

* of Harbor Canal and along the southeast side of No. 1 Basin. The largest has a lifting capacity of 14 tons. There is about 365,000 square feet of covered storage space.

PROVISIONS.—Fresh and canned provisions are obtainable by vessels anchored in the roadstead. No water or bunkers are obtainable.

REPAIRS.—Repairs of a minor nature can be made. Marine railways for small vessels are available. Lloyds Agency has a representative in Tjirebon.

COMMUNICATIONS.—Tjirebon is a port of call for coastal and ocean-going vessels. The port is connected by railroad, telephone, and telegraph with the main systems of Java. Ships' radio messages are sent via Djakarta Radio. Communication between ship and shore is maintained by launch. A radio station is located in the town.

MEDICAL.—There are hospitals in Tjirebon. Means of disinfection are available. In an emergency, the harbor doctor will board ships. Dental treatment can be obtained in the town.

COASTAL FEATURES (CONTINUED)

2B-10 TANDJUNG BANGKADERES (6°45' S., 108°41' E.) formed by the deposits of several small rivers, is low. Gebang, a village surrounded by coconut trees, is located 4 miles southeastward of the cape. A little farther eastward and 2 miles inland, there is a sugar factory with a blue roof.

Tandjung Sanggarung, the northwest point, and Tandjung Losari, the northeast point, of the delta of the Kali Losari, which has 4 mouths, are formed by the deposits of that river. The land in the vicinity of the delta is low and wooded. Udjung Brebes is formed by the delta of the Kali Pemali.

ASPECT.—Gunung Tukung, Gunung Tapak, and Gunung Sirantjang (sec. 2B-2) are prominent.

DEPTHS.—Vessels passing along this coast

should keep outside the 10-fathom curve until Tegal light structure bears 159°. A 2¾ fathom shoal lies inside the 5-fathom curve in a position about 4 miles eastward of Udjung Brebes.

CAUTION.—The contour of the various points along this section of the coast are reported to be extending seaward and changing considerably.

ANCHORAGE, which offers fair shelter during either monsoon, can be taken in the bay entered between Udjung Brebes and Tandjung Losari. A fishing village stands at the head of the bay. Vessels can anchor under Tandjung Losari in 3 to 3½ fathoms.

TEGAL ROAD

2B-11 TEGAL ROAD (6°51' S., 109°12' E.).—This is an open roadstead that offers some protection during the west monsoon. The small harbor, enclosed by two breakwaters, is kept open by dredging, but is suitable only for small craft. Large vessels anchor in the roadstead and discharge into lighters.

LANDMARKS—SIGNALS.—The lights of the sugar refineries are visible from a great distance from May to October. A flagstaff, from which a blue flag is displayed when it is dangerous for small craft to enter, is located westward of the harbor.

NAVIGATIONAL AIDS.—A light is shown from a red and white banded iron beacon, 26 feet high, standing on the northwest edge of Karang Djeruk.

A light is shown from the root of the inner west jetty. A light is shown from the head of the west jetty. A light is shown from the head of the east jetty.

A light is shown from a wooden mast located near the customs house.

ANCHORAGES.—Vessels can anchor in convenient depths with good holding ground. Vessels usually anchor with Tegal light structure bearing 192° during the west monsoon and 215° during the east monsoon. The anchorage

is unsafe. Small vessels usually anchor in 16 to 23 feet near the extension of the axis of the harbor.

TEGAL (6°51' S., 109°08' E.)

2B-12 FACILITIES.—TEGAL is a light-erage port subject to heavy silting and is the shipping center for the province of Tegal. The customs official is also the harbor master. Local produce is exported.

BERTHS.—There are no deep-water berths. The Inner Harbor, consisting of Old Harbor Channel, East Harbor Channel, First Inner Harbor, and Second Inner Harbor, is entered between two jetties, 160 feet apart. It is suitable only for small craft.

HARBOR CRAFT.—Harbor launches and towing launches are available.

CARGO INFORMATION.—Several lighters and a few tugs are available. There are covered and open storage areas. Loading and discharging of large ships is accomplished by lighters in the roadstead. Several hand cranes are available.

PROVISIONS.—Some fresh and canned provisions are obtainable.

REPAIRS.—Repairs of a minor nature can be made. Small slipways for fishing vessels are located at the northwest corner of First Inner Harbor and also at the southeast corner for launches and dredgers.

COMMUNICATIONS.—Tegal is a port of call for ocean and coastal shipping. It is connected by rail, telephone, and telegraph with the Java system.

MEDICAL.—There is a modern hospital and two smaller ones. Means of disinfection are available.

COASTAL FEATURES (CONTINUED)

2B-13 BETWEEN TEGAL AND TANDJUNG SARI, 14 miles eastward, the coast is thickly populated with the main road passing close to the shore. Several settlements, promi-

nent from the offing and surrounded by coconut trees, are scattered along the shore. Tandjung Sari, a rounded wooded area, serves as a landmark. A large, conspicuous house with a red roof is located close eastward of Tandjung Sari. A smaller house with red roofs is located $2\frac{3}{4}$ miles farther eastward. Between Tandjung Sari and Udjung Pemalang, the coast is low and wooded.

CAUTION.—Between Tandjung Sari and Udjung Pemalang, vessels should not approach the coast in less than 10 fathoms on account of fishing stakes and tree stumps remaining from old fishing nets.

PART C. UDJUNG PEMALANG TO TANDJUNG APIAPIANOM

2C-1 UDJUNG PEMALANG (6°48' S., 109°29' E.) is a promontory terminating in a low, wooded point, and is formed by the deposits of the Kali Tjomol. Udjung Tjomol, the northeast point of the promontory, is located about 3 miles eastward of Udjung Pemalang. The Kali Siragi flows out through two mouths between Udjung Pemalang and Pekalongan. The bank that fronts the cape has been reported as extending northward.

COAST—GENERAL

2C-2 BETWEEN UDJUNG PEMALANG AND PEKALONGAN, the coast is flat for some distance inland, but to the eastward the mountains approach the sea. Pekalongan and Semarang are the only shipping places of importance along this coast.

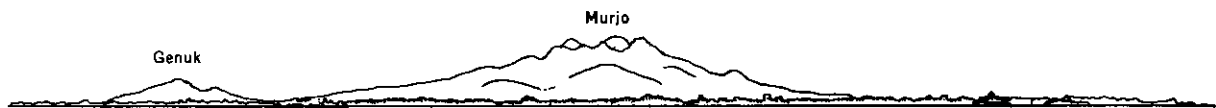
ASPECT.—Gunung Priksha, located near Tandjung Tjelong, is a rounded, well-wooded hill, 1,204 feet high. Tandjung Tjelong is high and covered with vegetation. A higher ridge of mountains lies farther inland. Gunung Langit, 5,325 feet high and located 25 miles south-southeastward of Udjung Pemalang, is more conspicuous from westward and appears as a sharp peak when seen from northwestward.

Gunung Ragajembangan, located $6\frac{1}{2}$ miles eastward of Gunung Langit, is 7,143 feet high and appears as a truncated cone from westward. It gradually assumes a more rounded shape as the vessel proceeds eastward. Gunung Prahū, $16\frac{1}{2}$ miles southward of Tandjung Tjelong, is the eastern summit of this ridge. It is 8,458 feet high and has the appearance of a vessel, bottom, up, lying in a northwest and south-east direction.

* Gunung Sundoro and Gunung Sumbing, to the southeastward of Gunung Prahū, are two conical mountains. The former is a truncated cone, with a flat upper surface, 10,288 feet high. The latter, 10,813 feet high, has a broken upper surface, with a conspicuous higher point on the west rim of the crater.

Gunung Ungaren and Gunung Merababu are located southward of Semarang. The former is 6,725 feet high and has a round undulating summit. The latter, which attains a height of 10,308 feet, is a volcano which has been inactive for centuries. It has a crater shaped like a horseshoe with the opening to the northwestward.

Gunung Merapi, 9,550 feet high and located a few miles southward of Gunung Merababu, is sometimes visible in the background. Gunung Lawu, 60 miles southeastward of Semarang, is a volcano with a broad crown rising very steeply to a height of 10,712 feet. It is often visible for a great distance over the lower mountains.



NORTH COAST OF JAVA, HIGHEST SUMMIT OF MURJO 21 MILES, 110°

Gunung Murjo, a number of rugged peaks, lies about 12 miles from the coast to the southward of Pulau Mondoliko. The highest and most prominent is Gunung Suturengo, 5,256 feet high. The peak is sharp on a southwest bearing, but appears as a truncated cone when bearing southeast. Gunung Rahtau, 4,977 feet high, is the southwest peak of the range.

Nearer the coast is Gunung Tjelering, a number of well-wooded and rugged peaks. Gunung Genuk, the summit, is 2,352 feet high.

DEPTHS—DANGERS

2C-3 The 10-fathom curve lies from $11\frac{1}{2}$ to $5\frac{1}{2}$ miles off the coast. Karang Bapang ($6^{\circ}34'$ S., $109^{\circ}50'$ E.), a small reef, is the outer danger off this stretch of coast. It is shaped like a pear with the broad part to the east and has a least depth of 11 feet. The sea over it is often discolored and during the west monsoon the sea is rough in its vicinity.

A shoal with a least depth of $1\frac{3}{4}$ fathoms is located $2\frac{1}{2}$ miles southwestward of Karang Bapang in position about 17 miles northward of Tandjung Gunung.

A wreck with masts showing lies sunk about $4\frac{1}{2}$ miles north-northwestward of Tandjung Tjelong.

Korowelang Rock, a small steep-to reef with a depth of 10 feet, is located about $2\frac{1}{2}$ miles northward of Tandjung Korowelang. A lighted BUOY, painted in black and white checkers, is moored off the northwest side of the rock. A 7-fathom patch lies about 1 mile west-northwestward of the rock.

OFF-LYING ISLANDS AND ADJACENT DANGERS

2C-4 KEPULAUAN KARIMUNDJAWA is described in Part 2D.

CURRENTS

2C-5 A current sometimes sets across Semarang Road. See section 2-4 for additional information on currents.

WINDS AND WEATHER

2C-6 PEKALONGAN has a cool, pleasant, and healthy climate. In the vicinity of Semarang Road the west monsoon limits the land wind to a large extent. The sea wind is then mostly from a northwesterly direction. During the west monsoon the wind blows either hard with rain or it is nearly calm with no mean periods. The finest weather often suddenly changes to stormy weather without warning. The stiffest and most lasting monsoon wind never blows more toward the south than in a west-southwesterly direction.

During the east monsoon the wind usually blows during the night and morning until 0900 in an east-southeasterly to southeasterly direction. It then diminishes and shifts with the sun up to 1200 to about north-northeast. Up to 1400 light and variable winds continue blowing, then the sea wind develops into a squall blowing from north to east causing surf and sea and keeps blowing in this manner until 1900 or 2000. The wind then veers back to east-southeast, becomes more steady and lasts until 2100. At sunrise it is very hazy. After about two hours of sunshine the air becomes clear, but the land in the interior is not generally visible. Towards evening the weather becomes hazier. During this season visibility is fairly clear for only about 2 hours of the day.

NAVIGATION

2C-7 Vessels bound for Surabaya from Djakarta pass well off this coast and about $7\frac{1}{2}$ miles northward of Pulau Mondoliko. (See section 2-2).

COASTAL FEATURES—PEKALONGAN ROAD

2C-8 BETWEEN UDJUNG PEMALANG AND PEKALONGAN the coast is low and flat.

PEKALONGAN ROAD ($6^{\circ}51'$ S., $109^{\circ}42'$ E.) is an open roadstead which offers little protection from either monsoon. The harbor is formed by the mouth of the Kali Pekalongan which flows out between two jetties. The entrance of the harbor has silted up and is obstructed by many wrecks. A dangerous wreck was reported (1962) to lie close eastward of the east jetty. It is impossible for ships of any draft to enter.

LANDMARKS—SIGNALS.—A group of tjemera trees, which stand about 110 yards southward of the light structure, serve as a good mark for ships approaching from the eastward. A flagstaff, from which a blue flag is displayed when it is dangerous for small craft to enter, stands on a white pyramid near the light structure.

NAVIGATIONAL AIDS.—A light is shown on the west side of the river, 64 yards inland from the head of the jetty. A light is shown from the head of each jetty.

ANCHORAGES.—The usual anchorage for light-draft vessels is in 16 to 23 feet, soft mud, about 1 mile from shore with the light structure bearing between 160° and 200° . Deep-draft vessels can anchor farther offshore in convenient depths.

PEKALONGAN ($6^{\circ}51'$ S., $109^{\circ}42'$ E.)

2C-9 FACILITIES. — PEKALONGAN, the capital of Pekalongan District, is located nearly 2 miles from the coast on both banks of the Kali Pekalongan. A bridge crosses the river near an old fort. A town square contains the residency, school, and church. There is a customs office in the town. A good road leads from the roadstead to the town.

BERTHS.—There are no deep-water berths. A quay with crane facilities is located about 2 miles upriver.

PROVISIONS.—Fresh provisions are obtainable.

REPAIRS of a minor nature can be made. A small shipyard is located on the west bank, just within the mouth of the river.

COMMUNICATIONS.—Coastal vessels call regularly. Pekalongan is connected by railroad, telephone, and telegraph with the Java system.

MEDICAL.—There is a harbor doctor and an infirmary. Means for disinfection are available.

COASTAL FEATURES

2C-10 BETWEEN PEKALONGAN AND TANDJUNG GUNUNG, the coast is low. The latter point is rocky and is backed by a broad low hill, on which are some tall trees up to 272 feet high. The Kali Sambong, which has a red-roofed house on the left bank, flows out about midway between Pekalongan and Tandjung Gunung. A small, but prominent, group of coconut trees stands on the right bank of this stream.

BETWEEN TANDJUNG GUNUNG AND TANDJUNG TJELONG, the coast is backed by densely wooded hills. The latter point is high and wooded. The coastal range of hills ends 4 miles eastward of Tandjung Tjelong, after which the coast is again low and flat as far as Tandjung Korowelang. The broad, but shallow, mouth of the Kali Kuta is located about 7 miles eastward of Tandjung Tjelong. A few high trees stand in this vicinity.

TANDJUNG KOROWELANG, formed by the deposits of the Kali Bodri which flows out through three mouths, is a low, bare, rounded point, 4 miles wide. The point is reported to be extending in an east and west direction. Rice fields are found in this vicinity. Two chimneys are located about 4 and 6½ miles south-southwestward of the point.

BETWEEN TANDJUNG KOROWELANG AND SEMARANG, the coast is mostly marshy. Between the former point and the Kali Kendal, 4 miles southeastward, there is a

coconut plantation. Eastward of the river mouth the coast is intersected by two small rivers which can be identified by the coconut trees in their vicinity.

SEMARANG ROAD

2C-11 SEMARANG is located at the mouth of the Kali Baru, the canalized eastern estuary of the Kali Semarang. It is a lighterage port, limited to use by small craft and lighters; large vessels anchor in Semarang Road. The mouth of the Kali Baru is enclosed between two jetties set about 500 feet apart. The east jetty has been extended about 400 yards. The west jetty has a 20-foot break in it. The west jetty is low and the east jetty covers at high water.

It was reported (1963) that Semarang is a good radar target at a distance of 28 miles.

LANDMARKS.—The lighthouse and the chimney of the Chandi Experimental Station are prominent. A long shed, having a red roof on which "Socony" is painted in white letters, is located southwestward of the lighthouse. A large tank, painted aluminum, is located close eastward of the range beacons. The tomb on Melaja Hill should not be confused with the prominent Chinese tomb more to the eastward.

TIDES are predominantly diurnal with a spring rise of 3 feet.

DEPTHS—DANGERS.—The 10-fathom curve lies about 6 or 7 miles offshore. The roadstead was reported (1961) to be silting up, but dredging operations were underway. During the west monsoon, shoals form off the head of the west jetty and less water than charted is often found in front of the entrance channel. The controlling depth into the harbor is 5 feet at low water.

An obstruction (an anchor with 15-fathoms of chain) lies about 1 2/5 miles north-northwestward of the head of the west jetty. An obstruction lies about 1 mile north-northwestward of the same head. A green conical BUOY is moored close eastward of the obstruction.

A 2½-fathom shoal lies close westward of the entrance range in position about 1¼ miles northward of the lighthouse.

Numerous FISH TRAPS, lighted and un-

lighted, are located within 1 mile to the eastward and $1\frac{1}{2}$ miles to the westward of the black and white checkered light buoy moored about $2\frac{1}{3}$ miles north-northwestward of the lighthouse.

NAVIGATIONAL AIDS.—A light is shown from a 12-sided white iron tower, 115 feet high, located on the west side of New Harbor.

A light is shown from the head of west jetty. A light is shown on the same jetty from a position about 700 yards southward of its head. A light is shown from the head of east jetty.

RANGE LIGHTS.—The front light of a range is shown from a mast standing about 75 yards eastward of the lighthouse. The rear light is shown from a mast standing 225 yards 181° from the front mast. Each mast has a white triangular daymark. The 181° range leads into the harbor.

A red can BUOY with a red cylindrical topmark is moored about $2\frac{1}{4}$ miles northeastward of the lighthouse.

A light BUOY, painted in black and white checkers, is moored about $2\frac{1}{3}$ miles north-northwestward of the lighthouse.

SIGNALS.—During the west monsoon communication with the harbor is frequently dangerous, in which case a blue flag is hoisted from the flagstaff near the lighthouse and also from the signal mast of the lookout station. When communication with the shore is suspended due to bad weather, vessels can make contact with the shore by radio via the Harbormaster.

ANCHORAGES.—The roadstead limits are shown on H.O. Chart 3007. This area has good holding ground, but it is exposed to winds between north-northeast and west. Strong winds quickly raise a sea. The anchorages are less safe during the west monsoon, when it is sometimes necessary to let go a second anchor.

Large vessels can anchor in 5 or 6 fathoms, mud, about 3 miles offshore. Small vessels can anchor in $2\frac{1}{4}$ to 4 fathoms about 1 mile off the outer end of the west jetty. It is recommended that vessels calling at Semarang during the west monsoon anchor westward of the entrance channel, but within the roadstead limits.

PILOTAGE is not compulsory for the road-

stead, but, upon request, the harbormaster will serve as pilot for small craft wishing to enter the harbor.

SEMARANG ($6^\circ 57' S., 110^\circ 25' E.$)

2C-12 FACILITIES.—SEMARANG, the capital of Central Java with a population of 412,000 (est. 1962), is the most important port between Tandjungpriok and Surabaya and is an important fishing center. Exports include copra, rubber, kapok, sugar, coffee, tobacco, hides, and timber.

BERTHS.—Numerous wharves for small coasters and small craft having a draft of less than 10 feet are available. Railroad sidings lead to the harbor areas.

A late 1960 report states the least depth alongside the wharves is $12\frac{1}{2}$ feet.

Dredging to a projected depth of about $16\frac{1}{2}$ feet at the head of the East Harbor Canal was reported in late 1962.

