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JOINT ARMY-NAVY
INTELLIGENCE STUDY
OF
Celebes Sea Area



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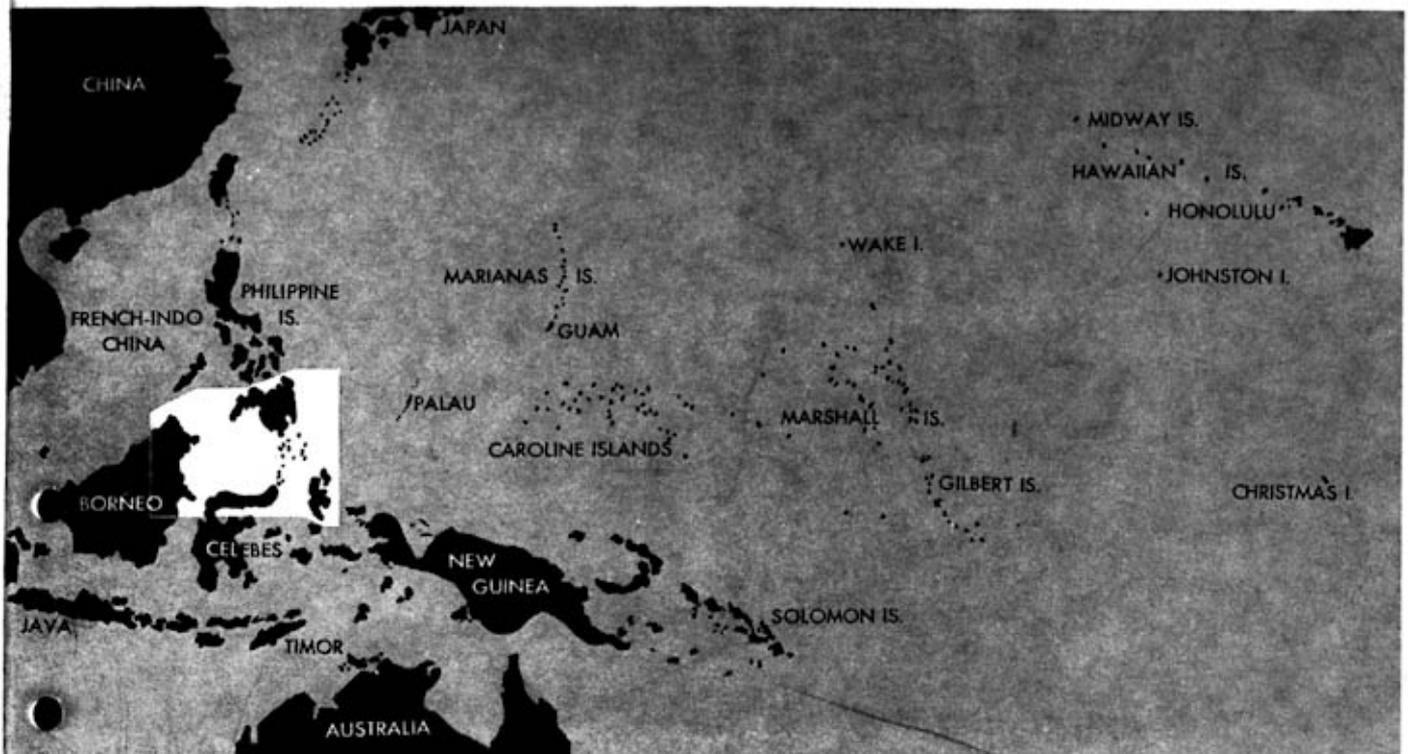
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CHAPTER VII

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JOINT ARMY-NAVY INTELLIGENCE STUDY
OF
CELEBES SEA AREA
TRANSPORTATION AND COMMUNICATIONS

MAY 1944

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TRANSPORTATION AND COMMUNICATIONS

70. General

To make generalizations regarding the transportation and communication facilities of the Celebes Sea Area is difficult, since there are great variations in the degree of exploitation or development of its various segments. It can nevertheless be said that no portion of the region has a fully developed or well balanced system of transportation or communication. If comparisons are made within the region, the Philippines, British North Borneo, and portions of Northern Celebes can undoubtedly be said to be best served.

A. Transportation.

Water is by far the most important means of transportation. Before the Pacific War, ocean-going and coastal ships made regular calls at all the larger ports; the coastal ships also called at very minor points whenever cargoes were available. In addition, native vessels of about 100 tons gross tonnage down to dugout canoes moved freely from island to island and along the coasts. Inland waterways, although not so significant as sea lanes, were of great local importance since land routes as a whole were poorly developed. All available navigable streams were utilized by native bancas, praus, and dugouts and, if deep enough, by coastal steamers.

The entire native population is highly skilled in the use and construction of outrigger boats. This is particularly true of the Moros of the Sulus and Mindanao, and the Tobelos, Galeas, and Djailolos of Halmahera. The kind and variety of native boats is well illustrated by a classification and description of those in the Halmahera area (Topic 73, A, (1)).

The development of land transportation in the Celebes Sea region has been handicapped by all the deterring factors encountered in the tropical East Indies: heavy rainfall, dense vegetation, rough terrain, and a low level of economic exploitation. The stage of development of the land routes varies from political unit to political unit. The most advanced system is found on Mindanao, where there are 2,176 miles of improved roads. Other areas with more than primitive systems are British North Borneo, where there are 125 miles of railroad; and the Minahasa district of the Northern Celebes, where there is a well-developed net of both primary and secondary roads. The least developed area is the Dutch portion of northern Borneo, where the entire system consists of short stretches of native trail or tracks.

The scarcity of vehicles of all types—carts, bicycles, cars, trucks, and buses—even in the prewar period, has no doubt been accentuated today, and the chief means of conveyance must be native carriers, pack animals, and imported vehicles. A scarcity of motor fuel should also be anticipated.

B. Communications.

Embryonic internal communication systems were found in several areas of the Celebes Sea Area, particularly in the Philippines, British North Borneo, and Northern Celebes. These telegraph and telephone systems usually connected the chief cities to their hinterlands by local telegraph and telephone lines.

Elsewhere communication was largely via wireless from a few scattered stations.

External communications were largely by wireless (TABLE VII - 7) although there were several submarine cables connecting the region to neighboring areas. These latter included the lines from Badliangao, Misamis Occidental, to Negros Islands, from Mempakul to Singapore via Victoria; from Manado to Yap; from Manado to Balikpapan; and from Kema to Ternate.

71. Railroads

The only common carrier railroad in the region is the Government-owned Railway of British North Borneo. All others are private light railways, and most of them are operated by lumber companies for hauling timber.

A. North Borneo State Railway.

(1) Administration and personnel.

The State Railway of British North Borneo is owned and operated by the British North Borneo Company, a chartered company. In 1931, the Railroad was administered by a General Manager and Locomotive Superintendent; 2 Permanent Way Engineers; an Assistant Locomotive Superintendent; and an Accountant and Traffic Officer, aided by an Asiatic staff of 150 stationmasters, clerks, guards, drivers, firemen, ticket agents, porters, and cleaners.

(2) Gauge and length.

The railroad is of meter gauge (3' 3 $\frac{3}{8}$ "') and runs from Jesselton to Beaufort (57 miles) and thence to Tenom (30 miles) along the Padas River gorge. From Tenom a branch runs north to Melalap (9 miles). Another branch runs from Beaufort to Weston (20 miles) on the coast of Brunei Bay. A ferry is maintained at Beaufort across the Padas River to transport passengers and goods between Beaufort and Beaufort South stations. The total length of line was 116 miles (119.1 miles including spurs) and the total length of track was 125 miles (FIGURE VII - 39).

(3) Track and right of way.

No detailed information is available concerning track, right of way, or clearance (loading) gauge. The main line is laid with 60-pound rails, while sidings still use 30-pound rails. Available photographs seem to indicate that the spacing of ties is about 2 feet, center to center (FIGURE VII - 1). Broken stone is used for ballast, particularly at stations. Photographs show that the thickness of ballast along the line is below the expected normal standards. There is no detailed information regarding grades and curves; it is believed, however, that no steep grades exist along the coastal plain from Jesselton to Beaufort. Curves are sharp, especially in the Padas River gorge section between Beaufort and Tenom (FIGURE VII - 1). On the latter route, it was found necessary to change the larger size 4-6-0 locomotive for 2 smaller, specially built locomotives of the same type. The gorge section has many slides and washouts. The original wood-

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en bridges of the railway have been largely replaced by steel structures.



FIGURE VII - 1. *British North Borneo.*
View of track in Padas Gorge, North Borneo State Railway.
Before 1932.

(4) Rolling stock.

In 1941 the railway operated 12 locomotives (FIGURES VII - 2 to VII - 5), 36 passenger cars (41 reported in 1940) (FIGURE VII - 2), 154 freight cars (FIGURE VII - 3), and 6 motor trolleys (FIGURE VII - 4). (TABLE VII - 1 shows various types of equipment used.)

TABLE VII - 1

ROLLING STOCK, NORTH BORNEO STATE RAILWAY, 1940

Locomotives				
NAME	NO.	YEAR	TYPE	DESCRIPTION
"290"	1011	1898	0-4-2	Tank
Hildyard	837	1900	4-6-0	Tender
Stoop	916	1900	4-6-0	Tender
Maitland	1016	1904	4-6-0	Tender
Sir Bouverie Clark	1185	—	4-6-0	Tender
Empire	—	—	4-6-0	Tender
Gaya	—	—	4-6-4	Tank
Kinabalu	—	—	4-6-4	Tank
Beaufort-	—	—	4-6-4	Tank
Weston	—	—	4-6-4	Tank
Papar	—	—	4-6-4	Tank
"Sentinel" Patent	6375	1926	—	—
Passenger Cars				
2	1st class bogie coaches			
6	1st and 2nd class composite			
4	FMS 2 axle composite			
1	FMS inspection			
1	Post Office			
1	Post Office and Brake			
4	3rd class and Brakes			
11	3rd class			
1	Limbawang (3rd class?)			
4	FMS 2 axle (3rd class?)			
6	Brake vans			
Freight Cars				
68	covered goods vans			
3	fuel trucks			
5	cattle trucks			
2	horse boxes			
43	lowsides			
31	timber trucks			
1	low loading truck			
1	gang wagon			

Motor Cars

- Fairbanks 10 H.P. Motor Trolley No. 2
- Drewry 10 H.P. 6 Seater Motor Trolley No. 3
- Drewry 10 H.P. Rail Motor Trolley No. 3
- Inspection Trolley (Jesselton)
- Inspection Trolley (Beaufort)
- Inspection Bicycle Trolley

* The Drewry cars, built by Drewry Car Co., Ltd., are equipped with side curtains and wooden canopies.



