point**, 1 mile above, with shoals of 3 to 6 feet (0.9 to 1.8 m) 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 (0.6 m) at low water can be carried into the river from northward, close around the end of **Ricketts 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.

Aberdeen Proving Ground—Navigation prohibited.—For the protection of life and property during target practice in the waters adjacent to Aberdeen Proving Ground, near the head of Chesapeake Bay, navigation is prohibited in the following areas:

Northeastward of a line extending northwestward from the southwest point of Pooles Island and touching the southwest point of Spry Island, and Lower Island and Brier Points at the entrance to Hawthorn Cove.

Northwestward of a line touching the southeast tangent of Pooles Island and extending 39° true to Black Point near the south entrance to Spesutie Narrows; thence in mid-channel through Spesutie Narrows. This includes Romney Creek, Bush River up to a line extending from Fairview Point to Chelsea, and Gunpowder River up to a line extending from Olivers Point to Reardons Inlet.

Seneca Creek, 2½ miles northward of Miller Island, has a depth of 8 feet (2.4 m) in the entrance and 5 feet (1.5 m) in mid-channel to near the head. It is frequented only by small craft.

Middle River, 2¼ miles 297° true (NW. ⅞ W. mag.) from the black buoy east-northeastward of Miller Island, has a depth of 8 feet (2.4 m) for 3 miles above the entrance and 2½ feet (0.8 m) for a farther distance of ½ mile to the head of navigation. Unmarked

shoals extend off both points at the entrance and from many of the points above the entrance, but the mid-channel is clear if the points be given a good berth. **Middleriver** is a village and summer resort at the head of navigation; it is on the railroad and is the terminus of an electric road to Baltimore. The river has many tributaries, the most important being **Frog Mortar Creek**, which has a depth of 6 feet (1.8 m) to near the head. There is a small marine railway in Frog Mortar Creek and in the creek northwest of **Clarke Point**. The Glenn L. Martin Aircraft factory is located at the head of **Dark Head Creek**.

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 (2.4 to 3.0 m). A shoal extends half way across the entrance from the northwest side.

Miller Island is a bare marsh without prominent marks. A shoal extending northeastward is marked off its end by a black buoy.

Hart Island is marshy and marked by a thick clump of trees in the center and scattered trees near the northeast end.

The thoroughfare between the southwest end of Hart Island and the mainland has a depth of 1½ feet (0.5 m) at low water and 2½ to 3 feet (0.8 to 0.9 m) at high water and is considerably used. Craighill Channel range rear light (skeleton tower) is on the east side.

A wooden bridge has been built from the southwest end of Hart 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.

Back River has a depth of 6 feet (1.8 m) for a distance of 5½ miles above the entrance and 5 feet (1.5 m) for a farther distance of 1 mile to an electric-railway bridge. The bridge has a draw opening 25 feet wide, with high water clearance of 2½ feet (0.8 m), and small boats can go about 1 mile above in either branch at high water, but boats seldom go above the bridge. A fixed railway bridge, 1 mile above has a span 72 feet wide and a high water clearance of 8 feet (2.4 m). The river is unmarked, but above the entrance the mid-channel is clear for vessels of 4 feet (1.2 m) draft to the first bridge. The best water leads westward of an unmarked middle ground 3 miles above the entrance. There is a 4-foot (1.2 m) spot on the southwest side of the middle ground. A row of piles extends ⅜ mile eastward from the mouth of **Bread and Cheese Creek**, ¾ mile below the bridge. The main approach to the river is through Hawk Cove, but small craft from southward usually enter through the thoroughfare westward of Hart Island.

8. INSIDE ROUTE, DELAWARE RIVER TO CHESAPEAKE BAY

From Trenton the route leads down the Delaware River to the entrance to the Chesapeake and Delaware Canal at Reedy Point, and thence through this canal to Chesapeake City. Thence down Back Creek and Elk River to the head of Chesapeake Bay at Turkey Point and thence down Chesapeake Bay and through Hampton Roads and Elizabeth River to Norfolk.

The controlling depth from Delaware Bay to Chesapeake Bay is about 12 feet (3.7 m). Dredging is now in progress to increase this

depth to 27 feet (8.2 m). A vessel or combined tug or barge, exceeding 46 feet in beam is not permitted to pass through the Chesapeake and Delaware Canal unless special arrangements are made for a specific trip. Rafts in transit must not exceed 45 feet in width.

A vessel with a speed of 10 miles, running in daytime only, can make the passage from Trenton to Norfolk in 2 to 2½ days under favorable conditions.

Supplies.—Coal in limited quantities can be obtained at numerous places, but the best and most convenient coaling places are Philadelphia, Baltimore, and Norfolk. Gasoline, provisions, and water can be obtained at most of the towns or cities along the route.

Pilots can be obtained at Trenton, Philadelphia, Delaware City, Chesapeake City, Baltimore, and Norfolk for either the whole or parts of the passage. A fisherman or pilot may sometimes be obtained at the mouth of Back Creek competent to pilot a vessel to Chesapeake City. The fees are not prescribed by law.

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 & 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 at the water line.

DELAWARE RIVER TO THE ENTRANCE TO CHESAPEAKE AND DELAWARE CANAL (INSIDE ROUTE)

(Charts 294, 295, and 296)

The distance is 66 miles from Trenton to the entrance to the Chesapeake & Delaware Canal at Reedy Point, and the channel, which has been dredged, has ample width and is easily followed. A stranger proceeding with caution should have little difficulty in making the passage from Trenton to Reedy Point with the aid of the chart and the directions.

A project calls for a dredged channel 12 feet (3.7 m) deep and 200 feet wide from the lower bridge at Trenton to the Marine Terminal of that city. Depths in the dredged channel below Trenton are always ample for vessels that can use the inside route. Many of the shoals in the river are bare at or before low water and are generally covered with marsh grass, which makes them usually well defined. The water in the river above Chester is fresh and suitable for boilers. Coal can be obtained conveniently at the larger cities along the river.

Anchorage.—Except for ½ mile below Bordentown there is sufficient width at most places alongside the channel for anchorage, for which the chart must be the guide. Between Port Richmond and Marcus Hook anchorages are prescribed by regulation. Those most convenient to the city of Philadelphia are on the east side of the river at Port Richmond, Cooper Point, and Greenwich Point, and are marked by anchorage buoys (see p. 75). Below Marcus Hook suitable anchorages may be selected well off the ranges. Convenient anchorage for yachts can be found off the yacht clubs at Tacony

and Essington, north and south of Philadelphia, respectively. (For yacht clubs see p. 365). Public landings where vessels may tie up for a short time are located at the foot of Vine Street and at the foot of Dock Street in Philadelphia. There are a number of piers at Philadelphia at which vessels may lie for which wharfage charges are made, pier No. 57 north and Nos. 30 and 34 south being convenient to the city.

Caution.—All persons operating yachts, motorboats, speedboats, and other craft in Delaware River are warned to keep clear of the submerged portions of the 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 No. 294. They are marked by lights as shown on the chart.

Tides.—The mean range of tides at Trenton is 4.8 feet; at Bordentown, 4.9 feet; Burlington, 4.9; Philadelphia, 5.2; Chester, 5.4; and Delaware City, 5.5. Tides occur at Trenton 2⅔ hours, at Bordentown 2¼ hours and at Burlington 1½ hours later than at Philadelphia, and at Chester 1¼ hours and at Delaware City 2¾ hours earlier than at Philadelphia.

CHESAPEAKE & DELAWARE CANAL

This 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 and there are no toll charges. The overhead clearance is limited to 140 feet (42.7 m) at mean low water by vertical lift bridges, when in an upper position. The canal and its approaches are being dredged to a new project depth of 27 feet (8.2 m). In 1936 vessels with a draft of 12 feet (3.7 m) or less navigated the main canal.

Information concerning the conditions existing in the canal at any particular time, and authority for wide craft, and rafts to traverse the waterway (see p. 311) should be obtained from U. S. Engineer Sub-Office, Chesapeake City, Md., telephone Chesapeake City 43. 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, Pa.

Delaware River entrance.—The Delaware River entrance to the canal is at Reedy Point, about 1¾ miles below the old Delaware City entrance. The entrance is between two stone jetties about 800 feet apart at the outer ends, and the channel, project width of which is 250 feet, is located midway between them. The north jetty is marked by a flashing red light, and the south jetty by a flashing white light.

A branch channel from Delaware City to the main canal, has been dredged to a depth of 6 feet (1.8 m) at mean low water, and a bottom width of 50 feet. The point of junction of the new and old channels is about 2 miles west of the Delaware River. This branch channel is crossed at Delaware City by a double leaf bascule bridge having a horizontal clearance of 60 feet and a maximum vertical clearance of 17 feet (5.2 m) at mean low water 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. The branch

channel is open to traffic, and in May, 1936, had a controlling depth of 5 feet (1.5 m) from Delaware River to the bridge, and thence 2 feet (0.6 m) to the main canal.

Project Depth.—The existing project provides for a channel having a depth of 27 feet (8.2 m) and a width of 250 feet from Delaware River to Elk River; and thence 400 feet wide down Elk River and Chesapeake Bay to deep water at or near Pooles Island. It also provides for deepening the **Delaware City Branch Canal** to 8 feet (2.4 m). (The portion of the project in Elk River and Chesapeake Bay is included in the Baltimore, Maryland, U. S. Engineers' District.)

Tides.—The normal range of tide is 5.5 feet (1.7 m) at the Delaware River end of the canal, and about 2.0 feet (0.6 m) at the Chesapeake City end. "Local mean low water" at the mouth of Back Creek is about +2.0 feet (0.6 m) on the canal datum; it increases to +2.2 feet (0.7 m) at Bethel, and then decreases gradually eastward, being +0.9 feet (0.3 m) at Delaware River.

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 (2.7 to 3.0 m) 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 (0.3 or 0.5 m) 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.

Currents.—The daily predicted times of slack water and the times and velocities of strengths of flood and ebb are given in the **Atlantic Coast Current Tables** published annually by the Coast and Geodetic Survey. The currents in the canal are moderate during fair weather, ranging from 1½ to 2 miles per hour, with the highest velocities at Chesapeake City and Reedy Point. Storm tides increase these velocities to as much as 3 miles per hour, or even more. 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 in the entrance.

Turning Basin.—A turning basin at which wide boats may pass each other, or long craft turn around, is provided 1,500 feet west of the Chesapeake City bridge.

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.—There are tie-up dolphins and boardwalks provided in the canal at Reedy Point entrance, on the north side and at Chesapeake City on the south side. Bulkhead wharves are provided at St. Georges just east of the bridge, at Chesapeake City on the west side of the mooring basin, and at Delaware City at the Delaware River entrance to the Branch Channel on the north side. **Regulations** for the use of these facilities have been posted and further information can be secured by telephoning the Canal Office, Chesapeake City 43.

Bridges.—There are four highway bridges over the canal; that is, at Reedy Point, St. Georges, Summit, and Chesapeake City; and one

railway bridge, at Canal Station. All bridges are vertical lift, with clearance of 140 feet above low water when open. The bridge at Summit has a clearance of about 65 feet when in a closed position. When closed, the vertical clearances above mean high water are as follows:

	Feet	(*Meters*)
Reedy Point Bridge	6	(1.8)
St. Georges Bridge	16	(4.9)
Pennsylvania Railroad Bridge	45	(13.7)
Summit Bridge	65	(19.8)
Chesapeake City Bridge	9	(2.7)

The signal for opening of bridges is three blasts of the whistle or of a horn. (See below—Traffic signals at all bridges.)

Supplies.—Gasoline and supplies can be obtained at Chesapeake City, St. Georges Bridge, and Delaware City. There is a marine railway at Chesapeake City capable of hauling out a boat about 60 feet long and draft of about 4½ feet (1.4 m).

Traffic Control.—As an aid to navigation in the canal, a dispatching system has been established, with a dispatcher on duty at the Chesapeake City office at all times. 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 over shoals.

The cooperation of the canal users is essential to the successful handling of traffic, especially in the matter of information as to length, beam, and draft of vessels, visibility of draft numerals, and the strict observance of existing rules and regulations pertaining to the use of the waterway.

Traffic Signals at all bridges.—

Red Light: Vessels must be kept under control to stop if necessary due to failure of bridge to raise.

Green Light: Vessel may proceed.

Two blasts of horn, Fixed Red and Blinking Red Lights: Stop and tie up before reaching bridge. This signal will be given when, for any reason, it becomes necessary to stop a vessel at any of the canal bridges.

Four blasts of horn: Vessel may proceed after having been stopped and tied up.

Tows.—No towboat shall be permitted to enter this canal with more than one barge in one tow proceeding with the tide. When proceeding against the tide two loaded, or three light barges, in single file are permitted.

No towboats shall be permitted to enter the canal if considered inadequate to safely handle its tow.

Vessels transiting the Chesapeake and Delaware Canal abreast must have the towboat on the port side of the vessel being towed.

For further information see pages 308 and 310.

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.

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, Md. (Telephone Chesapeake City 43).

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. (See p. 310.)

Speed Limits.—The speed limit in any part of the waterway is 6 miles per hour—3 miles per hour when passing approaching craft or craft tied to the bank. Excessive speed is not only damaging to boats tied up at wharves, and detrimental to the banks of the canal, but is liable to cause serious accidents to those who indulge in it. The operations involved in interrupting the stream of vehicular traffic and raising the bridge are based upon a speed of 6 miles per hour by the approaching vessel. If that speed is exceeded, the boat may reach the bridge before it is elevated sufficiently to allow the boat to pass, with consequent serious damage to the craft.

BACK CREEK AND ELK RIVER

(Chart 1226)

Back Creek has a length of 3¼ miles from Chesapeake City to Elk River. A channel 27 feet (8.2 m) deep and 250 feet wide is being dredged through this creek at present from the Chesapeake and Delaware Canal at Chesapeake City to near **Courthouse Point** with cut-offs through Sandy and Grass Points. The section between Courthouse Point and Long Creek has been completed but the depths in the canal are reported subject to rapid change. (See p. 309.) It is well marked by lights and buoys. Caution should be exercised because of dredging and other working plant. A pilot may be obtained on inquiry at Chesapeake City and sometimes at the entrance to the creek. The channel in the creek is too narrow for anchorage. Gasoline and provisions are obtainable at Chesapeake City, and there is a shipyard and marine railway. (See previous page.)

Elk River has a length of nearly 8 miles from Back Creek to the entrance of the river at **Turkey Point**. The natural channel is wide and easily followed. A convenient anchorage will be found near the west shore about 1½ miles northeast from Turkey Point.

The project calls for a dredged channel from near Courthouse Point to near **Pooles Island** in Chesapeake Bay continuing 27 feet (8.2 m) deep and 400 feet wide from the dredged section in Back Creek. Dredging is under way.

Tides.—At Chesapeake City, Back Creek tides occur about 3 hours after tides at Baltimore, and the mean range of tides is 2.3 feet.

CHESAPEAKE BAY (INSIDE ROUTE)

(Charts 1222 to 1226)

GENERAL

The channel in Chesapeake Bay is well marked and easily followed. Coal, gasoline, repairs, and supplies of all kinds can be best obtained at Baltimore and Norfolk. Some supplies and gasoline

can be had at numerous places on the tributaries of the bay, the best places near the sailing route being Annapolis, Solomons on the Patuxent River, and Cockrells Creek (Reedville) on the Great Wicomico River. There are small marine railways at various places and these are described elsewhere in the text.

Caution.—For the protection of life and property during target practice in the waters adjacent to **Aberdeen Proving Ground,** near the head of Chesapeake Bay, **navigation is prohibited** in certain areas. (See page 306.)

Anchorage can be had at numerous places on the shores of the bay and its tributaries, depending on the direction of the wind. Those most frequently used and easiest of access are:

Patapsco River.—Light-draft vessels usually anchor in Old Road Bay or off the mouth of Stony Creek, depending on the wind and sea. Anchorages in the vicinity of Baltimore are prescribed by regulations; they are on the northeast side of the harbor between Canton and Fells Point, in the cove on the southerly side east of Federal Hill and alongside the Fort McHenry dredged channel in the Patapsco River. (See page 254.)

Severn River, at Annapolis in the three anchorages in the mouth of Spa Creek, depths about 8 to 15 feet (2.4 to 4.6 m); also in Annapolis Roads southeastward of Greenbury Point Shoal Lighthouse.

Patuxent River.—Small vessels usually anchor on the north side between Drum Point Lighthouse and the horizontally striped buoy 5/8 mile westward of the lighthouse, and small craft frequently anchor in the cove on the north side of Solomons Island (1 5/8 miles westward of Drum Point Lighthouse).

Cornfield Harbor, on the west side of Point Lookout, entrance of Potomac River, is occasionally used; it is sheltered only from northerly and northeasterly winds.

Great Wicomico River and the mouth of Cockrell Creek is a good and convenient harbor. The fish stakes, off the entrance, may give trouble at times to vessels entering. The depths at the anchorage are 15 to 20 feet (4.6 to 6.1 m).

Rappahannock River.—Anchorage, exposed to southeasterly winds, can be selected in the entrance.

Mobjack Bay is exposed to southerly and southeasterly winds, and except toward its head or in the arms it is exposed to northwest winds also.

Hampton Roads.—Small craft usually anchor in what is locally known as Mother Hawkins Hole, on the north side of the eastern part of Hampton Bar. The entrance is between the wharf at Old Point Comfort and the horizontally striped buoy close westward of it. Small craft usually seek shelter in Hampton Creek in bad weather. Small vessels frequently anchor on the northerly part of Craney Island Flats westward of the dredged channel leading to Norfolk; also on the shoals eastward of that channel between the Virginian Railroad pier at Sewall Point and the piers 1 1/2 miles southward.

The anchorages for small vessels near Norfolk are on the northeast side of the channel opposite Hospital Point, on the west side of the channel between Hospital Point and Portsmouth, and on the south side of the Eastern Branch between Norfolk and Berkley. Smith

Creek, locally known as "The Hague," which is opposite Hospital Point, is frequented by yachts and small boats.

For additional information about anchorages here see charts 400 and 452, and appendix page 354.

The waterfront is lined with wharves, three of which are public with depths alongside from 8 to 18 feet (2.4 to 5.5 m) (see page 158). A berth can sometimes be arranged for at the Norfolk and Western grain elevator docks near the Union Station. Other docks are available but wharfage is charged.

Tides.—The mean range of tides at Baltimore is 1.1 feet; Rappahannock River entrance, 1.2; Old Point Comfort, 2.5; and Norfolk, 2.8.

DIRECTIONS, INSIDE ROUTE, DELAWARE BAY TO CHESAPEAKE BAY

Courses in the Delaware Bay and River are given on page 83. The course entering the Delaware and Chesapeake Canal from Delaware River mid-channel between the lighted jetties is 79° true (E. 1/8 N. mag.) and this course extends for about 2¾ miles as far as Biddles Point. Passage through the canal is made by following the aids and proceeding in accordance with canal regulations. (See description on page 309.) From Courthouse Point in the Elk River southwestward into Chesapeake Bay to southeastward of Pooles Island, a distance of about 23 miles, the proposed channel 27 feet (8.2 m) deep and 400 feet wide is being dredged. Until this work is completed and the channels are established no courses will be published for Chesapeake Bay above the Patapsco River entrance. The courses from Baltimore southward are given on page 146. During strong winds small vessels can favor the lee shore, being guided by the chart. Care should be taken to avoid the fish traps which extend long distances from shore in places.

9. APPENDIX

COAST PILOTS OF THE COAST AND GEODETIC SURVEY

	Price
U. S. Coast Pilot, Atlantic Coast, Section A, from St. Croix River to Cape Cod	$0.75
U. S. Coast Pilot, Atlantic Coast, Section B, from Cape Cod to Sandy Hook, including Long Island Sound	.75
U. S. Coast Pilot, Atlantic Coast, Section C, Sandy Hook to Cape Henry, including Delaware and Chesapeake Bays	.75
U. S. Coast Pilot, Atlantic Coast, Section D, Cape Henry to Key West	.75
U. S. Coast Pilot, Gulf Coast, from Key West to the Rio Grande	.75
U. S. Coast Pilot, West Indies, Puerto Rico, and Virgin Islands	.75
Inside Route Pilot, New York to Key West	.50
U. S. Coast Pilot, Pacific Coast, California, Oregon, and Washington	.75
U. S. Coast Pilot, Alaska, Part I, from Dixon Entrance to Yakutat Bay	.75
U. S. Coast Pilot, Alaska, Part II, Yakutat Bay to Arctic Ocean	.75
U. S. Coast Pilot, Hawaiian Islands	.50
U. S. Coast Pilot, Philippine Islands, Part I, Luzon, Mindoro, and Visayas	.75
U. S. Coast Pilot, Philippine Islands, Part II, Palawan, Mindanao, and Sulu Archipelago	.75
Distances Between United States Ports	.10

FIELD STATIONS

Boston, Mass., room 808, Customhouse.
New York, N. Y., rooms 741-742, Customhouse.
New Orleans, La., room 314, Customhouse.
San Francisco, Calif., room 307, Customhouse.
Seattle, Wash., room 601, Federal Office Building.
Manila, P. I., Intendencia Building.

At these stations complete files of the United States Coast and Geodetic Survey Charts, Coast Pilots, Tide Tables, Current Tables, and other publications relating to navigation may be consulted and information affecting navigation obtained without charge. Light Lists, Buoy Lists, and Notices to Mariners are kept for sale or for free distribution to mariners. The field stations are also sales agencies for the Coast and Geodetic Survey publications. A chart catalogue, giving lists of Charts, Coast Pilots, Tide Tables, and agencies of the Coast and Geodetic Survey, can be obtained from any of the field stations or will be sent, free of charge, on application to the Coast and Geodetic Survey, Washington, D. C. Frequent changes occur in the agencies, and the list of agencies is published in the first notice each month of the Notice to Mariners.

NAVIGATIONAL AIDS AND THE USE OF CHARTS

The **Coast and Geodetic Survey** is charged with the survey of the coasts, harbors, and tidal estuaries of the United States and its insular possessions and issues the following publications relating to these waters as guides to navigation: Charts, Coast Pilots, Tide Tables, Current Tables, a catalog of these publications, and Notices to Mariners, the last-named published weekly by the Bureau of Lighthouses and Coast and Geodetic Survey.

Charts bear three dates, which should be understood by persons using them: (1) The date (month and year) of the edition, *printed* on the late charts below the border in a central position; (2) the date of the latest correction to the chart plates, *printed* in the lower left-hand corner below the border; (3) the date of issue, *stamped below* the border and just to the left of the subtitle. Charts show all necessary corrections as to lights, beacons, buoys, and dangers, which have been received to the *date of issue*, being hand corrected since the latest date printed in the lower left-hand corner. All small but important corrections occurring subsequent to the *date of issue* of the chart are published in Notice to Mariners and should be applied by hand to the chart immediately after the receipt of the notices. The date of the edition of the chart remains unchanged until an extensive correction is made on the plate from which the chart is printed. The date is then changed and the issue is known as a new edition. When a correction, not of sufficient importance to require a new edition, is made to a chart plate, the year, month, and day are noted in the lower left-hand corner. All the notes on a chart should be read carefully, as in some cases they relate to the aids to navigation or to dangers that cannot be clearly charted. The charts are various in character, according to the objects which they are designed to subserve. The most important distinctions are the following:

1. Sailing charts, mostly on a scale of approximately 1:1,200,000, which exhibit the approaches to a large extent of coast, give the offshore soundings, and enable the navigator to identify his position as he approaches from the open sea.
2. General charts of the coast, on scales of 1:400,000 and 1:200,000, intended especially for coastwise navigation.
3. Coast charts, on a scale of 1:80,000, by means of which the navigator is enabled to avail himself of the channels for entering the larger bays and harbors.
4. Harbor charts, on larger scales, intended to meet the needs of local navigation.

Note.—General charts of the Philippine Islands are on scales 1:1,600,000, 1:800,000, and 1:400,000; coast charts are on scales 1:100,000 and 1:200,000.

Coast pilots, relating to waters of the United States, Puerto Rico, Virgin Islands, Alaska, Hawaiian Islands, and the Philippine Islands, contain descriptions of the coasts, harbors, dangers, and directions for coasting and entering

harbors. At intervals of about one year supplements are issued, containing the more important corrections since the publication of the volume. The supplements are printed on one side of the paper only, so that they may be cut and pasted in the appropriate places in the volume. Supplements and other corrections for any volume can be furnished, free of charge, on application to the Coast and Geodetic Survey, Washington, D. C., or any of its field stations, provided the volume itself has not been superseded by a subsequent edition.