A new Y-head pier, for discharging coastal tankers is located near the yacht club. Vessels of 285-foot length and $8\frac{1}{2}$ -foot draft could be accommodated (late 1960). A depth of $8\frac{1}{2}$ feet at this pier was reported in 1961. The pierhead, about 30 feet long, is flanked by dolphins a little in front of the pierhead. The dolphins are connected by catwalk to the pierhead, thus forming a Y. Vessels lay against the dolphins and run their lines to mooring buoys off bow and stern.

TUGS.—Small tugs, towing launches, and launches are available.

CARGO INFORMATION.—Loading and unloading of large ships is by lighter at the roadstead. Fifty-four lighters of 50 to 80 tons capacity are available, but only about 30 are serviceable at any one time. Stationary and traveling cranes of up to 10-ton capacity are available in the harbor area. Open and covered storage facilities are available.

PROVISIONS.—A limited supply of fresh fruits and vegetables can be obtained.

FUEL.—Some coal is obtainable. Fuel oil, diesel oil, gasoline, and kerosene are obtainable in limited quantities. In 1961 it was reported bunkers were not available to vessels in the road.

WATER, obtainable only in an emergency, is supplied by a small water boat and a 40-ton lighter.

REPAIRS can be made to small craft. Machine repairs, including castings up to 1,000 pounds, can be made. Marine railways and drydocks are available for small craft. The largest drydock has a length of 143½ feet, a width of 28½ feet, and a depth over the sill at mean high water of 8 feet. A 130-ton gantry crane is available. Small ships can be built. An early 1961 report states that there are no facilities for hull and engine repairs.

COMMUNICATIONS.—Coastal and ocean-going vessels make regular calls at Semarang. The town has rail, telephone, and telegraph connections with all important ports in Java. An airfield is located 3½ miles westward of the town.

MEDICAL.—There are several hospitals and infirmaries in Semarang. Quarantine regulations are in force.

COASTAL FEATURES (CONTINUED)

2C-13 BETWEEN SEMARANG AND UDJUNG TELUKAWAR, the coast is low and is intersected by a number of small rivers. Small trees line the shore. The land within is flat for a considerable distance, so that in clear weather Gunung Lawu (sec. 2C-2) can be seen. Gunung Murjo and Gunung Genuk, described in the same section, are also prominent.

DEPTHS-DANGERS.—All dangers are contained within the 10-fathom curve which lies up to 5½ miles offshore. The coastal reef projects ½ mile from the coast in places. Close inshore the bottom is soft gray mud; blue mud
* and black sand are found farther out.

DJAPARA ROAD

2C-14 DJAPARA ROAD is entered between Udjung Telukawar and Udjung Njamplung. The former point is rocky and is bordered by a reef projecting from 200 to 800 yards offshore. Tandjung Kelor is fringed by

a reef extending up to 600 yards offshore. Udjung Njamplung is a low, flat spit of coral and sand, covered with brushwood and fringed by a reef to a distance of 400 to 600 yards.

ISLANDS AND DANGERS.—Pulau Penganten is a cluster of bare rocks of a gray color. They stand close together, are up to 5 feet high, and are surrounded by a reef.

Pulau Pandjang can be sighted at a distance of 10 miles. It stands out as a long, low strip of land, somewhat darker than the shore backing it.

ANCHORAGES.—Djapara Road provides good anchorage during the east monsoon, but is unsafe during the west monsoon.

Anchorage can be taken, during the east monsoon, in 3½ to 4½ fathoms, soft mud, with Udjung Telukawar in range with the west extremity of Tandjung Kelor. It is not advisable to anchor closer to the latter point because of the reef extending northward from it.

During the west monsoon there is probably some shelter from northwesterly seas close under the lee of Pulau Pandjang in 5 to 5½ fathoms.

DIRECTIONS.—The main entrance of the roadstead is between Pulau Pandjang and Udjung Njamplung. Vessels from southward can pass between the island and Tandjung Kelor. Such vessels can steer 018° with Udjung Njamplung ahead. When the north point of Pulau Pandjang bears 270°, vessels can steer for the anchorage.

DJAPARA is a shipping place of some importance and is the chief town of the district. There is a doctor at Djapara.

COASTAL FEATURES (CONTINUED)

2C-15 BETWEEN UDJUNG NJAMPLUNG AND TANDJUNG APIAPIANOM (6°25' S., 111°03' E.) the coast is rocky and irregular with sharp projecting points. The coast northeastward of Djapara is covered with dense forests, and rises rapidly to the mountains.

Tandjung Tumpuk is low, rocky, and wooded. Udjung Piring is a level point with low brush-

wood and a white sandy beach. Tandjung Djati is a rounded promontory. Tall trees stand close to the high sandy beach near the point.

Tandjung Tanah Merah, $4\frac{1}{2}$ miles eastward of Tandjung Djati, is a red promontory. It appears as prominent steep rock, covered with dark trees at its top. Tandjung Tular, located 6 miles eastward of Tanah Merah, is a spur of Gunung Tjelering. Tandjung Betong has a round hill, 167 feet high, on it. The hill is the site of an old fort. A hill, 213 feet high, stands between Tandjung Tular and Tandjung Betong. Both hills are prominent when viewed from westward.

BETWEEN TANDJUNG DJATI AND TANDJUNG BETONG there are fresh water brooks cut off from the sea in the dry season by a sandy beach. These increase to small mountain torrents during the rainy season. They break through the sand barrier and empty into the sea.

DEPTHS—DANGERS.—All dangers are contained within the 10-fathom curve which lies from $1\frac{1}{2}$ to $5\frac{1}{2}$ miles offshore. Reefs extend up to 600 yards off the projecting points.

A stranded wreck lies about 1 mile southward of Ujung Piring. Karang Ombo, a small shoal of $4\frac{3}{4}$ fathoms, lies close outside the 6-fathom curve in a position about $1\frac{1}{2}$ miles northward of the same point.

A dangerous wreck lies 3 miles northwestward of Tandjung Tanah Merah. A dangerous pinnacle rock lies about 1 mile northeastward of the same point. A rock, 100 feet long and almost awash, lies about 650 yards of Tandjung Tular.

PULAU MONDOLIKO (MANDALIKA), which lies within the 6-fathom curve, is small in extent and 240 feet high. Some trees, 60 feet high, are found on the island. A small stone jetty is located on the southwest end of the island. There is a sandy beach on the southeast side of the island. Vessels usually pass

well northward of the island. The channel between the island and Tandjung Betong is narrow and has depths of 4 to $4\frac{1}{2}$ fathoms. Small vessels wishing to use this channel should stay in midchannel and not approach the southeast coast of the island too closely.

A LIGHT is shown from a white skeleton tower, 52 feet high, on the summit of the island.

CAUTION.—Less water than charted has been reported (1947) northward of the island, the 6-fathom curve lying northward of its charted position.

PART D. KEPULAUAN KARIMUNDJAWA

GENERAL REMARKS

2D-1 KEPULAUAN KARIMUNDJAWA are a group of islands and dangers lying off the north central part of Java. Pulau Karimundjawa, Pulau Kemudjan, and Pulau Genting are the highest islands of the group and are probably of volcanic origin. The remaining islands are more or less flat and of coral formation. The reefs surrounding these islands can, as a rule, be readily seen by the discoloration of the water. Karimundjawa Road, located off the southwest side of Pulau Karimundjawa, is the main shipping place.

Trade is principally conducted with Semarang, Djapara, and Djuwana by small ships and praus. Exports are coconuts, tripang, timber, dried fish, and turtles.

CURRENTS

2D-2 See section 2-4.

WINDS AND WEATHER

2D-3 See section 2-3.

NAVIGATION

2D-4 The track from Djakarta to Makasar Strait leads well northward of the islands. The track from Djakarta to Surabaya leads well southward of the group.

ISLANDS AND DANGERS

2D-5 PULAU KARIMUNDJAWA, the largest and most important island of the group, is mountainous. Its summit attains a height of 1,660 feet and has spurs branching off to the various points of the island, which are mostly composed of large boulders. Sandy beaches are found between the points and some mountain streams are visible from the offing. The island is surrounded by a stone and coral reef, outside which, especially on the north and west sides, are several detached patches.

It was reported (1963) that Pulau Karimundjau was a good radar target at a distance of 20 miles.

PULAU KEMUDJAN, separated from Pulau Karimundjawa by a narrow and shoal channel, is mostly flat and wooded. It has a hill, 374 feet high, near the south point. Batu Lawang, the north point of the island, and a few headlands on the east and west coasts, are 80 to 100 feet high and rocky. Between the rocky parts there is here and there a strip of sand, but otherwise the coast is mostly covered with mangroves. A rocky islet lies off the middle of the west coast.

ISLANDS WESTWARD OF MAIN ISLANDS.—Pulau Kembar, the northwestern island, is covered with bushes and fringed by a reef. There is a drying sandbank on the north end of the reef.

Pulau Katang and Pulau Njamuk are small wooded islets surrounded by reefs. Karang Katang is the extensive reef westward and northward of Pulau Katang. Karang Besi, the north part of the reef, has a drying sandbank on it. Two drying sandbanks are found on the south part of Karang Katang. A WRECK lies on the south end of the reef.

Gosong Selikur is a reef on which there is a drying sandbank.

Pulau Parang is wooded and is surrounded by a reef. Its north part is rocky and 262 feet high. There is a village on its low south part. Three streams flow down its west side. A small islet stands on the reef fringing the south end of the island.

It was reported (1963) that Pula Barang was a good radar target at a distance of 16 miles.

Gosong Kumbang is a reef on which there is a drying sandbank. Pulau Krakal-besar and Pulau Krakal-ketjil are small wooded islets surrounded by reefs; the former having high trees and the latter low trees. Karang Kapal, the southwest danger, is an extensive reef composed with coral rock. It partly dries at low water.

Pulau Bengkoang is wooded and is surrounded by a reef. A tower equipped with a radar reflector is located close off the northeast extremity of the island. TAKA MENJAWAKAN, a dangerous reef with a least depth of 11 feet, can only be seen from a short distance. In order to clear this danger, vessels passing eastward of Pulau Parang should keep Gosong Kumbang in range with Pulau Krakal-besar and Pulau Krakal-ketjil.

Pulau Menjawakan, Pulau Tjemera-besar, and Pulau Tjemera-ketjil are low reef-surrounded islets. A detached 2-fathom shoal lies about 600 yards 080° from the north point of Pulau Tjemera-besar. A rock with 3 feet over it lies just outside the reef fringing the southeast side of Pulau Tjemera-ketjil. Gosong Tjemera, a reef located 1/2 mile southeastward of Pulau Tjemera-ketjil, has a sandy cay on its north side. A 6-fathom patch is located 800 yards north-northeastward of this reef.

Pulau Gelean and Pulau Burung are flat islets, surrounded by fringing reefs. The latter has some high trees on it.

Pulau Mendjangan-besar and Pulau Mendjangan-ketjil are low islets surrounded by extensive reefs on which many rocks dry at low water.

ISLANDS EAST OF MAIN ISLANDS.—Pulau Sintok, Pulau Tenga, and Pulau Ketjil, small islets covered with coconut trees and causarina trees, are separated from the east coast of Pulau Kemudjan by a narrow and foul channel. A tower equipped with a radar reflector is located close off the north extremity of Pulau Sintok. Pulau Tenga is

located nearly 1 mile northeastward of the east point of Pulau Kemudjan and Pulau Ketjil is located about the same distance eastward of that point. Gosong Tenga, a reef located about 1/2 mile northward of Pulau Tenga, partly dries and has a rock which is always visible above water on its north part.

Gosong Batu Putih, located about 1 mile southwestward of Pulau Sintok, and midway between that islet and Pulau Kemudjan, is a rock 200 yards in diameter. It is usually marked by discoloration.

Gosong Selaka, about 1/2 mile east-south-eastward of the east end of Pulau Karimundjawa, is a sandbank which remains dry at high water. Under favorable conditions it can be seen from a distance of 2 miles.

Pulau Tjendiakian is low and covered with trees. It is surrounded by a reef. Pulau Gundul is a mass of rock, 148 feet high. It is almost bare, being but scantily covered with low brushwood.

It was reported (1963) that Pula Gundul was a good radar target at a distance of 14 miles.

Pulau Genting, Pulau Seruni, and Pulau Sembangan lie on the same reef. The latter islet is located about 1 mile westward of the north end of Pulau Genting. Pulau Genting has several hills on its east side, the highest being 328 feet. The islet is covered with trees. A dangerous pinnacle rock was reported (1948) to lie about 1/2 mile eastward of the south end of the islet. Pulau Sembangan and Pulau Seruni, low islets, have coconut trees and brushwood growing on them.

OFF-LYING DANGERS.—SVERRE REEF (6° 02' S., 110° 21' E.) consists of large boulders surrounded by broken coral and sand. A least depth of 2 3/4 fathoms is found on the southwest side of the reef. The reef can be recognized by the light color of the water surrounding it.

A 4 1/4-fathom shoal is located about 6 miles northeast of the 5-fathom shoal in a position about 61 miles northeastward of Pulau Kemudjan.

A reported (1964) unexploded depth charge lies sunk about 7 miles northwest of the 5-fathom shoal.

KARIMUNDJAWA ROAD

2D-6 KARIMUNDJAWA ROAD, located off the southwest side of Pulau Karimundjawa, affords anchorage either northwestward or southeastward of Tandjung Benteng, according to the monsoon. Tandjung Benteng is a small tongue of land. The channel between the reef fronting Tandjung Benteng and that surrounding Pulau Mendjangan-besar is narrow and foul. It is suitable only for small craft with local knowledge. The channel between the reef surrounding Pulau Mendjangan-besar and that surrounding Pulau Mendjangan-ketjil has depths of 10 to 12 fathoms in the fairway, but there is a 1 3/4-fathom patch in the narrow part and foul ground off its north entrance.

EAST MONSOON ANCHORAGES.—The best anchorage is off the southwest side of Pulau Karimundjawa, to the northward of Pulau Mendjangan-besar. This anchorage, shown on the plan, should only be used by vessels with local knowledge due to the dangers in its vicinity. Larger vessels can anchor in 14 to 15 fathoms, firm sand, to the northeastward of Karang Wangkang. Vessels wishing to make this anchorage should steer a northerly course, passing well westward of Pulau Mendjangan-ketjil, until the round-topped tree northward of Tandjung Pudak bears 113°. Thence they should steer in on this bearing which will lead about 400 yards northeastward of Karang Wangkang. Anchorage can be taken when Tandjung Gelam is in range with Pulau Bengkoang.

WEST MONSOON ANCHORAGE.—Vessels can anchor in the south part of the channel between Pulau Mendjangan-besar and Tandjung Pudak in 15 to 17 fathoms, firm sand. Small vessels with local knowledge can anchor farther within the channel, but the bottom is uneven and whirlpools cause vessels to veer sharply.

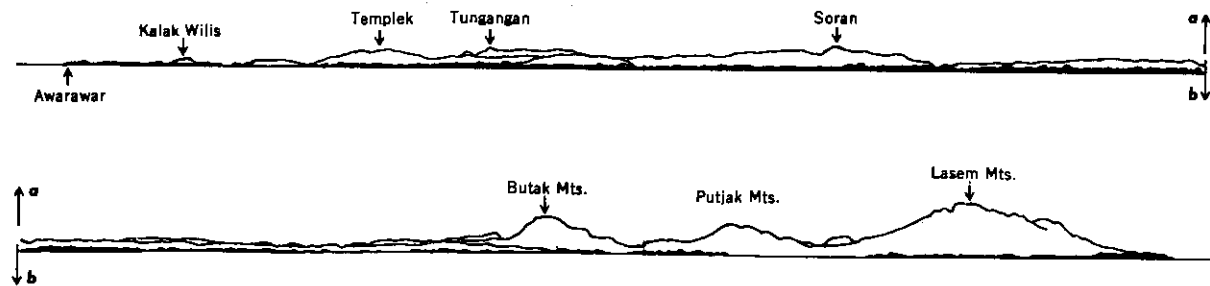
PART E. TANDJUNG APIAPIANOM TO TANDJUNG PANGKAH

2E-1 TANDJUNG APIAPIANOM ($6^{\circ} 25' S.$, $111^{\circ} 03' E.$) is low, and from it the coast trends southward for about 1 mile to Tandjung Bugel. Both of these points are hard to identify from offshore.

COAST—GENERAL

2E-2 BETWEEN TANDJUNG APIAPIANOM AND TUBAN, the coast is regular,

the most prominent rocky points being Tandjung Bendoh, Tandjung Petokol, and Tandjung Awarawar. Eastward of Tuban the coastal contour becomes more uneven, with various small headlands and bights. The coast presents a fertile and thickly wooded appearance. It is fronted by a sandy beach, except between Tandjung Bugel and Pechangakan, $18\frac{1}{2}$ miles south-southeastward, and to the eastward of Kali Lugan, where there are extensive fish ponds. The latter river flows out about $6\frac{3}{4}$ miles eastward of Tuban.



★ NORTH COAST OF JAVA, Tg. AWARAWAR 15 MILES, 209°

ASPECT.—Gunung Nglangu, 1,486 feet high and located 14 miles southward of Djuwana, is prominent. Gunung Lasem, consisting of several peaks, lies inland of Tandjung Bendoh. Gunung Argapura, the summit, rises to a height of 2,644 feet. Southward of this range and joined to it by a lower ridge is Gunung Putjak, the summit of which is 1,611 feet high. Gunung Butak, 2,208 feet high, is the summit of a range located about $5\frac{1}{2}$ miles southward of Gunung Putjak.

Gunung Soran, located 7 miles southward of Tandjung Petakol and 971 feet high, is the highest summit of a ridge of hills running parallel to the coast.

Gunung Kalak Wilis, located $4\frac{1}{2}$ miles southward of Tandjung Awarawar, is 239 feet high, prominent, and wooded. Farther inland are the Tuban mountains. Gunung Tunangan, the summit of this range, is 1,611 feet high. Gunung Templek, the 1,506 foot peak located $4\frac{1}{2}$

miles east-northeastward of Gunung Tunangan, is also prominent.

A conspicuous hill, 256 feet high, with a small wood on its north side, is located about 8 miles eastward of Tuban, close to the coast. The charted 564-foot peak, located $6\frac{1}{2}$ miles southeastward of Tuban, is a very conspicuous square hill. It rises steeply and has very little vegetation on it. This hill and a hill about 2 miles northward are sometimes referred to as "the false coffins".

Gunung Kandang, located about 2 miles southwestward of Patjiran, and Gunung Kendil, $1\frac{1}{2}$ miles southward of that town, have the same appearance as the above two hills. They slope gradually northward and are steep on their south and southwest sides.

Gunung Pundut, located 4 miles south-southeastward of Tandjung Pakis, has a small conical summit. Two bare flat hills are located $4\frac{1}{2}$ and 6 miles, respectively, southwestward of

Udjung Pangkah. A triangular pyramid, visible only 2 miles, stands on the northeastern and higher of these hills.