FIGURE VII - 2. *British North Borneo.*
Train on North Borneo State Railway, 1931.

(5) Speeds and train services.

Speed statistics are not available. It took about 1 hour to go by railroad from Jesselton to Papar, a distance of 23 miles. The more difficult route from Beaufort to Tenom (about 30 miles) took some 2 hours, an average speed of approximately 15 m.p.h.

Train service, prior to the Japanese invasion, was regular. Normally 1 train ran from Jesselton to Beaufort and return on week days; on Sundays, 2 trains ran in each direction. On the Beaufort-Weston section, trains ran both ways on Tuesdays, Thursdays, Saturdays, and Sundays. But on Tuesdays there were 2 trains to Beaufort, and on Thursdays two to Weston. On the Beaufort-Melalap section there was 1 train each way every Tuesday and Friday, an up train (to Melalap) every Monday, and a down train every Saturday.

(6) Traffic.

The goods carried by the railroad were classified under the 2 headings, "Products of the Country" and "Imports." Rubber was the principal product of the country; timber, sago, jungle produce (dammar and rattan), palm-leaves, stone, and fish were of secondary importance. The main imported commodity was rice; only about half the rice consumed by the inhabitants is grown locally. Other imports included shop goods, iron and manufactured goods, kerosene oil, and household provisions such as sugar and salt. The train mileage in 1937 was 83,051 miles, and a total of 132,225 passengers and 13,952 tons of goods were carried in 1938. In 1940, the passengers numbered 173,125, and 21,333 tons of goods were transported. (The highest number of passengers was 358,033, in 1920.)

(7) Stations and shops.

There were over 20 stations, provided with wooden, corrugated iron, or thatched roofs. The station usually consisted of a ticket office, store room, a small waiting room, and a station-master's office. All were built on piles to protect the wooden flooring from ground moisture.

Following is a list of main stations along the railroad:



FIGURE VII - 3. *British North Borneo.*
Train crossing on Rayoh Bridge, North Borneo State Railway.

Main Line

Jesselton Wharf to Jesselton Town	1 mile
Victoria Barracks	3 miles
Tanjong Aru	4 miles
Putatan	8 miles
Kinarut	13 miles
Kawang	17 miles
Papar	24 miles
Kimanis	33 miles
Bongawan	39 miles
Membakut	45 miles
Lumat	51 miles
Beaufort	57 miles
Jimpanga	59 miles
Rayoh	74 miles
Pangi	80 miles
Tenom	87 miles
Melalap	96 miles

Weston Line

Api-Api	60 miles (from Jesselton)
Lumadan	
Bukau	69 miles
Maraba	71 miles
Annuman	73 miles
Linkungan	75 miles
Weston	77 miles

The railroad repair shops were located at Tanjong Aru, south of Jesselton (FIGURES VII - 6 and VII - 7).

(8) *Vulnerable points.*

The most vulnerable points are the Papar Bridge of 4 Warren truss through spans supported on 3 piers and 2 abutments (FIGURES VII - 8 and VII - 9) and the steel bridge at Rayoh



FIGURE VII - 4. *British North Borneo.*
Drewry Rail Car, North Borneo State Railway.

(FIGURE VII - 3). The Padas River gorge is the only very vulnerable area.

B. Other railways.

The only other railways in the Celebes Sea Area are light railways: the short marine railways at the major ports (Chapter VI), numerous logging railways, an abandoned coal mine line, and a Decauville railway serving the Tarakan oil fields (TABLE VII - 2).

The logging railways served only small areas adjacent to the sawmills. The locomotives used by the lumber companies in Mindanao were usually 100 H.P. wood-burning engines. The



FIGURE VII - 5. *British North Borneo.*
Locomotive in running shed at Tanjong Aru workshops, North Borneo State Railway.



FIGURE VII - 6. *British North Borneo.*
Erecting shop of Tanjong Aru workshops, North Borneo State Railway.



FIGURE VII - 7. *British North Borneo.*
Machine shop of Tanjong Aru workshops, North Borneo State Railway.

railway built by the Philippine government-controlled National Coal Company from Malangas, Zamboanga, about 20 miles inland into the Sebuguey peninsula was abandoned, but the right-of-way remained at the time of Japanese occupation. In

addition to the Decauville railway on Tarakan, there are probably others of the same type serving the plantations of the region.



FIGURE VII - 8. *British North Borneo.*
Papar River Bridge, 5° 40' N, 115° 59' E, North Borneo State Railway.



FIGURE VII - 9. *British North Borneo.*
End view of Papar River Bridge, North Borneo Railway.

TABLE VII - 2
LIGHT RAILWAYS OF THE CELEBES SEA AREA

OPERATOR	LOCATION	TRACK MILEAGE	REMARKS			
				Gingog Timber Co.	Gingog, Misamis Oriental	2.5 Logging railway
				Gulf Trading Co.	Tambungon	— Logging railway
				Hercules Lumber Co.	Lumarao, Zamboanga	3.1 Logging railway
				Larapan Sawmill	Iligan, Lanao	.6 Logging railway
				M. Y. Maruyama Heirs	Davao, Davao	.1 Logging railway
				Mantivo Sawmill	Zamboanga, Zamboanga	.5 Logging railway
				Mindanao Lumber Co.	Margosatubig, Zamboanga	7.1 Logging railway with 2 locomotives.
				Misamis Lumber Co.	Misamis, Misamis Occidental	4.2 Logging railway
				National Coal Co.	Malangas inland	19.2 Abandoned mine railway
MINDANAO						
Anakan Lumber Co.	Anakan, Misamis Oriental, P.I.	18.6	Logging railway with 3 locomotives (FIGURE VII - 10)			
Findlay Millar Lumber Co.	Kolambugan, Lanao, P.I. Milbuk, Cotabato, P.I.	19.9 6.2	Logging railway with 7 locomotives (FIGURE VII - 11)			

TABLE VII - 2 (Continued)

Panabutan Lumber and Plantation Co.	Panabutan, Zamboanga	2.1	Logging railway
Port Banga Lumber Co.	Port Banga, Zamboanga	2.5	Logging railway
Port Lebak Lumber Co.	Port Lebak, Cotabato	2.2	Logging railway
Tagum Trading Co.	Hijo, Davao	7.9	Logging railway with 3 locomotives.
Tibungko Lumber Co.	Ilang, Davao	4.3	Logging railway
Utley Plantation Co.	Madaum, Davao	.7	Logging railway
BORNEO.			
North Borneo Trading Co.	Sandakan	?	Logging railway (FIGURE VII - 12)
Bataafsche Petroleum Maatschappij (BPM)	Tarakan Island	2.5	Decauville railway servicing oil fields.



FIGURE VII - 10. *Mindanao Island.*
Logging railway of Anakan Lumber Company, Misamis Oriental.



FIGURE VII - 11. *Mindanao Island.*
Logging railway of Kolambagan Lumber Company, Lanao.



FIGURE VII - 12. *British North Borneo.*
View of logging railway running to Sandakan.

72. Roads and Trails

The official classification of roads and trails is different in each of the several political units of the Celebes Sea Area. In the Netherlands East Indies the term "primary or auto" and "secondary" are used to describe roads, while cart tracks, bridle paths, and footpaths are other categories. In the Philippines the terms, "first class," "second class," and "third class" are used for roads, while trails are divided into "trails for carts with narrow treads" or cart tracks and trails. In British North Borneo there are roads, bridle paths, and tracks. No overall reconciliation of these various categories will be attempted but each will be explained separately as far as possible in the following areal discussions.

A. Halmahera sector.

The land transportation system of Halmahera is characterized by the complete absence of roads; numerous footpaths along the coasts and across the interior of the several islands; minor networks of bridle paths in the vicinity of the larger towns; and cart tracks in Ternate and Tidore Islands (FIGURE VII - 13).

The main difference between cart tracks and bridle paths is in their widths, with slight differences in surfacing and maintenance. Cart tracks are usually wide enough for 1-way motor vehicle traffic, while such is not necessarily true for all bridle paths. In either case, the ability of the tracks or paths to stand

up to the stress of motor vehicle traffic is limited to the dry season.

It should also be noted that, in almost all cases, land communication lines in Halmahera, whether cart tracks, bridle paths, or trails, are in very poor repair. This is particularly true of footpaths or trails, which, because of secondary forest growth, degenerate very rapidly without proper maintenance and periodic cutting.

Because of the absence of roads, most pre-war interior journeys were made with the aid of carriers. These men could be recruited at all villages for a wage which varied from 30 to 50 cents (Dutch) per day according to travel conditions. Most journeys to the interior also involved some water travel, and praus could be hired for 50 to 100 cents per day, with the rowers getting 30 cents per day plus their food.

The supply of vehicles on Halmahera was very limited. The trading companies of the island, whether under missionary, Government, or private auspices, usually had enough bullock carts to transport their produce. Bali cattle were the popular draft animals. At Tobelo there were 4 motor trucks, and 4 or 5 private cars. There were 5 or 6 motor trucks and about 10 trucks and private cars at Ternate. Bicycles were numerous in Ternate, but very scarce elsewhere; there were none in minor villages.

(1) *Morotai Island.*

There are 2 bridle paths and 4 footpaths on Morotai Island.

Both bridle paths are on the east coast, one from Boesoboeso to Sangowo-ketjil and the other from Berebere to Sakita. The 4 footpaths in the area include: one leading inland from the northeast coast at Pangeo to the west coast of the island at Hapo; another, following the southeast coast from Daroeba for a distance to Sabatai, which then turns inland and comes out on the southwest coast at Tg. Pilowo; another, leading inland from the west coast at Tilai; and a short bridle path and footpath on the westernmost tip of the island at Wajaboela.

(2) Halmahera.