Tide tables.—The Coast and Geodetic Survey Tide Tables are issued annually in advance of the year for which they are made and contain the predicted times and heights of the tide for each day in the year at the principal ports of the world. A table of tidal differences is given by means of which the tides at about 3,900 intermediate ports may be obtained. These tables are published in two volumes under the titles: Tide Tables, Atlantic Ocean, and Tide Tables, Pacific Ocean and Indian Ocean.

Current tables are also issued annually in advance. They include daily predictions of the times of slack water and the times and velocities of strength of flood and ebb for a number of harbors, together with differences for obtaining predictions for numerous other places, as well as other useful information on currents. The current tables appear in two volumes, one for the Atlantic coast of the United States and the other for the Pacific coast of the United States.

Agencies for the sale of the Charts, Coast Pilots, Tide Tables, and Current Tables of the Coast and Geodetic Survey are established in many ports of the United States and in some foreign ports. The charts and publications can also be purchased in the office of the Coast and Geodetic Survey, Washington, D. C., or any of the field stations. If ordered by mail, prepayment is obligatory. Remittances should be made by postal money order or express order, payable to the Coast and Geodetic Survey. Postage stamps, checks, and drafts cannot be accepted. The sending of money in an unregistered letter is unsafe. Only catalogue numbers of charts need be mentioned. The catalogue of charts and other publications of the survey can be obtained free of charge on application at any of the sales agencies or to the Coast and Geodetic Survey, Washington, D. C. A list of the sales agencies of the Coast and Geodetic Survey is published quarterly in the Notice to Mariners.

Other publications.—Lists of Lights, including buoys and other daymarks of the United States, its insular possessions, and the Great Lakes, are published by the Bureau of Lighthouses and may be purchased from its sales agencies or from the Superintendent of Documents, Washington, D. C. Notice to Mariners, relating to the same waters, is published weekly by the Bureau of Lighthouses and Coast and Geodetic Survey; this publication can be obtained free of charge on application to the superintendents of lighthouses of the various districts. The Corps of Engineers, United States Army, in cooperation with the Bureau of Operations, United States Shipping Board, publish the Port Series in 25 volumes and Port and Terminal Charges at United States Ports. These volumes contain much useful information concerning port conditions which is of interest to the navigator. They may be purchased from the Superintendent of Documents, Washington, D. C.

PUBLICATIONS

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

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

The List of Publications of the Department of Commerce lists the publications of the United States Coast and Geodetic Survey and may be secured free on application from the offices of the Department of Commerce and its field agencies, or from the Superintendent of Documents, Government Printing Office, Washington, D. C.

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 any one during business hours.

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., Field Stations 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., Field Stations 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., Field Stations of the United States Coast and Geodetic Survey, and authorized sales agents in 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., Field Stations of the United States Coast and Geodetic Survey, and authorized sales agents in the various ports.

TIDAL CURRENT CHARTS

Boston Harbor, Long Island and Block Island Sounds, New York Harbor, San Francisco Bay—Four volumes:
Published by the United States Coast and Geodetic Survey.
For sale by the United States Coast and Geodetic Survey, Washington, D. C., Field Stations of the United States Coast and Geodetic Survey, and authorized sales agents in the various ports.

NOTICE TO MARINERS

Issued by the United States Department of Commerce and by the Hydrographic Office, United States Navy Department.

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

LIGHT LISTS

United States, Territories, and Possessions:
Published by the United States Lighthouse Service.
For sale by the Superintendent of Documents, Washington, D. C., and by authorized sales agents in the various ports.

Philippine Islands:
Published by the Department of ~~Agriculture and Commerce, Navigation~~ Division, Manila, Philippine Islands.
~~Copies of the List~~ of Lights, Buoys, Beacons and Daymarks of the Philippine ~~Islands~~ may be secured free on application to the Chief, Navigation ~~Division~~, Department of Agriculture and Commerce, Manila, P. I.
A limited number of Philippine Notice to Mariners and List of Lights, etc., are available for free distribution at the Coast and Geodetic Survey Field stations at Seattle, Wash., San Francisco, Calif., and Honolulu, T. H.

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 Radio beacon System, Atlantic and Gulf Coasts, Pacific Coast, and Great Lakes:
Free on application to the various superintendents of lighthouses.

Circular No. 1, Radio, Distribution of Weather Information, Forecasts, and Warnings by Radio for the Benefit of Marine, Aviation, and Commercial Interests:
Free on application to the Weather Bureau, United States Department of Agriculture, Washington, D. C.

List of Stations Performing Special Services:
Published and for sale by the Bureau of the International Telecommunication Union, Berne, Switzerland.

List of Coast Stations and Ship Stations:
Published and for sale by the Bureau of International Telecommunication Union, Berne, Switzerland.

Radio Aids to Navigation (H. O. Publ. No. 205):
Published by the Hydrographic Office, United State Navy Department.
For sale by the Hydrographic Office, Washington, D. C.

Radiobeacons and Radiobeacon Navigation:
Published by the United States Lighthouse Service.
For sale by the Superintendent of Documents, Washington, D. S.

List of Radiobeacons:
See Light Lists published by the United States Lighthouse Service.

MISCELLANEOUS

American Practical Navigator (Bowditch):
Published by the Hydrographic Office, United States Navy Department.
For sale by the Superintendent of Documents, Washington, D. C.

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 Bureau of Marine Inspection and Navigation, United States Department of Commerce, Washington, D. C.

Laws Governing Steamboat Inspection:
Published by and free on application to the Bureau of Marine Inspection and Navigation, United States Department of Commerce, 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 Bureau of Marine Inspection and Navigation, United States Department of Commerce.
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 Bureau of Marine Inspection and Navigation, United States Department of Commerce, 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 Bureau of Marine Inspection and Navigation, United States Department of Commerce, Washington, D. C.

Pilot Rules for Great Lakes and Their Connecting and Tributary Waters:
Published by and free on application to the Bureau of Marine Inspection and Navigation, United States Department of Commerce, Washington, D. C.

Port and Terminal Charges at United States Ports:
Prepared by the Board of Engineers for Rivers and Harbors, War Department.
For sale by the Superintendent of Documents, Washington, D. C.

Port Series—of the United States—25 volumes:
Prepared by the Board of Engineers for Rivers and Harbors, War Department.
For sale by the Superintendent of Documents, Washington, D. C.

Regulations for Lighting Bridges:
Prepared by the United States Lighthouse Service, Washington, D. C.
For sale by the Superintendent of Documents, Washington, D. C.

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 Shipping Board.
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.

Rules and Regulations; The Navigable Waters of the United States:
Prepared by the United States Engineers.
For sale by the Superintendent of Documents, Washington, D. C.

International Code of Signals in 2 volumes

REMARKS ON THE USE OF CHARTS

Accuracy of charts.—The value of a chart depends upon the character and accuracy of the survey on which it is based, and the larger the scale of the chart the more important do these become. In these respects the source from which the information has been compiled is a good guide. This applies particularly to the charts of the Alaska Peninsula, Aleutian Islands, Arctic Ocean, and part of Bering Sea, and the Philippine Islands. The early Russian and Spanish surveys were not made with great accuracy, and until they are replaced by later surveys these charts must be used with caution.

With respect to these regions, the fullness or scantiness of the soundings is another method of estimating the completeness of a chart. When the soundings are sparse or unevenly distributed, it may be taken for granted that the survey was not in great detail. A wide berth should, therefore, be given to every rocky shore or patch, and this rule should invariably be followed, viz, that instead of considering a coast to be clear unless it is shown to be foul the contrary should be assumed.

With respect to a well-surveyed coast, only a fractional part of the soundings obtained are shown on the chart, a sufficient number being selected to clearly indicate the contour of the bottom. When the bottom is uneven the soundings will be found grouped closely together, and when the slopes are gradual fewer soundings are given. 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 entrance 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 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 or coral heads.

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. These changes are often of frequent occurrence; therefore, when vessels' drafts approximate the charted depth of a dredged channel local information as to conditions should be obtained before entering.

Danger curves.—The depth curves will be found useful in giving greater prominence to outlying dangers. It is a good plan to trace out with a colored pencil the curve next greater than the draft of the vessel using the chart and regard this as a "danger curve", which is not to be crossed without precaution. Isolated soundings shoaler than surrounding depths should be avoided, as there is always the possibilty that the shoalest spot may not have been found.

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 regard should be had to the scale of the chart, and 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 a greater effect in misplacing the position the longer the line to be drawn.

Distortion of printed charts.—The majority of Coast and Geodetic Survey charts are now printed by lithography on dry paper and have little, if any, distortion. A lithographed chart may be distinguished from a plate-printed chart by the feel of the surface, the former being smooth, while the latter is rough. Lithographed charts also are usually tinted in colors, while the others are in black and white.

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

Lighted buoys and other unwatched lights cannot be implicitly relied on; the light may be altogether extinguished, or if flashing or occulting, the apparatus may get out of order.

Lights.—The distances given in the light lists, Coast Pilots, and on the charts for the visibility of lights are computed for a height of 15 feet (4.6 m) for the observer's eye. The table of distances of visibility due to height, published in the light list, affords a means of ascertaining the effect of a greater or less height of the eye. The glare of a powerful light is often seen far beyond the limit of visibility of the actual rays of the light, but this must not be confounded with the true range of visibility. Again, refraction may often cause a light to be seen farther than under ordinary circumstances. As the range of visibility increases with the elevation of the observer, it is often possible to obtain a bearing before the light is sighted from the bridge by sighting the light from aloft, noting a star in range with it, and then obtaining a bearing of the star with compass or pelorus.

The actual power of a light should be considered when expecting to make it in thick weather. A weak light is easily obscured by haze, and no dependence can be placed on its being seen. The power of a light can be estimated by its candlepower as given in the light lists and in some cases by noting how much its visibility in clear weather falls short of the range due to the height at which it is placed. Thus a light standing 200 feet above the sea and recorded

as visible only 10 miles in clear weather is manifestly of little brilliancy, as its height would permit it to be seen over 20 miles if of sufficient power.

Light sectors.—Where lights have various colored sectors it should be borne in mind that the bearings of the edges of the sectors as given in the light lists and Coast Pilots are in degrees true, reading clockwise from 0° at N. as observed from a vessel.

In some conditions of the atmosphere white lights may have a reddish hue; the mariner, therefore, should not trust solely to color where there are sectors, but should verify the position by taking a bearing on the light. On either side of the line of demarcation between white and red there is always a small sector of uncertain color, as the edges of a sector cannot be cut off sharply.

Fog signals.—Sound is conveyed in a very capricious way through the atmosphere. Apart from the wind, large areas of silence have been found in different direction and at different distances from the origin of the sound signal, even in clear weather. Therefore, too much confidence should not be felt as to hearing a fog signal. The apparatus, moreover, for sounding the signal may require some time before it is in readiness to act. A fog often creeps imperceptibly toward the land and is not observed by those at a lighthouse until it is upon them, whereas a vessel may have been in it for many hours while approaching the land. In such a case no signal may be sounded. When sound travels against the wind it may be thrown upward; in such a case a man aloft might hear it when it is inaudible on deck. The conditions for hearing a signal will vary at the same station within short intervals of time. Mariners must not, therefore, 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. Taken together, these facts should induce the utmost caution when nearing the land or danger in fog. The lead or an echo-sounding instrument are often the only safe guide and should be faithfully used. The establishment of radiobeacons and radio direction-finder stations combined with the use of radio direction-finder apparatus aboard ship have greatly facilitated the fixing of position in fog.

In regions where the shores are high and rocky the echo of the whistle frequently gives warning of too close an approach to shore. In narrow passages it is often possible to keep in mid-channel by directing course so that the echoes from both shores are heard at approximately the same time.

An echo may sometimes be heard from the boarded side of a beacon (echo board) or from a flat surface of any structure. A megaphone is said to be helpful for detecting sound and for determining the direction to the source.

Submarine signals, installed on many lightships and buoys, have an effective range of audibility greater than signals sounded in air, and a vessel equipped with receiving apparatus can determine the approximate bearing of the signal, and when the sound signals (air or submarine) are synchronized with the radiobeacon the distance from the lightship may be determined. See page 30. These signals can be heard also on vessels not equipped with receiving apparatus by observers below the water line, but a bearing of the signal cannot then be readily determined.

Tides.—A knowledge of the tide, or vertical rise and fall of the water, is of great and direct importance whenever the depth at low water approximates or is less than the draft of the vessel and wherever docks are constructed so as to be entered and left near the time of high water. But under all conditions such knowledge may be of indirect use, as it often enables the mariner to estimate in advance whether at a given time and place the current will be running flood or ebb.

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 low-water springs. For foreign charts many different planes of reference are in use, but that most frequently adopted is low-water springs.

It should be remembered that whatever plane of reference is used for a chart there may be times when the tide falls below it. When the plane is mean low water or mean lower low water, there will generally be as many low waters or lower low waters below those planes as above them; also the wind may at times cause the water to fall below the plane of reference.

Tidal currents.—In navigating where the tidal range is considerable, special caution is necessary. It should be remembered that along the coast there are indrafts into all bays and bights, although the general set of the current is parallel to the shore; and that the effect of a crosscurrent is greater on a vessel running slowly than when at full speed. The turn of the tidal current offshore is seldom coincident with the time of high and low water on the shore.

At the entrance to most harbors without important tributaries or branches, the current turns at, or soon after, the time of high and low water within. The diurnal inequality in the velocity of current will be proportionately but half as great as in the height of the tides. Hence, although the heights of the tide may be such as to cause the surface of the water to vary but little in level for 10 or 12 hours, the ebb and flow will be much more regular in occurrence. A swift current often occurs in narrow openings between two bodies of water because the water at a given instant may be at different levels. Along most shores not seriously affected by bays, tidal rivers, etc., the current usually turns soon after high and low waters.

The swiftest current in straight portions of tidal rivers is usually in the mid-channel, but in curved portions the strongest current is toward the outer edge of the curve. Counter currents and eddies may occur near the shore of straits, especially in bights and near points.

Tide rips and swirls occur in places where strong currents occur, caused by a change in the direction of the current, and especially over shoals or in places where the bottom is uneven. Such places should be avoided if exposed also to a heavy sea, especially with the wind opposing the current. When these conditions are the worst the water is broken into heavy choppy seas from all directions, which board the vessel, and also make it difficult to keep control, owing to the plunging effects of the propeller and rudder.

The current tables published by the Coast and Geodetic Survey give the predicted times of slack water and other current data for a number of places on the Pacific and Atlantic coasts of North America and in the Philippines.

Current arrows on charts show only the usual or mean direction of a tidal stream or current. It must not be assumed that the direction of the current will not vary from that indicated by the arrow. In the same manner the velocity of the current constantly varies with circumstances, and the rate given on the chart is a mean value, corresponding to an average range of tide. At some stations but few observations have been made.

Fixing position.—The most accurate method available to the navigator for fixing a position relative to the shore is by plotting with a protractor sextant angles between well-defined objects on the chart. This method, based on the "*three-point problem*" of geometry, should be in general use.

In many narrow waters also, where the objects may yet be at some distance, as in coral harbors or narrow passages among mud banks, navigation by sextant and protractor is invaluable, as a true position can in general be obtained only by this method. Positions by bearings are too rough to depend upon, and a small error in either taking or plotting a bearing might, under such circumstances, put the ship ashore. For its successful employment it is necessary, first, that the objects be well chosen, and, second, that the observer be skillful and rapid in his use of the sextant. The latter is only a matter of practice.

Near objects should be used either for bearings or angles for position in preference to distant ones, although the latter may be more prominent, as a small error in the bearing or angle or in laying it on the chart has a greater effect in misplacing the position the longer the line to be drawn. On the other hand, distant objects should be used for direction because less affected by a small error or change of position. The three-arm protractor consists of a graduated circle with one fixed and two movable radial arms. The zero of the graduation is at the fixed arm, and by turning the movable arms each one can be set at any desired angle with reference to the fixed arm.

To plot a position, the two angles observed between the three selected objects are set on the instrument, which is then moved over the chart until the three beveled edges in case of a metal instrument, or the radial lines in the case of a transparent or celluloid instrument, pass respectively and simultaneously through the three objects. The center of the instrument will then mark the ship's position, which may be pricked on the chart or marked with a pencil point through the center hole. The tracing-paper protractor, consisting of a graduated circle printed on tracing paper, can be used as a substitute for the brass or celluloid instrument. The paper protractor also permits the laying

down for simultaneous trial of a number of angles in cases of fixing important positions. Plain tracing paper may also be used if there are any suitable means of laying off the angles.

The value of a determination depends greatly on the relative positions of the objects observed. If the position sought lies on the circle passing through the three objects, it will be indeterminate, as it will plot all around the circle. An approach to this condition, which is called a "revolver", must be avoided. In case of doubt, select from the chart three objects nearly in a straight line or with the middle object nearest the observer. Near objects are better than distant ones, and, in general, up to 90°, the larger the angles the better, remembering always that large as well as small angles may plot on or near the circle and hence be worthless. If the objects are well situated, even very small angles will give for navigating purposes a fair position, when that obtained by bearings of the same objects would be of little value.

Accuracy requires that the two angles be simultaneous. If under way and there is but one observer, the angle that changes less rapidly may be observed both before and after the other angle and the proper value obtained by interpolation. A single angle and a range give, in general, an excellent fix, easily obtained and plotted.

The compass.—It is not intended that the use of the compass to fix the position should be given up. There are many circumstances in which it may be usefully employed, but errors more readily creep into a position so fixed. Where accuracy of position is desired, angles should invariably be used, such as the fixing of a rock or shoal or of additions to a chart, as fresh soundings or new buildings. In such cases, angles should be taken to several objects, the more the better; but five objects are a good number, as the four angles thus obtained usually establish a position free of any doubt. When only two objects are visible, a sextant angle can be used to advantage with the compass bearings and a better fix obtained than by two bearings alone.

Doubling the angle on the bow.—The method of fixing by doubling the angle on the bow is invaluable. The ordinary form of it, the so-called "bow and beam bearing", the distance from the object at the latter position being the distance run between the times of taking the two bearings, gives the maximum of accuracy and is an excellent fix for a departure, but does not insure safety, as the object observed and any dangers off it are abeam when the position is obtained. By taking the bearing at two points and four points on the bow a fair position is obtained before the object is passed, the distance of the latter at the second position being, as before, equal to the distance run in the interval allowing for current. Taking afterward the beam bearing gives, with slight additional trouble, the distance of the object when abeam. Such beam bearings and distances, with the times, should be continually recorded as fresh departures, the importance of which will be appreciated in case of being suddenly shut in by fog. A graphic solution of the problem for any two bearings of the same object is frequently used. The two bearings are drawn on the chart, and the course is then drawn by means of the parallel rulers, so that the distance as measured from the chart between the lines is equal to the distance made good by the vessel between the times of taking the bearings.

Danger angle.—The utility of the danger angle in passing outlying rocks or dangers should not be forgotten.

Range finders.—Vessels equipped with range-finding apparatus have a ready means for determining the distance from an object and, combined with a bearing, can fix their position at any time when objects are visible.

Soundings.—In thick weather, when near or approaching the land or danger, soundings should be taken continually and at regular intervals, and with the character of the bottom systematically recorded. By marking the soundings on tracing paper, according to the scale of the chart, along a line representing the track of the ship and then moving the paper over the chart parallel with the course until the observed soundings agree with those of the chart, the ship's position will in general be quite well determined.

Echo sounding.—This modern method of obtaining soundings is coming into use extensively. Its advantages lie in the fact that rapid and almost instantaneous soundings can be had while the vessel is running at full speed, and the navigator thereby knows at all times the depth of water under his keel. The method of determining the ship's position as described in the preceding paragraph is eminently applicable when echo soundings are obtained. Two types of instruments have been brought out. In one type, the returning echo

is flashed on a revolving plate and the depth read by an adjacent scale, while with the other type the depths are recorded on a graph.

By means of echo soundings, a vessel can follow a safe depth curve with ease, and dangerous points and capes can be rounded in thick weather with utmost safety.

Echo sounding has been developed to such an extent that it is now used by the surveying vessels of the Coast and Geodetic Survey and has practically replaced the use of the pressure tube.

Use of sounding tubes.—Although of undoubted value as a navigational instrument, the sounding tube is subject to certain defects which, operating singly or in combinations, may give results so misleading as to seriously endanger the vessel, whose safety is entirely dependent upon an accurate knowledge of the depths. There are various types of tubes in common use which are too well known to require a detailed description here. They are all based on the principle that the column of air in the tube will be compressed in proportion to the depth to which the tube is lowered in the water. The principle is sound theoretically, but in practice there are several sources of mechanical errors which affect the result in proportion to the depth of water determined. The most important sources of errors are as follows:

(*a*) *Inherent:* Those which occur as a result of permanent defects in the tube, such as the variation of the bore from a true cylinder, variation in the thickness of the cap, etc.

(*b*) *External:* Those which occur as a result of the conditions under which the sounding was taken, variations of temperature or barometric pressure from the normal, etc.

(*c*) *Accidental:* Those which affect a single sounding, due to the failure of the tube to register properly, leakage of air, loss of water from leaky valve, errors due to the presence of salt in the tube, etc.

Before undertaking the sounding necessary to make any particular landfall the vessel should be stopped for an up-and-down cast of the lead in order to test the accuracy under the prevailing conditions of the tubes which are to be used. For this purpose it is not necessary to get bottom; simply run out 60 to 80 fathoms of wire and then see how closely the tubes register that amount. A number of tubes can be sent down at one time, and it is then possible to select one or two which register most nearly correct. The accidental errors are probably the most serious of the three types, both because they are apt to be larger in amount and because it is impossible to foresee when they will occur. It should be kept in mind that tubes which have been working properly for a number of soundings may suddenly develop errors, and for this reason the mariner must beware of overconfidence in the tubes.

Sumner's method.—Among astronomic methods of fixing a ship's position the great utility of Sumner's method or one of its many modifications should be well understood, and this method should be in constant use. The Sumner line—that is, the line drawn through the two positions obtained by working the chronometer observation for longitude with two assumed latitudes, or by drawing through the position obtained with one latitude a line at right angles to the bearing of the body as obtained from the azimuth tables—gives at times invaluable information, as the ship must be somewhere on that line, provided the chronometer is correct. If directed toward the coast, it marks the bearing of a definite point; if parallel with the coast, the distance of the latter is shown. Thus the direction of the line may often be usefully taken as a course. A sounding at the same time with the observation may often give an approximate position on the line. A very accurate position can be obtained by observing two or more stars at morning or evening twilight, at which time the horizon is well defined. The Sumner lines thus obtained will, if the bearings of the stars differ three points or more, give an excellent result. A star or planet at twilight and the sun afterward or before may be combined; also two observations of the sun with sufficient interval to admit of a considerable change of bearing. In these cases one of the lines must be moved for the run of the ship. The moon is often visible during the day, and in combination with the sun gives an excellent fix.

Position line by means of tables.—The Summer line of position furnished ready to lay down on the chart may be derived from the tables of "Simultaneous Hour Angle and Azimuth of Celestial Bodies", published by the Hydrographic Office as Publication No. 208. By means of these tables all calculations are avoided, but they are not recommended for use within an hour of the

meridian, when the Marc St. Hilaire Method of Ex-Meridian Tables should be substituted.

Position line by Marc St. Hilaire or calculated altitude method.—By this method the altitude of the celestial body is calculated for the assumed position, and the difference between the observed and calculated altitudes is laid off toward or away from the assumed position, according to sign, along the azimuth of the observed body. The line of position is then drawn through the new point in a direction normal to the azimuth of the celestial body. This method has certain advantages, the principle one being that the solution is strong even when the body is near the meridian. Full description of this method will be found in any epitome of navigation.

Radio direction finder bearings and positions are especially valuable at night and during fog or thick weather when other observations are not obtainable. For practical navigating purposes radio waves may be regarded as traveling in a straight line from the sending station to the receiving station. Instruments for determining the bearing of this line are now available. The observations may be divided into two general classes: First, where the bearing of the ship's radio call is determined by one, two, or more radio stations on shore and the resulting bearing or position is reported to the vessel (see p. —); secondly, where the bearing of one or more known radio stations is determined on the vessel itself and plotted as a line of position or as cross bearings. Experiments show that these bearings can be determined with a probable error of less than 2°, and the accuracy of the resulting position is largely dependent on the skill and care of the observer. It must be remembered, however, that these lines are parts of great circles, and if plotted as straight lines on a Mercator chart a considerable error may result when the ship and the shore station are a long distance apart. The bearings may be corrected for this distortion as explained on page 33.

Radio bearings may be combined with position lines obtained from astronomic observations and used in ways very similar to the well-known Sumner line when avoiding dangerous shoals or when making the coast.