DEPTHS—DANGERS

2E-3 The 10-fathom curve lies up to 12 miles offshore between Tandjung Apiapianom and Tandjung Bendoh. Between the latter point and Udjung Pangkah the same curve lies up to $7\frac{1}{2}$ miles offshore. An obstruction with a depth of 8 fathoms lies 14 miles north-northeastward of Rembang. A wreck with the mast projecting above water is located 9 miles north-eastward of the mouth of the Kali Djuwara.

CURRENTS

2E-4 Strong easterly currents are found in the north approach to Selat Surabaya during the west monsoon; during the east monsoon a strong current runs to the westward. For additional information on currents see section 2-4.

WINDS

2E-5 See section 2-3.

NAVIGATION

2E-6 See section 2-2.

CAUTIONS

2E-7 BUGEL BANK, an extensive sandy shoal, fronts the coast between Tandjung Apiapianom and Tandjung Bendoh. It has been reported that this bank has been extending seaward. Vessels rounding this bank should keep at least 1 mile clear of its edge, in depths not less than 10 fathoms.

COASTAL FEATURES

2E-8 BETWEEN TANDJUNG APIAPIANOM AND THE MOUTH OF THE KALI DJUWANA there are no prominent marks. Southward of Tandjung Bugel there is a small strip of sandy beach, and extensive fish ponds with a number of streams serving as outlets for them. A mud bar fronts the river.

Between the mouth of the Kali Djuwana and Tandjung Bendoh, the coast is fronted by numerous islets and dangers. Fishponds continue eastward to Pulau Kapaju and from there to the mouth of the Kali Lasem there is a sandy beach.

Udjung Leran, a low bare point, is somewhat difficult to distinguish. The coast between this point and Tandjung Bendoh is here and there covered with shrubs. A wooded islet lies close inshore, about midway between the points.

DJUWANA ROAD

2E-9 DJUWANA ROAD is a lighterage port of some importance. The roadstead is exposed to both monsoons, but Bugel Bank (sec. 2E-7) affords some protection during the west monsoon.

LANDMARKS.—The coconut palms on Pulau Marungan show up well against the low coast backing the islet.

The chimney of the sugar mill, located about 5 miles northwestward of Djuwana, is sometimes visible when the sun shines on it. The town of Djuwana, located about 2 miles upriver, is not visible from seaward. Only the red and white roofs of the warehouses are sometimes seen.

DEPTHS—DANGERS.—The 3-fathom curve lies about 5 miles northeastward of the mouth of the Kali Djuwana. Between Djuwana and Rembang there are a number of islets, reefs, and rocks, all lying within the 5-fathom curve. The bottom near the coast consists of soft gray mud. Farther offshore the bottom is blue mud and black sand, mixed with shells. Numerous large rocks front the coast in some places as far out as the 3-fathom curve.

ANCHORAGES.—Vessels can anchor according to draft with the mouth of the Kali Djuwana bearing between 210° and 225° . Care must be taken to avoid the wreck with mast showing.

DIRECTIONS.—Vessels bound for Djuwana Road from westward, after rounding the

steep-to north extremity of Bugel Bank in not less than 10 fathoms, can steer for the anchorage as the east side of the bank is very flat and can be easily sounded.

Vessels coming from eastward, after passing Tandjung Bendoh at a distance of 2 to 3 miles, can steer a due west course for the road.

DJUWANA is a shipping place of some importance. Sugar is exported. Small craft are built. Some provisions are obtainable. There is railroad communication with Semarang and Lasem. A doctor is stationed at Djuwana.

REMBANG ROAD

2E-10 REMBANG ROAD is a lighterage port of some importance. The road is open to northwesterly and northeasterly winds. During the east monsoon, however, the anchorage is usually calm, but during the west monsoon there is often much surf, making communication with the shore difficult. A boat landing is located abreast the church.

LANDMARKS.—The high, red roof of the residency at Rembang and the group of trees near the church are visible from the offing. The club, which is a large white building with great pillars, is prominent.

DEPTHS—DANGERS.—The outer dangers in the approach to Rembang have been described in section 2E-9. Penowo Reef, which dries at low water and is marked by breakers and discoloration at high water, and Gosong Reef, a small sandbar dry at low water and partly visible at high water, are dangers lying outside the 3-fathom curve.

Pulau Marungan is a small islet covered with coconut palms. It is surrounded by a reef which extends $\frac{1}{3}$ mile northward and dries at low water. There is a burial place with a group of trees on the west side of the islet. Pulau Gedeh is covered with small trees. Pulau Tjilik is a low islet. At high water it is nothing more than a sandbank with some black rocks above water. Wen Wen Reef partly dries at low water. Pulau Marsaran is a sandbank.

ANCHORAGES.—Vessels can anchor according to draft northward of Rembang. The

bottom is mud. During the east monsoon vessels can anchor in 3 to 5 fathoms mud, off the small bay which indents the coast to the southward of Udjung Leran. Cargo is handled by large fishing praus at the anchorage.

DIRECTIONS.—Vessels approaching Rembang Road from northward should remain in depths of over 5 fathoms until the red roof of the residency, or the club bears 180° ahead. Vessels coming from eastward should pass well northward of Tandjung Bendoh and Gosong Reef.

REMBANG, the capital of the district, is of some importance as a shipping center. Some timber is exported. The harbor master is also the collector of the port. Fresh provisions are obtainable. The town is connected with the telegraph and railroad systems of Java. There is a harbor doctor.

LASEM, a town standing on the Kali Lasem, is a river port for small craft. Timber is the chief export. A shipyard at Lasem builds and repairs small craft. The town is connected with the postal, telegraph, and railroad systems of Java.

COASTAL FEATURES (CONTINUED)

2E-11 TANDJUNG BENDOH ($6^\circ 37' S.$, $111^\circ 30' E.$) is low and bare of vegetation. It is difficult to identify from the offing. A village, located about 600 yards southward of the point, can be recognized by the conspicuous and isolated coconut palms which appear as an island when seen from eastward.

It was reported (1963) that Tandjung Bendoh was a good radar target at a distance of 15 miles.

Tandjung Pelabuhan, just eastward of Tandjung Bendoh, is formed by a spur of Gunung Lasem (sec. 2E-2). It is very rocky. Tandjung Kapal is low and can be recognized by a prominent tree which from a distance resembles a sailing prau. A large boulder is located close eastward of the point, about 100 yards offshore.

Tandjung Petokol, a rocky point, 56 feet high, can be indentified from the offing by the dark trees on it. Between this point and

Tandjung Kapal is Sarang, a village with a small fishing harbor, sheltered by two small stone breakwaters.

It was reported (1963) that Tandjung Petokol was a good radar target at a distance of 21 miles.

BANTJAR, a village close eastward of Tandjung Petokol, is a lumber port. During the east monsoon vessels can ANCHOR offshore in convenient depths and work cargo. During the west monsoon loading can be done only at midday. Provisions are obtainable and it is reported that limited supplies of water can be delivered aboard.

TANDJUNG AWARAWAR is low, but may be identified by Gunung Kalak Wilis (sec. 2E-2). The coast in this vicinity is edged by a narrow reef and covered with shrubs.

It was reported (1963) that Tandjung Awarawar was a good radar target at a distance of 15 miles.

DEPTHS-CAUTIONS.—Between Tandjung Bendoh and Tandjung Awarawar, there are no dangers outside the 6-fathom curve. Less water than charted, however, was reported to exist on a line between the latter point and Tandjung Petokol.

TUBAN ROAD

2E-12 TUBAN ROAD is a shipping place of some importance. The road is open to northwesterly and northeasterly winds and

there is always quite a bit of swell.

LANDMARKS.—Tuban is recognizable by the large waringin trees which stand out darker than the other trees. A white chimney is prominent.

DEPTHS-DANGERS.—The 6-fathom curve lies about 5 miles northeastward of Tuban. A dangerous wreck is located about 6 miles northward of Tuban.

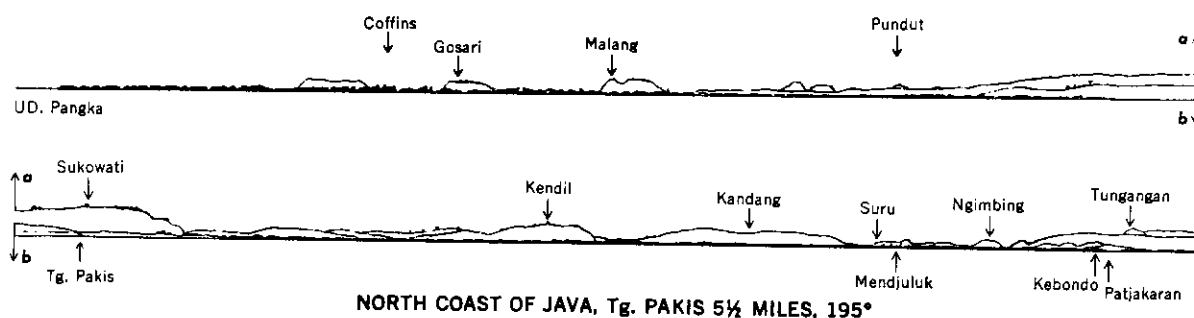
ANCHORAGE.—Vessels usually anchor according to draft with the flagstaff at the roof of the pier bearing 203°. The bottom is mud.

TUBAN has no beach; the houses stand behind a seawall. Fresh provisions and water are obtainable. There is a harbor doctor.

COASTAL FEATURES (CONTINUED)

2E-13 PALANG is a rather large village standing at the mouth of a small river. The Kali Lohgung discharges about 3 miles eastward of the village. The bridges across these rivers are visible from the offing. A large, conspicuous white house with a zinc roof is located at the village of Bromdong. Tandjung Kodok, located 3½ miles westward of Tandjung Pakis, is rocky and undermined by the sea. The latter point is fairly high.

A dangerous wreck is located about 6¾ miles north-northeastward of Tandjung Pakis.



(1959) **INDONESIA—Java—Surabaya approach—Wreck information.**—The wreck “obstr (Rep 1957)” charted in 6°53'45'' S., 112°43'55'' E. (approx.) will be expunged. A depth of 3 fathoms 1 foot will be charted in the above position.
(N.M. 14/65.)

(B.P.I. 21 (151), Djakarta, 1964.)

H.O. Chart **6324.**

H.O. Pub. 72, 1962, page **87.**

PART F. SELAT SURABAJA AND ITS APPROACHES

2F-1 UDJUNG PANGKA ($6^{\circ}51' S.$, $112^{\circ} 33' E.$) is low and not easily distinguished. Pangka village can be identified by its stone houses.

TANDJUNG MODUNG ($6^{\circ}55' S.$, $112^{\circ} 49' E.$), the northwest extremity of Madura, is low and covered with vegetation. It can be recognized by two low, dark, round-topped trees on it. The reef fringing the point consists of coral and stone, covered with a layer of mud.

GENERAL REMARKS

2F-2 THE NORTH ENTRANCE OF SELAT SURABAJA is between Tandjung Modung and Udjung Pangka. This space, however, is almost entirely occupied by an extensive shoal flat. The northern portion of the strait, including the buoyed channel through the shoal flat, as far southward as Surabaya, is known as West Gat. The part of the strait eastward of Surabaya is known as East Gat.

ASPECT.—The two bare flat hills, located $4\frac{1}{2}$ and 6 miles, respectively, southwestward of Udjung Pangka, are described in section 2E-2. Gunung Malang, 459 feet high and having a square, flat, top, is located about 5 miles southeastward of Tandjung Pakis. These hills serve as good marks for identifying Udjung Pangka. During the west monsoon vessels approaching the channel should sight these hills before sundown.

A range of hills lies $1\frac{1}{2}$ miles southwestward of the town of Gresik (Grissee). Gunung Petukangan, the eastern summit 410 feet high, has a prominent dome-shaped wooded area with a white pyramid to the westward. The east and west sides of this ridge of hills slope gradually. The north side is fairly steep and has little vegetation on it. In addition to Gunung Petukangan there are but two other conspicuous summits, one at the west extremity of the ridge and the other about $\frac{1}{2}$ mile farther eastward. Both have conspicuous woods on them.

DEPTHS—DANGERS

2F-3 DEPTHS.—In 1961 the least depth in midchannel was 27 feet. Greater depths are found in the roadstead.

In 1963 the channel was being widened.

FOUL GROUND-SHOALS.—A foul ground of unknown depth lies about $1\frac{1}{2}$ miles northward of the entrance of West Gat buoyed entrance channel, in a position $5\frac{3}{4}$ miles northwestward of Tandjung Modung.

An obstruction is located in the entrance channel in a position about $1\frac{3}{4}$ miles northward of Karang Djamuang.

The mud bank on the west side of the strait is continually extending due to large deposits from the Sungai Solo. In 1960 the 3-fathom curve was about $5\frac{3}{4}$ miles northward of Pangka village. The bank is reported to be extending westward.

A $2\frac{1}{4}$ -fathom shoal lies westward of the channel range line in a position about $3\frac{1}{2}$ miles northward of Djamuang Reef beacon.

A $1\frac{3}{4}$ -fathom shoal lies close eastward of the channel range line in a position about $1\frac{1}{4}$ miles northward of the above beacon.

A rocky shoal, having a least depth of 18 feet, lies about 800 yards east-northeastward of the head of the oil pier at Podjok, located about 1 mile northwestward of Gresik light structure.

Karang Djamuang lies on the east side of the channel, and at low water dries over a length of $\frac{1}{2}$ mile. An old fort stands on the reef on two small islands connected on their north sides by a SEAWALL. Small fishing vessels now use the harbor inside the seawall. The reef is connected to Tandjung Piring by a TRAINING WALL. The top of the wall, which is 10 feet wide, is level with highest high water; at low water the top projects 8 feet above water, and the width is then 40 feet at the waterline. In 1960, only about 10 percent of the wall remained intact; the remainder was crumbling or had washed away. A DISUSED LIGHTHOUSE, painted black, stands on the northwest side of the reef.

Middlerug, on the west side of the channel

to the southwestward of Karang Djamuang, is a narrow ridge of hard sand having a least depth of 6 feet.

Van Drieen, a stone reef having a least depth of $2\frac{1}{4}$ fathoms, is located nearly in midchannel, about $1\frac{3}{4}$ miles north by eastward of Gresik light structure. The reef is about 175 yards wide.

Pisang Reef, on the west side of the channel about $2\frac{1}{2}$ miles southeastward of the above light structure, is 300 yards long and 100 yards wide. The east side of the reef is steep-to.

A 13-foot shoal lies about $1\frac{1}{2}$ miles southwestward of Tandjung Kamal in position about $1\frac{1}{4}$ miles east-southeastward of Pisang Reef.

The Buffels are two large rocks on the north side of the channel, $1\frac{1}{4}$ miles southeast by southward of Tandjungan. The northern rock lies close to the low water edge and is just covered at high water. The outer rock is within the 3-fathom curve and dries 7 feet.

WRECKS.—A wreck lies about $3\frac{1}{4}$ miles northward of Udjung Pangka. Vessels should pass well northward of this danger.

A wreck lies in the north approach to West Gat, about 22 miles northward of Udjung Pangka. A wreck lies stranded about $1\frac{1}{2}$ miles south-southeastward of the point. A wreck lies stranded about $2\frac{1}{4}$ miles north-northwestward of the same point.

A dangerous wreck is located about $\frac{1}{2}$ mile northeast of Gresik. A BUOY marks the wreck.

A wreck, with part of the bridge visible at high water, lies sunk on the axis line of West Gat in position $6^{\circ}53'45''S.$, $112^{\circ}43'45''E.$ A BUOY marks the wreck. In mid-1962 it was reported a new channel had been dredged around the wreck limiting the length of entering vessels to approximately 600 feet.

Numerous wrecks lie in West Gat, and its approaches, the positions of which can best be seen on the chart.

FISH STAKES.—Numerous fish stakes extend northward from Udjung Pangka to the edge of the 3-fathom curve. They are also found throughout the strait. The large stakes

usually project 3 to 6 feet above water, sometimes extending into 25 feet of water. The smaller stakes are only placed on drying banks and afford good marks when the banks submerge.

NAVIGATION

2F-4 See section 2-2.

TIDAL CURRENTS

2F-5 **TIDAL CURRENTS** throughout West Gat have a predominating double-daily character, running twice to the northward and twice to the southward each day. There is no direct connection between the horizontal and vertical movement of the water. The north-going current attains its greatest rate, an average of $2\frac{1}{2}$ knots, about 12 hours before full and new moon, $1\frac{1}{4}$ hours after the moon's transit. The south-going current attains its greatest rate about 12 hours before full and new moon, $7\frac{1}{2}$ hours after the moon's transit. The lowest rate, about 1 knot, occurs 12 hours after the quarter. The current runs strongly through the channel to the eastward of Pisang Reef.

Although no monsoon current is observed in the west part of Selat Madura, the east monsoon causes a rise in the level in the funnel-shaped East Gat. This causes the north-going tidal current in West Gat to be noticeably strengthened and the southgoing tidal current to be noticeably weakened.

WINDS

2F-6 During the east monsoon the sea breeze at Surabaya is northerly, being strongest at about 1200. It decreases toward the evening at which time it veers to the southward. The southerly land wind commences about sunset. In the early morning it is often calm and misty.

During the west monsoon the sea breeze usually breaks through with considerable strength from northwest or west-northwest in the forenoon, remaining in this direction throughout the day and shifting gradually to a light southwesterly land wind at night.

CAUTIONS

2F-7 The channel over the bar is subject to constant change; hence little or no reliance can be placed on the buoys. Heavy wooded stakes have been placed on either side of the channel over the bar to prevent the channel from silting up. Numerous changes have occurred in shoals, dangers, and navigational aids. H.O. Chart 6324 should be used with caution.

Masters are cautioned that it is not guaranteed that the harbor pilot or tugs will meet the ship in the roadstead. Difficulties may be encountered because of the limited anchorage areas and the strong east-going current.

SEAPLANE LANDING AREA.—There is a seaplane landing area in West Gat, abreast Sembilangan. A seaplane landing area is located on the south side of West Gat, southward of The Buffels. Pisang Reef light structure and several lighted buoys mark the limits of this area. Anchoring and fishing in these areas is prohibited at all times.

CABLES.—A telegraph cable runs through West Gat. Another cable runs across the narrowest part of the channel between Semambung village and Tandjung Tandjungan. A small white cable hut indicates the landing place of the cable at the latter point.

A telephone cable is laid across the channel at Surabaya.

WEST GAT

2F-8 WEST SIDE OF WEST GAT.—Between Udjung Pangka and the abandoned fort, there are a few round-topped trees standing out against the low land beyond. The coast northward of Tandjung Sau is overgrown with high bamboo. Between Tandjung Sau and Gresik, the closely overgrown low coast recedes, and there are many fish ponds with several small streams flowing out. Between Gresik and Surabaya, the coast consists of a marshy tract with tall brushwood near the coast, and many fish ponds.

GRESIK is a place of considerable trade and is a port of call for coasters. There is a cement plant located northwestward of Gresik.

PIERS.—An offshore stone wharf for handling petroleum is located about 1 mile north-northwestward of the Gresik light structure.