For purposes of description, Halmahera Island may be divided into its 4 component arms: the northern, the northeastern, the central and southeastern, and the southern.

(a) *The northern arm.* Of the 4 arms, the northern arm is the one best provided with bridle paths and footpaths. Numerous footpaths cross the interior, making it possible to cross from east to west from any of the larger towns and villages on either coast. A good network of bridle paths centers around Djailolo and Soesoepe, around Iboe, and along the coast near Galela and Tobelo and near Kaoe. A good bridle path crosses the narrow isthmus between Bobaneigoe and Dodinga. Among the bridle paths the following are probably suitable for motor traffic in dry weather: Galela Lake to Mowea; and Kaoe to Pediwang, which is about 4 meters (13 feet) wide and believed to be reasonably well kept up. The path from Bobaneigoe to Dodinga has a good surface and is used by natives to portage praus, avoiding the long sea trip around the southern tip of Halmahera. In addition to the bridle paths, the coastal path from Djailolo northward to Soesoepe is suitable for motor transport.

(b) *The northeastern arm.* The northeastern arm of Halmahera has only scattered and unconnected footpaths. There is only 1 cross country route, from Dodaga, on Wasile Bay, southward to Boeli-serani on Boeli Bay (FIGURE VII - 14). All the other paths either lead for short distances along the coast or for short distances inland, usually following the rivers.



FIGURE VII - 14. Halmahera.
Typical bridge on cart track near Boeli-serani, 1939.

(c) *The central and southeastern arms.* The central and southeastern arms of Halmahera have several north-south footpaths, but no east-west route exists. Several good coastal bridle paths are found on the west coast, and along stretches of both the northern and southern coasts of the southeast arm.

Special mention should be made of the well-frequented footpath which affords good passage across the southeastern arm between Maba on Boeli Bay and Sepo on Weda Bay. The first part of this route can be made by prau, a useful means of transport especially during the wet season, when the area around Maba becomes a morass.

(d) *The southern arm.* The southern arm of Halmahera has a footpath along almost the entire east coast, and other footpaths along parts of the west coast, with about 5 or 6 main paths traversing the country from the east coast to the west coast.

(3) Ternate Island.

There is a good cart track suitable for motor transport running around the eastern half of the island. Beyond the southern and northern points of this track are bridle paths and footpaths, which make it possible to travel around the island by automobile in dry weather when the streams are all fordable. Other paths cross the island, following the slopes of the mountain and connecting with various small inland villages or cultivated plots. There is little track or trail maintenance on Ternate except for the circum-island route.

(4) Tidore Island.

A good cart track almost completely encircles the island, the gap in the north being filled by a good bridle path.

(5) Batjan Islands.

In the Batjan Islands, footpaths are the main means of land transportation. On Batjan Island, the pattern is one of north-south paths with a few east-west connections. On Kasiroeta Island, the pattern is one of east-west paths without north-south connections.

The few good bridle paths on Batjan Island center around Laboeha village. From Laboeha, a footpath leads across the island for a distance of 25 kilometers (15 miles) over relatively low ground to Babang Bay, emerging at the village of Babang. About 13 miles southeast of Laboeha, a footpath connects the village of Wajaoea on Wajaoea Bay with the village of Songa on Lapan Bay across the isthmus, a distance of 4½ kilometers (2.7 miles) over undulating terrain. On the northwest, coast footpaths, all leading inland, traverse a large area of marsh bordering Sambaki Strait. Three lead from Indari, Koesoekoesoe, and Dowongi-itji; the paths from Indari and Koesoekoesoe connect with an island footpath running south to Laboeha.

B. Sangihe-Talaud sector.

The islands comprising the Sangihe and Talaud group are well supplied with roads classified as "secondary" (Topic 72, F) by the Dutch. Most of the roads are surfaced with a layer of gravel or coral stone. All the larger islands—Tahoelandang, Siao, Sangihe, Karakelong, Salebaboe, and Kaberoeang—are encircled by secondary roads which closely follow the coasts. Trans-island roads also exist, especially on Sangihe and Karakelong islands (FIGURE VII - 45).

C. Mindanao sector.

(1) General characteristics.

There is no regularity about the pattern of roads on Mindanao. The areas best served by good highways are the north coast, the Bukidnon and Cotabato valleys, and the Davao region (FIGURE VII - 15). A good highway follows the north coast from Lanuza, in northeastern Surigao to Sindangan, on the

north coast of Zamboanga. From this main route, other highways extend into the interior or to towns on the south coast. The most important of these is the "Sayre Highway" through Bukidnon province, which joins the Cotabato-Davao highway near Kabacan. Another, but less important road, extends from Cagayan, Misamis Occidental, to Pantalan in Bukidnon. A main highway extends through Lanao province from Iligan to Malabang on the south shore where it connects with a coastal highway to Cotabato. Still another highway connects the north shore at Tanguib with the south at Pagadian. Next in importance to the north coast highway is the Cotabato-Davao highway, with its branch roads in Cotabato (the Koronadal highway and other short roads) and the coastal extensions in Davao, south to Malabang and north to Tagum and Moncayo. In addition to these main highways, there are several short stretches: one around the tip of the Zamboanga peninsula from Patalon to Vitali; one from Mati northward through Mayo, a few miles near Cateel; a stretch linking Hinatuan and Lianga; and another between Tago and Tandag.

The roads in Mindanao are less affected by climatic conditions than those in most other regions of the Celebes Sea Area, as the main highways are surfaced or metalled. The heavy seasonal rains, however, render some of the bridges unusable, but these, in general, are supplemented by ferries.

Mindanao is predominantly an island of high relief with a few conspicuous lowland areas. In general, the road pattern conforms to the pattern of coastal plains and river valleys. The only cross-island roads run through these conspicuous lowland areas: one through the narrow peninsula between Iligan and Illana Bay; the Lanao road following the Agus River and the west shore of Lake Lanao; the Sayre Highway through Bukidnon, following the valleys of the Tagoloan and Pulangi Rivers; the roads from Cotabato to Koronadal and Cotabato to Digos, both of which follow in part the valleys of the Mindanao River and its tributaries; and the road which had been planned to link Butuan and Davao through the Agusan valley, of which only the section from Davao to Moncayo has been completed.

The main highways of Mindanao were on the whole capable of supporting a good deal of truck traffic, as they were built chiefly for the purpose of getting produce to the nearest shipping point. Fairly large busses traveled the highways on regular schedules (FIGURE VII - 16). There were 6 bus companies serving the north coast and areas adjacent to the chief cities of the south coast—Zamboanga, Cotabato, and Davao (TABLES VII-3 and VII - 4).

TABLE VII - 3
ROAD MILEAGE, AUTOMOBILES, AND MOTOR TRUCKS
IN MINDANAO. (1940)

PROVINCE OR CITY	ROAD MILEAGE	AUTOMOBILES	BUSSES AND MOTOR TRUCKS
Agusan	110.8	36	69
Bukidnon	158.8	27	79
Cotabato	346.1	144	219
Davao (P)	164.2	74	53
Davao (City)	115.8	706	396
Lanao	261.8	83	159
Misamis Occidental	141.7	798	139
Misamis Oriental	272.4	190	288
Surigao	218.8	72	130
Zamboanga (P)	178.4	26	76
Zamboanga (City)	207.1	202	210
	2,175.9	1,658	1,818



FIGURE VII - 16. Mindanao.
Buses used on routes in Mindanao. Before 1941.

TABLE VII - 4
OMNIBUS COMPANIES, MINDANAO. (1941)

NO. OF BUSSES	NAME OF COMPANY	LOCATION
40	Surigao Express Co.	Surigao
60	Davao Autobus Co.	Davao
30	Cotabato Valley Transportation Co.	Cotabato
60	Zamboanga Autobus Co.	Zamboanga
70	Mindanao Autobus	Cagayan
60	Manila Railroad Co.	Cagayan

All roads were under the control of the Bureau of Public Works of the Philippine Islands. The road classification used by the Bureau was:

First class—Well graded and surfaced, thoroughly drained and constantly maintained, bridges and culverts complete and permanent or supplemented by ferries in seasons of high water.

Second class—Graded, surfaced, and generally maintained but bridges sometimes temporary structures; continuously passable during the dry season and usually during the wet season.

Third class—Usually narrow, poorly graded, or not graded; generally impassable in the rainy season.

First and second class roads are shown on FIGURE VII - 15 as metalled, and third class roads as unsurfaced. Distances in the Philippines are ordinarily given by kilometer number from the provincial capital, and kilometer posts were placed along the highways.

(2) Description of individual routes.

(a) *North coast highway—Lanuza* (Surigao province) *to Sindangan* (Zamboanga province)

1. Lanuza to Cantilan. The road is flat to Cantilan, with swampy areas lying east of the road. The Caracan River was normally crossed by ferry, but the bottom is stony and it could be waded or forded. The Cantilan River, just south of the town, is crossed by a strong wooden bridge, destruction of which would make crossing difficult since the river is deep, the current swift, and the banks high.

2. Cantilan to Placer. The terrain is more rugged, and grading and surfacing of the road not so good as in the stretches to the south and to the north.

3. Placer to Surigao. This was a main travelled highway and was in excellent condition, surfaced with coral limestone and oiled in some places. The stretch between Badas and Surigao is reasonably level and within sight of the Surigao River although it does not follow the valley bottom (FIGURES VII - 17 and VIII - 18). A branch road to the Mindanao Mother Lode mining camp leads off about 9 miles from Surigao.

4. Badas to Butuan. This stretch of the highway is rock surfaced and passes through much wooded country, especially south of Lake Mainit where there was a government forest preserve. Between Badas and Lake Mainit there were one or two single lane bridges but no steep grades. Along the shore of Lake Mainit, the road climbs to elevations of several hundred feet and then descends to a level stretch as it follows

the Tubay River to Cabadbaran. Along this level area, the road crosses several streams which are generally dry but can be forded during the rainy season. About 5 miles from Butuan, the road crossed the Taguibo river over a steel truss toll bridge (TABLE VII - 5). Approximately 4 miles east of Butuan, a road leads off southeast for about 7 miles; it is part of a projected connection with Lianga and Davao. At Butuan, there was a motor ferry across the Agusan River (FIGURE VIII - 25).