Radiobeacons.—The United States Lighthouse Service now maintains and operates radiobeacons at a large number of lighthouses and lightships. In fog or thick weather these radiobeacons send distinctive signals and ships equipped with radio direction finders may readily obtain bearings on these beacons. For a detailed description, see page 30.

Radiobeacon stations that are equipped for distance finding, transmit a special radio signal and sound a corresponding air or submarine signal at the same period of time. The reception of the sound signal by a vessel will be delayed depending upon the distance the sound has to travel, whereas the radio signal will be received practically instantaneously.

Synchronization of sound and radio signals.—When the sound signal travels through water, the number of seconds intervening between the reception of the radio signal and sound signal divided by 1.25 gives the distance of the vessel in miles from the station. Where the sound signal travels through air the distance in miles is obtained by dividing the number of seconds by 5 (or more exactly 5.5).

For details as to the signal characteristics see the Light Lists published by the United States Lighthouse Service.

Change in variation of the compass.—The gradual change in the variation must not be forgotten in laying down positions by bearings on charts. The magnetic compasses placed on the charts for the purpose of facilitating plotting become in time slightly in error, and in some cases, such as with small scales, or when the lines are long, the displacement of position from neglect of this change may be of importance. The compasses are replotted for every new edition if the error is appreciable. Means for determining the amount of this error are provided by printing the date of constructing the compass and the annual change in variation near its edge.

The change in the magnetic variation in passing along parts of the coast of the United States is so rapid as to materially affect the course of a vessel unless given constant attention. This is particularly the case in New England and parts of Alaska, where the lines of equal magnetic variation are close together and show rapid changes in magnetic variation from place to place, as indicated by the large differences in variation given on neighboring compass roses.

A table giving the magnetic variation for 1936 and the annual increase or decrease at certain points within the area covered by this volume is given on page 42 under "General information."

Local magnetic disturbance.—The term "local magnetic disturbance" or "local attraction" has reference only to the effects on the compass of magnetic masses external to the ship. Observation shows that such disturbance of the compass in a ship afloat is experienced only in a few places. Magnetic laws do not permit of the supposition that it is the visible land which causes such disturbance, because the effect of a magnetic force diminishes in such rapid proportion as the distance from it increases that it would require a local center of magnetic force of an amount absolutely unknown to affect a compass half a mile distant.

Such deflection of the compass is due to magnetic minerals in the bed of the sea under the ship, and when the water is shallow and the force strong the compass may be temporarily deflected when passing over such a spot, but the area of disturbance will be small, unless there are many centers near together. The law which has hitherto been found to hold good as regards local magnetic disturbance is that north of the magnetic equator the north end of the compass needle is attracted toward any center of disturbance; south of the magnetic equaor it is repelled. It is very desirable that whenever an area of local magnetic disturbance is noted the position should be fixed and the facts reported as far as they can be ascertained.

USE OF OIL FOR MODIFYING THE EFFECT OF BREAKING WAVES

Many experiences of late years have shown that the utility of oil for this purpose is undoubted and the application simple. The following may serve for the guidance of seamen, whose attention is called to the fact that a very small quantity of oil skillfully applied may prevent much damage, both to ships (especially of the smaller classes) and to the boats, by modifying the action of breaking seas. The principal facts as to the use of oil are as follows:

1. On free waves—that is, waves in deep water—the effect is greatest.
2. In a surf, or waves breaking on a bar, where a mass of liquid is in actual motion in shallow water, the effect of the oil is uncertain, as nothing can prevent the larger waves from breaking under such circumstances, but even here it is of some service.
3. The heaviest and thickest oils are most effectual. Refined kerosene is of little use; crude petroleum is serviceable when nothing else is obtainable; but all animal and vegetable oils, and generally waste oil from the engines, have great effect.
4. A small quantity of oil suffices, if applied in such a manner as to spread to windward.
5. It is useful in a ship or boat, either when running or lying-to or in wearing.
6. No experiences are related of its use when hoisting a boat at sea or in a seaway, but it is highly probable that much time would be saved and injury to the boat avoided by its use on such occasions.
7. In cold water the oil, being thickened by the lower temperature and not being able to spread freely, will have its effect much reduced. This will vary with the description of oil used.
8. For a ship at sea the best method of application appears to be to hang over the side, in such a manner as to be in the water, small canvas bags capable of holding from 1 to 2 gallons of oil, the bags being pricked with a sail needle to facilitate leakage of the oil. The oil is also frequently distributed from canvas bags or oakum inserted in the closet bowls. The positions of these bags should vary with the circumstances. Running before the wind they should be hung on either bow—for example, from the cathead—and allowed to tow in the water. With the wind on the quarter the effect seems to be less than in any other position, as the oil goes astern while the waves come up on the quarter. Lying-to, the weather bow, and another position farther aft seems the best places from which to hang the bags, using sufficient line to permit them to draw to windward while the ship drifts.
9. Crossing a bar with a flood tide, to pour oil overboard and allow it to float in ahead of the boat, which would follow with a bag towing astern, would appear to be the best plan. As before remarked, under these circumstances, the effect cannot be so much trusted. On a bar with the ebb tide running it would seem to be useless to try oil for the purpose of entering.

10. For boarding a wreck it is recommended to pour oil overboard to windward of her before going alongside. The effect in this must greatly depend upon the set of the current and the circumstances of the depth of water.

11. For a boat riding in bad weather from a sea anchor it is recommended to fasten the bag to an endless line rove through a block on the sea anchor, by which means the oil can be diffused well ahead of the boat and the bag readily hauled on board for refilling if necessary.

INSTRUCTIONS TO MARINERS IN CASE OF SHIPWRECK

General information.—Coast Guard (lifesaving) stations and houses of refuge are located upon 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 are fully supplied with boats, wreck guns, beach apparatus, restoratives, and clothing provided by the Blue Anchor Society, women's national association for the shipwrecked requiring it, etc.

Houses of refuge are supplied with boats and restoratives but not manned by full crews; an officer in charge, and at places, one or two additional men reside in each, who are required to make extended excursions along the coast after every storm, with a view of ascertaining if any shipwreck has occurred and finding and succoring any persons that may have been cast ashore.

Houses of refuge are located exclusively upon the east coast of Florida, where the requirements of relief are different from those of other portions of the seaboard.

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, and, if needed, with clothing provided by the Blue Anchor Society.

The station crews patrol the beach from 2 to 4 miles each side of their stations between sunset and sunrise, and if the feather 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 the 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 or 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 the 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."

The above instruction being complied with, the result will be shown in figure 1.

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."

These instructions being obeyed, the result will be shown in figure 2.

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.

Figure 3, page 331, represents the apparatus rigged, with the breeches buoy hauled off to the ship.

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 signaling as directed in the foregoing instructions, 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.

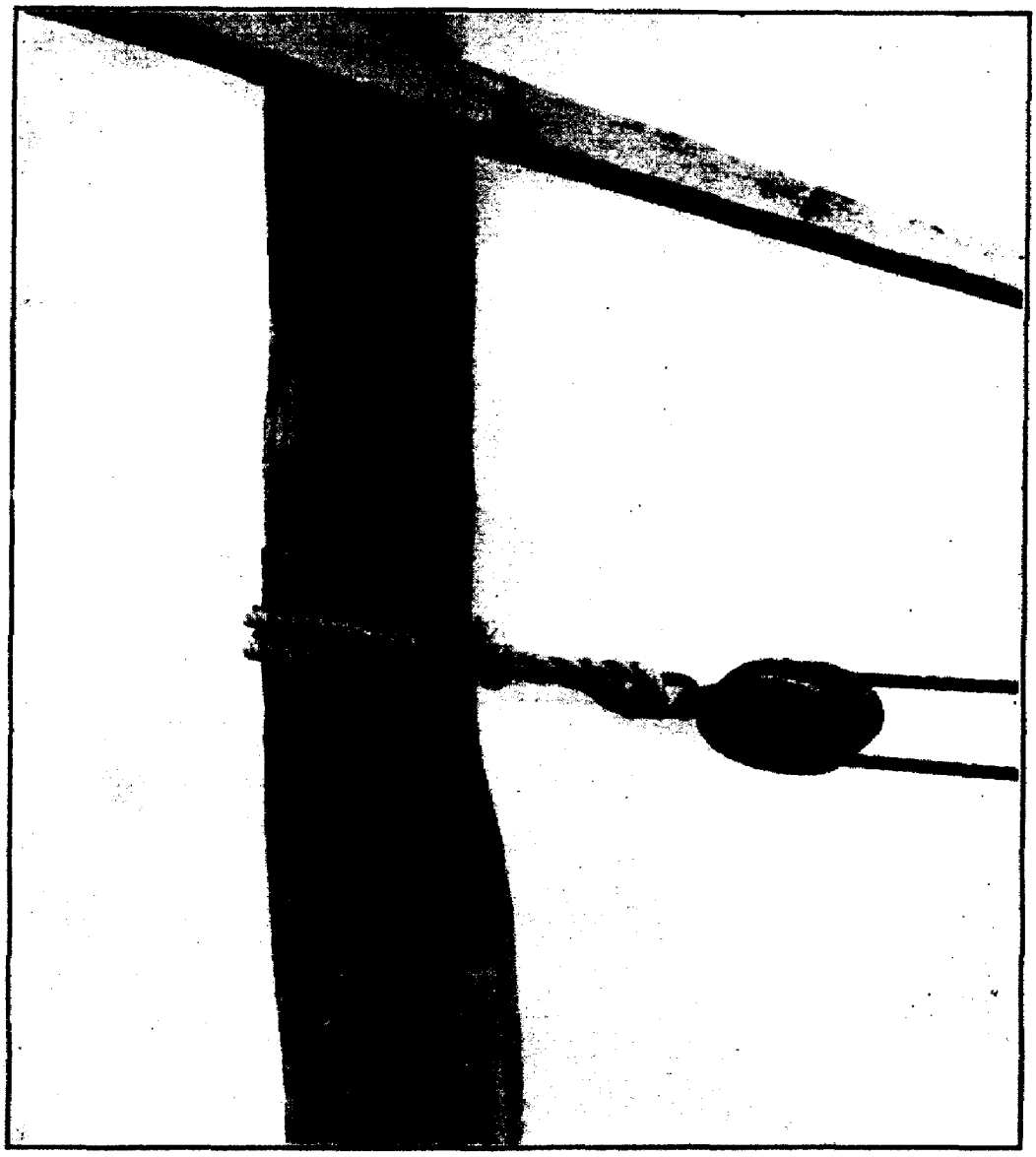

FIGURE 1.

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 move-

ment 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.

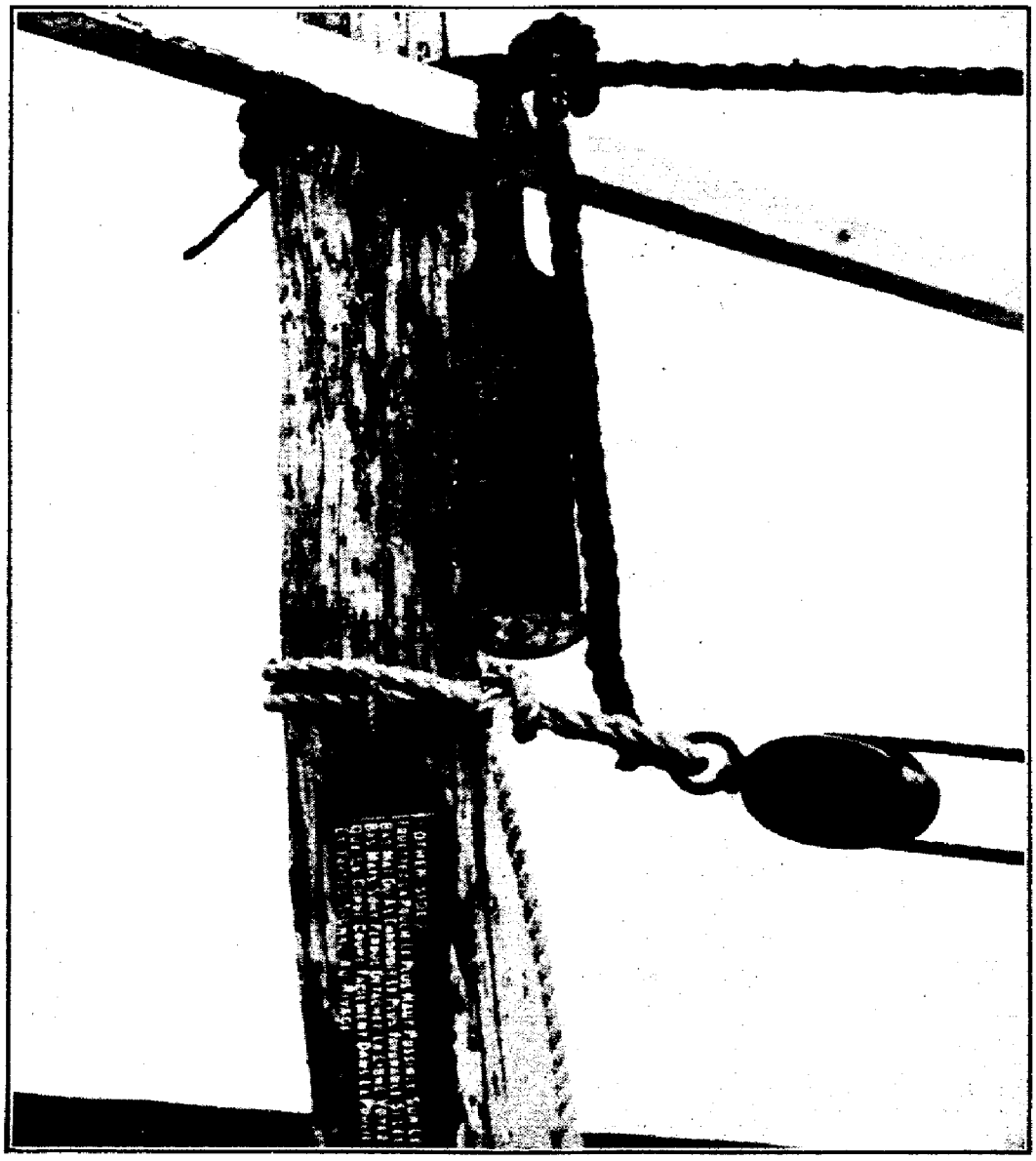

FIGURE 2.

Make the shot line fast on 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, approved by the International Marine Conference convened at Washington in October 1889, have been adopted by the Coast Guard Service 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.*'

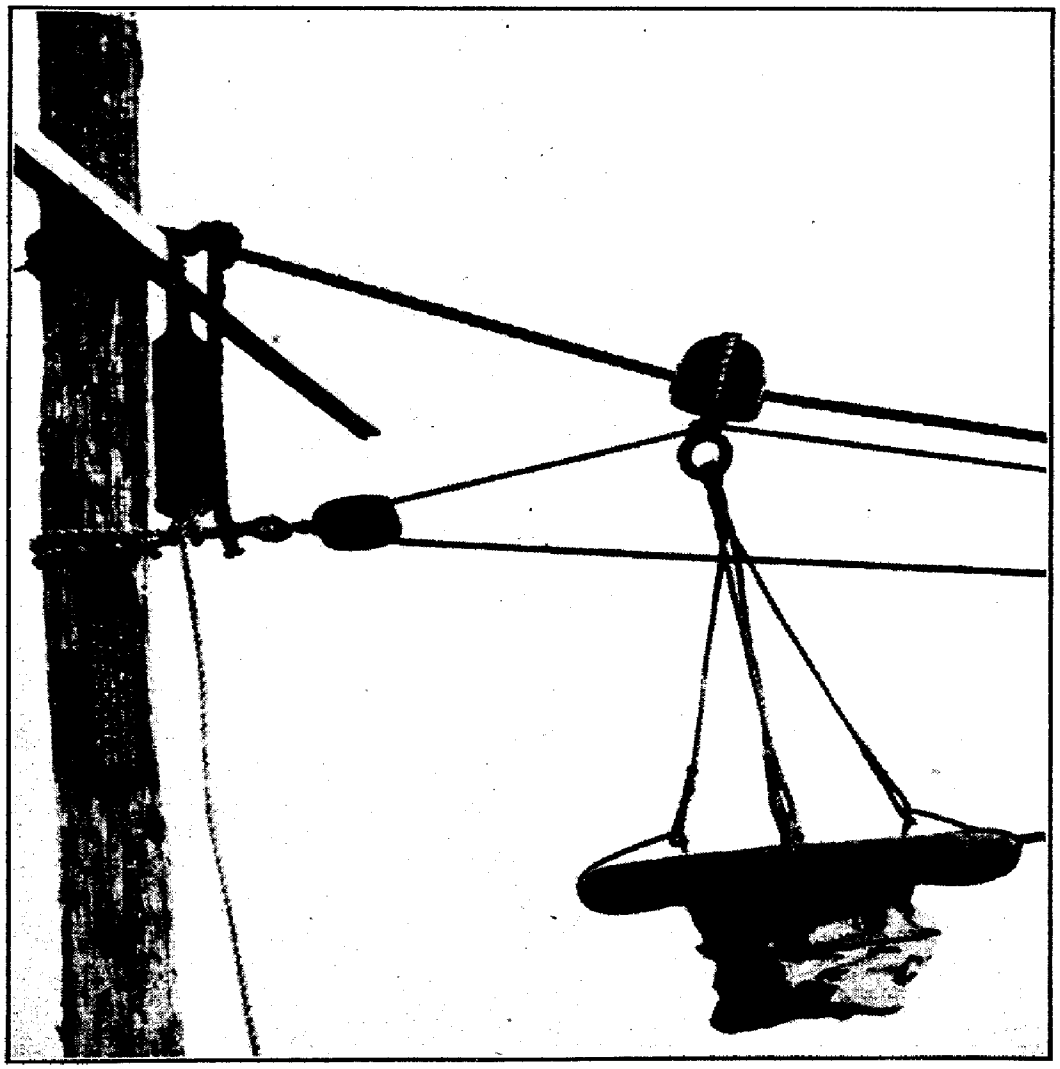

FIGURE 3.

"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 following: In the daytime, 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."

BOUNDARY LINES OF THE HIGH SEAS

The following lines dividing the high seas from rivers, harbors, and inland waters described in this volume are designated and defined pursuant to section 2 of the act of Congress of February 19, 1895. Waters inshore of the lines here laid down are "inland waters", and upon them the inland rules and pilot rules made in pursuance thereof apply. Upon the high seas, viz, waters outside of the lines here laid down, the international rules apply. The following lines were made effective June 1, 1935:

INLAND WATERS ON THE ATLANTIC, GULF, AND PACIFIC COASTS OF THE UNITED STATES

General rule.—At all buoyed entrances from seaward to bays, sounds, rivers, or other estuaries for which specific lines are not prescribed herein, Inland Rules of the Road 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.

Modifications of general rule.—Lines of demarcation have been established for the following specific areas of inland waters on the Atlantic coast of the United States where the Inland Rules of the Road are to be followed.

Massachusetts Bay.—A line drawn from Cape Ann Lighted Whistle Buoy to Boston Lightship; thence to Cape Cod Lighthouse.

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

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

Delaware Bay and tributaries.—A line drawn from Cape May East Jetty Light to Cape May Harbor Whistle Buoy; thence to Overfalls Lightship; thence to Cape Henlopen Coast Guard Station.

Chesapeake Bay and tributaries.—A line drawn from Cape Charles Lighthouse to Cape Henry Lighthouse.

Charleston Harbor.—A line drawn from Sullivans Island Coast Guard Station to Charleston Lighted Whistle Buoy C; thence to Charleston Lighthouse.

Savannah Harbor.—A line drawn from the southwesternmost extremity of Braddock Point to Tybee Lighted Whistle Buoy T; thence to a tank on Tybee Island beach, bearing approximately 281°.

INTERNATIONAL RULES TO PREVENT COLLISIONS OF VESSELS

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the following regulations for preventing collisions at sea shall be followed by all public and private vessels of the United States upon the high seas in all waters connected therewith navigable by seagoing vessels.

PRELIMINARY

In the following rules every steam vessel which is under sail and not under steam is to be considered a sailing vessel, and every vessel under steam, whether under sail or not, is to be considered a steam vessel.

The words "steam vessel" shall include any vessel propelled by machinery.

A vessel is "under way", within the meaning of these rules, when she is not at anchor, or made fast to the shore, or aground.

RULES CONCERNING LIGHTS, AND SO FORTH

The word "visible" in these rules when applied to lights shall mean visible on a dark night with a clear atmosphere.

Article 1. The rules concerning lights shall be complied with in all weathers from sunset to sunrise, and during such time no other lights which may be mistaken for the prescribed lights shall be exhibited.

Art. 2. A steam vessel when under way shall carry—(*a*) On or in front of the foremast, or if a vessel without a foremast, then in the fore part of the vessel, at a height above the hull of not less than twenty feet, and if the breadth of the vessel exceeds twenty feet, then at a height above the hull not less than such breadth, so however, that the light need not be carried at a greater height above the hull than forty feet, a bright white light, so constructed as to show an unbroken light over an arc of the horizon of twenty points of the compass, so fixed as to throw the light ten points on each side of the vessel, namely, from right ahead to two points abaft the beam on either side, and of such a character as to be visible at a distance of at least five miles.

(*b*) On the starboard side a green light so constructed as to show an unbroken light over an arc of the horizon of ten points of the compass, so fixed as to throw the light from right ahead to two points abaft the beam on the starboard side, and of such a character as to be visible at a distance of at least two miles.

(*c*) On the port side a red light so constructed as to show an unbroken light over an arc of the horizon of ten points of the compass, so fixed as to throw the light from right ahead to two points abaft the beam on the port side, and of such a character as to be visible at a distance of at least two miles.

(*d*) The said green and red side lights shall be fitted with inboard screens projecting at least three feet forward from the light, so as to prevent these lights from being seen across the bow.

(*e*) A steam vessel when under way may carry an additional white light similar in construction to the light mentioned in subdivision (*a*). These two lights shall be so placed in line with the keel that one shall be at least fifteen feet higher than the other, and in such a position with reference to each other that the lower light shall be forward of the upper one. The vertical distance between these lights shall be less than the horizontal distance.

Art. 3. A steam vessel when towing another vessel shall, in addition to her side lights, carry two bright white lights in a vertical line one over the other, not less than six feet apart, and when towing more than one vessel shall carry an additional bright white light six feet above or below such lights, if the length of the tow measuring from the stern of the towing vessel to the stern of the last vessel towed exceeds six hundred feet. Each of these lights shall be of the same construction and character, and shall be carried in the same position as the white light mentioned in article two (*a*), excepting the additional light, which may be carried at a height of not less than fourteen feet above the hull.

Such steam vessel may carry a small white light abaft the funnel or aftermast for the vessel towed to steer by, but such light shall not be visible forward of the beam.

Art. 4. (*a*) A vessel which from any accident is not under command shall carry at the same height as the white light mentioned in article two (*a*), where they can best be seen, and if a steam vessel, in lieu of that light two red lights, in a vertical line one over the other, not less than six feet apart, and of such a character as to be visible all around the horizon at a distance of at least two miles; and shall by day carry in a vertical line, one over the other, not less than six feet apart, where they can best be seen, two black balls or shapes, each two feet in diameter.

(*b*) A vessel employed in laying or in picking up a telegraph cable shall carry in the same position as the white light mentioned in article two (*a*), and if a steam vessel in lieu of that light three lights in a vertical line, one over the other, not less than six feet apart. The highest and lowest of these lights shall be red and the middle light shall be white, and they shall be of such a character as to be visible all around the horizon at a distance of at least two miles. By day she shall carry in a vertical line, one over the other, not less than six feet apart, where they can best be seen, three shapes not less than two feet in diameter, of which the highest and lowest shall be globular in shape and red in color and the middle one diamond in shape and white.

(*c*) The vessels referred to in this article, when not making way through the water, shall not carry the side lights, but when making way shall carry them.

(*d*) The lights and shapes required to be shown by this article are to be taken by other vessels as signals that the vessel showing them is not under command and cannot therefore get out of the way.

These signals are not signals of vessels in distress and requiring assistance. Such signals are contained in article thirty-one.

Art. 5. A sailing vessel under way and any vessel being towed shall carry the same lights as are prescribed by article two for a steam vessel under way with the exception of the white lights mentioned therein, which they shall never carry.