A pier projects about 500 yards from the vicinity of the lighthouse to the edge of the mud flat. A T-head pier, the inner part of which forms a dam, extends about $\frac{1}{2}$ mile from a position about 1 mile southeastward of the light structure. In 1957, the pierhead, which is 540 feet long, had a least depth of $19\frac{2}{3}$ feet at the north end, and almost 23 feet at the south end.

A 1962 report states the depth alongside the pierhead was $29\frac{1}{2}$ feet (MLWS). Bagged cement is loaded. An oil pipeline runs to the cement company's storage tanks ashore. A shipyard in this vicinity, capable of building 300-ton wooden vessels and repairing steel coasters, is nearing completion (1962).

EAST SIDE OF WEST GAT.—Between Tandjung Modung and Tandjung Piring the coast is low and wooded and there are several towns, the largest of which is Bangkalan. A conical hill, 452 feet high and having a rounded summit, is located $4\frac{1}{2}$ miles eastward of Bangkalan. There are some high coconut palms near Tandjung Piring. Batu Lajar, a stony patch on which there is a grayish brown rock, 10 feet high, is located $1\frac{1}{2}$ miles eastward of the latter point.

Between Tandjung Piring and the town of Sembilangan there is a small pier, 10 feet wide and 810 feet long, reaching to the edge of the drying part of the reef. The shore on either side of the pier is covered with low round-topped trees which shed their leaves during the east monsoon. The houses in Sembilangan are hidden from view by thick verdure. A pier, 10 feet wide and 900 feet long, is located near the village. The pier has small booms and at its head is a white TIDAL GAUGE house.

Tandjung Bulu is prominent because of the high trees on it. A conspicuous grove of coconut palms stands on Tandjung Djunganjar. The village of Djunganjar has stone houses with tile roofs. A prominent white cable house with a dark red roof stands close northward of Tandjungan.

(5799) INDONESIA—Java—North coast—Surabaja—Chart amendment.—
The sunken wreck in $6^{\circ}59'38''$ S., $112^{\circ}42'00''$ E. will be recharted as a stranded
wreck.
(See N.M. 20 (2883) 1965.)

(B.P.I. 22 (166), Djakarta, 1965.)
H.O. Chart **6324.**
H.O. Pub. 72, 1962, page 90.

(N.M. 40/65.)

(7756) INDONESIA—Java—Surabaya approach—Anchorage information.—

An anchorage area for ships awaiting a pilot is bounded by a line joining the following points:

- (a) 6°50.0' S., 112°43.5' E.
- (b) 6°50.0' S., 112°45.5' E.
- (c) 6°52.0' S., 112°45.5' E.

(N.M. 50/03.)

(B.P.I. 36(268), Djakarta, 1966.)

H.O. Charts **6324, 3332.**

H.O. Pub. 72, 1962, page **90.**

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(723) **INDONESIA—Java—North coast—Surabaja—Depth information.**—

1. Depths exist as indicated; distances and bearings from the tower ($7^{\circ}11.8' \text{ S.}, 112^{\circ}44.0' \text{ E.}$ approx.):

(a) 5 fathoms 1 foot, 940 yards 267° .

(b) 7 fathoms 2 feet "Wk", 1,914 yards $271^{\circ}45'$.

(c) 6 fathoms 4 feet, 2,493 yards 291° .

(d) 5 fathoms 4 feet, 2,089 yards $292^{\circ}30'$.

Note.—The 5-fathom 3-foot depth charted close northwestward will be expunged and Buoy No. 12 will be recharted 2,187 yards 292° from the tower.

(e) 4 fathoms 5 feet, 1,782 yards $296^{\circ}20'$.

(f) 5 fathoms 4 feet, 1,657 yards $300^{\circ}30'$.

Note.—The green buoy about 220 yards west-northwestward will be recharted 1,815 yards $301^{\circ}30'$ from the tower.

(g) 5 fathoms 4 feet "Wk.", 1,115 yards 305° .

(h) 2 fathoms 2 feet, 2,668 yards $313^{\circ}30'$.

(i) 2 fathoms, 2,439 yards 319° .

(j) 2 fathoms 1 foot, 2,362 yards $326^{\circ}30'$.

(k) 4 fathoms 3 feet, 1,443 yards $332^{\circ}30'$.

(l) 2 fathoms 3 feet, 2,165 yards 335° .

(m) 3 fathoms 3 feet, 1,761 yards $337^{\circ}30'$.

(n) 4 fathoms, 1,509 yards $343^{\circ}30'$.

(o) 1 fathom 2 feet, 2,045 yards 348° .

(p) 1 fathom 3 feet, 1,990 yards $355^{\circ}30'$.

(q) 3 fathoms 2 feet, 1,640 yards $357^{\circ}30'$.

(r) 4 fathoms 4 feet, 1,170 yards 004° .

(s) 3 fathoms 3 feet, 1,531 yards 004° .

(t) 5 fathoms 2 feet, 1,257 yards 013° .

(u) 0 fathom 4 feet, 2,093 yards $025^{\circ}45'$.

(v) 1 fathom, 2,323 yards $032^{\circ}30'$.

(w) 3 fathoms 2 feet, 2,045 yards 033° .

(x) 1 fathom 1 foot, 2,432 yards 036° .

(y) 3 fathoms 3 feet, 2,007 yards 041° .

(z) 2 fathoms 3 feet, 2,603 yards $044^{\circ}45'$.

(aa) 1 fathom 4 feet, 2,876 yards $045^{\circ}30'$.

(bb) 4 fathoms 4 feet, 2,209 yards 046° .

(cc) 5 fathoms 4 feet, 2,296 yards $053^{\circ}30'$.

(dd) 5 fathoms 5 feet, 2,843 yards 060° .

Note.—The black and white buoy in the close vicinity will be recharted 2,570 yards 062° from the tower.

(ee) 6 fathoms 3 feet, 2,780 yards $066^{\circ}30'$.

Note.—The black and white buoy about 140 yards westward will be recharted 2,482 yards $065^{\circ}20'$.

2. Mariners are advised that hydrography in Surabaja Road differs considerably from that charted.

(N.M. 5/66.)

(Indonesian Chart 97).

H.O. Chart 6324 (Plan).

H.O. Pub. 72, 1952, page 90.

(4026) **INDONESIA—Java—North coast—Surabaya—Buoys established.**—
Buoys have been established as indicated:

- (a) A red can buoy in $7^{\circ}10'54''$ S., $112^{\circ}44'32''$ E. (approx.).
- (b) A black conical buoy in $7^{\circ}10'50''$ S., $112^{\circ}44'21''$ E. (approx.).
- (c) A black and white checkered conical buoy in $7^{\circ}10'35''$ S., $112^{\circ}45'19''$ E. (approx.).

(B.P.I. 26 (191, 192), 27 (199), Djakarta, 1964.)

(N.M. 31/64.)

H.O. Chart **6324 (Plan).**

H.O. Pub. 72, 1952, page 90.

(6679) **INDONESIA—Java—Surabaya Strait—Chart amendment.**—Pisangs
Reef Light ($7^{\circ}11.2'$ S., $112^{\circ}41.2'$ E. approx.) shows *Occ. 3 sec. 36 ft. 10 M.*

(N.M. ~~46~~/75.)

(H.O. Light List.)

H.O. Chart **6324.**

H.O. Pub. 112, No. 28010.

H.O. Pub. 72, 1962, page 90.

A stone PIER with a wooden extension built out to 3 feet of water is located close westward of Tandjung Kamal. Another pier is located eastward of this point. Kamal is a landing place for the ferry to Surabaya and has a marine railway for small craft. The coast becomes higher to the eastward of the same point and $1\frac{1}{2}$ miles eastward there is a round hill with a height of 279 feet. A conspicuous white triangulation stone stands on this hill.

NAVIGATIONAL AIDS

2F-9 TELUK SEMANGKA PILOT LIGHTSHIP is moored about 6 miles west-northwestward of Tandjung Modung. The lightship in late 1960 was a small coaster and also served as the pilot station. It has a black hull with "Pilot Surabaya" in white on the sides, two masts, and white superstructure. A red nun buoy is moored about $2\frac{1}{4}$ miles northwestward of the lightship. It was reported (1962) that the light vessel was not always in position.

It was reported (1963) that the pilot light vessel had been removed and that pilots board from a pilot vessel with markings similar to those of the former pilot light vessel, moored in the approximate former position of the latter; also that as the pilot vessel periodically enters the harbor for water and provisions and does not anchor in the same position on return to its station, mariners should not use it to fix their position. Vessels should keep in the vicinity of the pilot vessel to facilitate embarkation.

BUOYAGE.—The approach to and the channel through West Gat are marked by lighted and unlighted buoys, in accordance with the Indonesian system. The buoys that mark the channel over the bar are moved as necessary to conform with the constant changes in depth and direction.

SURABAJA OUTER LIGHTED BUOY, moored in 29 fathoms in a position about 18 miles north-northwestward of Tandjung Mo-

RANGE LIGHTS.—A light is shown from a white iron tower located almost 3 miles north-northeastward of Tandjung Piring. A light is shown from a white iron framework, 43 feet high, located on Tandjung Piring. A light is shown from a twelve-sided iron tower, 190 feet high, located at Sembilangan. The tower is painted white except on the seaward side, where the upper 66 feet is painted black. These lights form a range bearing $020^{\circ} 200^{\circ}$.

Range lights are shown on the north shore of the roadstead in a position about $1\frac{3}{4}$ miles eastward of Tandjung Kamal. The rear light is located 235 yards 046° from the front light structure.

LIGHTS.—A light is shown from a position a little northward of the jetty at Gresik. A light is reported to be located at the end of the T-head pier.

A light is shown from a beacon located on the east side of Pisang Reef.

A light is shown from the corner of a warehouse on the east side of the entrance of Tandjungperak. A light is shown from the west side of this entrance.

A light is shown from the roof of a warehouse on the northwest angle of Pangkalan Berlian. A light is shown from the northeast angle of this pier.

Two lights, about 100 yards apart, are shown on the west jetty of the Naval Basin; two lights are shown in similar positions on the east jetty of the Naval Basin. During the day the outer lamp posts are each fitted with a red triangle, and the inner lamp posts are each fitted with red rectangular screens. The north light on the west jetty bearing about 151° marks the west limit of a **PROHIBITED ANCHORAGE AREA**. The two lights on the east jetty in range 172° mark the east limit of this area.

A light is shown from a beacon on the south side of Karang Queen Olga.

A light is shown at Batu Perong, about $2\frac{1}{2}$ miles eastward of Tandjung Kamal.

ral beacons are established and on each side of the at Gat.

S.—Mooring buoys are of the entrance of and x.

(5799) **INDONESIA**—Java—North coast—Surabaya—Chart amendment.—The sunken wreck in $6^{\circ}59'38''$ S., $112^{\circ}42'00''$ E. will be recharted as a stranded wreck.

(See N.M. 20(2883) 1965.)

(B.P.I. 22(166), Djakarta, 1965.)

H.O. Chart 6324.

H.O. Pub. 72, 1962, page 90.

(N.M. 40/65.)

(4867) **INDONESIA—Java—Surabaja—Prohibited area.**—The island and strait area bounded by a line joining the following positions has been designated a prohibited area :

- (a) 7°12'00'' S., 112°44'00'' E.
- (b) 7°15'00'' S., 112°53'00'' E.
- (c) 7°05'00'' S., 112°53'00'' E.
- (d) 7°05'00'' S., 112°41'00'' E.
- (e) 7°10'30'' S., 112°44'00'' E.

(N.M. 37/64.)

(B.P.I. 32 (245), Djakarta, 1964.)
H.O. Chart 6324 (and Plan).
H.O. Pub. 72, 1962, page 91.

ANCHORAGES

2F-10 SURABAJA ROADSTEAD affords safe anchorage in both monsoons. The bottom consists of mud and sand, or sand, and is, therefore tolerably hard. Vessels sometimes drag anchor when a strong wind is combined with a strong tidal current.

Vessels in the roadstead are under the influence of the tidal current from the Kali Mas and generally swing head to southward sooner than vessels anchoring under the Madura shore.

Vessels anchoring eastward of the Naval Basin may have trouble with the old anchors and cables lying there.

An anchorage area has been designated on the south side of the roadstead just westward of the mouth of the Kali Mas. Anchorage has also been designated northward of the area between the east bank of the Kali Mas and the Kali Semampir. Permission to anchor in this area must be obtained from the harbor master. Both areas have depths of $4\frac{3}{4}$ to 11 fathoms, the least depths in the western area found over sunken wrecks. The limits of these areas are shown on H.O. Chart 6324.

Anchorage outside these areas are dangerous because of submerged wrecks, cables, etc. A small foul area lies off the east entrance of the Naval Basin. Poor anchorage ground is found northward of the shore, between the entrance of the Kali Mas and the entrance of the Naval Basin.

PROHIBITED ANCHORAGE.—Anchoring and fishing are prohibited because of telegraph cables within an area extending northward and northeastward across the channel from the shore near the entrance of the Naval Basin.

Anchoring is prohibited within an area extending about $\frac{3}{4}$ mile northeastward from the mouth of the Kali Semampir.

Anchoring is also prohibited within 330 yards of Djambatan Djamrud Utara, or in any part of the commercial harbor.

The limits of the prohibited anchorage areas

are indicated by dashed lines on H.O. Chart 6324. See section 2F-9 for lights indicating one of the areas.

DIRECTIONS

2F-11 The best time to enter West Gat is prior to slack water in the roadstead. During the west monsoon there is little difficulty in making the entrance of West Gat. During the east monsoon, especially in the morning, the prevailing mist and haze frequently hides the coastal hills of Java and Madura, but the coast can be approached until within a depth of 11 fathoms.

Vessels approaching from westward can obtain position by bearings on the flat-topped Gunung Malang (sec. 2F-2) and on the two bare flat hills, located southwestward of Udjung Pangka and described in section 2E-2.

Vessels approaching from eastward can obtain position by bearings of the hills on Madura. The most conspicuous are described in section 3A-2.

When the position has been fixed by bearings on these hills, vessels can head for Surabaya Outer Lighted Buoy and then steer southward for the light vessel, or they can keep in depths of over 10-fathoms and head direct for the light vessel.

The channel through West Gat is marked by range lights, lighted buoys, and buoys. Since pilotage is compulsory, and buoys are moved to conform to changes in the channel, no detailed directions are necessary. In 1962 it was reported that night navigation was no longer possible.

PILOTAGE

2F-12 PILOTAGE SERVICE is compulsory for Surabaya, and is available only between the hours of 0600 and 1600, due to the dangers in West Gat. Pilots are stationed at Teluk Semangka Light Vessel. Prior to docking, ships are met by a tug and a berthing pilot. (See section 2F-7). Requests for pilots should

be made at least 24 hours in advance by calling Surabaya Radio "PKD" on 500 kcs.

PILOT SIGNALS are shown from the light vessel by day and night as follows:

DAY SIGNALS.—First repeater over flag D: No pilot on light vessel; vessel may enter without pilot until one is met.

Two black cones, vertically displayed, points down: No pilot is available for vessels under 350 tons.

Flags CFM: Vessel will be served by a rowboat as no launch is available.

NIGHT SIGNALS.—A light just above the bulwarks or a swinging white light: The pilot will meet vessel immediately.

A fixed red light over a fixed red light: No pilot available, vessel may enter until a pilot is met.

Two fixed green lights: No pilot is available for vessels under 350 tons.

A fixed green light over a white light: Pilot will board ship from a rowboat.

A fixed red light: Firing practice is taking place in the west channel or from the north coast of Madura.

EAST APPROACH TO SELAT SURABAJA—EAST GAT

2F-13 TANDJUNG PADELEGAN (7°-15' S., 113°32' E.) is low, sandy, and hard to identify from the offing. The Kali Majungan enters the sea just westward of the point.

TANDJUNG BEDULAN (GERINTING) (7°42' S., 113°29' E.) is low, sandy, and steep-to. The point is hard to identify from the offing, but when close inshore, the remains of a landing stage about 2 miles to the eastward, and a number of praus lying on the beach there, may be seen.

GENERAL REMARKS

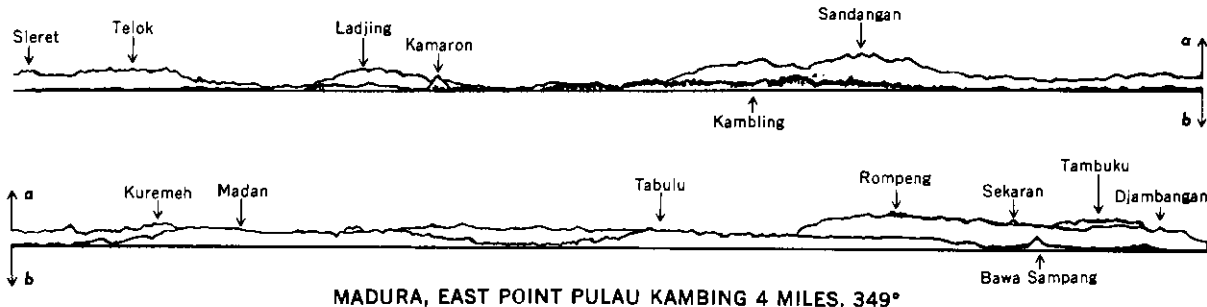
2F-14 The east approach to Selat Surabaya is through Selat Madura which is described in Chapter 3. The west part of the strait and East Gat, the connecting channel to Selat Surabaya, are described in this chapter.

ASPECT—NORTH SIDE OF APPROACH.—Gunung Bawa Sampang, located close to the coast and about 8 miles west-northwestward of Tandjung Padelegan, is 217 feet high and has a couple of large trees on its summit. Gunung Madah, located close to the coast and 7½ miles westward of Gunung Bawa Sampang, is 279 feet high and is bare on its upper part. A slanting, bare tree on the southeast part of Gunung Madah is prominent from all directions. There are some round-topped trees on the northwest slope of this hill. These trees are prominent from westward, but from other directions are obscured by the hill itself. Gunung Tabulu, between Gunung Bawa Sampang and Gunung Madah, is thickly wooded, 312 feet high, and extends in an easterly direction until behind the former hill.

Gunung Kuremeh, located about 5 miles northward of Gunung Madah, has a steep, sharp upper edge extending from three pointed peaks. Gunung Sandangan, located 6 miles westward of Gunung Kuremeh, is 859 feet high, has an undulating surface, and is wooded on its east part.

Gunung Ladjing, 758 feet high, is located 10¾ miles north-northwestward of Tandjung Batu Putu. Gunung Kamaron, a conspicuous peak of 541 feet with a tree on its summit, is located about 2 miles southeastward of the above hill.

Gunung Telok, 869 feet high, has a jagged appearance. It is the westernmost recognizable



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peak of a bare ridge. Gunung Sleret, 804 feet high, consists of four peaks standing close together. Gunung Sereng is 594 feet high and prominent. Gunung Kemere has four summits, the eastern and highest of 672 feet being especially prominent. Gunung Sereng and Gunung Kemere form a saddle.

An isolated fan-shaped tree on the flat hilly ridge abreast Tebul is prominent. A high, round-topped tree stands in an open space about 1 mile inland in a position about 2 miles farther westward. These trees lose their leaves during the east monsoon.