5. Butuan to Gingoog. This section of the road is gravel or stone surfaced and passes through some hilly terrain. A Philippine Army barracks and landing field were located seaward of the road about 3½ miles west of Butuan. A branch road to Buenavista on the sea leads off about 10 miles west of Butuan. Three or 4 miles farther, the road crossed the Kinabhanggan river over a steel toll bridge. A short distance beyond, there is a side road to the coastal town of Nasipit. From this point the road descends from the hills almost to sea level northwest of Nasipit and then climbs the hilly divide across the peninsula to Gingoog Bay. The road follows rather close to the bay, passing the lumbering operations at Anakan before reaching Gingoog.

6. Gingoog to Cagayan. The highway closely parallels the coast around the peninsula between these towns. There are several vantage points from which excellent views of the bays may be obtained. This stretch of the road is gravelled or rock-surfaced and is wide enough for 2 cars to pass. Most of the route is not ditched. The streams are small and almost dry except during floods; the river bottoms are gravel and can be forded. Most of the bridges are of wood and built near low water level so that flood waters pass over them. About 16 miles west of Gingoog a short road leads off southwest to a lumber company. From the tip of the peninsula for about 15 miles south along Macajalar Bay, the road runs through coconut groves beyond which there are heavily forested areas which give way to cultivated areas



FIGURE VII - 17. *Mindanao.*
View of Placer-Surigao road, just north of fork at Badas, Surigao.

with some rice paddies. At the head of the bay the road crosses the Tagoloan river by bridge and beyond passes the plant of the Del Monte Company. A cut-off between Gingoog and Tagoloan via Claveria had been planned, and the part between Claveria and Tagoloan had been partially completed in 1941. About 9

miles east of Cagayan, the Sayre Highway leads off to the south. From this point to Cagayan the highway is generally fifty to several hundred feet from the shore with a gentle slope seaward from the road. From the town of Cagayan to the port of Macabalan there is a short stretch of surfaced road.

TABLE VII - 5
SELECTED BRIDGES OF MINDANAO (shown on FIGURE VII - 15)

NAME	LOCATION (Km. show highway distance from provincial capitals)	TYPE	LENGTH	WIDTH	REMARKS
<i>Agusan</i>					
1. Taguibo	Km. 9.9 on Butuan-Cabadbaran road	Through riveted steel truss with sidewalks	1 span, 158 ft. (48.78 m.). Total length, 192 ft. (58.46 m.)	3 feet (6.10 m.)	Toll bridge
2. Kinabhangnan	Km. 21.90 west of Butuan	Through riveted steel	1 span, 120 ft.		Toll bridge
<i>Bukidnon</i>					
3. Diklom	On Cagayan-Malaybalay road north of Del Monte Camp.	Timber truss	One 65-ft. span		May have been replaced
4. Manapuli	Over Manapuli river at Km. 20.6 south of Malaybalay	Suspension with steel towers and beams, concrete anchors and abutments	One 120-ft. span	10 ft. 8 in.	Completed 1927
<i>Cotabato</i>					
5. Rio Grande (Mindanao)	East of Cotabato at Km. 72.9 on the Cotabato-Davao highway, at Pagalungan	Pony riveted steel truss with sidewalks	9 spans, 19.7 ft. (24.38 m.) Total 765 ft. (232 m.)	20 ft. (6.1 m.)	
6. Silik Creek No. 1	Fort Pikit-Silik road	Timber on piles	7 spans, 19.7 ft. (6 m.) Total, 138 ft.		
7. Silik Creek No. 2	On Fort Pikit-Silik road	Timber on piles	7 spans, 19.7 ft. (6 m.) each. Total 138 ft.		
8. Libungan River	At Km. 31.6 east of Cotabato	Through riveted steel truss	1 span, 159.5 ft. (48.76 m.) Overall length, 198 ft.	20 ft. (6.1 m.)	
<i>Davao</i>					
9. Padada	Km. 68 on road south from Davao to Bolton	Through riveted steel truss	1 span, 159.5 ft. (48.7 m.)	20 ft. (6.1 m.)	
10. Sirawan	Km. 21.3 on road south from Davao	Reinforced concrete rigid frame	1 span, 49.2 ft. (15 m.) overall length	20 ft. (6.1 m.)	
11. Talomo	Km. 7.6 west of Davao	Steel truss	1 span, 79.5 ft. (24.38 m.) 1 span, 100 ft. (30.48 m.)	18 ft. (5.5 m.)	
12. Matina	Km. 5.5 south of Davao	Reinforced concrete rigid frame	1 span, 49.2 ft. (15 m.) overall	20 ft. (6.1 m.)	
13. Davad River	Km. 1 (.6 m.) just west of Davao	Steel truss	3 spans, 150 ft. (45.7 m.) each. Overall, 450 ft. (137.1 m.)	16.1 ft. (4.88 m.)	
14. Bunawan	Km. 23.18 north of Davao	Pony steel truss	1 span, 79.5 ft. (24.38 m.) Overall, 107 ft.	20 ft. (6.1 m.)	Completed 1936
15. Lasang	Km. 27.7 north of Davao	Reinforced concrete deck beam	3 spans, 39.4 ft. (12 m.) each	20 ft. (6.1 m.)	
<i>Lanao</i>					
16. Mataling	Just northwest of Malabang on Dansalan-Malabang road	Reinforced concrete arch	1 span, 70 ft. (21.3 m.)		
17. Dansalan	Over Agus River at Dansalan	Steel truss	1 span, 130 ft.		
18. Pantar	Over Agus River at Pantar, north of Dansalan	Suspension and girder; concrete piers			
19. Iligan	Over Malinduag River south of Iligan	Suspension and I-beam girder. Steel cables, timber towers on reinforced concrete piers	Suspension, 268.5 ft. (82.3 m.)		

TABLE VII - 5 (Continued)

NAME	LOCATION	TYPE	LENGTH	WIDTH	REMARKS
20. Mandulog	At Km. 40.8 near Santa Filomena on the coastal highway north of Iligan	Pony riveted steel truss on steel cylinder piers and concrete abutments	5 spans, 795 ft. (24.38 m.) each. Overall, 455 ft.	20 ft. (6.1 m.)	
<i>Misamis Occidental</i>					
21. Clarin	Km. 36 south of Oroquieta (about 7 km. north of Misamis)	Reinforced concrete slab and girder spans	5 spans, 39.3 ft. (12 m.) each	20 ft. (6.1 m.)	Replaced a wooden bridge
22. Tudela	Km. 30 south of Oroquieta	Reinforced concrete slab and girder on piles, with sidewalks	2 spans, 39.3 ft. (12 m.) each. Overall, 105 ft. (32 m.)	20 ft. (6.1 m.)	
23. Jimenez	Km. 18.5 south of Oroquieta; over Palilan River	Wood truss, reinforced concrete pier and abutments	2 spans, 80 ft. each		May have been replaced by riveted steel truss toll bridge
24. Sumasap	Km. 17.08 south of Oroquieta	Pony riveted steel truss	1 span, 80 ft. Overall 105 ft. (31.99 m.)	20 ft. (6.1 m.)	
25. Aloran	About 8 km. south of Oroquieta	Steel (?)			
26. Pinis	Over Pinis River about 4.5 km. south of Oroquieta	Steel (?)			
27. Oroquieta	At Oroquieta over Oroquieta river on coastal highway	Steel truss, reinforced concrete abutments and pier on timber pile foundations	2 spans, 130 ft. (39.62 m.) each. Overall, 245 ft. (74.7 m.)	16 ft. (4.88 m.)	Completed 1930
28. Plaridel	On branch road, near town of Plaridel	Wood truss	1 span, 90 ft.		
<i>Misamis Oriental</i>					
29. Iponan	At Iponan, over Iponan River, about 8 km. west of Cagayan	Collapsible wood	12 spans, 20 ft. each		
30. Cagayan	Over Cagayan River at western edge of Cagayan town	Steel truss, with sidewalks	4 spans, 160 ft. (48.76 m.) each	18 ft. (5.5 m.)	Toll bridge
31. Balbagan (Camiguin Is.)	About 4 km. south of Mambajao along coastal road	Reinforced concrete arch	1 span, 22 ft. (6.7 m.)		
<i>Zamboanga</i>					
32. Puluán	At Dapitan	Wood pile, rock causeway over tidal river	850 ft. (260 m.)		
33. Rizal	At Dapitan	Timber pile with rock fill approaches across tidal river	600 ft. (183 m.)		
34. Ilaya	Over Ilaya River at Km. 6.2 on Plaridel-Dapitan road	Through riveted steel truss and reinforced concrete deck beam; steel cylinder piers	1 span (truss), 120 ft. (36.58 m.) 2 girder spans, 39.3 ft. (12 m.)	20 ft. (6.1 m.)	
35. Dipolog	At Dipolog, Km. 14.23 on Dapitan-Dipolog road	Steel truss with sidewalks	2 spans, 98.4 ft. (30.48 m.) each 2 spans, 78.6 ft. (24.38 m.) each Overall, 388 ft. (118 m.)	20 ft. (6.1 m.)	
36. Dikayu	Over Dikayu River east of Katipunan Km. 26	Reinforced concrete slab and girder	6 spans, 39.3 ft. (12 m.) Overall, 223 ft.	20 ft. (6.1 m.)	Toll bridge
37. Ayala	Km. 17.3 west of Zamboanga on coast road	Wood pile	1 span, 110 ft.		It was planned to replace this with riveted steel truss
38. Manicahan	Over Manicahan River at Km. 24 on east coast road	Timber on reinforced concrete abutments and wood piles			

TABLE VII - 5 (Continued)

NAME	LOCATION	TYPE	LENGTH	WIDTH	REMARKS
39. Bolong	About Km. 35 north of Zamboanga on the east coast highway				
40. Isabela, Basilan I.	Over Isabela River at the town	Wood truss and pile	1 central truss, 50 ft. 3 pile spans, 20 ft. each 1 pile span, 10 ft.		

7. Cagayan to Pantalan. This short road down into Bukidnon Province leaves the main road just west of the bridge over the Cagayan River. It follows the river for some distance and is lined with houses. Just after leaving the town, the road makes a sharp turn and ascends a hill from which there is a view over the town and coastline. As the road leaves the town it winds its way through heavily wooded and mountainous terrain, and it is reported that there are frequent landslides. The Cagayan River is crossed by ferry at Ugyaban, at which point the river is about 40 feet wide, deep, swift, and with rocky banks. It should be noted that the road through rich farm country from Talakag to Pantalan was improved for trucks in 1941.