Art. 6. Whenever, as in the case of small vessels under way during bad weather, the green and red side lights cannot be fixed, these lights shall be kept at hand, lighted and ready for use; and shall, on the approach of or to other vessels, be exhibited on their respective sides in sufficient time to prevent collision, in such manner as to make them most visible, and so that the green light shall not be seen on the port side nor the red light on the starboard side, nor, if practicable, more than two points abaft the beam on their respective sides. To make the use of these portable lights more certain and easy, the lanterns containing them shall each be painted outside with the color of the light they respectively contain, and shall be provided with proper screens.

Art. 7. Steam vessels of less than forty, and vessels under oars or sails of less than twenty, tons gross tonnage, respectively, and rowing boats, when under way, shall not be required to carry the lights mentioned in article two (*a*), (*b*), and (*c*), but if they do not carry them they shall be provided with the following lights:

First. Steam vessels of less than forty tons shall carry—

(*a*) In the fore part of the vessel or on or in front of the funnel, where it can best be seen, and at a height above the gunwale of not less than nine feet, a bright white light constructed and fixed as prescribed in article two (*a*), and of such a character as to be visible at a distance of at least two miles.

(*b*) Green and red side lights constructed and fixed as prescribed in article two (*b*) and (*c*), and of such a character as to be visible at a distance of at least one mile or a combined lantern showing a green light and a red light from right ahead to two points abaft the beam on their respective sides. Such lanterns shall be carried not less than three feet below the white light.

Second. Small steamboats, such as are carried by seagoing vessels, may carry the white light at a less height than nine feet above the gunwale, but it shall be carried above the combined lantern mentioned in subdivision one (*b*).

Third. Vessels under oars or sails of less than twenty tons shall have ready at hand a lantern with a green glass on one side and a red glass on the other, which, on the approach of or to other vessels, shall be exhibited in sufficient time to prevent collision, so that the green light shall not be seen on the port side nor the red light on the starboard side.

Fourth. Rowing boats, whether under oars or sail, shall have ready at hand a lantern showing a white light which shall be temporarily exhibited in sufficient time to prevent collision.

The vessels referred to in this article shall not be obliged to carry the lights prescribed by article four (*a*) and article eleven, last paragraph.

Art 8. Pilot vessels when engaged on their station on pilotage duty shall not show the lights required for other vessels, but shall carry a white light at the masthead, visible all around the horizon, and shall also exhibit a flare-up light or flare-up lights at short intervals, which shall never exceed fifteen minutes.

On the near approach of or to other vessels they shall have their side lights lighted ready for use, and shall flash or show them at short intervals to indicate the direction in which they are heading, but the green light shall not be shown on the port side nor the red light on the starboard side.

A pilot vessel of such a class as to be obliged to go alongside a vessel to put a pilot on board may show the white light instead of carrying it at the masthead, and may, instead of the colored lights above mentioned, have at hand, ready for use, a lantern with green glass on the one side and red glass on the other, to be used as prescribed above.

Pilot vessels when not engaged on their station on pilotage duty shall carry lights similar to those of other vessels of their tonnage.

A steam pilot vessel, when engaged on her station on pilotage duty and in waters of the United States, and not at anchor, shall, in addition to the lights required for all pilot boats, carry at a distance of eight feet below her white masthead light a red light, visible all around the horizon and of such a char-

acter as to be visible on a dark night with a clear atmosphere at a distance of at least two miles, and also the colored side lights required to be carried by vessels when under way.

When engaged on her station on pilotage duty and in waters of the United States, and at anchor, she shall carry in addition to the lights required for all pilot boats the red light above mentioned, but not the colored side lights. When not engaged on her station on pilotage duty, she shall carry the same lights as other steam vessels.

Art. 9. Fishing vessels and fishing boats, when under way and when not required by this article to carry or show the lights hereinafter specified, shall carry or show the lights prescribed for vessels of their tonnage under way.

(*a*) Open boats, by which is to be understood boats not protected from the entry of sea water by means of a continuous deck, when engaged in any fishing at night, with outlying tackle extending not more than one hundred and fifty feet horizontally from the boat into the seaway, shall carry one all-around white light.

Open boats, when fishing at night, with outlying tackle extending more than one hundred and fifty feet horizontally from the boat into the seaway, shall carry one all-around white light, and in addition, on approaching or being approached by other vessels, shall show a second white light at least three feet below the first light and at a horizontal distance of at least five feet away from it in the direction in which the outlying tackle is attached.

(*b*) Vessels and boats, except open boats as defined in subdivision (*a*), when fishing with drift nets, shall, so long as the nets are wholly or partly in the water, carry two white lights where they can best be seen. Such lights shall be placed so that the vertical distance between them shall be not less than 6 feet and not more than 15 feet, and so that the horizontal distance between them, measured in a line with the keel, shall be not less than 5 feet and not more than 10 feet. The lower of these two lights shall be in the direction of the nets, and both of them shall be of such a character as to show all around the horizon, and to be visible at a distance of not less than 3 miles.

Within the Mediterranean Sea and in the seas bordering the coasts of Japan and Korea sailing fishing vessels of less than 20 ton gross tonnage shall not be obliged to carry the lower of these two lights. Should they, however, not carry it, they shall show in the same position (in the direction of the net or gear) a white light, visible at a distance of not less than 1 sea mile, on the approach of or to other vessels.

(*c*) Vessels and boats, except open boats as defined in subdivision (*a*), when line fishing with their lines out and attached to or hauling their lines, and when not at anchor or stationary within the meaning of subdivision (*h*), shall carry the same lights as vessels fishing with drift nets. When shooting lines, or fishing with towing lines, they shall carry the lights prescribed for a steam or sailing vessel under way, respectively.

Within the Mediterranean Sea and in the seas bordering the coasts of Japan and Korea, sailing fishing vessels of less than 20 tons gross tonnage shall not be obliged to carry the lower of these two lights. Should they, however, not carry it, they shall show in the same position (in the direction of the lines) a white light visible at a distance of not less than 1 sea mile on the approach of or to other vessels.

(*d*) Vessels when engaged in trawling, by which is meant the dragging of an apparatus along the bottom of the sea—

First. If steam vessels, shall carry in the same position as the white light mentioned in article 2 (*a*) a tricolored lantern so constructed and fixed as to show a white light from right ahead to two points on each bow, and a green light and a red light over an arc of the horizon from two points on each bow to two points abaft the beam on the starboard and port sides, respectively; and not less than 6 nor more than 12 feet below the tricolored lantern a white light in a lantern, so constructed as to show a clear, uniform, and unbroken light all around the horizon.

Second. If sailing vessels, shall carry a white light in a lantern, so constructed as to show a clear, uniform, and unbroken light all around the horizon, and shall also, on the approach of or to other vessels, show where it can best be seen a white flare-up or torch in sufficient time to prevent collision.

All lights mentioned in subdivision (*d*) first and second shall be visible at a distance of at least 2 miles.

(*e*) Oyster dredgers and other vessels fishing with dredge nets shall carry and show the same lights as trawlers.

(*f*) Fishing vessels and fishing boats may at any time use a flare-up light in addition to the lights which they are by this article required to carry and show, and they may also use working lights.

(*g*) Every fishing vessel and every fishing boat under 150 feet in length, when at anchor, shall exhibit a white light visible all around the horizon at a distance of at least 1 mile.

Every fishing vessel of 150 feet in length or upward, when at anchor, shall exhibit a white light visible all around the horizon at a distance of at least 1 mile, and shall exhibit a second light as provided for vessels of such length by article 11.

Should any such vessel, whether under 150 feet in length or of 150 feet in length or upward, be attached to a net or other fishing gear, she shall on the approach of other vessels show an additional white light at least 3 feet below the anchor light, and at a horizontal distance of at least 5 feet away from it in the direction of the net or gear.

(*h*) If a vessel or boat when fishing become stationary in consequence of her gear getting fast to a rock or other obstruction, she shall in daytime haul down the day signal required by subdivision (*k*); at night show the light or lights prescribed for a vessel at anchor; and during fog, mist, falling snow, or heavy rainstorms make the signal prescribed for a vessel at anchor. (See subdivision (*d*) and the last paragraph of article 15.)

(*i*) In fog, mist, falling snow, or heavy rainstorms drift-net vessels attached to their nets, and vessels when trawling, dredging, or fishing with any kind of drag net, and vessels line fishing with their lines out, shall, if of 20 tons gross tonnage or upward, respectively, at intervals of not more than 1 minute make a blast; if steam vessels, with the whistle or siren, and if sailing vessels, with the foghorn, each blast to be followed by ringing the bell. Fishing vessels and boats of less than 20 tons gross tonnage shall not be obliged to give the above-mentioned signals; but if they do not, they shall make some other efficient sound signal at intervals of not more than 1 minute.

(*k*) All vessels or boats fishing with nets or lines or trawls, when under way, shall in daytime indicate their occupation to an approaching vessel by displaying a basket or other efficient signal where it can best be seen. If vessels or boats at anchor have their gear out, they shall, on the approach of other vessels, show the same signal on the side on which those vessels can pass.

The vessels required by this article to carry or show the lights hereinbefore specified shall not be obliged to carry the lights prescribed by article 4 (*a*) and the last paragraph of article 11.

Art. 10. A vessel which is being overtaken by another shall show from her stern to such last-mentioned vessel a white light or a flare-up light.

The white light required to be shown by this article may be fixed and carried in a lantern, but in such case the lantern shall be so constructed, fitted, and screened that it shall throw an unbroken light over an arc of the horizon of twelve points of the compass, namely, for six points from right aft on each side of the vessel, so as to be visible at a distance of at least 1 mile. Such light shall be carried as nearly as practicable on the same level as the side lights.

Art. 11. A vessel under 150 feet in length when at anchor shall carry forward, where it can best be seen, but at a height not exceeding 20 feet above the hull, a white light, in a lantern so constructed as to show a clear, uniform, and unbroken light visible all around the horizon at a distance of at least 1 mile.

A vessel of 150 feet or upwards in length when at anchor shall carry in the forward part of the vessel, at a height of not less than 20 and not exceeding 40 feet above the hull, one such light, and at or near the stern of the vessel, and at such a height that it shall not be less than 15 feet lower than the forward light, another such light.

The length of a vessel shall be deemed to be the length appearing in her certificate of registry.

A vessel aground in or near a fairway shall carry the above light or lights and the two red lights prescribed by article 4 (*a*).

Art. 12. Every vessel may, if necessary in order to attract attention in addition to the lights which she is by these rules required to carry, show a flare-up light or use any detonating signal that cannot be mistaken for a distress signal.

Art. 13. Nothing in these rules shall interfere with the operation of any special rules made by the government of any nation with respect to additional station and signal lights for two or more ships of war or for vessels sailing

under convoy, or with the exhibition of recognition signals adopted by shipowners, which have been authorized by their respective governments and duly registered and published.

Art. 14. A steam vessel proceeding under sail only, but having her funnel up, shall carry in daytime, forward, where it can best be seen, one black ball or shape 2 feet in diameter.

SOUND SIGNALS FOR FOG, AND SO FORTH

Art. 15. All signals prescribed by this article for vessels under way shall be given.

First. By "steam vessels", on the whistle or siren.

Second. By "sailing vessel" and "vessels towed", on the foghorn.

The words "prolonged blast" used in this article shall mean a blast of from four to six seconds' duration.

A steam vessel shall be provided with an efficient whistle or siren sounded by steam or by some substitute for steam, so placed that the sound may not be intercepted by any obstruction, and with an efficient foghorn, to be sounded by mechanical means, and also with an efficient bell. In all cases where the rules require a bell to be used a drum may be substituted on board Turkish vessels, or a gong where such articles are used on board small seagoing vessels. A sailing vessel of twenty tons gross tonnage or upward shall be provided with a similar foghorn and bell.

In a fog, mist, falling snow, or heavy rainstorms, whether by day or night, the signals described in this article shall be used as follows, namely:

(*a*) A steam vessel having way upon her shall sound, at intervals of not more than two minutes, a prolonged blast.

(*b*) A steam vessel under way, but stopped, and having no way upon her, shall sound, at intervals of not more than two minutes, two prolonged blasts, with an interval of about one second between.

(*c*) A sailing vessel under way shall sound at intervals of not more than one minute, when on the starboard tack, one blast; when on the port tack, two blasts in succession; and when with the wind abaft the beam, three blasts in succession.

(*d*) A vessel when at anchor shall, at intervals of not more than one minute, ring the bell rapidly for about five seconds.

(*e*) A vessel when towing, a vessel employed in laying or in picking up a telegraph cable, and a vessel under way, which is unable to get out of the way of an approaching vessel through being not under command, or unable to maneuver as required by the rules, shall, instead of the signals prescribed in subdivisions (*a*) and (*c*) of this article, at intervals of not more than two minutes, sound three blasts in succession, namely: One prolonged blast followed by two short blasts. A vessel towed may give this signal and she shall not give any other.

Sailing vessels and boats of less than twenty tons gross tonnage shall not be obliged to give the above-mentioned signals; but if they do not, they shall make some other efficient sound signal at intervals of not more than one minute.

SPEED OF SHIPS TO BE MODERATE IN FOG, AND SO FORTH

Art. 16. Every vessel shall, in a fog, mist, falling snow, or heavy rainstorms, go at a moderate speed, having careful regard to the existing circumstances and conditions.

A steam vessel hearing, apparently forward of her beam, the fog signal of a vessel, the position of which is not ascertained, shall, so far as the circumstances of the case admit, stop her engines, and then navigate with caution until danger of collision is over.

STEERING AND SAILING RULES—PRELIMINARY—RISK OF COLLISION

Risk of collision can, when circumstances permit, be ascertained by carefully watching the compass bearing of an approaching vessel. If the bearing does not appreciably change, such risk should be deemed to exist.

Art. 17. When two sailing vessels are approaching one another, so as to involve risk of collision, one of them shall keep out of the way of the other, as follows, namely:

(*a*) A vessel which is running free shall keep out of the way of a vessel which is close-hauled.

(*b*) A vessel which is close-hauled on the port tack shall keep out of the way of a vessel which is close-hauled on the starboard tack.

(*c*) When both are running free, with the wind on different sides, the vessel which has the wind on the port side shall keep out of the way of the other.

(*d*) When both are running free, with the wind on the same side, the vessel which is to the windward shall keep out of the way of the vessel which is to the leeward.

(*e*) A vessel which has the wind aft shall keep out of the way of the other vessel.

Art. 18. When two steam vessels are meeting end on, or nearly end on, so as to involve risk of collision, each shall alter her course to starboard, so that each may pass on the port side of the other.

This article only applies to cases where vessels are meeting end on, or nearly end on, in such a manner as to involve risk of collision, and does not apply to two vessels which must, if both keep on their respective courses, pass clear of each other.

The only cases to which it does apply are when each of the two vessels is end on, or nearly end on, to the other; in other words, to cases in which, by day, each vessel sees the masts of the other in a line, or nearly in a line, with her own; and by night, to cases in which each vessel is in such a position as to see both the side lights of the other.

It does not apply by day to cases in which a vessel sees another ahead crossing her own course; or by night, to cases where the red light of one vessel is opposed to the red light of the other, or where the green light of one vessel is opposed to the green light of the other, or where a red light without a green light, or a green light without a red light, is seen ahead, or where both green and red lights are seen anywhere but ahead.

Art. 19. When two steam vessels are crossing, so as to involve risk of collision the vessel which has the other on her own starboard side shall keep out of the way of the other.

Art. 20. When a steam vessel and a sailing vessel are proceeding in such directions as to involve risk of collision, the steam vessel shall keep out of the way of the sailing vessel.

Art. 21. Where, by any of these rules, one of two vessels is to keep out of the way, the other shall keep her course and speed.

NOTE.—When, in consequence of thick weather or other causes, such vessel finds herself so close that collision cannot be avoided by the action of the giving-way vessel alone, she also shall take such action as will best aid to avert collision. (See articles 27 and 29.)

Art. 22. Every vessel which is directed by these rules to keep out of the way of another vessel shall, if the circumstances of the case admit, avoid crossing ahead of the other.

Art. 23. Every steam vessel which is directed by these rules to keep out of the way of another vessel, shall, on approaching her, if necessary, slacken her speed or stop or reverse.

Art. 24. Notwithstanding anything contained in these rules every vessel, overtaking any other, shall keep out of the way of the overtaken vessel.

Every vessel coming up with another vessel from any direction more than two points abaft her beam—that is, in such a position, with reference to the vessel which she is overtaking that at night she would be unable to see either of that vessel's side lights—shall be deemed to be an overtaking vessel; and no subsequent alteration of the bearing between the two vessels shall make the overtaking vessel a crossing vessel within the meaning of these rules, or relieve her of the duty of keeping clear of the overtaken vessel until she is finally past and clear.

As by day the overtaking vessel cannot always know with certainty whether she is forward of or abaft this direction from the other vessel she should, if in doubt, assume that she is an overtaking vessel and keep out of the way.

Art. 25. In narrow channels every steam vessel shall, when it is safe and practicable, keep to that side of the fairway or midchannel which lies on the starboard side of such vessel.

Art. 26. Sailing vessels under way shall keep out of the way of sailing vessels or boats fishing with nets, or lines, or trawls. This rule shall not give to any vessel or boat engaged in fishing the right of obstructing a fairway used by vessels other than fishing vessels or boats.

Art. 27. In obeying and construing these rules due regard shall be had to all dangers of navigation and collision, and to any special circumstances which may render a departure from the above rules necessary in order to avoid immediate danger.

SOUND SIGNALS FOR VESSELS IN SIGHT OF ONE ANOTHER

Art. 28. The words "short blast" used in this article shall mean a blast of about one second's duration.

When vessels are in sight of one another, a steam vessel under way, in taking any course authorized or required by these rules, shall indicate that course by the following signals on her whistle or siren, namely:

One short blast to mean, "I am directing my course to starboard."

Two short blasts to mean, "I am directing my course to port."

Three short blasts to mean, "My engines are going at full speed astern."

NO VESSEL UNDER ANY CIRCUMSTANCES TO NEGLECT PROPER PRECAUTIONS

Art. 29. Nothing in these rules shall exonerate any vessel, or the owner or master or crew thereof, from the consequences of any neglect to carry lights or signals, or of any neglect to keep a proper lookout, or of the neglect of any precaution which may be required by the ordinary practice of seamen, or by the special circumstances of the case.

RESERVATION OF RULES FOR HARBORS AND INLAND NAVIGATION

Art. 30. Nothing in these rules shall interfere with the operation of a special rule, duly made by local authority, relative to the navigation of any harbor, river, or inland waters.

DISTRESS SIGNALS

Art. 31. When a vessel is in distress and requires assistance from other vessels or from the shore the following shall be the signals to be used or displayed by her, either together or separately, namely:

In the daytime: First. A gun or other explosive signal fired at intervals of about a minute.

Second. The international code signal of distress indicated by N. C.

Third. The distance signal, consisting of a square flag, having either above or below it a ball or anything resembling a ball.

Fourth. A continuous sounding with any fog-signal apparatus.

At night: First. A gun or other explosive signal fired at intervals of about a minute.

Second. Flames on the vessel (as from a burning tar barrel, oil barrel, and so forth).

Third. Rockets or shells throwing stars of any color or description, fired one at a time, at short intervals.

Fourth. A continuous sounding with any fog-signal apparatus.

INLAND RULES TO PREVENT COLLISION OF VESSELS

(See also **Pilot Rules** (p. 9), Form 804 published by the Bureau of Marine Inspection and Navigation)

AN ACT To adopt regulations for preventing collisions upon certain harbors, rivers, and inland waters of the United States

Whereas the provisions of chapter eight hundred and two of the laws of eighteen hundred and ninety, and the amendments thereto, adopting regulations for preventing collisions at sea, apply to all waters of the United States connected with the high seas navigable by seagoing vessels, except so far as the navigation of any harbor, river, or inland waters is regulated by special rules duly made by local authority; and

Whereas it is desirable that the regulations relating to the navigation of all harbors, rivers, and inland waters of the United States, except the Great Lakes and their connecting and tributary waters as far east as Montreal and the Red River of the North and rivers emptying into the Gulf of Mexico and their tributaries, shall be stated in one act: Therefore

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the following regulations for preventing collision shall be followed by all vessels navigating all harbors, rivers, and inland waters of the United States, except the Great Lakes and their connecting and tributary waters as far east as Montreal and the Red River of the North and rivers emptying into the Gulf of Mexico and their tributaries, and are hereby declared special rules duly made by local authority:

PRELIMINARY

In the following rules every steam vessel which is under sail and not under steam is to be considered a sailing vessel, and every vessel under steam, whether under sail or not, is to be considered a steam vessel.

The words "steam vessel" shall include any vessel propelled by machinery.

A vessel is "under way", within the meaning of these rules, when she is not at anchor, or made fast to the shore, or aground.

RULES CONCERNING LIGHTS, AND SO FORTH

The word "visible" in these rules, when applied to lights, shall mean visible on a dark night with a clear atmosphere.

Article 1. The rules concerning lights shall be complied with in all weathers from sunset to sunrise, and during such time no other lights which may be mistaken for the prescribed lights shall be exhibited.

Art. 2.[1] A steam vessel when under way shall carry—(*a*) On or in front of the foremast, or, if a vessel without a foremast, then in the fore part of the vessel, a bright white light so constructed as to show an unbroken light over an arc of the horizon of twenty points of the compass, so fixed as to throw the light ten points on each side of the vessel, namely, from right ahead to two points abaft the beam on either side, and of such a character as to be visible at a distance of at least five miles.

(*b*) On the starboard side a green light so constructed as to show an unbroken light over an arc of the horizon ten points of the compass, so fixed as to throw the light from right ahead to two points abaft the beam on the starboard side, and of such a character as to be visible at a distance of at lease two miles.

(*c*) On the port side a red light so constructed as to show an unbroken light over an arc of the horizon of ten points of the compass, so fixed as to throw the light from right ahead to two points abaft the beam on the port side, and of such a character as to be visible at a distance of at least two miles.

(*d*) The said green and red side lights shall be fitted with inboard screens projecting at least three feet forward from the light, so as to prevent these lights from being seen across the bow.

(*e*) A seagoing steam vessel when under way may carry an additional white light similar in construction to the light mentioned in subdivision (*a*). These two lights shall be so placed in line with the keel that one shall be at least fifteen feet higher than the other, and in such a position with reference to each other that the lower light shall be forward of the upper one. The vertical distance between these lights shall be less than the horizontal distance.

(*f*) All steam vessels (except seagoing vessels and ferryboats), shall carry in addition to green and red lights required by article two (*b*), (*c*), and screens as required by article two (*d*), a central range of two white lights; the after light being carried at an elevation at least fifteen feet above the light at the head of the vessel. The headlight shall be so constructed as to show an unbroken light through twenty points of the compass, namely, from right ahead to two points abaft the beam on either side of the vessel, and the after light so as to show all around the horizon.

Art. 3. A steam vessel when towing another vessel or vessels alongside shall, in addition to her side lights, carry two bright white lights in a vertical line, one over the other, not less than three feet apart, and when towing one or more vessels astern, regardless of the length of the tow, shall carry an additional bright white light three feet above or below such lights: *Provided*, That on the Red River of the North and the rivers emptying into the Gulf of Mexico and their tributaries, this article shall not affect the signal lights used on towing vessels which propel the tow by pushing at the rear of the tow. Each

[1]Article 2 is amended by Motorboat Regulations approved June 9, 1910. (See p. 350.)

of these lights shall be of the same construction and character, and shall be carried in the same position as the white light mentioned in article two (*a*) or the after range light mentioned in article two (*f*).

Such steam vessel may carry a small white light abaft the funnel or aftermast for the vessel towed to steer by, but such light shall not be visible forward of the beam.

Art. 5. A sailing vessel under way and any vessel being towed, except barges, canal boats, scows, and other vessels of nondescript type, when in tow of steam vessels, shall carry the same lights as are prescribed by article two for a steam vessel under way, with the exception of the white lights mentioned therein, which they shall never carry.

Art. 6. Whenever, as in the case of vessels of less than ten gross tons under way during bad weather, the green and red side lights cannot be fixed, these lights shall be kept at hand, lighted and ready for use; and shall, on the approach of or to other vessels, be exhibited on their respective sides in sufficient time to prevent collision, in such manner as to make them most visible, and so that the green light shall not be seen on the port side nor the red light on the starboard side, nor, if practicable, more than two points abaft the beam on their respective sides. To make the use of these portable lights more certain and easy, the lanterns containing them shall each be painted outside with the color of the light they respectively contain, and shall be provided with proper screens.

Art. 7. Rowing boats, whether under oars or sail, shall have ready at hand a lantern showing a white light which shall be temporarily exhibited in sufficient time to prevent collision.