A large quarantine hospital, located a little over 1 mile east-northeastward of Tandjung Kamal, serves as a prominent landmark. The tower of the government building, located $4\frac{1}{2}$ miles southward of Tandjung Kamal, is prominent.

ASPECT-SOUTH SIDE OF APPROACH.—Between Tandjung Bedulan and Tandjung Tambakagung, the Java coast is densely overgrown. Eastward of Tandjung Kraksaan, which is located about 5 miles southwestward of Tandjung Bedulan, the coast is less wooded and large plains run to the foot of Gunung Hiyang.

Gunung Hiyang rises rapidly from the southward to a very prominent summit, Gunung Argopuru. This peak is 10,131 feet high and slopes gradually down to the northward with several summits. Gunung Krintjing, 7 miles eastward of this peak, can be recognized by its comparatively steep slope on the west side; on the east side it runs over to the Gunung Sahing, a range with some very sharp peaks, one of which has the shape of a giant tusk and is 4,364 feet high and very prominent.

Gunung Loros ($7^{\circ}44'$ S., $113^{\circ}35'$ E.) is a prominent cone, 1,768 feet high with a ridge running out to southward about $\frac{1}{2}$ its height. It is visible from great distances from eastward and westward. It appears as a sharp peak when viewed from northward.

Between Gunung Argopuru and Gunung Tengger, about $36\frac{1}{2}$ miles westward, there are

several high mountains. Gunung Lamongan, which rises in two peaks to a height of 5,482 feet, is an active volcano from which a column of smoke constantly rises. During the night a red glow may be seen over the summit. This volcano is located about $13\frac{3}{4}$ miles westward of Gunung Argopuru.

Gunung Penawungan, located about 8 miles northwestward of Gunung Lamongan, is a small mountain. Its broad, round top is prominent.

Between Probolinggo and Tandjung Warangan, the summit of Gunung Mahameru (Semaru), 12,060 feet high, is seen appearing above the slopes of the Gunung Tengger. Farther eastward more of this vast, conical, volcano comes into view. Heavy clouds of smoke rise from it at intervals.

Gunung Tengger, one of the most remarkable volcanoes on Java, is located about $18\frac{1}{2}$ miles south-southwestward of Tandjung Warangan. It rises from a very large base in a gentle slope, with gradually extending ridges. The summit, seen at a distance, is less conical than most of the other principal volcanoes, varying in height at different peaks from 8,000 to nearly 10,000 feet. The central crater, 8,468 feet high, is considerably below the highest point and consists of a large excavation of irregular form, surrounded on all sides by peaks of varying heights.

Gunung Penangungan, located 25 miles westward of Tandjung Warangan, is a steep, conical mountain with a very sharp peak, 5,423 feet high. Gunung Ardjuno appears from eastward as a broad ridge with three summits differing little in height. Gunung Welirang, the north summit, attains a height of 10,355 feet. The south summit is 10,954 feet high. Both of these summits are very sharp peaks, but the middle summit is more rounded. To the southward of Gunung Ardjuno are the Gunung Kawi, of which Gunung Butak, with a rounded summit 9,410 feet high, is conspicuous.

COASTAL HILLS.—Gunung Semonkrong, a ridge rising to 276 feet, is located close southward of Tandjung Warangan. Some very conspicuous hills, visible at a great distance to seaward and forming an excellent mark when the mountain peaks are obscured, are located eastward of the summit of this ridge. Gunung Tugel, a conical hill 279 feet high, is located $5\frac{1}{2}$ miles southeastward of Gunung Semonkrong. Gunung Glugu, 12 miles east-southeastward of Gunung Tugel, is 344 feet high and has a small wood on the top darker than the trees on the slopes.

A number of **SUGAR MILLS** are located along this coast. The **LIGHTS** of these mills are visible at night.

DEPTHS-DANGERS

2F-15 DEPTHS.—The south coast of Madura, between Tandjung Padelegan and Tandjung Batu Putih, 22 miles westward, is fringed by a sandbank which extends over 1 mile from the shore for about 10 miles eastward of the mouth of the Kali Balega and then close in to up to $\frac{1}{2}$ mile from the shore for the remainder of this stretch of coast.

The 10-fathom curve, which lies up to $2\frac{1}{2}$ miles off this coast, crosses the southeast entrance of Selat Surabaya in a southwesterly direction from the mouth of the Kali Balega to a position about 11 miles northwestward of Tandjung Warangan. The southeast entrance of Selat Surabaya is shallow; the main channel through having a least depth of 14 feet.

The north coast of Java, between Tandjung Bedulan and Probolinggo, is fronted by a steep-to, mud and sandbank, depths of 10 fathoms being found up to $1\frac{1}{2}$ miles from the shore.

Between Probolinggo and the position 11 miles northwestward of Tandjung Warangan, the 10-fathom curve lies up to $5\frac{1}{2}$ miles offshore.

DANGERS.—Pulau Kambing is low and wooded, the tops of the trees being about 100 feet high. A steep-to reef, which dries at low water, surrounds the island. Several houses are visible along the north coast. A white triangular pillar is located near the east end of the island.

Manila Rock is about 200 yards in diameter. It is awash at low water and is rather steep-to. A **LIGHT** is shown from the rock.

Sirumpa Rock is about 200 yards in diameter and dries at low water on its southeast side. It is steep-to with depths of 14 to 22 fathoms, mud, surrounding it. A black **BEACON**, surmounted by a black cone topmark, point up, stands on the rock.

Bura Reef is a patch of sand, stone, and coral. It is about $\frac{1}{4}$ mile in diameter and has on it a rock which dries at low water.

Zwaantjes Reef (Karang Koko) is elliptical in shape and about $\frac{1}{2}$ mile long in an east-west direction. The reef is steep-to and consists of coral, rock, and sand. A sandbank on its west side can usually be seen. A **LIGHT** is shown on Zwaantjes Reef.

Karang Tjonken is a small rocky patch covered by 3 feet of water.

Pulau Ketapang is a low sparsely wooded island lying in the north approach to Probolinggo. A prominent double-topped tree stands in the middle of the south side of the island. Katon Reef is a patch of sand and coral, 160

(114) **INDONESIA**—Java—Selat Madura—Unexploded depth charges—Obstructions.—1. Unexploded depth charges have been reported in the following approximate positions:

(a) $7^{\circ}26'00''$ S., $113^{\circ}22'30''$ E.

(b) $7^{\circ}28'30''$ S., $113^{\circ}21'10''$ E.

2. Obstructions have been reported in the following approximate positions:

(a) $7^{\circ}20'30''$ S., $113^{\circ}34'00''$ E.

(b) $7^{\circ}20'30''$ S., $113^{\circ}35'20''$ E.

(B.P.I. 48 (370, 371), Djakarta, 1964.)

H.O. Charts 3332, 3055.

H.O. Pub. 72, 1962, page 94.

(N.M. 1/65.)

yards in diameter and covered by 4 1/4 fathoms. There are depths of from 6 to 8 fathoms between this reef and Pulau Ketapang. A 6-fathom patch is located about 1 1/2 miles east-southeastward of Pulau Ketapang.

A dangerous sunken WRECK lies about 9 1/2 miles east-southeastward of Castor Beacon in approximately 7°23'18" S., 113° 01'30" E.

NAVIGATION

2F-16 The hills on Madura afford good marks for the approach to East Gat, but during the monsoon it is usually very hazy from sunrise until the breeze sets in. Vessels should steer through the middle of Selat Madura and shape course for the Outer Lighted Buoy as soon as Zwaantjes Reef is identified.

TIDAL CURRENTS

2F-17 Vessels approaching East Gat will find that the monsoon current is no longer perceptible and that the tidal currents have increased considerably. In the vicinity of Zwaantjes Reef, the average rate of the tidal current is 1 knot, increasing to 1 1/2 knots at full moon and new moon, and decreasing toward the quarters to about 1/2 knot. The direction is east with the ebb and west with the flood, the current changing direction with the double-daily tide. The tidal currents under the Java and Madura shores are not as strong as in the middle of Selat Madura, the maximum rate being about 1/2 knot.

The tidal current runs into East Gat with a rising tide and outward with a falling tide. The times of change are near the times of high and low waters, but they may be irregular being influenced by the prevailing monsoon. In the vicinity of the Outer Lighted Buoy the rate of the current amounts to about 2 knots, in the vicinity of Surabaya

Roadstead about 4 knots, and may considerably exceed this in the narrow parts of the channel. Outside the fairway on the banks and under the shore the current seldom exceeds 1 knot. The rate is stronger with the greater tide than at the smaller and is stronger at springs than at neaps.

SEAS.—Considerable swell may roll in from eastward from June to September and when in opposition to the tidal current will cause a short choppy sea.

WINDS AND WEATHER

2F-18 The monsoons in Selat Madura are rather weak, the east monsoon being the stronger. The high land on both sides of the strait causes land and sea breezes, which materially interfere with the steadiness of the monsoon winds.

THE EAST MONSOON commences in April and blows from an east-southeasterly direction. It reaches its full development in May, and remains stationary until September. It commences to weaken in strength and constancy in October. The wind will be steadiest at night on the south side of the strait, and in conjunction with the land breeze will blow in a south-southeasterly direction. In daytime the opposition of the sea breeze will cause the wind to be less reliable in strength and direction. Contrary conditions on the north side of the strait will produce steady winds by day and weak and variable winds at night.

THE WEST MONSOON, due to the large land mass to westward, is greatly weakened. January and February are the only months during which the wind blows with reliable steadiness. During these months the wind blows from a westerly to west-northwesterly direction. At this season the wind is more constant near the Java coast in daytime and on the Madura side at night.

WEATHER.—A cloudless but very hazy sky

is the prevailing feature of the east monsoon. Rain seldom falls. The rainy months are from December to March during the west monsoon; about every third day will be rainy. Squalls and thunderstorms are infrequent.

COASTAL FEATURES

2F-19 NORTH SIDE OF EAST APPROACH TO SELAT SURABAJA.—Between Tandjung Padelegan (sec. 2F-13) and Tandjung Batu Putih, 22 miles westward, the coast is hilly to within 2 miles of the former point, where it becomes low and marshy. ANCHORAGE can be taken anywhere off this coast, outside the sandbank described in section 2F-15.

SAMPANG, the residence of a government official and a salt shipping place of some importance, stands about 1 mile inland on the banks of a narrow river. The town is not visible from seaward, the harbor office being the only building on the shore. The river is navigable only by small craft.

ANCHORAGE can be taken in 8 to 10 fathoms, mud, about 1 3/4 miles from shore with the harbor office bearing 330° and a bare hillock eastward of the town bearing 023°. During the east monsoon, vessels can anchor under the lee of Pulau Kambing (sec. 2F-15).

TANDJUNG BATU PUTIH (7°13' S., 113° 09' E.) is a steep and rocky point. The soil forming the point is of a light color. The point is wooded, the tops of the trees being 100 feet above water. A sandspit, formed by sand and rock brought down by the Kali Baliga, extends about 3 miles south-south-eastward from the river mouth; the greater part of the sandspit dries at low water. Its edge is steep-to with depths of 6 to 9 fathoms close outside. Gunung Sleret (Seleret) (sec. 2F-14) in range with a prominent tree

near the village of Labuan bearing 307° leads southwestward of this sandbank. The village is located about 4 1/2 miles westward of Tandjung Batu Putih.

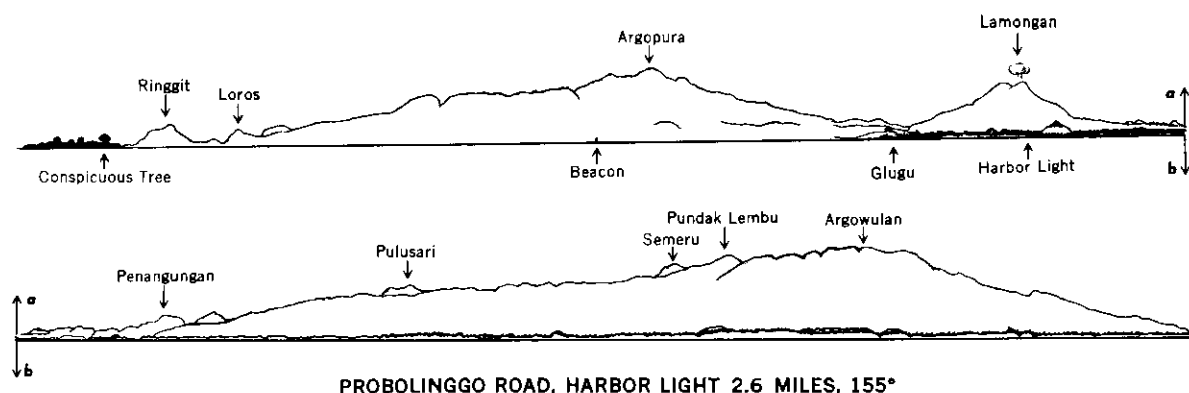
KALI BALIGA, navigable only by small craft, discharges just eastward of the above point. A can buoy, painted in black and white stripes and having a cross topmark, is located off the mouth of the river. Salt warehouses and salt pans are found in this area.

2F-20 SOUTH SIDE OF EAST APPROACH TO SELAT SURABAJA.—Between Tandjung Bedulan (sec. 2F-12) and Probolinggo, there are several sugar mills along the coast. Tandjung Padjarakan, located 6 3/4 miles west-southwestward of Tandjung Bedulan, is formed by a group of high trees standing in the water. The village of Padjarakan, which stands on the beach, has a sugar mill southward of it.

KRAKASAN, the chief place of the district, is a river port of some importance. A government official and a doctor reside in the town. The town stands on the banks of the Kali Buntu which is navigable only by small craft and which flows out in the vicinity of Tandjung Krakasan. The point, located 5 miles west-southwestward of Tandjung Bedulan, has some large trees standing in the water. The bank off the river mouth is very steep-to, so that vessels must not approach in less than 10 fathoms.

A WRECK over which there is 4 1/2 fathoms lies about 1 mile off the mouth of the Kali Buntu in a position with the sugar mill at Padjarakan bearing about 196°. The wreck is marked by a green buoy.

ANCHORAGE can be taken in 10 fathoms, northward of Tandjung Krakasan.



PROBOLINGGO ROAD

2F-21 PROBOLINGGO ROAD (7° 43' S., 113° 13' E.) is an open lighterage port. The harbor is suitable only for praus and lighters.

LANDMARKS.—PROBOLINGGO can be identified by Pulau Ketapang (7°41' S., 113° 15' E.) (sec. 2F-15), the surrounding hills, the light structure, flagstaff and white building near the inner end of the harbor. There are several prominent white smokestacks in the town.

DEPTH—DANGERS.—Pulau Ketapang, Katon Reef and adjacent dangers are described in section 2F-15. These dangers lie within the 10-fathom curve. The 6-fathom curve lies about 1/2 mile northward of the heads of the breakwaters. A dangerous cross sea is often found off the breakwater heads. A wreck with 4 feet over it lies close northward of the head of the west breakwater.

NAVIGATIONAL AIDS.—A light is shown from the head of the west breakwater.

A conical buoy, with red and white stripes and a cross topmark, is moored about 2 1/2 miles eastward of the light structure.

MOORING BUOY.—A mooring buoy is located about 5 miles east-southeastward of the above light structure.

ANCHORAGE can be taken in 7 fathoms, mud, with the harbor entrance open and with the light structure bearing 180°, distant 1/2 mile. This anchorage is partly sheltered from northeasterly winds by Pulau Ketapang.

DIRECTIONS.—Vessels approaching the roadstead from eastward may pass on either side of Pulau Ketapang or between that island and Katon Reef. Gunung Weni, located about 9 miles south-southeastward of Probolinggo, in range with Gunung Glugu (sec. 2F-14) bearing 178°, leads eastward of the island. Gunung Weni in range with the white stone pyramid near the beach eastward of the town, bearing 162°, leads eastward of Katon Reef and over a 6-fathom patch.

Vessels approaching the roadstead from westward should bring the light structure in range with Gunung Glugu bearing 141°, or the light structure in range with Gunung Weni, bearing 158°. Both of these ranges lead westward of Katon Reef.

PROBOLINGGO

2F-22 FACILITIES.—PROBOLINGGO HARBOR consists of an inner and outer tidal basin, connected by a channel 830 feet long and 70 feet wide. The inner basin is 650 feet long and 200 feet wide. The outer basin is 1,400 feet long and 250 feet wide and is connected to the sea by a dredged channel 2,000 feet long and up to 75 feet wide which runs between two stone breakwaters. There is quayage for praus and small craft all round the inner basin and on both sides of the channel which connects the two basins. The outer basin has about 325 feet of quayage, at its northeast end, and eleven small piers. Both basins have rail clearance. Coffee sugar, and tobacco are exported.

CARGO INFORMATION.—Ships are loaded and discharged by lighter at the roadstead. Harbor and port facilities include a few small tugs and several lighters. Two 2-ton steam cranes and one 5-ton hand crane are available. There are open and covered storage facilities. During the west monsoon (December through March, cargo operations are sometimes difficult due to a heavy swell.

PROVISIONS.—Some local produce is obtainable.

WATER.—Boiler water can be obtained in quantity. Drinking water is difficult to obtain.

REPAIRS of a minor nature can be made. A salvage tug and divers can be obtained from Surabaya on short notice.

COMMUNICATIONS.—Coastal and ocean-going vessels make regular calls at Probolinggo Road. The town is connected by railroad, telegraph, and telephone with other ports in Java.

MEDICAL.—There is a harbor doctor, and two small hospitals.

COASTAL FEATURES (CONTINUED)

2F-23 BETWEEN PROBOLINGGO AND TANDJUNG TAMBAKAGUNG the coast is densely overgrown. A partly drying mud and sand bank fronts the shore. Between the Kali Porong and the latter point, the coast, which is densely wooded, is broken in places by

many outlets of this river. Farther south-eastward there are many fishing villages and fish ponds. There are few prominent landmarks, the exception being Gunung Bale Pandjang, 184 feet high. This hill is the westernmost elevation on a ridge located about 5 miles west-northwestward of Pasuruan.

DEPTHS.—The coast is difficult to approach due to the extensive mud and sand bank which dries over a great breadth at low water. The depths decrease rapidly inside the 6-fathom curve, outside this curve they increase gradually.

PASURUAN ROAD

2F-24 PASURUAN ROAD is an open light-erage port. The town of Pasuruan stands on both banks of the Kali Gembong. The river entrance can be recognized by the harbor light structure and by a group of trees. A prominent water tower is located 1 mile southwestward of the light structure.

DEPTHS-DANGER.—The 10-fathom curve lies about 3 miles offshore. The harbor can only be entered by boats at high water. A shoal over which there is a least depth of 2 fathoms lies 1 1/2 miles north-northeastward of the light structure.

TIDES AND CURRENTS.—Springs rise 6 1/4 feet. There is a tide gauge located in 3 feet of water, nearly 1 mile northeastward of the lighthouse. There is very little current.

CLIMATOLOGICAL TABLES.—(See Appendix.)

NAVIGATIONAL AIDS.—A light is shown from the east side of the river entrance.