8. Cagayan to Iligan. This portion of the highway is 2-lane, gravel-surfaced and comparatively level and straight (FIGURE VII - 18). It parallels the coast rather closely and the sea is visible at many places. Much of this area is planted in coconuts and corn. Just before the provincial boundary is reached there is a good trail which follows a river inland to a gold property. Beyond, in the vicinity of the Mandulog River, a road leads into the mining claims up that river. The road crossed the Mandulog River over a fairly new bridge before reaching Iligan.



FIGURE VII - 18. Mindanao.
Looking toward the sea along coastal road, about 17 miles NNE of Cagayan, Misamis Oriental, 1939.

9. Iligan to Kolambugan. The highway continues rock-surfaced and 2-lane to Kolambugan (FIGURE VII - 19). Several rivers along this section of the route were either ferried or forded and frequently caused considerable delay.

10. Kolambugan to Misamis. This section of the highway is poorer than most of the north coast road because of the swampy nature of the land over which it was built. It is difficult to keep the road drained and in repair. From this road, at the head of Panguil Bay, an equally poor road crosses to the southern coast of the island and follows the shore to Pagadian. This isthmus is the narrowest point at which the island can be



FIGURE VII - 19. Lanao, Mindanao.
Culvert along coastal highway between Iligan and Camp Overton, 1938.

crossed. From Tangub, on the north coast highway, to Misamis, the road traverses higher land and is considerably better. There are several narrow wooden bridges but they were strong enough to support bus and truck traffic.

11. Misamis to Oroquieta. This is a well-built stretch of road and supported heavy truck traffic during all seasons. The highway is stone-surfaced in some sections, macadamized in others. It closely parallels the coast and runs through much rice paddy land. There are many streams most of which were crossed over strongly built permanent bridges (TABLE VII - 5).

12. Oroquieta to Dipolog. This portion of the road cuts across the peninsula through hilly wooded terrain. It is winding and poorly surfaced in some places. Some of the bridges were temporary, and portions of the road were under construction in 1941. Numerous side roads connect the main road with important towns such as Plaridel and Baliangao in Misamis Province, and Dapitan in Zamboanga. The latter is reached either by branch highway along the Dapitan River or by coastal highway from Dipolog.

13. Dipolog to Sindangan. The highway closely parallels the coast, frequently at the water's edge, and within sight of the sea at most places. It is gravel and rock-surfaced, the section south of Katipunan having been cut from the rocky cliff at the water's edge. Between Dipolog and Katipunan the highway crosses the coastal edge of a flat to rolling grassy plain.

(b) Iligan (Lanao) to Cotabato.

1. Iligan to Dansalan. This road leaves the coastal highway at Camp Overton just south of Iligan. Two roads lead inland from this point: the Old Spanish Trail, which is the more easterly of the two, and the newer road which passes the military reservation and Abaga Falls. This road is shorter but is cut

through more rugged terrain; the Old Spanish Trail has a much easier grade. South of the junction of these roads, the highway proceeds through level and slightly hilly country to Pantar, where it crosses the Agus River over a suspension bridge (FIGURE VII - 20). From this point, the road climbs steadily and is rather crooked. At the top of the climb, the road is level for $\frac{1}{4}$ mile before it reaches Lake Lanao at Camp Keithley (FIGURES VII - 21 and VII - 22). A branch of the main road goes eastward to Dansalan where the Agus River is crossed again by bridge (FIGURES VII - 23 and VIII - 23). It has been reported that a dirt road was completed from Dansalan around the east shore of Lake Lanao.



FIGURE VII - 20. Lanao, Mindanao.
Looking SW at Pantar Bridge across the Agus River, Iligan-Dansalan road.



FIGURE VII - 21. Lanao, Mindanao.
Along the Iligan-Dansalan road near Camp Keithley.



FIGURE VII - 22. Lanao, Mindanao.
Steel and wood bridge at Camp Keithley, 1927.

2. Dansalan to Malabang. From Dansalan and Camp Keithley the main provincial highway follows the west shore of Lake Lanao, rice fields and swamps lying between the road and the lake. This stretch of road has solid rock base covered with a surface of mixed clay and gravel. Although 2-lane all the way, it is narrower along the lake shore than to the south. From Ganassi, at the southern end of the lake, the road follows a ridge to the Mataling River, just northwest of Malabang (FIGURE VII - 24).

3. Malabang to Cotabato. For a short distance south of Malabang the road is quite near the shore and traverses level land. Beyond, it winds through hilly country to Polloc Harbor,

where it follows the shore to Parang (FIGURE VII - 25). From there the country is rolling grassland all the way to Cotabato. Several bridges on this portion of road cross deep river valleys, and their destruction would therefore seriously impede travel. About 7 miles northeast of Cotabato is the junction with the Davao road. The road leading to Cotabato south from the junction runs along a row of hills overlooking swampy country to the north and to the south (FIGURE VIII - 17). This section is often washed out during the wet season. There is a ferry at Cotabato and another a few miles south at Tamontaka.

(c) Sayre Highway from Cagayan (Misamis Occidental) to Kabacan (Cotabato).

1. Cagayan to Maluko. The highway follows the coast road for about 8 miles; it then turns south and immediately begins its winding ascent to the plateau area. Narrow canyon-like north-south river valleys, with high flat cultivated plateaus between, characterize this northern section of Bukidnon Province (FIGURE VII - 26). Just south of the provincial boundary, a branch road leads off south and west to Libona. This side road serviced the Del Monte pineapple plantation and was constructed for 2-way truck traffic (FIGURE VII - 27). As the main road continues southeast, it crosses several streams and in many places is cut from the sides of ravines. In spite of the difficult



FIGURE VII - 23. Lanao, Mindanao.
Bridge at Dansalan over Agus River.



FIGURE VII - 24. Lanao, Mindanao.

Dansalan-Malabang road, near Malabang. Now rock-surfaced. 1939.

terrain, the road is good 2-way gravel except over the narrow bridges. Most of the bridges are wooden, 30 or 40 feet long, and many have tops to keep them from rotting in the sun. These bridges usually span ravines in which streams flow only after heavy downpours. The stretch from Tankulan to Dalirig lies along the side of the 1,000-foot scenic Mangima canyon (FIGURE VII - 28). There are many steep inclines and numerous hairpin turns, but busses and trucks were able to make the run except when traffic was interrupted by landslides. The swift river was crossed on a firmly-built cement, hardwood, and steel bridge (FIGURE VII - 29).

From Dalirig, the road continues its zig-zag winding route to Maluko, crossing many bridged streams which would be too



FIGURE VII - 25. Mindanao.

Typical unsurfaced road. Branch road east from Parang, Corabato. 1939.

rocky and too swift to be crossed if the bridges were destroyed.

2. Maluko to Malaybalay. As the road turns southward out of Maluko, it enters another scenic canyon, the Kulaman, which lies between Maluko and Impasugong. This, like the Mangima canyon road, is zig-zag, cut from the canyon wall with a drop of several hundred feet on the valley side. About 2 miles south of Maluko, the road crosses the river over a 50-foot covered wooden bridge and then follows the southern rim of the canyon to the top. About 3 miles north of Impasugong, a side road leads westward to Simulao, and just beyond is a short road leading eastward to the Alalum Falls. The road from the top of the canyon to Impasugong is said to be the longest straight stretch along the Sayre Highway. From Impasugong the road again follows a canyon, having been cut from the solid rock mountain side (FIGURE VII - 30). Beyond Impalutao (about 12 miles north of Malaybalay) the road reaches the fairly level divide between the north coast and south coast drainage systems. Orange groves, cinchona plantations, and cattle ranches are located in this region. The prosperous village of Malaybalay lies at the bottom of the low gradual hill in a mountain-rimmed valley near the headwaters of one of the tributaries

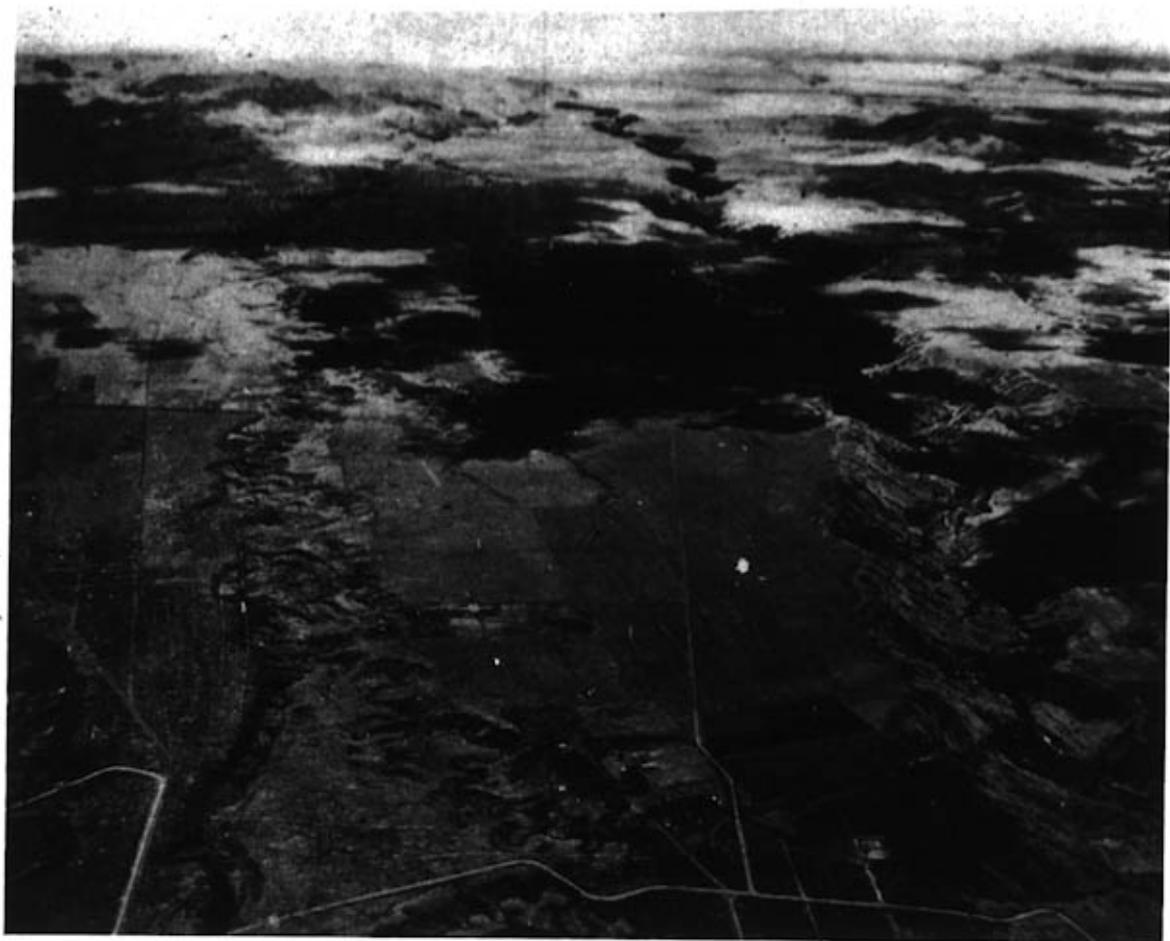


FIGURE VII - 26. *Bukidnon, Mindanao.*

Airview looking southward over Bukidnon plateau. Libona road shown in upper right, Del Monte plantation road in center, Sayre highway in foreground.