Art. 8. Pilot vessels when engaged on their station on pilotage duty shall not show the lights required for other vessels, but shall carry a white light at the masthead, visible all around the horizon, and shall also exhibit a flare-up light or flare-up lights at short intervals, which shall never exceed fifteen minutes.

On the near approach of or to other vessels they shall have their side lights lighted ready for use, and shall flash or show them at short intervals, to indicate the direction in which they are heading, but the green light shall not be shown on the port side nor the red light on the starboard side.

A pilot vessel of such a class as to be obliged to go alongside of a vessel to put a pilot on board may show the white light instead of carrying it at the masthead, and may, instead of the colored lights above mentioned, have at hand, ready for use, a lantern with a green glass on the one side and a red glass on the other, to be used as prescribed above.

Pilot vessels, when not engaged on their stations on pilotage duty, shall carry lights similar to those of other vessels of their tonnage.

A steam pilot vessel when engaged on her station on pilotage duty and in waters of the United States, and not at anchor, shall in addition to the lights required for all pilot boats, carry at a distance of eight feet below her white masthead light a red light visible all around the horizon and of such a character as to be visible on a dark night with a clear atmosphere at a distance of at least two miles, and also the colored side lights required to be carried by vessels when under way.

When engaged on her station on pilotage duty and in waters of the United States, and at anchor, she shall carry, in addition to the lights required for all pilot boats, the red light above mentioned, but not the colored side lights.

When not engaged on her station on pilotage duty, she shall carry the same lights as other steam vessels.

Art. 9. (*a*) Fishing vessels of less than ten gross tons, when under way and when not having their nets, trawls, dredges, or lines in the water, shall not be obliged to carry the colored side lights; but every such vessel shall, in lieu thereof, have ready at hand a lantern with a green glass on one side and a red glass on the other side, and on approaching to or being approached by another vessel such lantern shall be exhibited in sufficient time to prevent collision, so that the green light shall not be seen on the port side nor the red light on the starboard side.

(*b*) All fishing vessels and fishing boats of ten gross tons or upward, when under way and when not having their nets, trawls, dredges, or lines in the water, shall carry and show the same lights as other vessels under way.

(*c*) All vessels, when trawling, dredging, or fishing with any kind of drag nets or lines, shall exhibit, from some part of the vessel where they can be best seen, two lights. One of these lights shall be red and the other shall be white.

The red light shall be above the white light and shall be at a vertical distance from it of not less than six feet and not more than twelve feet; and the horizontal distance between them, if any, shall not be more than ten feet. These two lights shall be of such a character and contained in lanterns of such construction as to be visible all around the horizon, the white light a distance of not less than three miles and a red light of not less than two miles.

(*d*) Rafts or other water craft not herein provided for, navigating by hand power, horsepower, or by the current of the river, shall carry one or more good white lights, which shall be placed in such manner as shall be prescribed by the Board of Supervising Inspectors of Steam Vessels.

Art. 10. A vessel which is being overtaken by another, except a steam vessel with an after range light showing all around the horizon, shall show from her stern to such last-mentioned vessel a white light or a flare-up light.

Art. 11. A vessel under 150 feet in length when at anchor shall carry forward, where it can best be seen, but at a height not exceeding 20 feet above the hull, a white light, in a lantern so constructed as to show a clear, uniform, and unbroken light visible all around the horizon at a distance of at least 1 mile.

A vessel of 150 feet or upward in length when at anchor shall carry in the forward part of the vessel, at a height of not less than 20 and not exceeding 40 feet above the hull, 1 such light, and at or near the stern of the vessel, and at such a height that it shall be not less than 15 feet lower than the forward light, another such light. The length of a vessel shall be deemed to be the length appearing in her certificate of registry.

Art. 12. Every vessel may, if necessary, in order to attract attention, in addition to the lights which she is by these rules required to carry, show a flare-up light or use any detonating signal that cannot be mistaken for a distress signal.

Art. 13. Nothing in these rules shall interfere with the operation of any special rules made by the government of any nation with respect to additional station and signal lights for two or more ships of war or for vessels sailing under convoy, or with the exhibition of recognition signals adopted by shipowners, which have been authorized by their respective governments, and duly registered and published.

Art. 14. A steam vessel proceeding under sail only, but having her funnel up, may carry in daytime, forward, where it can best be seen, one black ball or shape 2 feet in diameter.

SOUND SIGNALS FOR FOG, AND SO FORTH

Art. 15. All signals prescribed by this article for vessels under way shall be given:

1. By "steam vessels" on the whistle or siren.
2. By "sailing vessels" and "vessels towed" on the foghorn.

The words "prolonged blast" used in this article shall mean a blast of from 4 to 6 seconds' duration.

A steam vessel shall be provided with an efficient whistle or siren, sounded by steam or by some substitute for steam, so placed that the sound may not be intercepted by any obstruction, and with an efficient foghorn; also with an efficient bell. A sailing vessel of 20 tons gross tonnage or upward shall be provided with a similar foghorn and bell.

In fog, mist, falling snow, or heavy rainstorms, whether by day or night, the signals described in this article shall be used as follows, namely:

(*a*) A steam vessel under way shall sound, at intervals of not more than 1 minute a prolonged blast.

(*b*) A sailing vessel under way shall sound, at intervals of not more than 1 minute, when on the starboard tack, one blast; when on the port tack, two blasts in succession, and when with the wind abaft the beam, three blasts in succession.

(*c*) A vessel when at anchor shall, at intervals of not more than 1 minute, ring the bell rapidly for about 5 seconds.

(*d*) A steam vessel when towing shall, instead of the signals prescribed in subdivision (*a*) of this article, at intervals of not more than 1 minute, sound three blasts in succession, namely, one prolonged blast followed by two short blasts. A vessel towed may give this signal and she shall not give any other.

(*e*) All rafts or other water craft not herein provided for, navigating by hand power, horsepower, or by the current of the river, shall sound a blast of the foghorn, or equivalent signal, at intervals of not more than 1 minute.

SPEED OF SHIPS TO BE MODERATE IN FOG, AND SO FORTH

Art. 16. Every vessel shall, in a fog, mist, falling snow, or heavy rainstorm, go at a moderate speed, having careful regard to the existing circumstances and conditions.

A steam vessel hearing, apparently forward of her beam, the fog signal of a vessel the position of which is not ascertained shall, so far as the circumstances of the case admit, stop her engines, and then navigate with caution until danger of collision is over.

STEERING AND SAILING RULES—PRELIMINARY—RISK OF COLLISION

Risk of collision can, when circumstances permit, be ascertained by carefully watching the compass bearing of an approaching vessel. If the bearing does not appreciably change, such risk should be deemed to exist.

Art. 17. When two sailing vessels are approaching one another, so as to involve risk of collision, one of them shall keep out of the way of the other as follows, namely:

(*a*) A vessel which is running free shall keep out of the way of a vessel which is close-hauled.

(*b*) A vessel which is close-hauled on the port tack shall keep out of the way of a vessel which is close-hauled on the starboard tack.

(*c*) When both are running free with the wind on different sides, the vessel which has the wind on the port side shall keep out of the way of the other.

(*d*) When both are running free, with the wind on the same side, the vessel which is to the windward shall keep out of the way of the vessel which is to the leeward.

(*e*) A vessel which has the wind aft shall keep out of the way of the other vessel.

Art. 18. Rule I. When steam vessels are approaching each other head and head, that is, end on, or nearly so, it shall be the duty of each to pass on the port side of the other; and either vessel shall give, as a signal of her intention, one short and distinct blast of her whistle, which the other vessel shall answer promptly by a similar blast of her whistle, and thereupon such vessels shall pass on the port side of each other. But if the courses of such vessels are so far on the starboard of each other as not to be considered as meeting head and head, either vessel shall immediately give two short and distinct blasts of her whistle, which the other vessel shall answer promptly by two similar blasts of her whistle, and they shall pass on the starboard side of each other.

The foregoing only applies to cases where vessels are meeting end on or nearly end on, in such a manner as to involve risk of collision; in other words, to cases in which, by day, each vessel sees the masts of the other in a line or nearly in a line with her own, and by night to cases in which each vessel is in such a position as to see both the side lights of the other.

It does not apply by day to cases in which a vessel sees another ahead crossing her own course, or by night to cases where the red light of one vessel is opposed to the red light of the other, or where the green light of one vessel is opposed to the green light of the other, or where a red light without a green light or a green light without a red light is seen ahead, or where both green and red lights are seen anywhere but ahead.

Rule III. If, when steam vessels are approaching each other, either vessel fails to understand the course or intention of the other, from any cause, the vessel so in doubt shall immediately signify the same by giving several short and rapid blasts, not less than four, of the steam whistle.

Rule V. Whenever a steam vessel is nearing a short bend or curve in the channel, where, from the height of the banks or other cause, a steam vessel approaching from the opposite direction cannot be seen for a distance of half a mile, such steam vessel, when she shall have arrived within half a mile of such curve or bend, shall give a signal by one long blast of the steam whistle, which signal shall be answered by a similar blast, given by any approaching steam vessel that may be within hearing. Should such signal be so answered by a steam vessel upon the farther side of such bend, then the usual signals for meeting and passing shall immediately be given and answered; but, if the first alarm signal of such vessel be not answered, she is to consider the channel clear, and govern herself accordingly.

When steam vessels are moved from their docks or berths, and other boats are liable to pass from any direction toward them, they shall give the same signal as in the case of vessels meeting at a bend, but immediately after clear-

ing the berths so as to be fully in sight they shall be governed by the steering and sailing rules.

Rule VIII. When steam vessels are running in the same direction, and the vessel which is astern shall desire to pass on the right or starboard hand of the vessel ahead, she shall give one short blast of the steam whistle, as a signal of such desire, and if the vessel ahead answers with one blast, she shall direct her course to starboard; or if she shall desire to pass on the left or port side of the vessel ahead, she shall give two short blasts of the steam whistle as a signal of such desire, and if the vessel ahead answers with two blasts, shall direct her course to port; or if the vessel ahead does not think it safe for the vessel astern to attempt to pass at that point, she shall immediately signify the same by giving several short and rapid blasts of the steam whistle, not less than four, and under no circumstances shall the vessel astern attempt to pass the vessel ahead until such time as they have reached a point where it can be safely done, when said vessel ahead shall signify her willingness by blowing the proper signals. The vessel ahead shall in no case attempt to cross the bow or crowd upon the course of the passing vessel. (Corrected as per Art. 32.)

Rule IX. The whistle signals provided in the rules under this article, for steam vessels meeting, passing, or overtaking, are never to be used except when steamers are in sight of each other, and the course and position of each can be determined in the daytime by a sight of the vessel itself, or by night by seeing its signal lights. In fog, mist, falling snow, or heavy rainstorms, when vessels cannot so see each other, fog signals only must be given.

Art. 19. When two steam vessels are crossing, so as to involve risk of collision the vessel which has the other on her own starboard side shall keep out of the way of the other.

Art. 20. When a steam vessel and a sailing vessel are proceeding in such directions as to involve risk of collision, the steam vessel shall keep out of the way of the sailing vessel.

Art. 21. Where, by any of these rules, one of the two vessels is to keep out of the way, the other shall keep her course and speed.

Art. 22. Every vessel which is directed by these rules to keep out of the way of another vessel shall, if the circumstances of the case admit, avoid crossing ahead of the other.

Art. 23. Every steam vessel which is directed by these rules to keep out of the way of another vessel shall, on approaching her, if necessary, slacken her speed or stop or reverse.

Art. 24. Notwithstanding anything contained in these rules, every vessel, overtaking any other, shall keep out of the way of the overtaken vessel. Every vessel coming up with another vessel from any direction more than two points abaft her beam—that is, in such position with reference to the vessel which she is overtaking that at night she would be unable to see either of that vessel's sidelights—shall be deemed to be an overtaking vessel; and no subsequent alteration of the bearing between the two vessels shall make the overtaking vessel a crossing vessel within the meaning of these rules, or relieve her of the duty of keeping clear of the overtaken vessel until she is finally past and clear.

As by day the overtaking vessel cannot always know with certainty whether she is forward or abaft this direction from the other vessel she should, if in doubt, assume that she is an overtaking vessel and keep out of the way.

Art. 25. In narrow channels every steam vessel shall, when it is safe and practicable, keep to that side of the fairway or midchannel which lies on the starboard side of such vessel.

Art. 26. Sailing vessels under way shall keep out of the way of sailing vessels or boats fishing with nets, or lines, or trawls. This rule shall not give to any vessel or boat engaged in fishing the right of obstructing a fairway used by vessels other than fishing vessels or boats.

Art. 27. In obeying and construing these rules, due regard shall be had to all dangers of navigation and collision, and to any special circumstances which may render a departure from the above rules necessary in order to avoid immediate danger.

SOUND SIGNALS FOR VESSELS IN SIGHT OF ONE ANOTHER

Art. 28. When vessels are in sight of one another, a steam vessel under way whose engines are going at full speed astern shall indicate that fact by three short blasts on the whistle.

NO VESSEL UNDER ANY CIRCUMSTANCES TO NEGLECT PROPER PRECAUTIONS

Art. 29. Nothing in these rules shall exonerate any vessel, or the owner or master or crew thereof, from the consequences of any neglect to carry lights or signals, or of any neglect to keep a proper lookout, or of the neglect of any precaution which may be required by the ordinary practice of seamen, or by the special circumstances of the case.

Art. 30. The exhibition of any light on board of a vessel of war of the United States or a revenue cutter may be suspended whenever, in the opinion of the Secretary of the Navy, the commander in chief of a squadron, or the commander of a vessel acting singly, the special character of the service may require it.

DISTRESS SIGNALS

Art. 31. When a vessel is in distress and requires assistance from other vessels or from the shore, the following shall be the signals to be used or displayed by her, either together or separately, namely:

In the daytime: A continuous sounding with any fog-signal apparatus, or firing a gun.

At night: First, flames on the vessel as from a burning tar barrel, oil barrel, and so forth.

Second. A continuous sounding with any fog-signal apparatus, or firing a gun.

Art. 32. All orders to helmsmen shall be given as follows: "Right Rudder" to mean "Direct the vessel's head to starboard." "Left Rudder" to mean "Direct the vessel's head to port." (Act of Congress approved August 21, 1935.)

RULES FOR LIGHTS FOR CERTAIN CLASSES OF VESSELS

RULES FOR LIGHTS FOR CERTAIN CLASSES OF VESSELS NAVIGATING THE HARBORS, RIVERS, AND INLAND WATERS OF THE UNITED STATES, EXCEPT THE GREAT LAKES AND THEIR CONNECTING AND TRIBUTARY WATERS AS FAR EAST AS MONTREAL, AND THE RED RIVER OF THE NORTH, AND RIVERS EMPTYING INTO THE GULF OF MEXICO, AND THEIR TRIBUTARIES

The following rules for lights to be carried by ferryboats, rules for lights for barges and canal boats in tow of steam vessels, rules for lights for rafts and other water craft navigating by hand power, horsepower, or by the current of the river, rule relating to use of searchlight, rule prohibiting unnecessary sounding of the steam whistle, rule prohibiting the carrying of unauthorized lights on steam vessels, and rules relating to drawbridges over navigable water of the United States were adopted by the Board of Supervising Inspectors, Steamboat Inspection Service, and approved by the Secretary of Commerce.

These rules concerning lights shall be complied with in all weathers from sunset to sunrise.

RULES FOR LIGHTS TO BE CARRIED BY FERRYBOATS NAVIGATING THE HARBORS, RIVERS, AND INLAND WATERS OF THE UNITED STATES, EXCEPT THE GREAT LAKES AND THEIR CONNECTING AND TRIBUTARY WATERS AS FAR EAST AS MONTREAL, AND THE RED RIVER OF THE NORTH, AND RIVERS EMPTYING INTO THE GULF OF MEXICO, AND THEIR TRIBUTARIES[8]

Ferryboats propelled by machinery and navigating the harbors, rivers, and other inland waters of the United States, except the Great Lakes and their connecting and tributary waters as far east as Montreal, and the Red River of the North, and rivers emptying into the Gulf of Mexico, and their tributaries, shall carry the range lights and the colored side lights required by law to be carried on steam vessels navigating those waters, except that *double-end ferryboats* shall carry a central range of clear, bright, white lights, showing all around the horizon, placed at equal altitudes forward and aft, also on the starboard side a green light, and on the port side a red light, of such a character as to be visible on a dark night with a clear atmosphere at a distance of at least 2 miles, and so constructed as to show a uniform and unbroken light over an arc of the horizon of 10 points of the compass, and so fixed as to throw the light from right ahead to 2 points abaft the beam on their respective sides.

[8] See Motorboat Regulations (act of Congress), approved June 9, 1910, p. 350.

The green and red lights shall be fitted with inboard screens projecting at least 3 feet forward from the lights, so as to prevent them from being seen across the bow.

Local inspectors in districts having ferryboats shall, whenever the safety of navigation may require, designate for each line of such boats a certain light, white or colored, which will show all around the horizon, to designate and distinguish such lines from each other, which lights shall be carried on a flagstaff amidships, 15 feet above the white range lights.

RULES FOR LIGHTS FOR BARGES AND CANAL BOATS IN TOW OF STEAM VESSELS AND FOR LIGHTS AND DAY SIGNALS FOR DREDGES, VESSELS WORKING ON WRECKS, ETC., NAVIGATING THE HARBORS, RIVERS, AND OTHER INLAND WATERS OF THE UNITED STATES, EXCEPT THE GREAT LAKES AND THEIR CONNECTING AND TRIBUTARY WATERS AS FAR EAST AS MONTREAL, AND THE RED RIVER OF THE NORTH, AND RIVERS EMPTYING INTO THE GULF OF MEXICO, AND THEIR TRIBUTARIES

Lights for barges and canal boats in tow of steam vessels on certain inland waters on the seaboard, except the Hudson River and adjacent waters and Lake Champlain.—On the harbors, rivers, and other inland waters of the United States, except the Great Lakes and their connecting and tributary waters as far east as Montreal, and the Red River of the North, and rivers emptying into the Gulf of Mexico, and their tributaries, and except on the waters of the Hudson River and its tributaries from Troy to the boundary lines of New York Harbor off Sandy Hook, as defined pursuant to section 2 of the act of Congress of February 19, 1895, the East River, and Long Island Sound (and the waters entering thereon, and to the Atlantic Ocean), to and including Narragansett Bay, R. I., and tributaries, and Lake Champlain, barges (except scows) and canal boats in tow of steam vessels shall carry lights as follows:

Barges and canal boats towing astern of steam vessels, when towing singly, or what is known as "tandem towing", shall each carry a green light on the starboard side and a red light on the port side, and a white light on the stern, except that the last vessel of such tow shall carry two white lights on her stern, athwartship, horizontal to each other, not less than 5 feet apart, and not less than 4 feet above the deck house, and so placed as to show all around the horizon.

When two or more boats are abreast, the colored lights shall be carried at the outer sides of the bows of the outside boats. Each of the outside boats in last tier of a hawser tow shall carry a white light on her stern.

The white light required to be carried on stern of a barge or canal boat carrying red and green side lights shall be carried in a lantern so constructed that it shall show an unbroken light over an arc of the horizon of 12 points of the compass, namely, for 6 points from right aft on each side of the vessel, and shall be of such a character as to be visible on a dark night with a clear atmosphere at a distance of at least 2 miles.

Barges or canal boats towing alongside a steam vessel shall, if the deck, deck houses, or cargo of the barge or canal boat be so high above water as to obscure the side lights of the towing steamer when being towed on the starboard side of the steamer, carry a green light upon the starboard side; and when towed on the port side of the steamer, a red light on the port side of the barge or canal boat; and if there is more than one barge or canal boat abreast, the colored lights shall be displayed from the outer side of the outside barges or canal boats.

The colored side lights referred to in these rules for barges and canal boats in tow shall be fitted with inboard screens, so as to prevent them from being seen across the bow, and of such a character as to be visible on a dark night, with a clear atmosphere, at a distance of at least 2 miles, and so constructed as to show a uniform and unbroken light over an arc of the horizon of 10 points of the compass, and so fixed as to throw the light from right ahead to 2 points abaft the beam on either side. The minimum size of the glass globes shall not be less than 6 inches in diameter and 5 inches high in the clear.

Scows when being towed by steam vessels on the waters covered by the first paragraph of these rules shall carry a white light at each end of each scow, except that when such scows are massed in tiers, two or more abreast, each of the outside scows shall carry a white light on its outer bow, and the outside scows in the last tier shall each carry, in addition, a white light on the outer part of the stern. The white light shall be carried not less than 8 feet above

the surface of the water, and shall be so placed as to show an unbroken light all around the horizon, and shall be of such a character as to be visible on a dark night with a clear atmosphere at a distance of at least 5 miles.

RULES FOR LIGHTS AND DAY SIGNALS TO BE CARRIED BY VESSELS, DREDGES OF ALL TYPES, AND VESSELS WORKING ON WRECKS OR OTHER OBSTRUCTIONS TO NAVIGATION, OR MOORED FOR SUBMARINE OPERATION, OR MADE FAST TO A SUNKEN OBJECT WHICH MAY DRIFT WITH THE TIDE OR BE TOWED[8]

Rule for signals to be displayed by a towing vessel when towing a submerged or partly submerged object upon a hawser when no signals are displayed upon the object which is towed.—The vessel having the submerged objects in tow shall display, by day, where they can best be seen, two shapes, one above the other, not less than 6 feet apart, the lower shape to be carried not less than 10 feet above the deck house. The shapes shall be in the form of a double frustum of a cone, base to base, not less than 2 feet in diameter at the center nor less than 8 inches at the ends of the cones, and to be not less than 4 feet lengthwise from end to end, the upper shape to be painted in alternate horizontal strips of black and white, 8 inches in width, and the lower shape to be painted a solid bright red.

By night the towing vessel shall display the regular side lights, but in lieu of the regular white towing lights shall display four lights in a vertical position not less than 3 feet nor more than 6 feet apart, the upper and lower of such lights to be white, and the two middle lights to be red, all of such lights to be of the same character as is now prescribed for the regular towing lights.

Rule for steamers, derrick boats, lighters, or other types of vessels made fast alongside a wreck, or moored over a wreck which is on the bottom or partly submerged or which may be drifting.—Steamers, derrick boats, lighters, or other types of vessels made fast alongside a wreck, or moored over a wreck which is on the bottom or partly submerged, or which may be drifting, shall display by day two shapes of the same character and dimensions and displayed in the same manner as required by the foregoing rule, except that both the shapes shall be painted a solid bright red; but where more than one vessel is working under the above conditions, the shapes need be displayed only from one vessel on each side of the wreck from which it can best be seen from all directions.

By night this situation shall be indicated by the display of a white light from the bow and stern of each outside vessel or lighter not less than 6 feet above the deck, and in addition thereto there shall be displayed in a position where they may best be seen from all directions two red lights carried in a vertical line not less than 3 feet nor more than 6 feet apart, and not less than 15 feet above the deck.

Rule for dredges which are held in stationary position by moorings or spuds.—Dredges which are held in stationary position by moorings or spuds shall display by day two red balls not less than 2 feet in diameter and carried in a vertical line not less than 3 feet nor more than 6 feet apart, and at least 15 feet above the deck house and in such a position where they can best be seen from all directions. By night they shall display a white light at each corner, not less than 6 feet above the deck, and in addition thereto there shall be displayed in a position where they may best be seen from all directions two red lights carried in a vertical line not less than 3 feet nor more than 6 feet apart, and not less than 15 feet above the deck. When scows are moored alongside a dredge in the foregoing situation they shall display a white light on each outboard corner, not less than 6 feet above the deck.

Rule for self-propelling suction dredges under way with their suctions on the bottom. Self-propelling suction dredges under way with their suction on the bottom shall display by day the same signals as are used to designate any steamer not under control; that is to say, two black balls not less than 2 feet in diameter and carried not less than 15 feet above the deck house, and where they may best be seen from all directions.

By night they shall carry, in addition to the regular running lights, two red lights of the same character as the masthead light, in the same vertical plane and underneath the masthead light, the red lights to be not less than

[8] Adopted by executive committee of Board of Supervising Inspectors on July 22, 1914, and approved by Secretary of Commerce on July 28, 1914. Adopted by Board of Supervising Inspectors on Jan. 20, 1915, and approved by the Secretary of Commerce on Apr. 12, 1915.

3 feet nor more than 6 feet apart and the upper red light to be not less than 4 feet and not more than 6 feet below the white masthead light, and on or near the stern two red lights in the same vertical plane not less than 4 feet nor more than 6 feet apart, to show through 4 points of the compass; that is, from right astern to 2 points on each quarter.