A conical buoy, painted in black and white stripes with a cross topmark, is moored in the approach in position about 1 1/3 miles north-northeastward of the light structure.

ANCHORAGE can be taken in 5 fathoms, mud, with the disused light structure located on the west side of the river entrance bearing 203°, distant 2 miles. The anchorage is open to northerly and easterly winds. It is protected from the west monsoon, but strong southwesterly to northwesterly winds sometimes blow. Communication with the shore, however, is seldom interrupted.

PASURUAN (7°37' S., 112°55' E.)

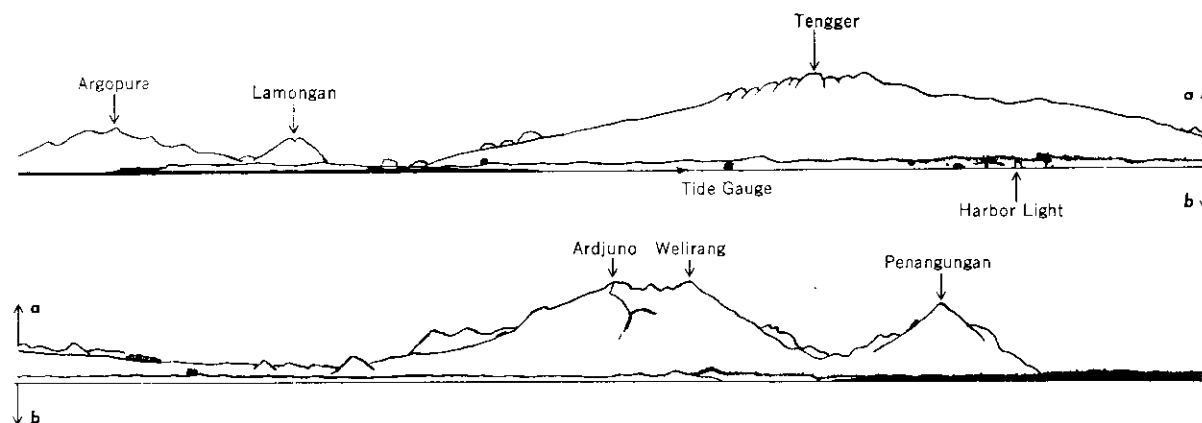
2F-25 **FACILITIES.**—PASURUAN is the capital of the district. The harbor office is located on the left bank of the river. There are two churches and a club in the town.

BERTHS.—Kali Gumbong is quayed and forms a prau harbor.

CARGO INFORMATION.—Cargo is loaded and discharged by means of lighters. Praus drawing 3 or 4 feet can usually pass out only twice daily.

PROVISIONS are scarce.

COMMUNICATIONS.—There are tele-



PASURUAN ROAD HARBOR LIGHT 3 MILES, 188°

graphic, railroad, and telephone connections with other ports in Java.

EAST GAT

2F-26 The east approach to Surabaya has the shape of a bent funnel. The wider part is fronted by the 3-fathom curve and has two channels leading through and meeting near Surabaya Road. The two channels are separated by The Tongue, a bank of hard sand, in many places mixed with gravel, mud, and shells.

NORTH SIDE OF EAST GAT.—Between Tandjung Batu Patih (sec. 2F-19) and Tandjung Kamal, there are many native villages near the shore. The west part of this coast rises in gentle slopes to the low coastal hills. The east part is steeper and ascends more abruptly from the sea. A prominent red cliff is located 2 miles eastward of Tandjung Kamal. The coast in the vicinity of the latter point is described in section 2F-8.

WEST AND SOUTH SIDES OF EAST GAT.—The Java shore, northward and westward of Tandjung Tambakagung (sec. 2F-23) is low and overgrown with brushwood, with extensive fish ponds within. There are no prominent landmarks, except for a narrow sandy strand between the villages of Pembumangen and Kendjeren. The former village is located about 8 3/4 miles northward of Tandjung Tambakagung. A white pillar on the south side of Wonokromo Canal serves as a useful mark for the immediate approach.

CURRENTS.—The current runs chiefly in the direction of the channel, that is toward the northwest or southeast. In the vicinity of Outer Lighted Buoy the rate seldom exceeds 2 knots. If it reaches this rate, a current of about 3 knots can be expected in the roadstead. The rate is from 2 to 3 knots in the western channel. Outside the channel, the current rarely exceeds 1 knot. The change in direction of the current occurs almost simultaneously with that in Surabaya Road (sec. 2F-27). For currents in West Gat, see section 2F-5.

CHANNELS.—The east channel is unmarked and is used only by small craft with local knowledge.

Alor Pelajaran, the western channel, is lighted. It partly follows the Java shore and had a least depth of 14 feet in 1959.

DANGERS.—A bank of mud and sand and

stones dries out nearly 3/4 mile from the east part of the north shore, lessening in width as the mouth of the strait is met. Dangerous ground is reported to exist northward and eastward of the entrance channel.

An unfinished fort, located about 1 3/4 miles southward of Batah-timur, is covered by 1 foot of water.

A bank of mud and sand dries out 1/2 mile to 1 1/2 miles from the west side of East Gat.

Kleta Reef, located 1 mile southwestward of Castor Beacon, consists of stones covered in places with sand. It has a depth of 1 1/2 feet over it, seldom breaks, and is not marked by discoloration.

WRECKS.—A wreck, parts of which are above water, is located close northward of the unfinished fort. A DANGEROUS WRECK lies about 2 1/2 miles north of KENDJERAN village. The wreck of a wooden drydock is reported to lie in Alor Pelajaran, eastward of Kendjeren village. Parts of the ribs are visible at low water. Heavy rips are found in its vicinity when the currents are strong.

Other submerged and stranded wrecks exist in East Gat, for locations of which see H.O. Chart 6324.

PROHIBITED AREAS.—The limits of the prohibited areas in East Gat are shown on the above chart.

CAUTION.—Indonesian Notice to Mariners No. 32/245 dated 8 August 1964 indicates establishment of a PROHIBITED AREA bounded by the following coordinates:

07°12'00" S., 112°44'00" E.

07°15'00" S., 112°53'00" E.

07°05'00" S., 112°53'00" E.

07°05'00" S., 112°41'00" E.

07°10'30" S., 112°44'00" E.

NOTE: Literal application of this edict prohibits traffic in the east part of Surabaya harbor and the eastern approaches thereto. No explanation was given as to the reasons for or the scope of this prohibition.

In 1965, it was reported that the eastern approaches to Surabaya through Madura Strait had been mined.

FISHING STAKES are found in East Gat. The larger type are principally found near Alor Pelajaran, where they usually reach to the edge of the bank. They are also found on The Tongue and along the Madura shore. The

smaller type are found on the drying parts on both the Madura and Java shores. For further information on fishing stakes, see section 2F-3.

NAVIGATIONAL AIDS.—The channel through East Gat is marked by lighted buoys and beacons. A light is shown from a position 2 3/4 miles eastward of Tandjung Kamal.

Outer Lighted Buoy, painted in red and white stripes, is moored about 8 1/2 miles southeastward of Castor Beacon.

Lighted Buoy No. 1, located westward of the above buoy is moored about 6 3/4 miles southeastward of the above beacon.

Castor Beacon and Pollux Beacon, each lighted and painted red, are the outermost beacons marking the western channel.

A beacon stands on Kleta Reef. A beacon, surmounted by a black and white striped cone, stands about 2 1/4 miles westward of Kleta Reef.

ANCHORAGE.—Inbound vessels can anchor in the vicinity of Outer Lighted Buoy when awaiting a pilot. Anchorage is prohibited within 5 miles of a rectangular ammunition dumping ground, about 1 mile square, located 13 miles south-southeastward of Pulau Kambing.

PILOTS.—Pilotage is compulsory. The pilot vessel cruises near Lighted Buoy No. 1. Pilots are available during daylight hours. The pilot (sent from Surabaya by launch) will wait no more than 2 hours for a ship's arrival. Requests for a pilot should be made 1 day in advance as described in section 2F-12.

It was reported (1963) that inbound vessels must leave the pilot station not later than 1600 and that outbound vessels must depart their berths not later than 1600.

DIRECTIONS.—The tide tables should be consulted before entering the western channel, so as to take advantage of high water over the bar. The Outer Lighted Buoy can be passed on either side, but it is recommended to keep Lighted Buoy No. 1 on the starboard hand. Castor Beacon and Pollux Beacon should each be passed 70 yards on the port hand.

SURABAJA ROADSTEAD AND HARBOR

2F-27 HARBOR.—That part of Surabaya Harbor lying westward of the Kali Mas is known as Tandjungperak. The part eastward

of the river is known as the Naval Basin or Marine Establishment.

DEPTHS—DANGERS.—Surabaya Roadstead has depths of 4 3/4 to 10 fathoms, between the 5-fathom curves. The deepest part of the roadstead lies on the south side, near the Java shore. Rocks and foul ground extend about 3/4 mile from the north shore.

The entrance of Tandjungperak formerly had a dredged depth of 33 feet. Charted depths (LWS) in this entrance were from 16 to 27 feet (1962). A foul area exists in the center of the entrance of the harbor, about 150 yards west-southwestward of the light on Pangkalan Djamrud. Foul ground lies about 1,150 yards northeastward and north-westward, respectively, of the same light. About 668 yards east-southeastward of Pangkalan Djamrud light, lies more foul ground. General depths within Tandjungperak range from 18 to 30 feet. The depth in the entrance of the Naval Basin is 18 to 25 feet. Depths within the Naval Basin are 12 to 42 feet. Depths of 13 to 24 feet are found in the Marine Basin. Kali Mas is dredged to 7 or 8 feet.

Numerous wrecks, including a dangerous wreck with stack above water, lie in the north part of Surabaya Roadstead.

An obstruction, having depths of 28 feet, lies close off the northeast part of Djambatan Djamrud Utara.

A foul area is located 400 yards north by westward of the northwest end of the above pier.

TIDAL CURRENTS.—The tidal currents in the roadstead have a predominating semi-diurnal character. They correspond with the tidal currents in the West Gat off Kali Miring (sec. 2F-5), and with that in the narrower part of the East Gat (sec. 2F-17), bordering on the roadstead so that almost simultaneous changes can be expected in the roadstead and in the above-mentioned areas. These changes last at least 1/2 hour, but the length varies. In general it can be said that the stronger (or weaker) the current, the shorter (or longer) time for a change of direction. Further, it should be noted, with reference to entering the harbor, that at positions close inshore the change of direction is 1 hour to 1 1/2 hours earlier in the (Continued on page 101)

beginning than in the middle of the roadstead. There is no direct connection between the horizontal and vertical movement of the water.

The result of the damming up of the water in the west part of Madura Strait, as described in section 2F-5, is that the westerly current, during the east monsoon, is stronger than the easterly current.

Masters of large ships having to wait for an anchorage are strongly urged to choose such a period of time for entering West Gat, so that the ship does not arrive at the roadstead during a strong easterly current.

SIGNALS.—The day signals displayed from the harbormaster's signal yard indicate the following:

Cone point up-----	Vessels should wait for harbor pilot.
One cylinder-----	Vessels should anchor.
Two cylinders (vertically displayed).	Vessels should moor.

SURABAJA (7°12' S., 112°44' E.)

2F-28 FACILITIES—SURABAJA, with a population of 1,100,000 (1960), is the chief town of the province and is the second most important port of Java. The United States is represented by a Consul and a Vice Consul. The office of the Harbor Doctor, together with the Customs, Police, and Quarantine offices are located in the middle of Pangkalan Djamrud. Surabaya serves also as an important naval port. Exports include sugar, molasses, kapok, tobacco, rubber, coffee, tapioca, and copra.

BERTHS.—Tandjungperak is used by large vessels. Small craft and praus use the east side of this basin and the quayed sides of the Kali Mas. The Marine Basin is the site of a government shipyard. Tankers up to 490 feet in length can moor at the Oiling Pier. Semampir Oiling Piers have a useable length of 262 feet each.

TUGS are available. Tugs equipped for salvage operations and fire fighting are also avail-

able. There are several towing and berthing launches.

CARGO INFORMATION.—The wharves are equipped with railroad sidings and warehouses. Traveling and floating cranes of various capacities are available; the largest of which has a capacity of 168 tons. A 100-ton crane stands on the coaling quay.

Vessels moored or anchored in the roadstead load and discharge their cargo into lighters, which have a capacity of from 40 to 150 tons each. Two 700-ton coaling lighters and four tugs of up to 1,000 h.p. are available. Two of these are equipped for salvage and fire-fighting operations.

PROVISIONS.—Fresh and dry provisions are obtainable.

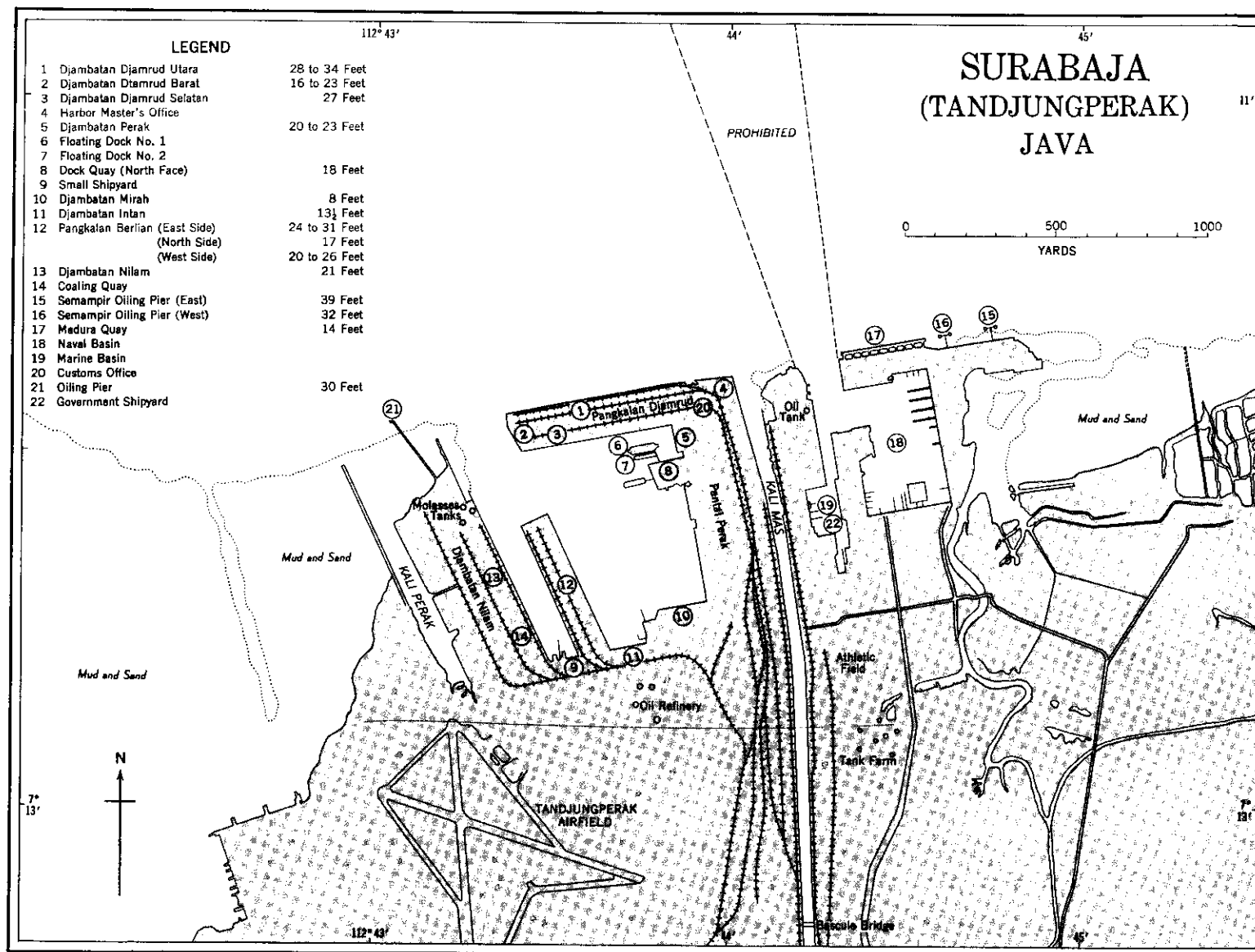
DECK AND ENGINE SUPPLIES are obtainable.

FUEL.—There is an oil refinery with a storage capacity of 152,000 barrels. Fuel is piped onto most of the piers at rates of up to 300 tons per hour. Vessels in the roadstead can bunker from an oil barge of 400-ton capacity. Diesel oil can be obtained from a 50-ton lighter.

COAL can be obtained. There are two electric transporters and two floating grabs. Coaling operations can be carried on day and night.

WATER.—Fresh water can be obtained from pipes on the wharves or from water boats. Boiler water is piped onto the wharves, or can be obtained from water barges. The pressure is low at the berths. The usual method of supply is by a 400-ton boat with pumps and by two 300-ton lighters, each with a delivery rate of from 15 to 20 tons per hour. All water should be boiled before drinking. It was reported (1963) that water for ships was not available.

REPAIRS.—The Government Shipyard is only equipped to carry out repairs to small vessels. Repairs to larger vessels are carried out in private yards. The primary mission of the yard is the repair and overhaul of naval



vessels. Repair facilities are limited to destroyers. There is a 3,000-ton drydock.

A pontoon dock and several floating and graving docks comprise the drydocking facilities of the port. The largest is a floating dock, the approximate dimensions being: maximum length 558 feet, breadth of entrance, 82 feet; depth on sill at highwater ordinary spring tides, 24 to 26 feet; lifting power 8,000 tons. It was reported (1960) that plans had been developed for the construction of a 10,000-ton drydock (naval) and a 7,000-ton floating drydock.

Two marine railways are used only for new construction.

Boiler and engine repairs can be made at the private yards.

Electronic repairs can be made. Compasses can be compensated.

* There are three floating cranes with a lifting power of 200, 75, and 30 tons. The before-mentioned 168-ton crane belongs to the navy.

A Lloyds surveyor resides at the port.

A vessel for transporting heavy loads and

boilers has a lifting capacity of 100 tons. It is also suitable for laying and taking up heavy moorings.

COMMUNICATIONS.—Surabaja is connected with other ports in Java by railroad, airlines, and roads. There is frequent communication by steamship with other Indonesian ports. World wide trade is carried on. A weekly air service is maintained with Singapore and a bi-weekly service with Europe. There is daily airmail service with Djakarta.

There is inter-island and world wide telegraphic service. Telephone facilities connect with all parts of Java. In addition there are radiotelephone connections with all of Europe and the United States. There is a government radio station which is open for public correspondence.

MEDICAL.—There are several hospitals which will accept seamen. In cases of emergency the harbor doctor will board ships. Ships leaving Surabaja for other Indonesian ports require a certificate of deratization not older than 6 months.