of the Pulangi and Mindanao Rivers (south coast drainage system) (FIGURE VIII - 22).

3. Malaybalay to Maramag. This entire stretch is through fairly level country (FIGURE VII - 31), with no canyons or difficult river crossings except across the swift flowing Manupali River, which spanned by a well-built suspension bridge (TABLE VII - 5). Should this bridge be destroyed, an alternative route could be used. About 7 miles south of Malaybalay, a branch dirt road leads eastward to Linabo and westward to Bugcaon and Alanib. The latter could be followed to a fording place across the Manupali, and it would then be possible to drive cross-country and connect with another dirt road from Lurugan into Mailag (a trail connects Lurugan with the Pantalan-Cagayan road). From Mailag to Maramag the country is open level ranch land with few dwellings along the road. This surfaced portion of the highway was the most recently completed, and some of the bridges may still be of a temporary nature.

4. Maramag to Kabacan. This stretch of the road was well graded and traversable in 1941 but had not been surfaced, so that it was frequently muddy or dusty. The country is fairly level and open approximately to the Cotabato line. From there

on the country is more rolling and heavily wooded. There is a ferry at Kabacan and, just beyond, the Sayre Highway joins the Cotabato-Davao road.

(d) *Cotabato-Davao Highway.*

1. Cotabato to Kabacan. This is one of the most important stretches of road in Mindanao and before the war was a well-used route. It is 2-way, well-surfaced all the way, and asphalted part of the distance. Between the town of Cotabato and the junction with the Sayre Highway, the route swings north of the marshes which lie between the Mindanao and Libungan Rivers. In spite of this, however, the road is not high enough to prevent frequent washes during periods of heavy rain. There were well-constructed bridges across the Libungan River and at Pagalungan. About 27 miles east of Cotabato a good road leads off to the south to the Mindanao River. Another branch road leads west from Pikit. The country through which the road passes is rolling, with small farms, some hemp plantations, coconut groves, rice paddies, and some wooded areas.

2. Kabacan to Digos. Beyond the junction with the Sayre Highway (south of Kabacan), the Davao road stretches through jungle wilderness, climbing all the way to the divide at the Davao provincial boundary. The portion of the road from



FIGURE VII - 27. *Bukidnon, Mindanao.*
Bridge over Little Agusan River, during construction. Libona road below Damilag.



FIGURE VII - 28. *Bukidnon, Mindanao.*
Airview of road through Mangima Canyon. 1939.

the Davao boundary to Digos is dirt- and gravel-surfaced and was not so good as the Cotabato section. Jungle continues to line the road to the coast.

(e) *Malalag-Moncayo (Davao Highway).*

1. Malalag to Digos. Starting near the plantations along Malalag Bay, the road to Digos is 2-way graded dirt. The bridges are generally small, 1-way, and of wood, with the exception of the one over the Padada River (TABLE VII - 5). A large part of this section of road is raised above the cultivated lowlands on either side.

2. Digos to Talomo. North from Digos the hills come down quite close to the coast, and although the highway follows close to the shore, it is in the foothills much of the time, with considerable areas of cogon grass. Proceeding northward toward Talomo, the land is somewhat more level and almost the entire area is under cultivation. This region was the center of abaca production in Mindanao and there are numerous large plantations all along the route. The road has a good crushed rock surface.

3. Talomo to Davao. This stretch of the road was a very busy one before the war and was asphalt surfaced. The road is chiefly through level land or low hills and the streams are well bridged (TABLE VII - 5 and FIGURE VII - 32). Destruction of some of these bridges would cause serious obstruction to traffic.

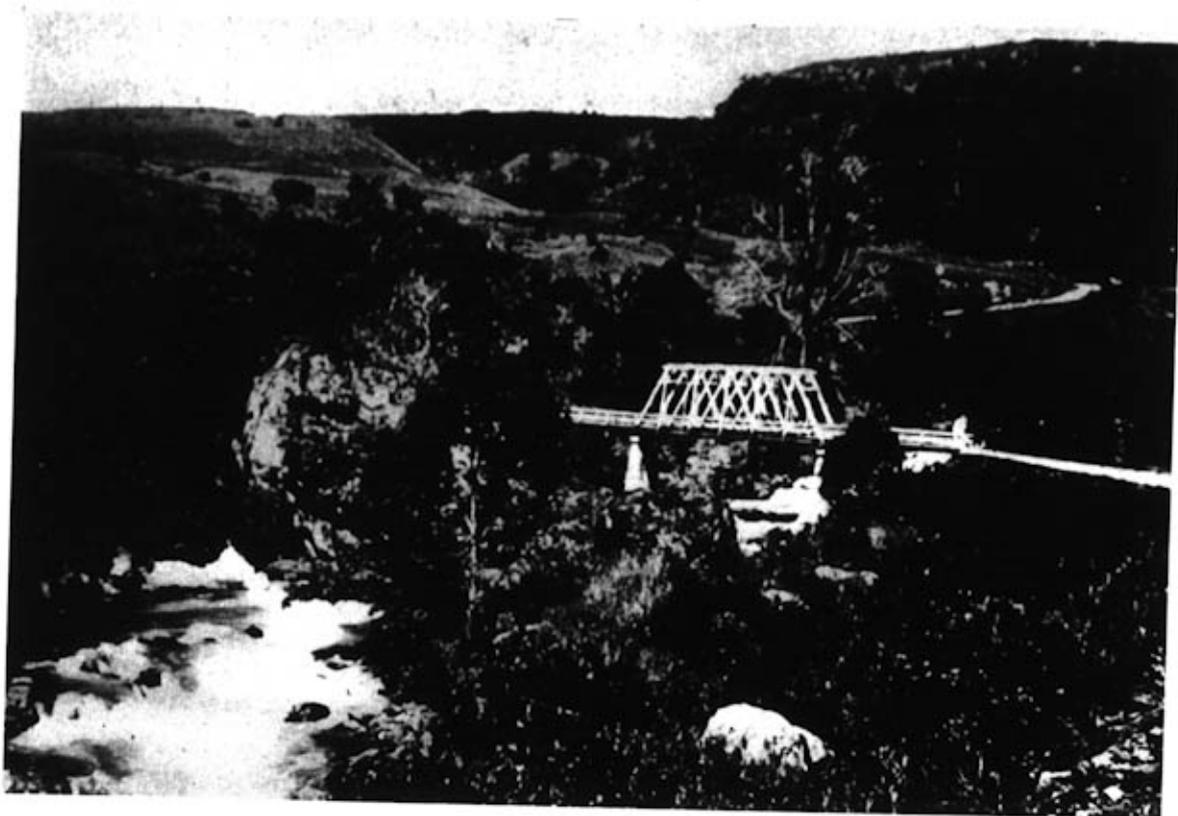


FIGURE VII - 29. *Bukidnon, Mindanao.*
Mangima Canyon Bridge between Tankulan and Dalirig, Sayre Highway.



FIGURE VII - 30. *Bukidnon, Mindanao.*
Looking down Atugan Canyon just south of Impasugong on
Sayre Highway. 1939.



FIGURE VII - 31. *Bukidnon, Mindanao.*
Looking south toward Mailag along the Sayre Highway. 1939.

4. Davao to Moncayo. For about 6 miles out of Davao, the road is concrete-surfaced; from there on, it is gravel to a point just beyond the Tagum River. Northward from Davao the

road proceeds through fairly open country, with some coconut trees near the shore. Beyond the Lasang River there is a swampy area where the road had to be built up above the general level. About 20 miles north of Davao, a fair road leads off northwest to the Davao Penal Colony. Approximately 8 miles beyond, there is a branch road to Hijo on the Hijo River. North from this junction the road is graded but not well surfaced, and would not take truck traffic. The grading extends to Moncayo, and it had been intended that a road be constructed on through the Agusan valley.



FIGURE VII - 32. *Davao, Mindanao.*
Generoso Bridge over Davao River, looking down stream.

5. Davao city and vicinity. In addition to the main highway described here, there was a network of good dirt plantation roads radiating from Davao, Tolomo, and Daliao. Most of these were connecting and were good enough for truck traffic except in the wettest period.

(f) *Cotabato-Makar* (Koronadal valley). This route follows the Cotabato-Davao highway to Midsayap and then a good road southward to Dulawan (FIGURE VII - 33). The new portion of the road starts at that point proceeding south and east across the Dansalan River. From the point where this highway crosses the river, the road goes through mountainous country. Beyond the river, the road crosses the lowland lying between the river and Lake Buluan. Proceeding southward to Koronadal, the road ascends a rough divide between the drainage of Illana Bay and Sarangani Bay. Beyond the divide the area is fairly flat. The road passed through the proposed Koronadal Resettlement area and was under construction in 1941. It was graded and traversable in dry weather all the way, but evidence seems to indicate that it was gravelled between Makar and Koronadal before the outbreak of the Pacific war.