Rule for vessels which are moored or anchored and engaged in laying pipe or operating on submarine construction or excavation.—Vessels which are moored or anchored, and engaged in laying pipe or operating on submarine construction or excavation shall display by day, not less than 15 feet above the deck, where they can best be seen from all directions, two balls not less than 2 feet in diameter, in a vertical line not less than 3 feet and not more than 6 feet apart, the upper ball to be painted in alternate black and white vertical stripes 6 inches wide, and the lower ball to be painted a solid bright red. By night they shall display three red lights, carried in a vertical line not less than 3 feet nor more than 6 feet apart and not less than 15 feet above the deck, and in such position as may best be seen from all directions.

All the lights required by these special rules for dredges, wrecking boats, lighters, etc., shall be of such size and character as to be visible on a dark night with a clear atmosphere for a distance of at least 2 miles.

Rule for vessels which are moored or at anchor.—Vessels of more than 300 gross tons, propelled by machinery, when moored or anchored in a fairway or channel where traffic is liable to congestion or confusion, shall display between sunrise and sunset, on the forward part of the vessel where it can best be observed from other vessels, one black ball or shape not less than 2 feet in diameter.

Rule for lights to be displayed on pipe lines.—Pipe lines attached to dredges, and either floating or supported on trestles, shall display by night one row of ~~white~~ lights not less than 8 feet nor more than 12 feet above the water, about equally spaced and in such number as to mark distinctly the entire length and course of the line, the intervals between lights where the line crosses navigable channels to be not more than 30 feet. There shall also be displayed on the shore or discharge end of the line two red lights, 3 feet apart, in a vertical line with the lower light at least 8 feet above the water, and if the line is to be opened at night for the passage of vessels, a similar arrangement of lights shall be displayed on each side of the opening. The lights shall be of the same size and character as specified in rule 5 above.

Rule for passing signals.—Vessels intending to pass dredges or other types of floating plant working in navigable channels, when within a reasonable distance therefrom and not in any case over a mile, shall indicate such intention by blowing the passing signal prescribed in the local pilot rules for vessels under way, which shall be answered in the usual manner from said plant if the channel is clear and the approaching vessel may pass on the course indicated; otherwise the floating plant shall sound the alarm or danger signal and the approaching vessel shall slow down or stop and await further signal from the plant.

When the pipe line from a dredge crosses the channel in such a way that an approaching vessel, owing to excessive draft or for other reasons, cannot pass around the pipe line or dredge, a signal shall be given from the vessel by sounding 4 blasts of the whistle, which shall be answered by a like signal from the dredge. The pipe line shall then be opened for the passage of the vessel as soon as practicable; when the line is open ready for passage, the dredge shall so indicate by sounding the usual passing signal, and the approaching vessel shall promptly pass the dredge.

Rule for speed of vessels passing floating plant working in channels.—Steamers with or without tows, passing floating plant working in channels, shall reduce their speed sufficiently to insure the safety of both said plant and themselves, and when passing within 200 feet of said plant their speed shall not exceed 5 miles per hour. While passing over lines of said plant, propelling machinery shall be stopped.

Rule for light-draft vessels passing floating plant.—Vessels whose draft permits shall keep outside of the buoys marking the ends of mooring lines of floating plant working in channels.

Rule for aids to navigation marking floating-plant moorings.—Breast, stern, and bow anchors of floating plant working in navigable channels shall be marked by barrel or other suitable buoys. By night approaching vessels shall be shown the location of adjacent buoys by throwing a suitable beam of light from said plant on the buoys until the approaching vessel has passed, or the

buoys may be lighted by red lights, visible in all directions, of the same size and character as specified in rule 5 above: *Provided*, That the foregoing provisions of this paragraph shall not apply to floating plant working in the following waters of New York Harbor and adjacent waters; namely, the East River, the North River (Battery to Spuyten Duyvil), the Harlem River, and the New York and New Jersey Channels (from the Upper Bay through the Kill Van Kull, Newark Bay, Arthur Kill, and Raritan Bay to the Lower Bay).

Rule for obstruction of channel by floating plant.—Channels shall not be unnecesarily obstructed by any dredge or other floating plant. While vessels are passing such plant, all lines running therefrom across the channel on the passing side, which may interfere with or obstruct navigation, shall be slacked to the bottom of the channel.

Rule for protection of marks placed for the guidance of floating plant.—Vessels shall not run over anchor buoys, or buoys, stakes, or other marks placed for the guidance of floating plant working in channels; and shall not anchor on the ranges of buoys, stakes, or other marks placed for the guidance of such plant.

NOTE.—If it is necessary to prohibit or limit the anchorage or movement of vessels within certain areas in order to facilitate the work of improvement, application should be made through official channels for establishment by the Secretary of War of special or temporary regulations for this purpose.

Rule for clearing of channels.—When special or temporary regulations have not been prescribed and action under these rules and regulations will not afford clear passage, floating plant in narrow channels shall, upon notice, move out of the way of vessels a sufficient distance to allow them a clear passage. Vessels desiring passage shall, however, give the master of the floating plant ample notice in advance of the time they expect to pass.

NOTE.—The designation "floating plant" as used in the above *rules*, includes dredges, derrick boats, snag boats, drill boats, pile drivers, maneuver boats, hydraulic graders, and survey boats.

Rule relating to the use of searchlights.—Any master or pilot of any steam vessel who shall flash or cause to be flashed the rays of the searchlight into the pilot house of a passing vessel shall be deemed guilty of misconduct and shall be liable to have his license suspended or revoked.

Rule prohibiting unnecessary sounding of the steam whistle.—The Board of Supervising Inspectors, at their annual meeting of January 1907 adopted the following rule:

Unnecessary sounding of the steam whistle is prohibited within any harbor limits of the United States. Whenever any licensed officer in charge of any steamer authorizes or permits such unnecessary whistling, upon conviction thereof before any board of inspectors having jurisdiction, such officer shall be suspended from acting under his license as the inspectors trying the case may deem proper.

Rule prohibiting the carrying of unauthorized lights on steam vessels.—Any master or pilot of any steam vessel who shall authorize or permit the carrying of any light, electric or otherwise, not required by law, on the ouside structure of the cabin or hull of the vessel that in any way will interfere with distinguishing the signal lights shall, upon conviction thereof before any board of inspectors having jurisdiction, be deemed guilty of misconduct and shall be liable to have his license suspended or revoked.

RULES FOR LIGHTS FOR RAFTS AND OTHER WATER CRAFT NAVIGATING BY HAND POWER, HORSEPOWER, OR BY THE CURRENT OF THE RIVER, ON THE HARBORS, RIVERS, AND OTHER INLAND WATERS OF THE UNITED STATES, EXCEPT THE GREAT LAKES AND THEIR CONNECTING AND TRIBUTARY WATERS AS FAR EAST AS MONTREAL AND THE RED RIVER OF THE NORTH AND RIVERS EMPTYING INTO THE GULF OF MEXICO AND THEIR TRIBUTARIES

Any vessel, except rafts and rowing boats under oars, navigating by *hand power, horsepower, or by the current of the river*, shall carry one white light forward, not less than 8 feet above the surface of the water.

Rafts propelled by hand power or by the current of the river, or which shall be anchored or moored in or near a channel or fairway, shall carry white lights, as follows:

Rafts of one crib and not more than two in length shall carry one white light. Rafts of three or more cribs in length and one crib in width shall carry one white light at each end of the raft. Rafts of more than one crib abreast shall carry one white light on each outside corner of the raft, making four lights in all.

The *white light* required by these rules for rafts and other water craft shall be carried, from sunset to sunrise, in a lantern so fixed and constructed as to show a clear, uniform, and unbroken light, visible all around the horizon, and of such intensity as to be visible on a dark night with a clear atmosphere at a distance of at least 1 mile. The lights for rafts shall be suspended from poles of such height that the lights shall not be less than 8 feet above the surface of the water.

REGULATIONS FOR TOWS OF SEAGOING BARGES WITHIN INLAND WATERS

(AS AMENDED TO ACT OF CONGRESS APPROVED MAY 20, 1936)

1. Tows of seagoing barges navigating the inland waters of the United States are limited in length to five vessels, including the towing vessel or vessels.

2. Hawsers are limited in length to 75 fathoms, measured from the stern of one vessel to the bow of the following vessel; and should in all cases be as much shorter as the weather or sea will permit.

3. In all cases where, in the opinion of the master of the towing vessel, it is dangerous or inadvisable, whether on account of the state of the weather, or sea, or otherwise, to shorten hawsers, hawsers need not be shortened to the prescribed length until reaching the localities named below:

(*a*) Tows bound for Hampton Roads or beyond, before passing Thimble Light.

(*b*) Tows bound up the Chesapeake, to the northward of Baltimore Light.

(*c*) Tows bound into New York from sea, at West Bank.

(*d*) Tows bound up the Delaware, between Fourteenth Foot Bank and Cross Ledge Lighthouses.

(*e*) Tows bound to Narragansett Bay, before reaching Rose Island.

(*f*) Hawsers may also be lengthened in the same places, under the same circumstances, when tows are bound out.

4. In all cases where tows can be bunched, it should be done.

(*a*) Tows navigating in the North and East Rivers of New York must be bunched above a line drawn between Robbins Reef Lighthouse and Owls Head, Brooklyn, but the quarantine anchorage and the north entrance to Ambrose Channel shall be avoided in the process of bunching tows. In the discretion of the master of the towing vessel, when tows are entering Long Island Sound from the westward, hawsers may be lengthened out after passing Fort Schuyler, and when entering Long Island Sound from the eastward, hawsers need not be shortened to the prescribed length until reaching Fort Schuyler.

(*b*) Tows must be bunched above the mouth of the Schuylkill River, Pa.

5. Section 15 of the act approved May 28, 1908, provides:

That the master of the towing vessel shall be liable to the suspension or revocation of his license for any willful violation of regulations issued pursuant to section 14 in the manner now prescribed for incompetency, misconduct, or unskillfulness.

6. Any violation of these regulations shall be reported in writing as soon as practicable to the board of local inspectors of steam vessels most convenient to the officer or other person who may witness the violation.

REGULATION OF MOTORBOATS

THE ACT APPROVED JUNE 9, 1910, TO AMEND LAWS FOR PREVENTING COLLISIONS OF VESSELS AND TO REGULATE EQUIPMENT OF CERTAIN MOTORBOATS ON THE NAVIGABLE WATERS OF THE UNITED STATES

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the words "motor boat", where used in this act, shall include every vessel propelled by machinery and not more than sixty-five feet in length, except tugboats and towboats propelled by steam. The length shall be measured from end to end over the deck, excluding sheer: *Provided*, That the engine, boiler, or other operating machinery shall be subject to inspection by the local inspectors of steam vessels, and to their approval of the design thereof, on all said motor boats which are more than forty feet in length and which are propelled by machinery driven by steam.

SEC. 2. That motor boats subject to the provisions of this Act shall be divided into classes as follows:

Class 1. Less than twenty-six feet in length.

Class 2. Twenty-six feet or over and less than forty feet in length.

Class 3. Forty feet or over and not more than sixty-five feet in length.

SEC. 3. That every motor boat, in all weathers, from sunset to sunrise, shall carry the following lights, and during such time no other lights which may be mistaken for those prescribed shall be exhibited:

(*a*) Every motor boat of class 1 shall carry the following lights:

First. A white light aft to show all around the horizon.

Second. A combined lantern in the fore part of the vessel and lower than the white light aft showing green to the starboard and red to port, so fixed as to throw the light from right ahead to two points abaft the beam on their respective sides.

(*b*) Every motor boat of classes 2 and 3 shall carry the following lights:

First. A bright white light in the fore part of the vessel as near the stem as practicable, so constructed as to show an unbroken light over an arc of the horizon of twenty points of the compass, so fixed as to throw the light ten points on each side of the vessel, namely, from right ahead to two points abaft the beam on either side. The glass or lens shall be of not less than the following dimensions:

Class 2. Nineteen square inches.

Class 3. Thirty-one square inches.

Second. A white light aft to show all around the horizon.

Third. On the starboard side a green light so constructed as to show an unbroken light over an arc of the horizon of ten points of the compass, so fixed as to throw the light from right ahead to two points abaft the beam on the starboard side. On the port side a red light so constructed as to show an unbroken light over an arc on the horizon of ten points of the compass, so fixed as to throw the light from right ahead to two points abaft the beam on the port side. The glasses or lenses in the said sidelights shall be of not less than the following dimensions on motor boats of—

Class 2. Sixteen square inches.

Class 3. Twenty-five square inches.

On and after July 1, 1911, all glasses or lenses prescribed by paragraph (*b*) of section 3 shall be fresnel or fluted. The said lights shall be fitted with inboard screens of sufficient height and so set as to prevent these lights from being seen across the bow and shall be of not less than the following dimensions on motor boats of—

Class 2. Eighteen inches long.

Class 3. Twenty-four inches long: *Provided*, That motor boats as defined in this Act, when propelled by sail and machinery or under sail alone, shall carry the colored lights suitably screened, but not the white lights prescribed by this section.

SEC. 4. (*a*) Every motor boat under the provisions of this Act shall be provided with a whistle or other sound-producing mechanical appliance capable of producing a blast of two seconds or more in duration, and in the case of such boats so provided a blast of at least two seconds shall be deemed a prolonged blast within the meaning of the law.

(*b*) Every motor boat of class 2 or 3 shall carry an efficient foghorn.

(*c*) Every motor boat of class 2 or 3 shall be provided with an efficient bell, which shall be not less than eight inches across the mouth, on board of vessels of class 3.

SEC. 5. That every motor boat subject to any of the provisions of this Act, and also all vessels propelled by machinery other than by steam, more than sixty-five feet in length, shall carry either life preservers or life belts or buoyant cushions, or ring buoys, or other device, to be prescribed by the Secretary of Commerce, sufficient to sustain afloat every person on board, and so placed as to be readily accessible. All motor boats carrying passengers for hire shall carry one life preserver of the sort prescribed by the regulations of the Board of Supervising Inspectors for every passenger carried, and no such boat while so carrying passengers for hire shall be operated or navigated except in charge of a person duly licensed for such service by the local board of inspectors. No examination shall be required as the condition of obtaining such license, and any such license shall be revoked or suspended by the local board of inspectors for misconduct, gross negligence, recklessness in navigation, intemperance, or violation of law on the part of the holder, and if revoked, the person holding such license shall be incapable of obtaining another such license for one year from the date of revocation: *Provided*, That motor boats shall not be required to carry licensed officers except as required in this Act.

SEC. 6. That every motor boat and also every vessel propelled by machinery other than by steam, more than sixty-five feet in length, shall carry ready for immediate use the means of promptly and effectually extinguishing burning gasoline.

SEC. 7. That a fine not exceeding $100 may be imposed for any violation of this Act. The motor boat shall be liable for the said penalty and may be seized and proceeded against, by way of libel, in the district court of the United States for any district within which such vessel may be found.

SEC. 8. That the Secretary of Commerce shall make such regulations as may be necessary to secure the proper execution of this Act by collectors of customs and other officers of the Government. And the Secretary of the Department of Commerce may, upon application therefor, remit or mitigate any fine, penalty, or forfeiture relating to motor boats except for failure to observe the provisions of section 6 of this Act.

SEC. 9. That all laws and parts of laws only insofar as they are in conflict herewith are hereby repealed: *Provided*, That nothing in this Act shall be deemed to alter or amend acts of Congress embodying or revising international rules for preventing collisions at sea.

SEC. 10. That this Act shall take effect on and after thirty days after its approval.

Department of Commerce Regulations.—From time to time, the Department of Commerce issues regulations pursuant to the above Motor Boat Act of June 9, 1910. The following memoranda are from the edition of Circular No. 236 dated December 1, 1936.

As defined by the above act, the words "motor boat" include boats temporarily or permanently equipped with detachable motors, and such vessels, when so equipped are subject to the act.

The lights provided for in Section 3 are *running lights*, which are to be carried on all motor boats when under way on inland waters in all weathers from sunset to sunrise. These lights are not in conflict with the anchor lights, and additional lights for pilot, towing, and fishing vessels, provided for in the Inland Rules of the Road.

Motor Boats of Class 1 must carry the two-color combination light and the white stern light required by section 3 (a) of the act. The use of separate red and green side lights in lieu of the combination red and green light is prohibited.

No penalty is incurred by motor boats for a failure to carry lights between the hours of sunrise and sunset.

If a motor boat, through temporary disablement of the machinery or lack of gasoline or for any other reason, finds it necessary to proceed under sail, in whole or in part, the white lights should be extinguished and she should proceed with her colored lights only. This does not convert a motor boat into a sail boat, however, and all other motor-boat equipment should be carried.

The after light should be higher and so placed as to form a range with the forward light and should be clear of house, awnings and other obstructions. It should be as near the stern as possible.

The law does not specify the size of lights to be carried on motor boats of Class 1. They should be large enough for the purpose intended, the illuminated portion of the light possibly 3 inches or more in diameter.

No size or style of whistle, fog horn or bell (except the bell for Class 3) is prescribed other than the requirement of being efficient for the purpose for which it is intended. A mouth whistle of suitable capacity has been held in compliance with the law. An electric horn or other sound-producing mechanical appliance of suitable capacity may be used in lieu of a whistle.

Fog horns cannot take the place of whistles on motor moats of Classes 2 and 3.

Every motor boat not carrying passengers for hire must have life preservers (belts, buoys, cushions, rings or other devices) in sufficient numbers for all hands (passengers, crew, children and babies). No life preserver is approved for more than one person. The regulations specify in detail the requirements for each preserver. Each preserver must have at least two strong straps, securely attached to it in such manner that they will not break or be torn loose under ordinary conditions, of sufficient length and so arranged that they may be slipped over the arms of the wearer to the shoulders.

Neither life preservers stuffed with granulated cork or other loose material nor pneumatic life preservers will be approved.

Wooden life floats of specified dimensions, etc., are the only substitutes for life preservers which are approved. Planks, gratings, flooring, oars, corks on fish nets, empty kegs or casks, wooden boxes, boats in tow, etc., are not approved as substitutes for life preservers. Life floats already installed on motor boats and constructed in accordance with previous regulations may continue to be used.

Motor boats carrying passengers for hire shall carry one life preserver of the sort prescribed by the Board of Supervising Inspectors for every person carried and the person in charge must be duly licensed.

Fire extinguishers of a type which have demonstrated their ability to "promptly and effectually extinguish burning gasoline" must be carried in all motor boats when being navigated. Extinguishers of the carbon dioxide, carbon tetrachloride, and foam types, all if of sufficient size to be effective, have demonstrated such ability. Neither soda and acid type extinguishers, sand, nor salt and sand have demonstrated such ability.

The design of the engine, boiler, or other operating machinery of motor boats more than 40 feet in length and not more than 65 feet in length, propelled by machinery driven by steam, shall be approved by the local inspectors.

All steam vessels more than 65 feet in length are subject to inspection as heretofore.

Motor boats propelled otherwise than by steam of above 15 gross tons carrying freight or passengers for hire, but not engaged in fishing as a regular business, are subject to inspection whether under or over 65 feet in length.

The only officer required to be carried on motor boats within the contemplation of the act of June 9, 1910, is the licensed operator provided for in the act.

All motor boats of 16 gross tons or over used exclusively for pleasure should be documented as yachts; all motor boats of 5 net tons or over engaged in trade must be documented—i. e., licensed by the Collectors of Customs. Vessels under 5 net tons are not registered, enrolled, or licensed in any case. The license of the vessel obtained from the Collector of Customs (designated a document) is additional to and must not be confounded with the license required for the operator of a motor boat.

All vessels, registered, enrolled, or licensed, except yachts, must have name and home port on stern and name on bow. Documented yachts must have name and home port conspicuously placed on the hull. Tonnage measurement is necessary only in case of vessels required to be registered, enrolled, or licensed.

Motor boats are required to have on board two copies of the pilot rules to be observed by them, which will be furnished by collectors of customs and local inspectors, Bureau of Marine Inspection and Navigation, on request. Copies of the current edition of Circular No. 236 should be inserted therein.

Numbering of motor boats.—Every undocumented vessel, operated in whole or in part by machinery, owned in the United States and found on the navigable waters thereof, except public vessels, and vessels not exceeding 16 feet in length measured from end to end over the deck excluding sheer, temporarily equipped with detachable motors, shall be numbered. Such numbers shall be not less in size than 3 inches and painted or attached to each bow of the vessel in such manner and color as to be distinctly visible and legible. When a number is awarded to a vessel under the provisions of this act, a certificate of such award shall be issued by the collector, said certificate to be at all times kept on board of such vessel and to constitute a document in lieu of enrollment or license.

All undocumented vessels, coming within the above definition, that are equipped with permanently fixed engines must be numbered whether over or under 16 feet in length. The exception in favor of "Vessels not exceeding 16 feet in length, etc." is held to apply only to such boats as rowboats and canoes designed and intended for the use of oars or paddles as the ordinary means of propulsion. Boats designed for the use of detachable motors as the ordinary means of propulsion are held to be subject to the act even if under 16 feet in length.

The said numbers, on application of the owner or master, shall be awarded by the collector of customs of the district in which the vessel is owned and a record thereof kept in the customhouse of the district in which the owner or managing owner resides. No numbers not so awarded shall be carried on the bows of such vessel.

Notice of destruction or abandonment of such vessels or change in their ownership shall be furnished within 10 days by the owners to the collectors of customs of the districts where such numbers were awarded. Such vessel sold into another customs district may be numbered anew in the latter district.

HARBOR REGULATIONS

HAMPTON ROADS AND HARBORS OF NORFOLK AND NEWPORT NEWS

THE ANCHORAGE GROUNDS

(All azimuths are referred to a true meridian)

Under authority of the provisions of section 7 of the river and harbor act approved March 4, 1915, the following anchorage grounds for vessels in Hampton Roads and the harbors of Norfolk and Newport News, Va., are hereby defined and established, and the following rules and regulations relating thereto are adopted.

TEMPORARY ANCHORAGE

Hampton Bar.—To the westward of a line bearing 8° from a point "A" determined by the following cross bearings: Old Point Comfort light, bearing 31°; 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.

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.

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 (an officer of the U. S. Coast Guard), 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 unattended 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.

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.

ANCHORAGE B

Naval anchorage.[1]—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.

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. Upon receiving word that any part of the fleet is expected, the Captain of the Port shall cause a sufficient area in this anchorage, and also in Anchorage C, to be vacated to accommodate the number of vessels scheduled to arrive.

ANCHORAGE C

Newport News Bar.[1]—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 lighted buoys marking the 40-foot dredged channel to Newport News; to the eastward of a line bearing north through red lighted buoy 8, at the western entrance to the Newport News channel.

Vessels shall be anchored so as to leave a clear fairway 200 yards wide from Newport News Channel buoy 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.

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[1] The established anchorages for naval vessels having been found inadequate at times when an especially large number of vessels are gathered for parade or other purposes, and the Navy Department having requested the establishment of a numbered series of anchorages for such occasions in order that a naval vessel may be ordered to proceed to a designated numbered anchorage in the harbor, the following arrangements have been made: A key chart for naval anchorages in Hampton Roads, which provides for the emergent anchorage of naval vessels in Anchorages A, C, E, and G, and also in the vicinity of Thimble Shoal, marked Anchorage "X" on the key chart, has been prepared. These desig-

ANCHORAGE D

The area enclosed by lines drawn as follows: From lighted buoy 1 at the entrance to the Newport News dredged channel to bell buoy 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 3°; thence bearing 3° for a distance of 775 yards to anchorage buoy E; thence bearing 49° on a line in extension of the southeast boundary of Anchorage B to intersection with the first line.

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 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.

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 5, except that in an emergency the fairway may be closed and occupied for anchoring of naval vessels.

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 20°; Craney Island Light, bearing 131°; Nansemond River Light, bearing 243°; westerly point, Newport News Middle Ground Light, bearing 89°; 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 southwest of the southwest boundary of Anchorage E. (See 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.

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 49° 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.

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 Anchorages 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.

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nated anchorages, 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 these specially numbered anchorages, he will authorize the use by naval vessels of the requested numbers, if they can be made available, the commercial conditions at the time being given proper consideration. If, in the opinion of the Captain of the Port, there are sufficient reasons why the numbers first asked for should not be used, he will confer with the naval officers making the request, and if other numbers can be agreed upon he will authorize their use; otherwise he will communicate the request to the Secretary of War with a statement of the circumstances and with his recommendations.

ANCHORAGE G

Newport News.—To the southward of the following lines: From Fishing Point to black can buoy 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 45°; Newport News Middle Ground Light, bearing 119°; Nansemond River Light, bearing 189°35′; thence 145° to Anchorage buoy F, intersecting an extension of the line marking the northern boundary of Anchorage E; thence easterly to the westerly point of Anchorage E. To the westward of a line parallel to and 425 yards west of the western boundary of Anchorage F.