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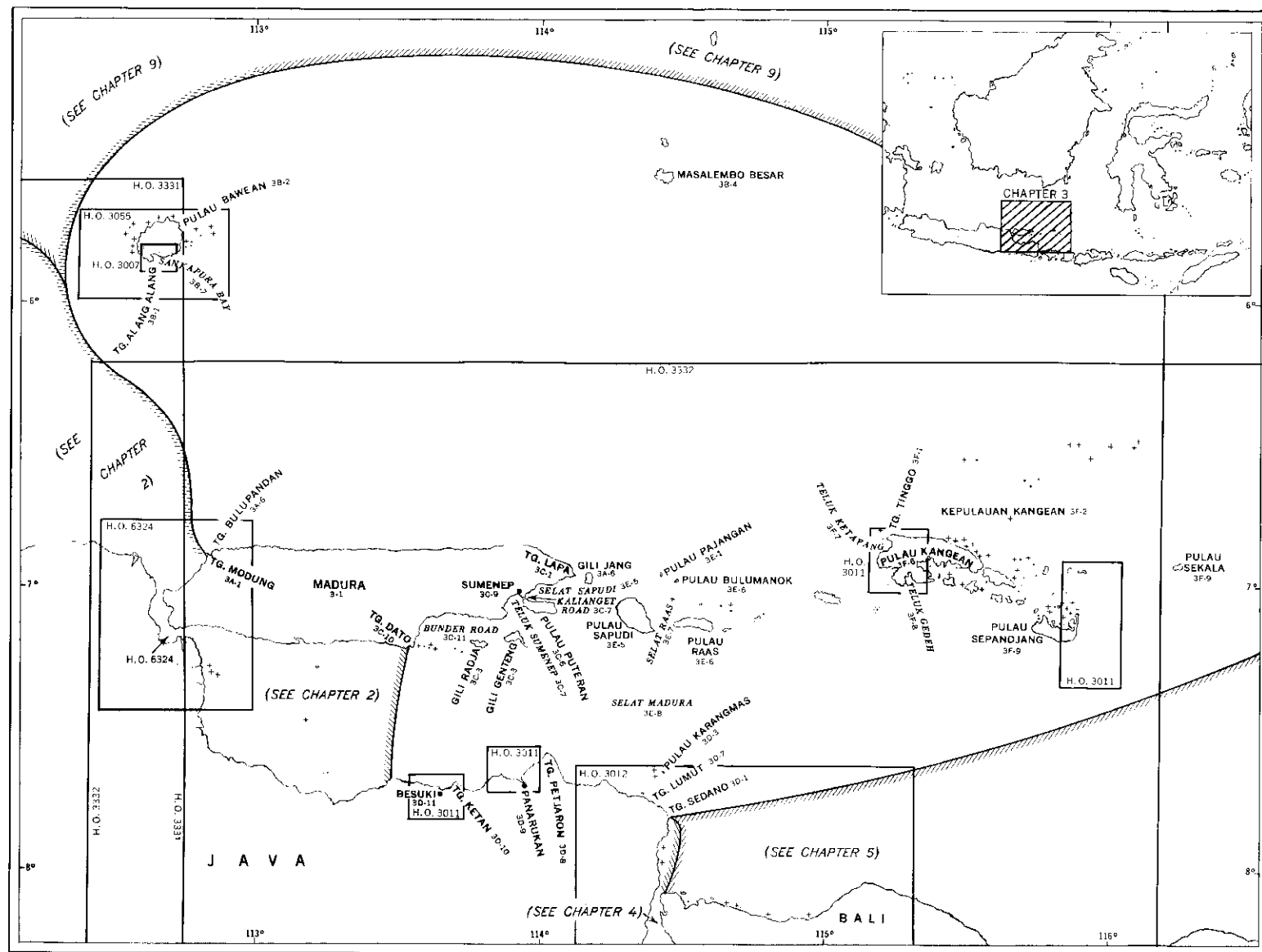


Chart limits shown are of the best scale charts issued to naval vessels by the U.S. Navy Hydrographic Office.
Numbers refer to the section in the text describing a designated locality.

CHAPTER 3—GRAPHIC INDEX

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CHAPTER 3

NORTH AND SOUTHEAST COASTS OF MADURA—OFFLYING ISLANDS—SELAT SAPUDI AND EAST PART OF SELAT MADURA

- Part A. North Coast of Madura—Tandjung Modung to Tandjung Lapa.
- Part B. Pulau Bawean and Adjacent Dangers.
- Part C. Southeast Coast of Madura—Tandjung Lapa to Tandjung Padelegan.
- Part D. Northeast Coast of Java—Tandjung Sedano to Tandjung Bedulan.
- Part E. Kepulauan Sapudi—Selat Sapudi—Selat Madura.
- Part F. Kepulauan Kangean.

PLAN.—This chapter describes the north coast of Madura from Tandjung Modung to Tandjung Lapa, including the off-lying Pulau Bawean. The arrangement is from west to east. The southeast coast of Madura, between Tandjung Lapa and Tandjung Padelegan, and the northeast coast of Java, between Tandjung Sedano and Tandjung Bedulan, are then described. The arrangement is from east to west. This is followed by a description of Selat Sapudi and the east part of Selat Madura. The arrangement is from north to south and from east to west. Kepulauan Kangean and surrounding dangers are then described.

GENERAL REMARKS

3-1 **MADURA** has an undulating surface. The hills in the west part seldom exceed 800 feet in height while those in the east part range between 1,000 and 1,565 feet high. The east end of the island is well cultivated; rice, maize and tobacco being grown in considerable quantities. The north coast of the island is bold and has no ports of importance. The interior of the island is to a great extent barren.

PULAU BAWEAN rises to a height of 2,159 feet and is surrounded by dangerous reefs. There are no harbors, but there are several somewhat exposed anchorages.

The **SOUTHEAST COAST** of Madura is irregular in contour and is fronted by numerous off-lying islands and reefs. There are no large ports, but Teluk Sumenup, located westward of Pulau Puteran, is of some importance.

The **NORTHEAST COAST OF JAVA** is backed by high mountains and is more or less rugged and steep. Panarukan, a shipping place

for sugar and tobacco, is the only port of importance.

KEPULAUAN SAPUDI consists of 13 islands lying between Madura and Kepulauan Kangean. Selat Sapudi separates this group from the islands off the east and southeast coasts of Madura.

SELAT MADURA is the wide channel between Madura and the east part of Java. Selat Surabaya, described in Chapter 2, connects the west part of this strait with the Java Sea.

KEPULAUAN KANGKAN consist of one large island and several smaller ones, with numerous islets surrounding and between them. The chief products are coconuts, rice and maize. Cattle are raised and the fishing industry thrives.

WINDS AND WEATHER

3-2 Winds and weather conditions in the Java Sea are described in section 2-3, and those in Selat Madura are described in section 2F-18.

In Selat Sapudi and passages eastward, including Kepulauan Kangean, the Southeast Monsoon prevails from April to October, and the Northwest Monsoon from November to March. In April and May all winds become southerly. In June south-southeast to southeast winds become dominant. These winds blow with greatest strength during July, August and September. In November northerly winds occur. Rain squalls are frequent with the winds blowing from various directions. In December northerly and northwesterly winds last longer and squalls come from northwesterly or west-northwesterly directions. In March it continues to blow strongly from westerly to west-northwesterly directions.

In the vicinity of Kepulauan Kangean it is very hazy during the east monsoon and the reefs are difficult to make out. During the west monsoon, it is usually clear, although heavy squalls are frequent, causing the land to be obscured by rain, with a heavy sea rising in a short time.

TIDAL CURRENTS—CURRENTS

3-3 CURRENTS in the Java Sea are described in section 2-4. In the vicinity of Pulau Bawean, generally speaking, the flood current sets to the eastward and the ebb current sets to the westward. This current, however, is often lost in the stronger current that sets in with the wind according to the prevailing monsoon. Eddies and countercurrents are found off the north and south points of the island. During the Southeast Monsoon there is usually a tide-race west of Pulau Fusa.

In the vicinity of Pulau Karangmas at the east entrance of Selat Madura, the monsoon current is stronger than the semidiurnal tidal current. During the Southeast Monsoon, from April to November, inclusive, the current sets between north-northwest and northwest and has a maximum rate of $1\frac{1}{2}$ knots. During the Northwest Monsoon, from December to March, the monsoon current sets northeast by east at

a maximum rate of $\frac{1}{2}$ knot. The semidiurnal tidal current sets northeast by north from $11\frac{1}{2}$ to $7\frac{3}{4}$ hours after the moon's transit and then runs in the opposite direction until $11\frac{1}{2}$ hours after the next transit of the moon. During the east monsoon this current is hardly perceptible. Currents in the approach to East Gat are described in section 2F-17.

There is no relationship between the changes in the horizontal and vertical movement of the waters in Selat Sapudi. The drift current sets northward during the Southeast Monsoon and southward during the Northwest Monsoon, causing a very troubled sea during the height of those seasons. In the open sea the drift current is stronger than the tidal current and is speeded up or retarded by the latter, varying from $\frac{3}{4}$ knot to 2 knots. In the narrow channels and near the land no rule holds good, but the flood usually sets southward and the ebb northward.

In the vicinity of Kepulauan Kangean the flood current sets north-northwestward and the ebb southeastward. In the open sea the rate seldom exceeds 1 knot, but in the passages between the various islands and reefs a rate of 2 to 3 knots has been observed.

CAUTIONS

3-4 Definite landmarks and lighted aids are lacking throughout the areas covered by this chapter. Fishing stakes are often encountered along the coast and in the approaches to the various roadsteads. The reefs and dangers in Kepulauan Kangean are hard to identify during the east monsoon, due to hazy conditions.

Breakers have been reported about 27 miles north-northeastward of Pulau Araan, over an area 12 miles in extent, north and south.

Discolored water was reported about 32 miles westward of Pulau Masalembo Ketjil in $5^{\circ}25'$ S., $113^{\circ}54'$ E.

NAVIGATION CORRIDOR LIMITS AND NAVAL EXERCISE AREAS.—The navigation corridor limits for in- and out-going

vessels in Selat Madura are bounded by the following positions:

NORTH LIMIT: From the outer lighted buoy of Surabaya Eastern Channel ($7^{\circ}23'30''$ S., $113^{\circ}00'30''$ E.) to Tandjung Batu Putih ($7^{\circ}13'30''$ S., $113^{\circ}09'$ E.) to Manila lighted beacon ($7^{\circ}21'30''$ S., $113^{\circ}10'30''$ E.) to position $7^{\circ}21'30''$ S., $114^{\circ}00'$ E. to position $7^{\circ}10'$ S., $114^{\circ}13'$ E.

SOUTH LIMIT: From the outer lighted buoy of Surabaya Eastern Channel to Sirumpa Beacon ($7^{\circ}24'30''$ S., $113^{\circ}04'$ E.) to position $7^{\circ}24'30''$ S., $114^{\circ}14'30''$ E.

In- and out-going vessels are cautioned to remain in the navigation corridor.

Vessels bound for the north coast of east Java or the south coast of Madura must keep a sharp lookout for flag signals (International) which will be flown by naval ships.

NAVAL EXERCISE AREAS are bounded by the following limits:

1. The shoreline of the south coast of Madura to the north limit of the navigation corridor.

2. The shoreline of the north coast of east Java to the south limit of the navigation corridor.

During the time of practice no vessel shall remain inside the exercise area.

PART A. NORTH COAST OF MADURA— TANDJUNG MODUNG TO TANDJUNG LAPA

3A-1 TANDJUNG MODUNG ($6^{\circ}55'$ S., $112^{\circ}49'$ E.) has been described in section 2F-1.

COAST-GENERAL

3A-2 The north coast of Madura is hilly and during the Southeast Monsoon presents a uniformly dry and barren aspect with few cultivated spots. A range of hills runs parallel with the shore, about $2\frac{1}{2}$ miles inland, and gradually increases in height to the eastward.

Gunung Sordjan, about 5 miles eastward of Tandjung Modung, is 354 feet high and promi-

nent. Gunung Bangsereh, 574 feet high, with a round-topped tree on the northwest slope, is located 3 miles southeastward of Gunung Sordjan. It is very prominent, especially from the eastward.

Gunung Berukung ($6^{\circ}56'$ S., $113^{\circ}07'$ E.), a bare, sloping hill, 751 feet high, has an isolated wood of high trees on the summit.

Gunung Tagiring, three hills close together and near the coast, is located $1\frac{1}{2}$ miles eastward of Gunung Sordjan; the west summit is rounded and 367 feet high; the east summit is conical.

Gunung Geger, 931 feet high and densely wooded, is a square, prominent hill with a flat top and high rocky patches. The patches show between the darker trees on the steep slopes. A hill, 210 feet high and located about 3 miles eastward of Tandjung Modung, is nearly perpendicular on its north side.

Gunung Piek, located $3\frac{3}{4}$ miles westward of Gunung Berukung, is a conical summit between two higher hills.

Gunung Batu Putih, 627 feet high and located $4\frac{3}{4}$ miles eastward of Gunung Berukung, is a conical hill with a broad gap on the east side and four detached groups of trees on the summit.

Gunung Kumbang ($6^{\circ}56'$ S., $113^{\circ}24'$ E.), 886 feet high, is a flat-topped hill covered with vegetation. Gunung Waru, located about 9 miles eastward of Gunung Kumbang, is 1,276 feet high. It appears as a table mountain from seaward and slopes steeply down on the north and south sides.

Gunung Pola (Merangan), 1,306 feet high and located 25 miles westward of Tandjung Lapa, is the highest peak on the north coast of Madura.

Gunung Podjok, located 5 miles east-northeastward of Gunung Pola, is 548 feet high. It appears as a conspicuous conical peak from westward, but from eastward it is difficult to identify against the high land behind.

Gunung Buruan, 935 feet high and located 12 miles west-northwestward of Tandjung

Lapa, is an isolated mountain with a slightly jagged summit. Gunung Lapa, located 2 miles northwestward of the same point, is a detached hill, 279 feet high.

DEPTHS-DANGERS

3A-3 The north coast of Madura is clear of dangers, the depths decreasing gradually as the shore is approached. The 10-fathom curve lies up to $3\frac{1}{2}$ miles off the north coast and up to $6\frac{1}{2}$ miles off the northeast coast. The bottom affords good holding ground everywhere as it consists of soft mud. The mud is mixed with sand within the 5-fathom curve.

TIDAL CURRENTS-CURRENTS

3A-4 See sections 2-4 and 3-3.

WINDS AND WEATHER

3A-5 See sections 2-3, 3-2, and 2F-18.

COASTAL FEATURES

3A-6 TANDJUNG BULUPANDAN ($6^{\circ}54'$ S., $112^{\circ}51'$ E.) is low and covered with shrubs. It can be identified by the high trees standing about $\frac{1}{3}$ mile east-northeastward. A small bay, mostly dry at low water, indents the coast between this point and Tandjung Modung.

Between Tandjung Bulupandan and the village of Ketapang, $26\frac{1}{2}$ miles eastward, there are many rocks along the steep coast. Ketapang, a town of some importance, stands at the junction of the coastal road and the road heading southward to Sampang. A waterfall tumbles into the sea in a position about $1\frac{1}{2}$ miles eastward of the village. Between the village and Tandjung Lapa, the coast is straight and monotonous with here and there a scattered village.

ISLAND AND DANGERS.—Gili Jang is a rocky island from about 100 to 130 feet high

with steep cliffs on its east side. There is a clump of trees in the middle of the north part of the island. This clump serves as a good landmark.

SELAT GILI JANG.—The channel between Tandjung Lapa and Gili Jang, has a rock in the fairway covered by $3\frac{3}{4}$ fathoms. The best passage leads between this rock and the island. The passage has a width of $\frac{3}{4}$ mile and depths of 4 to 6 fathoms. A 29-foot patch is located about $1\frac{1}{4}$ miles east of the north end of Gili Jang. These dangers will be cleared by steering a course of 011° – 191° at a distance of 700 yards from the west side of the island.

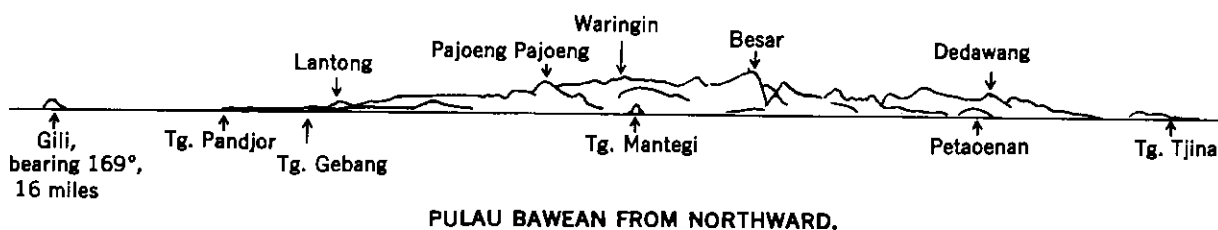
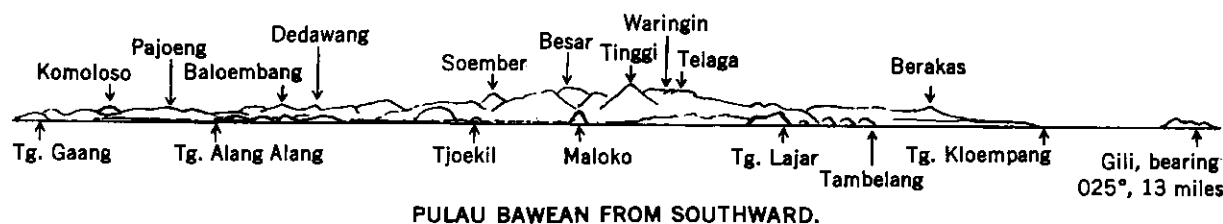
A rocky shoal with a depth of 8 feet lies close within the 5-fathom curve fronting the northeast side of Tandjung Lapa.

PART B. PULAU BAWEAN AND ADJACENT DANGERS.

3B-1 TANDJUNG ALANG ALANG ($5^{\circ}52'$ S., $112^{\circ}37'$ E.), the southwest extremity of Pulau Bawean, is the end of a narrow peninsula. From the offing this peninsula appears as an island. The coast reef which consists of large rocks extends 600 yards off the point.

GENERAL REMARKS

3B-2 PULAU BAWEAN, mountainous and densely wooded, rises to a height of 2,159 feet and is surrounded by dangerous reefs. Spurs from the mountains come down to the shore at the various points, low land being found only on the southeast and northwest sides of the island: there are no ports. Sankapura Road, on the south coast, Bangsai Bay, on the west coast, and Promahan Bay, on the north coast, are the best anchorages, although they are all more or less exposed. The inhabitants are mostly fishermen and seafarers.



DEPTHS—DANGERS

3B-3 PULAU BAWEAN is surrounded by dangerous reefs. The coastal reef follows approximately the outline of the coast and extends up to $1\frac{1}{2}$ miles off the salient points. Reefs extend 9 miles from the east coast, rendering the approach on this side very dangerous. The shoals show little discoloration, and although the water is quite clear, are first seen only when the ship is right over them. The reefs that uncover at low water do not show much discoloration when submerged.