FIGURE VII - 33. *Cotabato, Mindanao.*
Dulawan-Midsayap road, looking north toward junction with Cotabato-Davao Highway (Cotabato left, Davao right). 1939.

(g) *Zamboanga Peninsula.*

1. Patalon to Zamboanga. This entire stretch of road lies quite close to the shore, in many places being almost at the water's edge (FIGURE VII - 34). It is a good gravel-surfaced, 2-way highway capable of accommodating heavy truck traffic.

Coconuts line the landward side of the road, while many good beaches are to be found between the road and the sea. In numerous places it would be possible to drive from the beach up onto the road. There is a good network of supplementary roads in the vicinity of the city of Zamboanga.



FIGURE VII - 34. *Zamboanga, Mindanao.*
Zamboanga coastal road along Caldera Bay, 12 miles west of Zamboanga city.

2. Zamboanga to Bolong. This stretch of road is partially asphalted; the remainder is good 2-way gravel, capable of supporting heavy traffic all year (FIGURES VII - 35 and VII - 36). Coconuts line the road almost all the way. There are some areas of rice paddy in the lowlands at the southern end of the peninsula.



FIGURE VII - 35. *Zamboanga, Mindanao.*
A section of first-class water-bound macadam road near Zamboanga city. Before 1929.

3. Bolong to Vitali. North of Bolong, the road proceeds through hillier country with forests along the highway. Near Curuan there are rice paddies. The road continues on to

Vitali but is not so well used or maintained near the northern end.



FIGURE VII - 36. Zamboanga, Mindanao.
Bridge near Manicahan on coastal road 15 miles northeast of
Zamboanga city. Before 1939.

(b) *Miscellaneous short roads.*

1. Mati to Tugubun Point (Davao). The portion of this road from Mati to Mayo is well surfaced but the short stretch beyond is dirt. This dirt stretch follows the coast and is frequently washed by the high tide.
2. Cateel to Santa Filomena (Davao). This is a short stretch of only a few miles. Although rough, it was built to accommodate truck traffic.
3. Hinatuan to Lianga (Surigao). This was rather recently constructed and is reported to be of good gravel surfacing.

4. Tago to Tandag (Surigao). The road joining these 2 towns is short but well built and used for trucking.

5. Malangas to Sibuguey River (Zamboanga). A dirt road was built following roughly the route of the railroad to the coal mines of the Sibuguey peninsula (FIGURE VII - 37 and Reference K on FIGURE VII - 15).

6. Camiguin Island (Misamis Oriental). A fairly good road almost circles this island, following quite close to the coast all the way.

7. Cotabato to Nuro (Cotabato). There is a fairly good road southward from the town of Cotabato to Upi, a short dirt road continues to the village of Nuro.

(3) *Trails.*

No attempt has been made to describe the trails of Mindanao or to show their location on the map. Trails are very numerous, chiefly connecting water routes. Most of the trails, therefore, usually begin some distance upstream and often follow the stream closely to the drainage divide. In some areas, as on the deeply dissected plateau of northern Bukidnon, the trails follow the highlands or ridges.

D. Sulu Archipelago.

(1) *General.*

There are no roads on the islands of the Sulu Archipelago except those listed and described below. However, there are numerous trails on all of the other islands of sufficient land area. All other communication is by water.

(2) *Basilan Island.*

There is only 1 road on the island, linking Isabela, Lamitan, and Bohelbong in the north. The surface is of coral and basaltic rock and is almost as firm as cement in many places. The section from Lamitan to Bohelbong is not so well surfaced as that between Lamitan and Isabela. The road is 2-way, but there



FIGURE VII - 37. Zamboanga, Mindanao.
Malangas Road, ferry across Sibuguey River.

are some places where cars must come almost to a stop in order to pass each other. The road is ditched and well drained. There was bus service along the entire stretch. Leaving Isabela, the road eastward lies between the old volcanic peaks and the coastal plain with its coconut and rubber plantations (FIGURE VIII - 27). The hilly sections are well wooded and the road runs through the woods most of the distance from Isabela to Lamitan. The streams crossed are not large, and most of them are spanned by small wooden bridges. Several plantation roads lead off the main highway along the stretch between Isabela and Lamitan.

(3) Jolo Island.

An extensive network of gravelled, macadam, and coral rock-surfaced roads was maintained. Most of these roads were used by busses of the Jolo Transportation Company, and, if maintained, would support heavy traffic. The bus company had about 30 busses; in addition, some 34 trucks and 35 automobiles were registered. There were about 100 miles of surfaced highways and about 30 miles of graded road. Highways in and around the city of Jolo were mostly macadam (FIGURES VII - 38 and VIII - 29). Roads in the interior, such as the main east-west highway and the main north-south highway, were of gravel and crushed volcanic rock. Coastal roads were surfaced mainly with coral limestone, which is available along the beaches. The principal highways pass through gently rolling country, and are fairly well maintained. The Bureau of Public Works kept some



FIGURE VII - 38. Sulu.
First-class road from Jolo to Mainbung, 1927.

road equipment at Jolo. Most of the bridges are small but well constructed of timber, with concrete abutments to support a load of 5 tons. There is one 5-span concrete bridge over the Legian River near the town of Jolo (Reference 41 on FIGURE VII - 15).

(4) Tawitawi Island.

There is only 1 road on the island, which was being constructed of crushed rock in 1941 from Batu Batu on the south coast to Tawakan on the opposite coast. It was passable even in 1941.

(5) Cagayan Sulu Island.

There is a short road northeast from Gunboat Harbor to the opposite coast. There also are pony trails on the island.

E. Borneo.

This area may be discussed by political areas: British North Borneo and Dutch Borneo. British North Borneo has a comparatively good land transportation network with several roads and numerous bridle paths. On the other hand, the system of British North Borneo is characterized by numerous footpaths or trails (FIGURE VII - 39).

(1) British North Borneo.

Up to 1920, the British part had no roads outside of the urban and suburban areas of the cities of Sandakan and Jesselton. In 1941, there were about 340 miles of roads and 640 miles of bridle paths. For road surfacing hard sandstone was used wherever possible; elsewhere coral is the surfacing material (FIGURE VII - 40). No solid tires nor vehicles over 4 tons in weight were allowed on the roads. The bridle paths are generally 6 feet wide, well graded, and very good for pony and track transport (FIGURES VII - 41 and VII - 42). They were generally jeepable in all weather and motorable in dry weather.



FIGURE VII - 40. British North Borneo.
Road south of Sandakan.



FIGURE VII - 41. British North Borneo.
Bridle path.



FIGURE VII - 42. British North Borneo.
Typical bridge near Keningau.

The west coast has many more roads and bridle paths than the east coast. In the latter area, the only roads are in the vicinity of Sandakan, Lahad Datu, and Tawau. The chief purpose of these roads is to afford transportation between the towns and nearby estates. River transport was utilized almost entirely for the marketing of timber.

(2) *Dutch Borneo.*

In the Dutch portion of Northeastern Borneo, the only roads are on the island of Tarakan, leading from the town to the oil fields in the interior of the island (FIGURES VII - 43 and VII - 44). On the mainland, footpaths are the only means of land transport. They generally connect the headwaters of streams and rivers and usually follow valleys, although some cross mountain ridges. There is only 1 footpath leading from the east coast westward through the interior. It goes from Tg. Redeb westward, generally along river valleys, to the network of footpaths around Lg. Nawan. The only other small network of footpaths is around Papoetok, Paorang, and Lg. Beroewar in the north-west corner of Dutch Borneo.

F. Northern Celebes sector.

The northern arm of the Celebes is comparatively well supplied with roads and footpaths (FIGURE VII - 45). The main roads are concentrated in the Minahasa region, centering around Manado (FIGURE VII - 46). Secondary roads provide ample

connection between the roads in Minahasa (FIGURE VII - 47). The second important road system centers on Gorontalo. It is possible to cross the arm to the north shore at Koeandang by either of 2 good motor roads northward from Gorontalo around Limboto Lake. There are scattered stretches of good auto roads and also of secondary roads along parts of both the north and south coasts (FIGURE VII - 48).

The main auto roads are believed to have been constructed and improved so that they have a width of 6 meters (19.7 feet) with a surfaced top layer 4 meters (13.1 feet) wide and 20 centimeters (7 inches) thick. The gradient was to be not more than 1:18 and in general there was to be no curve less than 20 meters (65.6 feet) measured from the axis of the road. The secondary roads were to be 5 meters (16.4 feet) wide with a surfaced top layer of 3 meters (9.8 feet) in width and 15 centimeters (5.8 inches) thick. Gravel was to be used, if possible, for metalling of the road surface; otherwise, broken stone was to be the alternative material.

There are numerous footpaths throughout the northern arm of the Celebes. Several footpaths traverse the arm from the north to the south and provide access into the interior and to both coasts (FIGURE VII - 49). The footpaths supplement both the main auto roads and the secondary roads as means of land transport. The native carriers of the area, in transporting goods over these paths, employ back-baskets, which they attach to their shoulders with tumplines and shoulder cords.



FIGURE VII - 43. *Dutch Borneo.*
Road on Tarakan Island.