ANCHORAGE G-1

James River.—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.

ANCHORAGE G-2

James River.—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 30° from that point to a point on the Warwick County shore.

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 on Anchorage F.

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 5.

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 20 and 8, marking the northern side of the Western Branch Channel; and to the northeastward of a line through buoy 8 and high stack at West Norfolk.

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.

ANCHORAGE J

Sewall Point.—To the southward of a line bearing 87° from gas buoy 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.

ANCHORAGE K

To the southward of lines bearing 87° and 220°, respectively, from spar buoy 2, marking the southern side of the channel to the Virginian Railway coal pier at Sewall Point; to the northward of a line through spar buoys 1 and 3, marking the northern side of the channel to the Norfolk & Western Railway ter-

minal at Sewall Point; and to the eastward of a line through can buoy 11, marking the eastern side of the Norfolk Harbor Channel.

ANCHORAGE K–1

To the southward of a line through spar buoy 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 (Tidewater Terminals, Inc., lessee); and to the eastward of the eastern side of the Norfolk Harbor Channel.

ANCHORAGE K–2

To the southward of two lines, one 185 yards south of pier No. 1 of the United States Army Supply Base (Tidewater Terminals, Inc., lessee); 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 21, about 835 yards northerly of Lambert Point; and to the eastward of a line through buoys 15, 19, and 21, marking the eastern side of Norfolk Harbor Channel.

ANCHORAGE K–3

(For yachts and pleasure craft)

Lafayette River.—To the westward of Hampton Boulevard bridge crossing Lafayette River; and to the northward and eastward of line running 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 Anchorage K–2 and K–3.

It will be understood that the establishment of this area shall not interfere with navigation and oyster cultivation.

ANCHORAGE L

Lambert Point.—To the southeastward of a line bearing 51° from lighted buoy 23 off Lambert Point; to the northwestward of a line bearing 51° from can buoy 25 off Lambert Point Creek; to the northeastward of a line through lighted buoy 23 and can buoy 25 marking the eastern side of channel to Norfolk.

ANCHORAGE M

To the southeastward of a line bearing 47° from can buoy 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 182° from can buoy 27, 530 yards to a point; and the other bearing 109° from that point.

ANCHORAGE N

Atlantic City.—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 & Ohio Railroad pier in Norfolk and the other passing 100 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.

ANCHORAGE N–1

Smith Creek.—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. 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.

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.

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.

ANCHORAGE P

Port Norfolk.—To the southeastward of a line bearing 37° 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.

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.

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 the 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.

ANCHORAGE S

The area landward of the United States pierhead lines on the northern side of the Eastern Branch of the Elizabeth River, between a point 250 feet from the Virginia Railroad 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 RULES AND REGULATIONS

1. Except in cases of great emergency no vessel shall be anchored in Hampton Roads or the harbors of Newport News and Norfolk, Va., 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 vessels entering or leaving adjacent slips.

2. Whenever, in the opinion of the captain of the port such action may be necessary, that officer may require any or all vessels in any designated anchorage area to moor with two or more anchors.

3. Every vessel whose crew may be reduced to such number that it will not have sufficient men on board to weigh the anchor at any time shall be anchored with two anchors, with mooring swivel put on before the crew shall be reduced or released.

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

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

6. The Captain of the Port shall assign berths in the anchorages to all vessels applying. He may grant permits for habitually maintaining and using the same mooring place in an anchorage area, and no vessel shall occupy a permanent berth in an anchorage area, except under authority of such permit, which may be revoked at any time.

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

8. Except as provided in rule 10, 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 area F and F–1 only, described above under the heading "The Anchorage Grounds." 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.

Any vessel carrying explosives and desiring to proceed to the anchorage provided therefor must first obtain a written permit from the Captain of the Port; and no vessel shall occupy a berth in such anchorage except by authority of such permit, which may be revoked at any time. All other vessels, especially tugs and stevedores' boats, engaged or used in connection with loading explosives on vessels in anchorage areas must carry written permits from the Captain of the Port and must show these permits whenever required by the Captain of the Port or his properly authorized agents.

9. Whenever any water craft not fitted with mechanical power anchors in Anchorage F while carrying explosives, the Captain of the Port may require the attendance of a tug upon such water craft, when in his judgment such action is deemed necessary.

10. The District Engineer in charge of works of river and harbor improvement is empowered to authorize, in writing, the anchoring in or near the vicinity of such a work of a single scow carrying explosives for use on the work, but only in quantities considered by him safe and necessary. The District Engineer shall prescribe the conditions under which this explosive shall be stored and handled and shall in each case furnish the Captain of the Port with a copy of the written permit to anchor explosives on the work and a copy of the rules and regulations for its storage and handling.

The mooring for the purpose of taking on bunker coal at any wharf of a vessel carrying explosives or other dangerous articles may be permitted by the Captain of the Port, in writing, at such times and places and such periods, during daylight only, and under such conditions as to arrangement, loading and handling of cargo, and mobility of vessel as in his judgment will not interrupt the free and proper use of navigable waters and will not endanger life or property; provided the explosives aboard are manufactured, marked, packed, shipped, and stowed in compliance with the Interstate Commerce Regulations governing the transportation of explosives and other dangerous articles, or foreign government regulations providing an equal degree of safety and security.

11. Municipal ash scows may be anchored in such places as the Captain of the Port may designate.

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

13. Permits to anchor in channels within the limits of Hampton Roads and the harbors of Norfolk and Newport News, Va., 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.

14. Nothing in these rules and regulations shall be construed as relieving the owner or person in charge of any vessel from the penalties of the law for obstructing navigation or for obstructing or interfering with range lights, or for not complying with the navigation laws in regard to lights, fog signals, or for otherwise violating law.

REGULATIONS GOVERNING THE USE AND NAVIGATION OF THE WATERS OF HAMPTON ROADS AND THE HARBORS OF NORFOLK AND NEWPORT NEWS, VA., AND THE HANDLING OF EXPLOSIVES THEREIN BY VESSELS OTHER THAN COMMON CARRIERS CARRYING EXPLOSIVES

Under authority of section 7 of the river and harbor act approved August 8, 1917, the following regulations are prescribed to govern the use and navigation of the waters of Hampton Roads and the harbors of Norfolk and Newport News, Va., by vessels, other than common carriers, carrying explosives:

1. The officer of the Coast Guard designated "Captain of the Port" shall have immediate supervision of the enforcement of these regulations.

2. Vessels carrying explosives shall be at all times in charge of competent persons and must display by day a red flag of at least 16 square feet at the masthead, or at least 10 feet above the upper deck, if the vessel has no mast; at night a red light will be displayed in the same positions specified for the red flag. For use in emergencies each barge must be provided with a suitable anchor, ground tackle, and equipment, to be approved by the Captain of the Port; with an adequate supply of fire extinguishers, and fire pails filled with water, and with a suitable fog-horn and bell.

3. No smoking will be permitted on or near any vessel, barge, or scow carrying explosives, and no person under the influence of liquor will be allowed on board, nor to approach such vessels. Every person having business on board vessels which are being loaded with explosives, other than members of the crew, must have a pass from the Captain of the Port in such form as the Captain of the Port shall determine.

4. Vessels carrying explosives shall not carry inflammable liquids, inflammable solids, oxidizing materials, mineral acids, as defined in Interstate Commerce Commission regulations for the transportation of explosives, or articles likely to ignite spontaneously, or to give off inflammable gases, unless the explosives are stored in separate rooms or are otherwise so separated as to effectually prevent danger to the explosive from any of these articles, or from the vapor thereof. Where blasting caps, detonating fuses, and fulminate of mercury in bulk are loaded on the same vessel with high explosives, they must be in a different compartment, the distance in a straight line from the compartment containing them to the explosives to be not less than 25 feet.

5. No unnecessary fires shall be permitted on vessels carrying explosives, and those fires which are deemed necessary must be properly safeguarded and must be left in constant charge of some one individual of the crew during the entire period that they are burning. Cabins on barges or lighters carrying explosives of any, or all, descriptions, in which oil lights or stoves are used must be protected by covering the wooden walls, partitions, floors, and ceilings with two thicknesses of one-quarter inch asbestos board placed with joints broken and covered with No. 26 gage metal. This protection must also be applied to doors, and the doors from the cabin into other parts of the boat must be provided with substantial springs, making them self-closing. The stoves must be at least 18 inches from all partitions, and a sheet-metal shield 5½ feet in height, securely fastened to the floor and the wall, must be placed midway between the walls and the stove. The stove must be at least 6 inches from the floor of the cabin, supported either on legs permanently and securely fastened to the stove and the floor, or on 6 inches of hollow tile securely fastened in place. The hole in the roof of the cabin where the stovepipe passes through shall be 18 inches larger in circumference than the stovepipe, and a substantial metal plate shall be placed in the opening surrounding the pipe to hold it in place. The stovepipe shall also be tied into the walls so that it will not shift. The smokestack must be provided with substantial screens of fine mesh or other satisfactory spark arrester. All oil lamps must be held in marine brackets. Safety matches of wooden-stick type rather than the paper type must be used exclusively and kept in proper receptacles. Oils and lamps must be kept on deck in a box lined with metal in such position that it can be readily thrown overboard. No artificial light shall be permitted in the holds or compartments of any vessel that contains explosives except electric flashlights or electric lanterns or an approved electric lighting of the vessel. Crews must not have or carry matches, firearms, or cartridges on their persons. Electric flashlights must be provided for the attendants.

6. No explosives will be allowed to be placed aboard a vessel until the rest of the cargo has been placed aboard and the vessel trimmed. All work of

construction of floors, partitions, and other conditioning of the vessel, and the removal of any other combustibles from that part of the hold in which the explosives are to be stored, shall be completed before loading of the explosives is commenced. All rubbish, shovelings, old oil, paint cans, oil rags, rope ends, and other litter must be kept cleared out of the holds. Such lumber as is allowed to remain in the holds for use as firewood must be securely piled. Floors must be kept broom clean. All decks, gangways, and holds over which explosives must be passed in loading must be freed from all loose metal or tools and carefully swept before loading is commenced and after loading has ceased.

7. All explosives must be handled carefully. No metal tools shall be used in loading, unloading, or handling explosives. Men engaged in loading, unloading, or handling explosives must not have or carry on their persons metal tools or bale hooks, matches, firearms, or cartridges, and they must not wear boots or shoes shod or strengthened with iron nails or any metal unless such boots or shoes are covered with leather, felt, or some other such material. Packages of explosives must not be thrown, dropped, rolled, dragged, or slid over each other or over the decks. Dynamite boxes must be stowed topside up. Powder kegs should be loaded with seams up.

8. The term "high explosives in bulk" shall be construed to mean high explosives packed in boxes, barrels, or kegs, and not loaded ammunition or shells. The standard definition of the term "high explosives" will be that contained in paragraph 1503 of the regulations of the Interstate Commerce Commission for the transportation of explosives by rail, viz: "High explosives are all explosives more powerful than ordinary black powder, except smokeless powders and fulminates. Their distinguishing characteristic is their susceptibility to detonation by a blasting cap. Examples of high explosives are dynamite, picric acid, pictrates, chlorate powders, nitrate of ammonia powders, dry trinitrotoluol, dry nitrocellulose (gun cotton), dry tetra-nitroaniline, dry tetranitromethylaniline, and fireworks that can be exploded en masse." Unless they are loaded in the same vessel with articles enumerated in the rule quoted above, picric acid 10 per cent wet, and trinitrotoluol 10 per cent wet, and nitrocellulose (gun cotton) 20 per cent wet, will not be classified as high explosives. The term "high explosives in bulk" does not include such articles as benzol, tuluol, smokeless powder, black powder, small-arms ammunition, ammunition for cannon with explosive projectiles, explosive projectiles or torpedoes, percussion fuses, time fuses, combination fuses, tracer fuses, cordeau detonant, primers for cannon and small arms, blasting caps, detonating fuses, and fulminate of mercury in bulk. Blasting caps, detonating fuses, and fulminate of mercury in bulk will be considered as constituting a distinct class by themselves, and must be stowed and handled with special care.

9. In transferring high explosives in bulk, blasting caps, detonating fuses, and fulminate of mercury from one vessel to another they must be handled by hand or regulation chute and mattress. If difference in elevation between vessels or condition of weather renders it impossible to transfer or load by hand or chute, mechanical hoists and a special crate or basket may be used. Explosives transferred in this manner must not be handled roughly. They must be hoisted and lowered carefully and be deposited or lowered on a mattress.

10. When an inclined chute is employed, such chute shall be constructed of 1-inch planed boards with side guards 4 inches high, extending 8 inches above top face of bottom of chute and throughout its length fastened with brass screws. D-shaped strips or runners not more than 6 inches apart and running lengthwise of the chute must be fastened to the upper surface of the bottom part by means of glue and wooden pegs extending through the bottom part and runners. Chutes must be occasionally wiped down with waste moistened with machine oil when dynamite packages are being handled. A stuffed mattress 4 feet wide by 6 feet long and not less than 4 inches thick, or a heavy jute or hemp mat of like dimensions, must be placed under the discharging end of the chute. The incline of the chute should be such that the velocity of the packages sliding will not be great enough to cause violent shock when coming in contact with other packages or when reaching the bottom of slide, or men must be stationed alongside the chutes to retard the velocity of the packages and prevent violent shocks when packages come in contact with each other or reach bottom of chute.

11. Broken or seriously damaged packages of explosives may be recoopered when it is practicable and not dangerous. A broken box of dynamite that can not be recoopered should be reinforced by stout wrapping paper and twine,

placed in another strong box, and surrounded by dry, fine sawdust, or dry and clean cotton waste, or elastic wads made from dry newspaper. A ruptured can or keg should be inclosed in a grain bag of good quality and boxed or crated. Injured packages thus protected and properly marked may be forwarded. Packages too seriously damaged to be recoopered should not be forwarded, but set aside and the shipper notified to make disposition of them. In removing broken cases or kegs of explosives from vessels, care must be taken to remove any particles of loose explosives.

12. The transportation of high explosives by water and the transfer of explosives to and from water craft in Hampton Roads and the harbors of Norfolk and Newport News shall be made under the direct supervision of such special inspectors as may be assigned for the purpose by the Captain of the Port, but this is not to be construed as charging the Captain of the Port with any responsibility in connection with the navigation of such water craft. Owners or agents of water craft, transferring or carrying such cargoes will be required to provide subsistence, when crews are subsisted on board, and, when necessary, suitable sleeping accommodation for special inspectors and for guards placed on board by the Captain of the Port, and for such period as he may specify. When crews are not subsisted on board, subsistence for inspectors and guards will not be required, but every opportunity will be afforded to them to use such cooking facilities as are provided for the crews.

13. In any case of violation of the regulations in regard to the handling of explosives, the Captain of the Port is empowered to remove any vessel, or any man or men from the waters to which these regulations pertain or to stop the loading or unloading of explosives in said waters.

14. Nothing in the foregoing shall be construed as relieving the master of any vessel carrying explosives from the responsibility of making frequent inspections, both by day and night, to see that these rules are complied with.

PORT OF PHILADELPHIA

(For established anchorages see p. 75)

1. It shall be the duty of the master of every ship or vessel, within 36 hours next after the arrival of any ship or vessel at the Port of Philadelphia, to make a report to the Board of Commissioners of Navigation of the name of such ship or vessel, her draft of water, and where any such ship or vessel shall be outward bound, the master of such ship or vessel shall make known to the said Board of Commissioners of Navigation her name and her draft of water at that time; and it shall be the duty of the President of the said Board of Commissioners of Navigation to have entered every such ship or vessel in a book, to be kept by them for that purpose, without fee or reward; and if the master of any ship or vessel shall fail to make such report he shall forfeit and pay the sum of $10.

2. It shall be unlawful for any vessel to anchor on the range line of any range lights established by the United States Lighthouse Board 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 $50, one-half the fine in such case to be paid to the informer and one-half to the State.

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

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

4. All vessels at anchor in the Port of Philadelphia shall keep their sails furled during the night and regulation riding lights exhibited.

5. Vessels anchoring in the stream and expecting to remain more than five running days will be required to report to the Commissioners of Navigation for anchorage berth and will have to moor if directed.

6. Permits may be granted by the Commissioners of Navigation to wrecking plants to anchor outside the anchorage limits of the Port of Philadelphia for the purpose of recovering sunken property, subject to supervision. Such plants must comply with the navigation laws in regard to lights, signals, etc., and must, if directed, move in ample time to give safe and clear passage to arriving and departing vessels.

7. If the Commissioners of Navigation direct the removal of any vessel which lies in the Harbor of the Port of Philadelphia, and the vessel is not promptly moved as directed, they 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 Commissioners of Navigation may recover the amount in an action of contract.

8. A vessel under 150 feet register length, when at anchor between sunset and sunrise, shall carry forward where it can best be seen, but at a height not exceeding 20 feet above the hull, a white light in a lantern constructed so as to show a clear, uniform and unbroken light, visible all around the horizon, at a distance of at least 1 mile.

9. A vessel of 150 feet or upward in register length, when at anchor between sunset and sunrise shall carry in the forward part of the vessel, at height of not less than 20 and not exceeding 40 feet above the hull, one such light, and at or near the stern of the vessel, and at such a height that it shall not be less than 15 feet lower than the forward light, another such light.

10. Vessels of more than 300 gross tons propelled by machinery, when moored or anchored in a fairway or channel where traffic is liable to congestion or confusion, shall display between sunrise and sunset on the forward part of the vessel where it can best be observed from other vessels one black ball or shape not less than 2 feet in diameter.

11. Dredges which are held in stationary position by moorings or spuds shall display by day two red balls not less than 2 feet in diameter and carried in a vertical line not less than 3 feet nor more than 6 feet apart, and at least 15 feet above the deck house and in such a position where they can best be seen from all directions. By night they shall display a white light at each corner, not less than 6 feet above the deck, and in addition thereto there shall be displayed in a position where they may best be seen from all directions two red lights carried in a vertical line not less than 3 feet nor more than 6 feet apart, and not less than 15 feet above the deck. Day and night markings to be displayed on the side on which vessels may pass with safety. When scows are moored alongside a dredge in the foregoing situation they shall display a white light on each outboard corner, not less than 6 feet above the deck.

12. Should any of the prescribed anchorages in the Port of Philadelphia become congested, vessels may be required to moor and, if necessary, to make fast alongside of other vessels already anchored.

13. Vessels hauled into any wharf or dock, or alongside of other vessels lying at any wharf or dock, must be made fast to the shore with proper lines, with sufficient fenders between them and the inside vessel, and shall, when so ordered by the Commissioners of Navigation, have their jib booms, booms, yards, davits, and bumpkins, if any, rigged in, their lower yards topped, and anchors either a cockbill or at the hawse pipe, as most convenient.

14. When fasts of vessels extend across a dock so as to obstruct passing vessels, the captain or person in charge shall, when so ordered by the Commissioners of Navigation, cause the fasts to be slackened or cast off. Such fasts or lines shall be marked at night by a red light in the center thereof.

15. 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.

16. 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.

17. No dock shall be unnecessarily obstructed by a vessel so as to prevent the loading or unloading of cargo by another vessel.

18. 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 Commissioners of Navigation, 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 the dock.

19. All seagoing vessels at anchor, or 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 vessel.

20. 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,

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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 the 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.

21. 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 Board.

22. Tows of seagoing barges must be bunched above the mouth of the Schuylkill River. (Regulation—U. S. Department of Commerce, December 21, 1928.)

23. 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 enchroachment on the river. Such vessels shall display by night a white light on the extreme outshore end or side.

24. 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.

25. 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.

26. The signal for the Commissioners of Navigation'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.

SPEED REGULATIONS

(FOR VESSELS NAVIGATING THE DELAWARE RIVER BETWEEN BRISTOL AND MARCUS HOOK)

1. Vessels shall not be worked or navigated in the Delaware River between the Point House Wharf and Pier G, Port Richmond, at a greater rate of speed than 8 nautical miles an hour, and such vessels shall navigate as far as is practicable from the pierhead line.

2. Vessels shall not be worked or navigated in the Delaware River in front of the Navy Yard, between red lighted bell buoy 44, off mouth of Schuylkill River, and red buoy 46, off Eagle Point, at a greater rate of speed than 12 nautical miles an hour.

3. Vessels passing craft anchored in the stream between Marcus Hook and Bristol, loading, discharging, or bunkering shall not navigate at a greater rate of speed than 8 nautical miles an hour.

4. Vessels shall not be worked or navigated in the Delaware River off Chester or Marcus Hook at a greater rate of speed than 12 nautical miles an hour.

5. When vessels are moored to the ends of piers at Marcus Hook, lying parallel with the river, passing vessels shall not exceed a speed of 8 nautical miles an hour.

Penalty.—Every master, officer, or other person or persons having charge of any vessel navigating the Delaware River and its navigable tributaries, who shall violate any rule regulating the speed of vessels, made and promulgated by the said Commissioners, he or they so offending, shall forfeit and pay a sum not exceeding $50 for the first offense and not less than $75 nor more than $100 for each subsequent offense, to be sued for and recovered with costs of suit, by the President of said Commissioners, for the use of the Commonwealth, before any magistrate of the city of Philadelphia or justice of the peace of the proper county.

REGULATIONS GOVERNING TWIN-SCREW VESSELS

From and after the passage of this regulation 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.

YACHT CLUBS

Alpha Boat Club, Foot of Welsh Street, Chester, Pa.
Anchor Yacht Club, Bristol, Pa.
Annapolis Roads Yacht Club, Annapolis, Md.
Arundel Boat Club, Hanover Street, Bridge Road, Baltimore, Md.
Atlantic City Yacht Club, head of New Hampshire Avenue, Atlantic City, N. J.
Barnegat Bay Motor Boat Club, Barnegat Bay, N. J.
Bay Head Yacht Club, Bayhead, N. J.
Bay Yacht Club, Atlantic Highlands, N. J.
Beachhaven Yacht Club, Beachhaven, N. J.
Bridesburg Yacht Club, Bridesburg, Philadelphia, Pa.
Brielle Yacht Club, Ocean Avenue, Brielle, N. J.
Cambridge Yacht Club, Inc., Cambridge, Md.
Cape May Yacht Club, Schellingers Landing, Cape May, N. J.
Capital Yacht Club, foot of 11th Street, S. W., Washington, D. C.
Chelsea Yacht Club, Atlantic City, N. J.
Chesapeake Bay Yacht Club, Easton, Md.
Chesapeake Cruising Club, Chesapeake City, Md.
Chester River Yacht & Country Club, Chestertown, Md.
Cohansey Yacht Club, Greenwich Piers, N. J.
Columbia Yacht Club, Garden Street, Bridesburg, Pa.
Columbia Yacht Club, H & Water Sts., Washington, D. C.
Corinthian Yacht Club of Baltimore, Balnew, Md. (Bull Creek).
Corinthian Yacht Club of Cape May, Yale Avenue, Cape May, N. J.
Corinthian Yacht Club of Philadelphia, Essington, Delaware County, Pa.
Corinthian Yacht Club of Washington, 2nd Street, Washington, D. C.
Delaware River Yacht Club, Torresdale, Pa.
Egg Harbor Yacht Club, Beachhaven, N. J.
Elk River Yacht Club, Oldfield Point, Elk River, Md.
Englewood Basin Yacht Club, Englewood, N. J.
Farragut Sportmen's Association, foot of Twenty-fifth Street, Camden, N. J.
Gibson Island Yacht Squadron, Gibson Island, Md.
Hampton Yacht Club, Hampton, Va.
Havre de Grace Yacht Club, Inc., Point Concord, Havre de Grace, Md.
Island Heights Yacht Club, Island Heights, N. J.
Keystone Yacht Club, Tacony, Philadelphia, Pa.
Lavallette Yacht Club, Lavallette, N. J.
Lewes Yacht Club, Lewes, Del.
Little Egg Harbor Yacht Club, Berkeley & West Aves., Beach Haven, N. J.
Longsport Yacht Club, Longsport, N. J.
Manasquan River Yacht Club, Brielle, N. J.
Mantoloking Yacht Club, Mantoloking, N. J.
Maryland Yacht Club, Broening Park, Baltimore, Md.
Miles River Yacht Club, St. Michaels, Md.
Mount Royal Yacht Club, Mount Royal, N. J. (Mantua River).
Norfolk Boat Club, foot of Freemason Street, Norfolk, Va.
Norfolk Country Club, Tanners Creek, Norfolk, Va.
North Hudson Yacht Club, Edgewater, N. J.
Ocean City Yacht Club, Bay and Battersea Roads, Ocean City, N. J.
Ocean City Motor Boat Club, Ocean City, N. J.
Ocean Gate Yacht Club, Ocean Gate, N. J.
Penn A. C. Yacht Club, Rittenhouse Square, Philadelphia, Pa.
Philadelphia Yacht Club, Essington, N. J.
Pine Beach Yacht Club, Toms River, N. J.
Players Boat Club (Inc.), Fairhaven, N. J.
Quaker City Yacht Club of Philadelphia, Princeton Ave. & Delaware River Philadelphia, Pa.
Rahway Yacht Club, Rahway, N. J.
Raritan Yacht Club, Perth Amboy, N. J.
Riverside Yacht Club, Essington, N. J.
Riverton Yacht Club, Riverton, N. J.
Roebling Yacht Club, Roebling, N. J.
Royal Swan Club, Sassafras River, Md.
Seaside Park Yacht Club, Seaside Park, N. J.
Tockwock Yacht Club, Fredericktown, Md.