ISLANDS AND DANGERS OFF WEST COAST.—A reef, with a least depth of $2\frac{1}{2}$ fathoms, is located about $4\frac{3}{4}$ miles west-southwestward of Tandjung Alang Alang. A $6\frac{1}{2}$ fathom patch is located about 3 miles southwestward of the same point. A detached $6\frac{1}{2}$ fathom patch lies about $2\frac{3}{4}$ miles west-northwestward of Tandjung Gaang.

Several detached reefs covered with less than 6 feet of water lie off the entrance of Bangsal Bay which indents the coast just northward of Tandjung Gili. Karang Djambang, the outermost danger, lies about 1 mile west-northwestward of the point.

Pulau Nusa ($5^{\circ}45'$ S., $112^{\circ}32'$ E.) is a bare rock, 62 feet high, located $2\frac{1}{2}$ miles west-northwestward of Tandjung Tjina. The islet is fringed by a narrow reef, and numerous shoal patches lie within a radius of 2 miles. The dangers southward of the islet show discoloration.

Pulau Bila, a wooded islet 155 feet high, stands on the coastal reef in a position about 2 miles northeastward of Tandjung Tjina. Shoal patches of $3\frac{3}{4}$ to $4\frac{3}{4}$ fathoms are located $1\frac{1}{2}$ miles north-northwestward of Pulau Bila. Foul ground, which can be seen only when close to, lies between these patches and the reef surrounding the islet.

ISLANDS AND DANGERS OFF EAST COAST.—A 7 fathom patch lies about $2\frac{1}{4}$ miles southward of Tandjung Lajar. A coral patch covered by 6 fathoms is located $3\frac{3}{4}$ miles southeastward of the same point.

Pulau Noko is low and covered with brushwood. The islet is fronted by a sandy beach and fringed by a narrow reef. A chain of reefs covered by $\frac{1}{2}$ fathom to 5 fathoms extends eastward from the islet. Beyond these reefs at a distance of 3 miles east by northward of the

islet there is a reef which dries in parts at low water. A $4\frac{3}{4}$ fathom patch lies about $1\frac{1}{2}$ miles southward of the east end of this reef.

Karang Bungarang is located $5\frac{1}{2}$ miles east by southward of Pulau Noko. It partly dries at low water. The bottom is foul between the reef and the reef surrounding Gili.

Karang Bitian, the easternmost known danger off Pulau Bawean, is a narrow reef with a least depth of $3\frac{1}{4}$ fathoms.

Gili, surrounded by reefs and separated from the east coast of Pulau Bawean by a foul channel, is a thickly wooded islet that rises to a height of 345 feet near its north end. A low sandy islet stands on the reef surrounding Gili in position about $\frac{3}{4}$ mile south-southwestward of that islet. A small wooded rock is located close eastward of the southeast end of Gili.

Karang Berapat is a reef with a least depth of $1\frac{1}{2}$ feet. Foul ground lies between this reef and the islet.

Karang Tambaga is a narrow reef, the west side of which dries at low water and is steep-to.

A reef with a least depth of $2\frac{3}{4}$ fathoms lies about $2\frac{1}{2}$ miles north-northeastward of Gili.

Karang Gosong has a white sandy cay visible 4 miles in its midpart. There are patches that dry at low water over the whole extent of the reef. A stranded vessel, which resembles a prau under sail and which is reported to be visible from 4 miles, lies on the northeast side of the reef. It was reported (1956) that Karang Gosong was always submerged.

A $1\frac{1}{4}$ fathom patch lies about $1\frac{3}{4}$ miles northward of Karang Gosong.

OFF-LYING ISLANDS AND DANGERS

3B-4 ANNIE FLORENCE REEF ($5^{\circ}13'$ S., $113^{\circ}17'$ E.) is very small in extent, dries at low water, and shows poor discoloration at other times. The sea breaks heavily over it at times. A patch of 8 fathoms, gravel and sand, lies about 9 miles east-northeastward of this reef.

A wreck with mast projecting above water is reported to lie in approximate position $4^{\circ}37'$ S., $113^{\circ}00'$ E.



Masalembo Ketjil

Masalembo Besar, bearing 046° , about 10 miles

KEPULAUAN MASALEMBO.

MASALEMBO BESAR ($5^{\circ}34'$ S., $114^{\circ}27'$ E.), a small island surrounded by reefs, is thickly wooded and attains an average height of 130 feet. A hill on the east side is 651 feet high; from southward this hill appears as a sharp peak. There is a sandy bight, with a village along its shores, on the southwest side of the island.

MASALEMBO KETJIL, 257 feet high and surrounded by a reef, is flat-topped and wooded. There are some gardens and a few scattered dwellings on the island. The reef at the northwest end of the island does not cover.

A WRECK with mast projecting above water is reported to lie 25 miles east-southeastward of Masalembo Besar.

NOTE.—The above two islands have been reported (1957) to be identifiable with charted features by radar at a distance of 15 miles. The dangers northward of these islands are described in Chapter 9.

TIDAL CURRENTS—CURRENTS

3B-5 See section 3-3.

WINDS AND WEATHER

3B-6 Rain is frequent and the climate is

relatively cool. Winds and weather conditions in the Java Sea are described in section 2-3.

PULAU BAWEAN—COASTAL FEATURES

3B-7 SANKAPURA BAY, entered between Tandjung Alang Alang (sec. 3B-1) and Tandjung Lajar, is fringed by reefs to a distance of up to $\frac{3}{4}$ mile. The latter point is a peninsula connected with the main island by a low ridge of sand, which is underwater at high tide. The outermost point is covered with dark trees and is 600 feet high. From the eastward, Tandjung Lajar appears as an island.

DANGERS.—Numerous reefs and dangers lie in the bay. Timbul Reef, with a least depth of 1 fathom, lies on the west side of the entrance range. Several dangers lie eastward of the entrance range.

LANDMARKS.—The entrance points are useful marks. Gunung Maloko, a conical hill 492 feet high, is prominent. A building with a very conspicuous cupola with a galvanized roof stands near the flagstaff at the village of Sankapura.

NAVIGATIONAL AIDS.—A light is shown from a flagstaff, 52 feet high, located near the root of the pier.

Range beacons with white topmarks are located westward of the village. The front beacon stands on the shore in a position about 1 mile west-northwestward of the root of the pier. The rear beacon, located 1,320 yards northward of the front beacon, stands on the summit of Gunung Tjoekel. These beacons in range 359° lead between the shoals to a suitable anchorage for small vessels.

A can buoy, with a red conical topmark and painted in red and white checkers, is moored close northwestward of Timbul Reef.

Beacons mark Kotong Reef and Djoelpoek Tengah Reef.

ANCHORAGES.—Strong westerly to west-northwesterly winds cause a ground swell to sweep around Tandjung Alang Alang into the roadstead. Continuous southerly winds cause

a swell in the roadstead.

Large vessels can anchor in 14 fathoms with the flagstaff bearing between 000° and 027°, and with the highest part of Tandjung Lajar bearing not more than 090°.

Small vessels can find sheltered anchorage in 4 to 7 fathoms on the range of the beacons with the flagstaff bearing between 072° and 079°.

Small craft with local knowledge can anchor near the pier, either eastward of Kotong Reef or eastward of Labuan Reef.

DIRECTIONS.—No directions are necessary for the outer anchorage. The anchorage for small vessels west of Kotong Reef, can be reached by steering in on the range of 359°, passing eastward of Timbul Reef, and steering slightly westward so as not to pass too close to Kotong Reef.

SANKAPURA, the seat of a civil administrator, stands along the banks of a small stream. There is a post office in the town. Vessels from Surabaya make regular calls at Sankapura.

A PIER projects in a southerly direction from the shore near the village of Sankapura. A breakwater about $\frac{1}{4}$ mile long is built across the reef lying to the southward of this pier.

BANGSAL BAY, entered between Tandjung Gili and Tandjung Dungus, a little less than 1 mile northeastward, has fair ANCHORAGE for small vessels in 15 fathoms, sand, just off the shore reef. Small vessels with local knowledge may approach this anchorage by bringing the west extremity of Tandjung Tjina to bear 063° and steer for it on that bearing until Pulau Nusa bears 000°. Thence a course of 099° with a conspicuous tree on Tandjung Dungus in range with the 1,245 foot hill backing it leads to the anchorage. The anchor can be dropped when Pulau Bila disappears behind Tandjung Tjina.

PROMOHAN BAY.—This small bay affords anchorage to small vessels in 8 to 11 fathoms. During the Southeast Monsoon, a heavy swell sets in around Tandjung Mantegi. Small ves-

sels with local knowledge wishing to enter the bay should avoid a $2\frac{1}{2}$ fathom patch which lies $11\frac{1}{2}$ miles 263° from the above point. Within the bay there is a detached coral patch with a depth of 3 feet, about 700 yards southward of the above patch.

KEPAH TENGAH is a village at the head of a small break in the coastal reef, about 1 mile southward of Tandjung Gebang. Anchorage can be taken, during the Southwest Monsoon, off this bay with Tandjung Gebang bearing 327° and the east point of Pulau Bawean bearing 180° .

PART C. SOUTHEAST COAST OF MADURA TANDJUNG LAPA TO TANDJUNG PADELEGAN.

3C-1 TANDJUNG LAPA ($6^\circ 59'$ S., $114^\circ 07'$ E.) is a low promontory, covered with palms and bordered by a reef which extends 1 mile eastward. Gili Jang and Selat Gili Jang, the strait between that island and Madura, are described in section 3A-6.

GENERAL REMARKS

3C-2 The southeast coast of Madura is high and thickly wooded for the most part. The coast northward of Tandjung Datu and portions of the shores of Teluk Sumenep are low and swampy. Two large bays are formed by the projecting Tandjung Tandjung. The east bay is divided into two smaller bays by Pulau Puteran. Teluk Semenep, the westernmost of these, is the most important.

ASPECT.—Gunung Rompeng, Gunung Sekaran and Gunung Tambuku, three summits, about equal distance apart, of a ridge running in an east and west direction, are located about 13 miles northward of Tandjung Padelegan. At a position 3 miles westward of Gunung Rompeng, the westernmost peak, the ridge trends southward, and gradually decreasing in elevation, turns back again eastward, and runs

nearly parallel with its former direction at a distance of 3 to 5 miles. Except for the three summits just mentioned, the greater part of the first ridge is obscured behind the second ridge, and attains its maximum elevation of 969 feet in Djambangan, about 3 miles southwest of Gunung Tambuku.

Gunung Tambuku, 1,545 feet high, the highest peak of the island, is located about 15 miles north-northeastward of Tandjung Padelegan. It has a very jagged edge owing to its many bare summits of various shapes. The summit descends steeply on its west side. Eastward of Gunung Tambuku, the ridge decreases gradually in height.

Eastward of Djambangan the ridge approaches nearer to the coast, and 7 miles westward of Tandjung Tandjung is Gunung Ponking, 732 feet high.

From Gunung Ponking the ridge runs eastward and terminates in a 341-foot hill about $1\frac{1}{4}$ miles northwestward of Tandjung Tandjung.

Gunung Buruan (sec. 3A-2) is very prominent when seen from off the south coast.

DEPTHS—DANGERS

3C-3 Numerous islands, reefs and dangers lie off the southeast coast of Madura.

Gili Jang and the dangers in its vicinity have been described in section 3A-6.

Tembaga Reefs, three in number, lie from $3\frac{3}{4}$ to $5\frac{1}{4}$ miles eastward of the southeast end of Pulau Puteran. The west reef is circular in shape, 500 yards in diameter and partly dries. The north reef, located 1 mile east by northward of the west reef, is over $\frac{1}{2}$ mile in length, northwest and southeast. A patch on its southeast side dries 2 feet.

A stranded WRECK lies on the west side of the drying patch. The south reef is $\frac{1}{2}$ mile in length and is very narrow. The channel between these dangers and Pulau Puteran is clear, and has depths of over 6 fathoms.

A round coral rock, 600 yards in diameter and having a least depth of $6\frac{1}{2}$ fathoms, lies about $8\frac{1}{2}$ miles east by northward of the southeast end of Pulau Puteran.

GILI GENTENG consists of two masses of high land connected by a low, narrow neck. From the offing the island appears as two islands. The northwest side of Gili Genteng is 218 feet high. The southeast end of the island is 85 feet high and has rocky sides. A drying reef surrounds the island. A $4\frac{3}{4}$ fathom patch lies about $1\frac{1}{2}$ miles west by northward of the southwest end of the island. A LIGHT is shown from the outer edge of the reef fringing the west side of the island.

During the Southeast Monsoon, vessels can ANCHOR in 6 or 7 fathoms, mud, about 800 yards off the middle of the northwest shore.

A small reef, that partly dries, is located 1 mile northeastward of the northeast point of Gili Genteng. The channel between this reef and the reef surrounding the island has depths of 4 to 6 fathoms in the fairway. The prominent clump of trees northwestward of Tandjung Tandjung in range with the east side of Noko Rock leads through this channel.

A shoal, with depths of less than 6 fathoms, on the seaward edge of which is a 16-foot patch, extends for about $1\frac{1}{2}$ miles from the west extremity of Gili Genteng.

Noko Rock, nearly midway between the north point of Gili Genteng and Tandjung Tandjung, is a patch of white coral, visible above water and encircled by a drying reef. It lies near the southeast extremity of a shoal area with depths of less than 6 fathoms which extends in a southeasterly direction for about 2 miles from Tandjung Tandjung.

Gili Lawak, the easternmost of a group of dangers that extend from $2\frac{1}{2}$ to 6 miles east-northeastward of the southeast end of Gili Genteng, is a low, flat, coral island, 600 yards long, north and south, and 72 feet high. It is covered with low brushwood and is surrounded by a reef. A white masonry triangulation pillar stands on the north side of the island.

Berg Reef, located $2\frac{1}{2}$ miles east-northeast-

ward of the southeast end of Gili Genteng, is a circular patch of coral, covered by 8 feet. Kokop Reefs are two small reefs lying about midway between Gili Lawak and Berg Reef. Each reef is about $\frac{1}{2}$ mile in diameter and dries to 2 or 3 feet.

GILI RADJA is well wooded and fertile. The south side is 142 feet high and the shore on that side is steep-to. The north side of the island slopes down to low, marshy land with a shelving shore in which there are fish ponds. A few scattered huts on the island can be seen from seaward. The island is fringed by a narrow steep-to reef on its south side, by a reef extending nearly one mile offshore on its east side, and by a reef extending $\frac{1}{2}$ mile offshore on its north and west sides. A rock with a depth of less than 6 feet and a shoal with a depth of 1 foot lie, respectively, about 1 mile northwestward and $\frac{1}{2}$ mile northward of the northeast extremity of the island. A WRECK, over which there is a depth of $3\frac{2}{3}$ fathoms, lies about $\frac{2}{3}$ mile north-northwestward of the southwest end of the island.

BEACONS.—A black beacon with a truncated cone topmark is located about $\frac{3}{4}$ mile east-southeastward of the east extremity of Gili Radja.

A beacon with a diamond topmark stands on the ridge in position about $1\frac{1}{2}$ miles south-eastward of the southwest end of the island.

A beacon, surmounted by a diamond-shaped topmark, painted in black and white bands, stands on the northwest extremity of Gili Radja.

A beacon with a white triangular topmark stands on the north side of the island in position $1\frac{1}{2}$ miles east-southeastward of its northwest extremity.

BUOYS.—Three black conical buoys, the two westernmost of which have each a ball topmark, are moored respectively about $3\frac{1}{2}$ miles northwestward, $2\frac{1}{2}$ miles northward, and 3 miles northeastward of the northeast extremity of Gili Radja.

GILI GILINGAN, $2\frac{1}{4}$ miles southwest of the southwest end of Gili Radja, is a wooded islet, 500 yards long and 54 feet high. A BEA-

CON, 66 feet high, consisting of a skeleton structure surmounted by a black diamond topmark, stands on Gili Gilingan.

GUNTUR ROCK, about 2 miles south-southeastward of Gili Gilingan, is a small round coral patch. A small part of this patch dries at low water. It is usually marked by discoloration when it is covered. An iron BEACON with a black quadrangular topmark stands on this danger. A sunken dock stands on the south side of the danger.

TIDAL CURRENTS

3C-4 The tidal currents off the southeast end of Pulau Puteran set southwestward on the rising tide and northeastward on the falling tide; the maximum rate is 1 knot.

The tidal currents are weak in the entrance of Teluk Sumenep, eastward of Tandjung Tandjung. The direction is greatly influenced by the wind and the maximum rate is $\frac{1}{2}$ knot.

At the anchorage off the mouth of the Kali Bunder, the current sets west-northwestward on the rising tide and east-southeastward on the falling tide. The maximum rate is 2 knots. In the vicinity of Gili Pandan the current sets westward on the rising tide and northeastward on the falling tide. For further information on currents see section 3-3.

WINDS AND WEATHER

3C-5 See sections 2F-18 and 3-2.

COASTAL FEATURES

3C-6 The bay between Tandjung Lapa and the north side of Pulau Puteran is of little importance to shipping as there are only depths of 1 fathom to 2 fathoms. It affords access for small craft, of light draft, bound through Selat Kalianget for the anchorages in Kalianget Road.

PULAU PUTERAN, separated from Madura by the narrow Selat Kalianget, is wooded and rather steep-to on its south side. The north side slopes downward toward the coast, which is low and even marshy in some places. A range of hills traverses the south side of the island. Gunung Tjabia attains a height of 341 feet. It is located 2 miles eastward of the southwest end

of the island. Gunung Modjopait, located $1\frac{3}{4}$ miles west-northwestward of the southeast end of the island, is 427 feet high. The hills slope down evenly to Tandjung Sarotak, the southeast extremity of the island. This point can be identified by a conspicuous tree standing over some graves. Tandjung Padeke, the southwest point of the island, is very conspicuous. The west coast of the island is low and wooded. The island is reef fringed to a distance of up to $\frac{1}{2}$ mile.

The principal town on the island is Talangu, on the northwest shore, abreast Kalianget. Puteran is a small town and is located near the northeast end of the island.

TELUK SUMENEP AND KALIANGET ROAD

3C-7 TELUK SUMENEP is entered between Tandjung Padike, the southwest extremity of Pulau Puteran and Tandjung Tandjung, the southeast extremity of Madura. The former point is a low tongue of land with a rocky extremity on which stands a large tree with a broad top. There is a native tomb on this point. The latter point is low, rocky and covered with a thick stand of trees. A conspicuous grove of trees stands on the east extremity of the southern range of hills in position about $1\frac{1}{2}$ miles northwestward of the point and at an elevation of about 341 feet.

KALIANGET ROAD is limited by an imaginary line drawn from the northwest point of Gili Genteng to Tandjung Tandjung and a line from the north point of that island to Tandjung Padike. In 1962, it was reported that there were several ruined fish traps in the roadstead.

Two shallow rivers have their outlets on the west shore of the bay. The Kali Saroka flows out about $2\frac{3}{4}$ miles northwestward of Tandjung Tandjung. There are several salt warehouses on the south side of the river mouth. The town of Saroka stands on the north side of the river mouth. The Kali Marengan has its origin near the town of Sumenup and discharges into the northwest corner of the bay. The coast between the two rivers is low and marshy and consists mainly of salt pans, from