Toms River Yacht Club, Toms River, N. J.
Townsend Inlet Motor Boat Club, Townsend Inlet, N. J.
Tred Avon Yacht Club, Oxford, Md.
Trenton Yacht Club, South Trenton, N. J.
Tri-State Yacht Club, Essington, Pa.
Virginia Yacht Club, Hampton, Va.
Westville Power Boat Association, Westville, N. J.
Windward Yacht Club, Toms River, N. J.
Wissinoming Yacht Club, Lardners Point, Philadelphia, Pa.
Yacht Club of Stone Harbor, Stone Harbor, N. J.
Yacht Club, South Amboy, N. J.
Yachtsmen's Club, Essington, Pa.

METEOROLOGICAL TABLES

Compiled by the United States Weather Bureau

NEW YORK, N. Y.

Month	Barometer at 32° F. and mean sea level: Mean: For month	Barometer: Extremes: Highest	Barometer: Extremes: Lowest	Barometer: Extremes: Range	Air temperature, in °F.: Mean: For month	Air temperature: Mean: Mean maximum	Air temperature: Mean: Mean minimum	Air temperature: Mean: Range	Air temperature: Extremes: Highest	Air temperature: Extremes: Lowest	Air temperature: Extremes: Range	Average relative humidity	Average amount of clouds 0-10	Precipitation (inches): Average fall	Precipitation: Number of days 0.01 inch or more	Precipitation: Maximum fall in 24 hours	Wind: Statute miles: Average hourly velocity	Wind: Statute miles: Highest velocity	Wind: Percentage of time: North	Wind: Percentage of time: Northeast	Wind: Percentage of time: East	Wind: Percentage of time: Southeast	Wind: Percentage of time: South	Wind: Percentage of time: Southwest	Wind: Percentage of time: West	Wind: Percentage of time: Northwest	Wind: Percentage of time: Calm	Number of days with winds of 33 miles or over	Number of days dense fog
January	30.10	31.01	28.61	2.40	30.9	37.8	24.1	13.7	68	−6	74	67	6	3.66	12	2.48	17	66	11	7	7	3	6	14	20	32	0	12	3
February	30.08	31.00	28.70	2.30	31.3	38.2	24.0	14.2	73	−14	87	66	6	3.82	10	3.25	17	73	14	9	10	4	8	12	13	30	0	9	2
March	30.00	30.96	28.38	2.57	37.7	45.9	31.1	14.8	80	3	77	63	6	3.64	12	3.60	18	70	12	8	10	5	11	11	11	32	0	12	2
April	30.00	30.71	29.03	1.68	49.4	56.9	41.0	15.9	91	12	59	62	6	3.23	11	3.72	17	65	11	8	9	7	13	13	14	25	0	12	1
May	29.99	30.57	29.02	1.55	60.6	68.2	51.7	16.5	95	34	61	63	6	3.24	11	4.17	14	69	11	7	11	8	18	14	13	18	0	7	2
June	29.98	30.56	29.34	1.22	68.8	77.0	61.0	16.0	97	44	53	66	6	3.33	11	3.88	14	67	11	6	8	9	19	16	11	19	0	5	1
July	29.98	30.51	29.35	1.16	73.8	81.8	66.6	15.2	100	54	46	68	6	4.24	12	3.80	13	68	12	7	7	7	22	18	12	15	0	4	1
August	30.00	30.45	29.28	1.16	73.1	79.6	65.5	14.1	102	51	51	70	6	4.33	10	5.05	12	59	13	11	9	7	19	18	10	13	0	2	0
September	30.08	30.61	29.19	1.42	66.8	73.9	59.6	14.3	100	39	61	70	5	3.39	9	6.17	13	65	14	11	11	9	16	15	10	14	0	3	1
October	30.06	30.72	29.06	1.60	56.3	63.2	48.8	14.4	88	29	59	67	5	3.53	9	9.40	15	65	14	9	5	5	12	15	14	26	0	7	2
November	30.09	30.82	28.70	2.10	44.2	51.2	37.9	13.3	74	7	67	68	6	2.96	9	3.62	16	61	7	7	8	4	11	19	18	26	0	9	2
December	30.09	30.93	28.96	1.97	35.0	41.0	28.3	12.7	68	−13	81	68	6	3.62	11	2.93	17	69	11	8	7	4	6	13	19	32	0	12	3
Mean	30.04	----	----	----	52.3	59.6	45.0	14.6	----	----	----	66	6	----	----	----	15	----	12	8	8	6	14	15	14	23	0	----	----
Total	----	----	----	----	----	----	----	----	----	----	----	----	----	42.99	127	----	----	----	----	----	----	----	----	----	----	----	----	94	20

Wind velocity data reduced to true values.

METEOROLOGICAL TABLES—Continued

Compiled by the United States Weather Bureau—Continued

ATLANTIC CITY, N. J.

Month	Barometer at 32° F. and mean sea level: Mean: For month	Barometer: Extremes: Highest	Barometer: Extremes: Lowest	Barometer: Extremes: Range	Air temperature, in °F.: Mean: For month	Air temperature: Mean: Mean maximum	Air temperature: Mean: Mean minimum	Air temperature: Mean: Range	Air temperature: Extremes: Highest	Air temperature: Extremes: Lowest	Air temperature: Extremes: Range	Average relative humidity	Average amount of clouds 0-10	Precipitation (inches): Average fall	Precipitation: Number of days 0.01 inch or more	Precipitation: Maximum fall in 24 hours	Wind: Statute miles: Average hourly velocity	Wind: Statute miles: Highest velocity	Wind: Percentage of time: North	Wind: Percentage of time: Northeast	Wind: Percentage of time: East	Wind: Percentage of time: Southeast	Wind: Percentage of time: South	Wind: Percentage of time: Southwest	Wind: Percentage of time: West	Wind: Percentage of time: Northwest	Wind: Percentage of time: Calm	Number of days with winds of 58 miles or over	Number of days dense fog
January	30.11	30.98	28.80	2.18	32.5	40.2	26.3	13.9	68	-4	72	75	6	3.49	12	2.98	12	68	10	8	5	5	9	16	21	26	0	10	2
February	30.11	30.97	28.79	2.18	33.6	40.0	26.4	13.6	77	-9	86	75	5	3.36	11	2.66	12	80	10	11	6	9	10	13	17	24	0	8	2
March	30.02	30.93	28.76	2.17	38.6	46.0	32.7	13.3	79	8	71	74	5	3.60	12	2.63	13	71	7	10	6	8	16	16	15	22	0	10	2
April	30.00	30.68	29.14	1.54	47.8	54.7	41.2	13.5	86	15	71	72	5	2.99	11	3.15	12	78	7	13	7	8	18	15	14	12	0	10	1
May	29.98	30.58	29.08	1.50	58.1	64.5	51.5	13.0	95	33	62	76	5	3.05	11	3.06	11	50	5	11	8	12	21	18	12	19	0	4	2
June	29.98	30.51	29.40	1.11	66.6	73.3	60.7	12.6	97	45	52	78	5	3.04	10	3.01	10	53	4	10	8	10	23	22	16	15	0	3	2
July	29.98	30.50	29.55	0.95	72.1	78.4	66.4	12.0	102	52	50	79	5	3.93	10	5.41	10	48	6	11	9	9	25	22	8	10	0	3	1
August	30.00	30.45	29.30	1.15	72.5	77.9	66.5	11.4	104	48	56	78	5	4.49	10	8.97	9	63	7	13	10	9	21	19	9	11	1	3	1
September	30.07	30.60	29.19	1.41	66.8	73.3	61.2	12.1	94	37	57	76	5	2.65	8	4.64	10	72	9	14	11	11	21	13	9	11	1	3	1
October	30.07	30.51	29.06	1.75	56.9	63.6	49.9	13.7	90	29	61	73	4	3.20	9	9.21	11	66	10	9	6	7	15	14	17	21	1	6	1
November	30.10	30.84	28.74	2.10	45.6	52.6	38.8	13.8	77	10	67	73	5	2.82	9	3.70	12	72	12	7	4	5	4	14	26	28	0	6	1
December	30.10	30.90	28.97	1.93	36.4	43.3	29.6	13.7	68	7	61	75	6	3.94	10	3.52	12	60	11	7	4	5	8	13	25	27	0	7	2
Mean	30.04				52.3	59.0	45.9	13.1				75	5				11		8	11	7	8	17	16	15	18	0		
Total														40.56	123												0	73	18

Wind velocity data reduced to true value. (Elevation of anemometer changed from 48 feet to 172 feet Dec. 17, 1921.)

PHILADELPHIA PA.

Month	Barometer at 32° F. and mean sea level: Mean: For month	Barometer: Extremes: Highest	Barometer: Extremes: Lowest	Barometer: Extremes: Range	Air temperature, in °F.: Mean: For month	Air temperature: Mean: Mean maximum	Air temperature: Mean: Mean minimum	Air temperature: Mean: Range	Air temperature: Extremes: Highest	Air temperature: Extremes: Lowest	Air temperature: Extremes: Range	Average relative humidity	Average amount of clouds 0–10	Precipitation (inches): Average fall	Precipitation: Number of days 0.01 inch or more	Precipitation: Maximum fall in 24 hours	Wind: Statute miles: Average hourly velocity	Wind: Statute miles: Highest velocity	Wind: Percentage of time: North	Wind: Percentage of time: Northeast	Wind: Percentage of time: East	Wind: Percentage of time: Southeast	Wind: Percentage of time: South	Wind: Percentage of time: Southwest	Wind: Percentage of time: West	Wind: Percentage of time: Northwest	Wind: Percentage of time: Calm	Number of days with winds of 58 miles or over	Number of days dense fog
January	30.11	30.97	28.67	2.30	32.6	39.9	26.2	13.7	73	−5	75	70	6	3.30	12	3.33	11	47	17	12	5	2	7	21	11	25	0	2	1
February	30.10	30.99	29.01	1.98	33.9	40.9	26.6	14.3	79	−11	90	69	6	3.32	11	3.86	11	44	17	12	9	4	8	16	9	25	0	2	1
March	30.02	30.92	28.80	2.12	40.8	49.4	33.5	15.9	86	5	81	67	6	3.39	12	2.79	12	47	17	9	8	3	14	16	10	22	0	3	1
April	30.01	30.69	28.19	1.50	52.1	60.7	43.1	17.6	93	14	79	64	6	3.05	11	2.77	11	47	16	11	9	5	11	19	11	18	0	3	(1)
May	29.99	30.56	28.23	1.33	62.9	72.0	53.7	18.3	96	35	61	64	6	3.26	11	3.16	10	68	16	9	11	4	12	22	11	15	0	2	(1)
June	29.98	30.54	29.38	1.16	71.4	80.4	62.8	17.6	102	46	56	66	6	3.24	10	3.43	10	48	13	7	10	6	13	24	12	15	0	(1)	(1)
July	29.98	30.51	29.43	1.08	76.2	84.7	68.2	16.5	103	54	49	66	6	4.15	11	3.18	9	49	13	9	11	5	16	25	10	11	0	1	(1)
August	30.00	30.45	29.34	1.11	74.8	82.2	66.5	15.7	106	57	55	68	6	4.62	11	5.89	9	43	15	11	10	4	15	26	8	11	0	(1)	(1)
September	30.08	30.61	29.32	1.20	68.0	76.4	60.5	15.9	102	40	62	69	5	3.14	9	5.62	9	45	15	13	12	7	15	21	8	9	0	1	1
October	30.07	30.68	29.03	1.63	57.8	65.3	49.5	15.8	91	29	62	66	5	2.81	9	3.70	10	58	18	10	7	4	10	23	10	18	0	2	1
November	30.10	30.84	29.88	.96	45.7	52.9	39.1	13.8	77	8	69	68	6	2.70	9	2.59	10	47	12	11	7	3	9	26	11	21	0	2	1
December	30.11	30.93	29.03	1.90	36.3	42.7	29.8	12.9	70	−5	75	69	6	3.43	10	3.78	11	49	15	12	6	3	8	17	13	26	0	2	1
Mean	30.05				54.4	62.3	46.6	15.7				67	6				10		15	11	9	4	11	22	10	18	0		
Total														40.41	126													20	8

[1] Less than 1.

Wind velocity data reduced to true values.

METEOROLOGICAL TABLES—Continued

Compiled by the United States Weather Bureau—Continued

BALTIMORE, MD.

Month	Barometer at 32° F. and mean sea level: Mean: For month	Barometer: Extremes: Highest	Barometer: Extremes: Lowest	Barometer: Extremes: Range	Air temperature, in °F.: Mean: For month	Air temperature: Mean: Mean maximum	Air temperature: Mean: Mean minimum	Air temperature: Mean: Range	Air temperature: Extremes: Highest	Air temperature: Extremes: Lowest	Air temperature: Extremes: Range	Average relative humidity	Average amount of clouds 0-10	Precipitation (inches): Average fall	Precipitation: Number of days 0.01 inch or more	Precipitation: Maximum fall in 24 hours	Wind: Statute miles: Average hourly velocity	Wind: Statute miles: Highest velocity	Wind: Percentage of time: North	Wind: Percentage of time: Northeast	Wind: Percentage of time: East	Wind: Percentage of time: Southeast	Wind: Percentage of time: South	Wind: Percentage of time: Southwest	Wind: Percentage of time: West	Wind: Percentage of time: Northwest	Wind: Percentage of time: Calm	Number of days with winds of 33 miles or over	Number of days dense fog
January	30.12	31.02	28.80	2.22	33.8	41.7	27.8	13.9	79	−6	85	67	6	3.50	11	3.27	8	44	11	13	6	9	13	22	10	16	0	1	3
February	30.11	30.94	28.96	1.98	35.4	42.6	28.2	14.4	83	−7	90	65	6	3.39	10	3.48	8	44	13	14	6	11	11	20	8	17	0	1	2
March	30.03	30.92	28.94	1.98	42.3	51.0	35.0	16.0	88	5	83	62	6	3.71	12	3.51	9	50	11	9	5	12	13	21	10	19	0	1	2
April	30.01	30.75	29.07	1.68	53.6	62.1	44.7	17.4	94	15	79	59	5	3.34	11	3.69	8	47	10	14	7	12	13	20	8	16	0	1	1
May	29.99	30.56	29.00	1.56	64.4	73.2	55.3	17.9	98	34	64	60	5	3.54	11	2.99	8	40	12	10	6	12	16	23	7	12	0	(1)	(1)
June	29.99	30.50	29.38	1.12	72.7	81.7	64.3	17.4	105	46	59	62	5	3.88	11	4.47	7	41	11	9	6	12	19	24	7	12	0	(1)	(1)
July	29.98	30.38	29.58	0.80	77.2	86.1	69.3	16.8	104	54	50	63	5	4.64	11	4.02	7	54	12	9	6	11	21	24	5	12	0	1	(1)
August	30.01	30.47	29.44	1.03	75.5	83.4	67.2	16.2	105	51	54	66	5	4.37	11	7.62	7	50	17	13	7	11	18	19	4	11	0	(1)	(1)
September	30.08	30.62	29.27	1.35	68.5	77.4	61.1	16.3	101	39	62	67	5	3.37	8	6.07	7	44	18	14	7	14	18	16	4	9	0	(1)	1
October	30.08	30.84	29.11	1.73	58.2	66.4	49.5	16.9	92	30	62	65	5	2.89	8	5.30	7	45	20	11	5	9	13	19	5	17	1	(1)	1
November	30.11	30.84	28.99	1.85	46.3	54.0	39.2	14.8	82	12	70	66	5	2.56	9	3.34	8	44	11	12	5	8	15	27	7	15	0	1	2
December	30.13	30.92	28.74	2.18	37.2	44.0	30.7	13.3	73	−3	76	67	6	3.37	11	3.16	8	43	12	12	5	7	12	26	8	18	0	1	3
Mean	30.05				55.4	63.6	47.7	15.9				64	5				8		13	11	6	10	15	21	7	14	0		
Total														42.56	124													7	15

[1] Less than 1.

Wind velocity data reduced to true value.

NORFOLK, VA.

Month	Barometer at 32° F. and mean sea level: Mean: For month	Barometer: Extremes: Highest	Barometer: Extremes: Lowest	Barometer: Extremes: Range	Air temperature, in ° F.: Mean: For month	Air temperature: Mean: Mean maximum	Air temperature: Mean: Mean minimum	Air temperature: Mean: Range	Air temperature: Extremes: Highest	Air temperature: Extremes: Lowest	Air temperature: Extremes: Range	Average relative humidity	Average amount of clouds 0-10	Precipitation (inches): Average fall	Precipitation: Number of days 0.01 inch or more	Precipitation: Maximum fall in 24 hours	Wind: Statute miles: Average hourly velocity	Wind: Statute miles: Highest velocity	Wind: Percentage of time: North	Wind: Percentage of time: Northeast	Wind: Percentage of time: East	Wind: Percentage of time: Southeast	Wind: Percentage of time: South	Wind: Percentage of time: Southwest	Wind: Percentage of time: West	Wind: Percentage of time: Northwest	Wind: Percentage of time: Calm	Number of days with winds of 33 miles or over	Number of days dense fog
January	30.13	30.95	28.88	2.07	40.6	49.4	33.8	15.6	80	5	75	71	6	3.10	11	2.22	13	52	16	18	6	5	14	15	14	12	0	2	2
February	30.11	30.83	29.04	1.79	42.7	50.4	34.1	16.3	81	2	79	69	5	3.22	11	3.45	13	49	14	18	6	9	15	13	12	13	0	1	2
March	30.03	30.91	28.84	2.07	48.2	57.3	39.9	17.4	92	14	78	67	5	3.77	11	2.78	14	57	12	16	7	9	19	14	11	12	0	2	1
April	30.01	30.71	29.02	1.69	56.8	65.9	47.9	18.0	95	23	72	65	5	3.23	10	5.19	13	52	10	18	9	10	19	15	9	10	0	1	(1)
May	30.00	30.58	29.23	1.35	66.2	75.2	57.5	17.7	98	38	60	67	5	3.81	11	3.78	12	57	8	18	11	12	19	16	10	6	0	1	1
June	30.00	30.46	29.39	1.07	74.4	83.0	65.9	17.1	102	49	53	69	5	4.22	11	5.97	11	59	6	14	10	11	24	19	9	7	0	1	1
July	30.00	30.38	29.61	.77	78.7	86.7	70.4	16.3	102	57	45	72	5	5.75	12	3.60	11	51	6	12	8	11	28	21	8	6	0	1	(1)
August	30.00	30.41	29.37	1.04	77.4	84.7	69.9	14.8	105	56	49	73	5	5.22	12	6.64	10	63	7	19	12	8	22	17	9	6	0	(1)	(1)
September	30.06	30.56	29.35	1.21	71.6	79.5	65.4	14.1	100	40	60	73	5	3.23	8	4.23	11	56	9	24	13	10	20	12	6	6	0	(1)	1
October	30.07	30.60	29.35	1.25	62.5	69.5	54.6	14.9	91	31	60	70	4	3.04	8	6.29	12	47	15	20	9	8	16	13	10	9	0	1	2
November	30.11	30.72	29.15	1.57	51.4	59.4	44.2	15.2	82	17	65	69	4	2.16	8	5.48	12	46	19	17	6	6	16	14	11	11	0	(1)	2
December	30.13	30.83	29.26	1.57	43.1	50.9	36.1	14.8	76	5	71	71	5	3.34	10	2.52	13	57	17	18	5	5	14	15	14	12	0	1	2
Mean	30.05	----	----	----	59.5	67.6	51.6	16.0	----	----	----	70	5	----	----	----	12	----	12	18	8	9	19	15	10	9	0	----	----
Total	----	----	----	----	----	----	----	----	----	----	----	----	----	44.09	123	----	----	----	----	----	----	----	----	----	----	----	----	11	14

[1] Less than 1.

Wind-velocity data reduced to true value

METEOROLOGICAL TABLES—Continued

Compiled by the United States Weather Bureau—Continued

RICHMOND, VA.

Month	Barometer at 32° F. and mean sea level: Mean: For month	Barometer: Extremes: Highest	Barometer: Extremes: Lowest	Barometer: Extremes: Range	Air temperature, in °F.: Mean: For month	Air temperature: Mean: Mean maximum	Air temperature: Mean: Mean minimum	Air temperature: Mean: Range	Air temperature: Extremes: Highest	Air temperature: Extremes: Lowest	Air temperature: Extremes: Range	Average relative humidity	Average amount of clouds 0-10	Precipitation (inches): Average fall	Precipitation: Number of days 0.01 inch or more	Precipitation: Maximum fall in 24 hours	Wind: Statute miles: Average hourly velocity	Wind: Statute miles: Highest velocity	Wind: Percentage of time: North	Wind: Percentage of time: Northeast	Wind: Percentage of time: East	Wind: Percentage of time: Southeast	Wind: Percentage of time: South	Wind: Percentage of time: Southwest	Wind: Percentage of time: West	Wind: Percentage of time: Northwest	Wind: Percentage of time: Calm	Number of days with winds of 58 miles or over	Number of days dense fog.
January	30.14	31.00	28.87	2.13	37.9	48.1	30.1	18.0	78	−1	79	71	6	3.21	10	2.66	8	48	8	20	6	6	11	24	11	14	0	(1)	2
February	30.11	30.89	29.00	1.89	39.6	48.5	29.8	18.7	82	−3	85	68	5	3.17	10	3.30	8	48	8	19	6	9	11	22	11	14	0	1	1
March	30.04	30.90	28.96	1.94	47.2	58.2	37.7	20.5	94	14	80	65	5	3.68	11	3.59	9	43	7	16	6	8	10	24	11	18	0	2	1
April	30.02	30.73	29.16	1.57	56.6	67.1	45.6	21.5	96	19	77	63	5	3.49	10	5.33	9	41	7	20	8	9	10	23	10	13	0	(1)	0
May	29.99	30.58	29.15	1.43	66.5	76.8	55.4	21.4	96	35	61	64	5	3.79	12	2.39	7	46	6	19	7	12	9	28	10	9	0	(1)	0
June	30.01	30.47	29.40	1.07	74.1	83.6	63.8	19.8	100	45	55	67	5	3.90	11	3.26	6	47	6	16	7	12	11	32	9	7	0	(1)	0
July	30.01	30.39	29.63	0.77	78.5	87.7	68.4	19.3	103	52	51	69	5	4.73	11	7.26	6	36	6	15	8	12	11	31	10	7	0	(1)	0
August	30.01	30.45	29.49	0.96	76.5	85.5	67.0	18.5	107	49	58	71	5	4.42	11	5.71	6	43	7	20	11	10	10	28	8	6	0	(1)	1
September	30.07	30.88	29.44	1.14	70.5	80.6	61.3	19.3	101	41	60	72	5	3.25	11	6.68	6	36	6	25	10	12	9	25	6	6	1	(1)	1
October	30.08	30.59	29.30	1.29	59.6	70.3	49.3	21.0	94	28	66	68	5	2.88	7	4.81	7	41	10	22	9	8	8	21	10	12	0	(1)	3
November	30.12	30.73	29.12	1.61	48.3	58.7	38.9	19.8	82	14	68	67	4	2.21	7	2.77	7	37	8	22	6	6	8	20	10	14	0	(1)	2
December	30.14	30.88	29.27	1.61	39.8	48.5	31.2	17.3	77	−2	79	71	6	3.29	10	2.52	7	42	8	20	6	6	8	26	13	13	0	(1)	2
Mean	30.06				57.9	67.8	48.2	19.6				68	5				7		7	19	7	9	9	25	10	11	0	(1)	
Total														42.02	124													4	13

[1] Less than 1.

Wind velocity data reduced to true value.

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