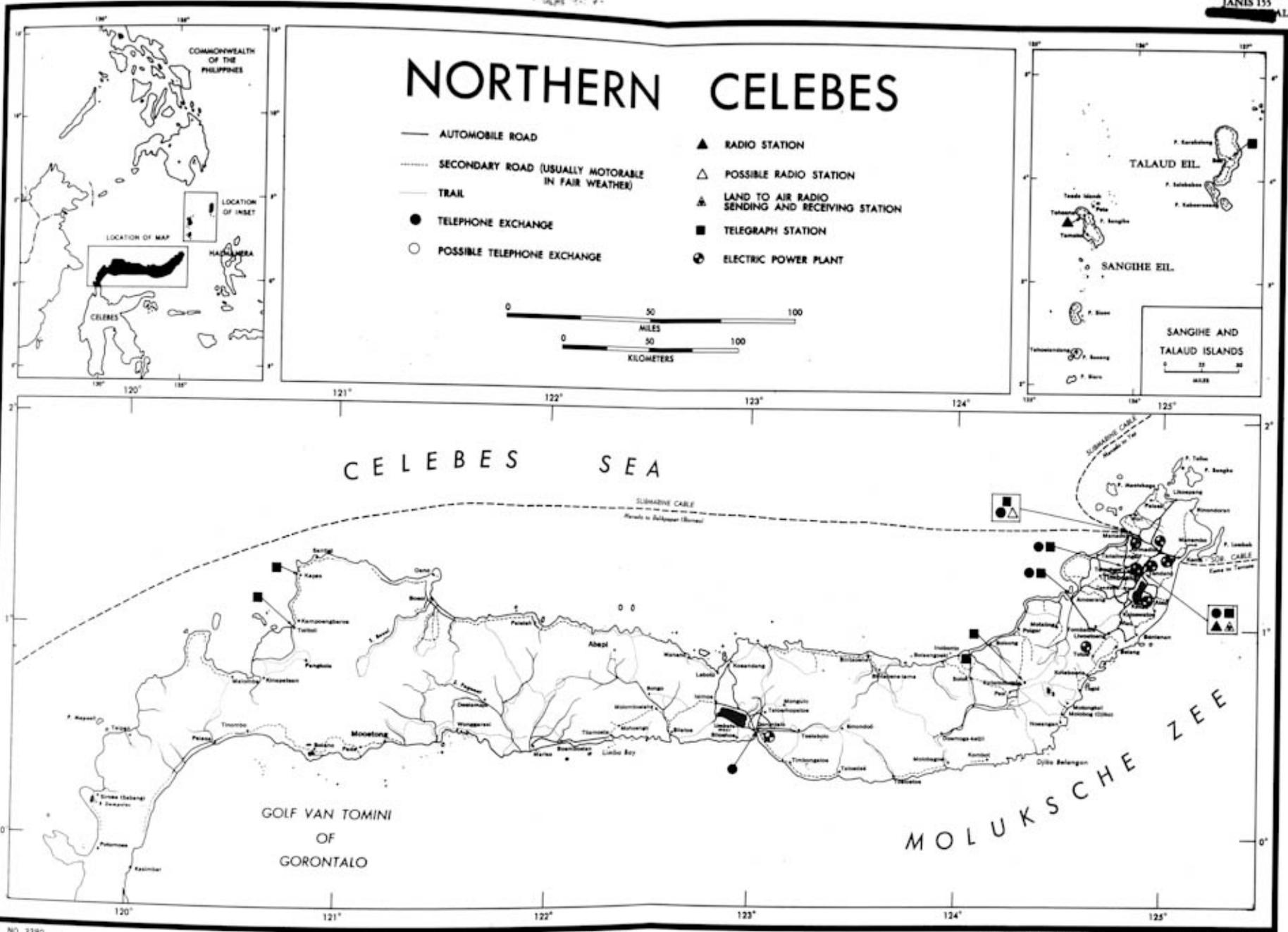




FIGURE VII - 44. *Dutch Borneo.*
Airview of road near Djoewata, Tarakan Island.



FIGURE VII - 47. *Celebes.*
Narrow dirt road along NW shore of Lake Tondano. 1937.



FIGURE VII - 48. *Celebes.*
Coastal road near Koeandang.



FIGURE VII - 46. *Celebes.*
Road bridge over Manado River near Manado.



FIGURE VII - 49. *Celebes.*
Footpath along Gorontalo Bay. 1939.

73. Water Transport

A. Coastal and inter-island.

(1) *Netherlands East Indies.*

Vessels of the Koninklijke Paketvaart-Maatschappij (K.P.M.), most of which were from 2,000 to 4,000 gross tons, paid regular calls to the various ports of the Dutch portion of the Celebes Sea Area. These ports, considered by area, were:

Halmahera: Boeli, Kaeo, Laboeha, Gamsoengi, Ternate, Tobelo, Wajaboela, and Weda.

Sangihe-Talaud: Beo, Peta, Hoeloe, and Tafoena.

Borneo: Tandjoeng Redeb, Tanjoeng-Selor, and Tarakan.

Northern Celebes: Amoerang, Boeol, Boroko, Gorontalo, Inobonto, Leok, Manado, Palehleh, Sabang (Dampelas), Soemalata, and Kampongbaroe.

In addition to the regular service calls at the above ports, many of the K.P.M. steamers stopped at any suitable anchorage when cargoes were available. The cargoes at these minor points as well as that at the major ports was usually assembled or disseminated by a fleet of smaller boats most of which belong to the prau classification, and which acted as lighters. The difficulties of travel by prau are great, and crews highly skilled in their use and having an intimate knowledge of local sailing conditions are essential.

The variety of praus utilized is illustrated by those in popular use in the Halmahera area. These included:

(a) *Pakata*. This type often has a small cabin amidships. Some are propelled by paddles, others by sail. The larger ones can carry up to 30 bags of copra equivalent to approximately 1,800 pounds and have crews of 5 or 6 persons.

(b) *Rolotoe*. The largest of these carry only 10 bags of copra (approximately 600 pounds). Some have a mast, others are paddle-propelled.

(c) *Rorebe*. A particular type used mainly by Tidorese. They usually carry masts and are good sailing vessels. They are used almost exclusively for fishing.

(d) *Lepa Lepa*. These are found both with and without masts. Large ones are up to 12 meters in length, and can load up to 15 bags of copra (approximately 900 pounds). Traders often use them for transport of copra, but they are not popular among natives for their own use.

(e) *Semang*. This very small craft, without a mast, is universally used. Larger craft often employ it as a tow.

(f) *Relang*. These can carry from 15 to 20 persons. Some are fitted with masts.

(2) *Philippine Islands.*

In Mindanao, the chief ports of call for ocean-going vessels were Zamboanga and Davao. The bulk of the islands trade, however, was carried by inter-island steamer service. Less regular stops were made at Cotabato and Cagayan, and occasional stops were made at Dipolog, Misamis, Iligan, Butuan, and Surigao, and at the docks of the larger lumber companies and plantations. There was a considerable coastal trade around the island involving the movement of goods from plantations and sawmills to nearby port towns. Trade along the northern coast was considerably curtailed during the northeast monsoons, when the water is extremely rough.

Craft of all varieties were seen in the ports of Mindanao. Ocean-going vessels of both cargo and passenger types were seen, a large number of which were Japanese-owned and called

principally at Davao. Inter-island steamers varied in size and generally followed the more sheltered inner routes of travel. Much of the coastal trade was carried on by launch-towed barges (FIGURE VII - 50). The native banca, an outrigger canoe with sails, is used for coastal transportation and travel as well as on the inland waterways (FIGURE VII - 51).



FIGURE VII - 50. *Mindanao.*
Typical launch-towed barge used in inter-island and coastal trade.



FIGURE VII - 51. *Mindanao.*
Houseboat outrigger canoe.

Several ocean-going vessels and the majority of the inter-island boats were lost during the early stages of the war. The Japanese report that full use is now being made of waterways in Mindanao.

The Sulu area was also served by steamers which maintained regular service with Jolo and Port Holland with occasional stops at Isabela. Jolo also had steamer connections with Sandakan and Singapore. There was also daily ferry service between Isabela and Lamitan and Zamboanga and bi-weekly service from Port Holland and Zamboanga. Motor launches provided inter-island service every 2 weeks between Zamboanga and various points in the Sulu Archipelago, including Jolo, Siasi, Bongao, and Silankai.

(3) *British North Borneo.*

British North Borneo was served principally by the Straits Steamship Company and the Sabah Steamship Company with some service also provided by the Indo-China Navigation Company, the Osaka Shosen Kaisha, and the K.P.M. The major ports of call were Sandakan, Lahad Datu, Semporna, Tawau, Kudat, Usukan, and Jesselton.

The extensive fleets of small boats common to the Celebes Sea Area are also part of the North Borneo water transportation picture.

B. Inland.

(1) *Halmahera sector.*

The use of rivers as inland waterways on Halmahera is everywhere difficult because of bars at the river mouths, generally awash at low tide, and because of the swiftness of river currents. Praus drawing 2 to 3 feet are about the largest which can negotiate the river mouths bars and only skillfully navigated praus can overcome the river dangers. On the smaller islands of the Halmahera area streams are too short, narrow, or uneven in flow to be used as waterways.

(2) *Sangihe-Talaud sector.*

The streams of the Sangihe-Talaud Islands, like those of the smaller islands of the Halmahera area, are not suitable for navigation except for dugout canoes or the very smallest praus.

(3) *Mindanao sector.*

The inland waterways form a very important part of the transportation pattern of Mindanao. The natives are adept at the handling of their bancas. These vary in size but are of the outrigger canoe class, usually equipped with a sail (FIGURE VII - 52). Most of the larger rivers of Mindanao are navigable for long distances by these shallow (about 1½-foot) draft boats (FIGURE VII - 53). Many are navigable by launches (FIGURE VII - 54). The 2 most important river systems in Mindanao are those of the Agusan and the Mindanao (Cotabato province). Both of these are over 100 miles long and navigable by banca for most of that length. Their numerous tributaries form a transportation network in their respective provinces (FIGURES VII - 55 and VII - 56). The larger islands near Mindanao—Camiguin, Siargao, and Dinagat—have few rivers

that are navigable at all. Available information on the navigability of rivers is shown in TABLE VII - 6. There are a number of lakes in Mindanao, the largest of which are Lakes Lanao, and Mainit. Both of these lakes and many of the smaller ones are used by bancas.

(4) *Sulu Archipelago.*

Most of the islands of the group are small and the streams are therefore short and seldom navigable. However, since there are few roads, these streams are used wherever possible. There are



FIGURE VII - 52. *Mindanao.*
Typical banca.



FIGURE VII - 53. *Davao, Mindanao.*
Native boats near head of navigation on Cateel River, about 25 miles from mouth. 1927.

no large rivers on Basilan Island, but a few of the small streams are navigable at high tide for short distances, the upper courses being blocked by rocks and fallen logs. There are no rivers of importance on any of the other islands.

(5) *Borneo.*

The rivers of Borneo, some of which are very wide and deep (Chapter II), were its main routes of travel and trade. Except for the most primitive nomads all the natives used boats continuously even for very short trips. The importance of waterways is well illustrated in FIGURE VII - 39, where it can be seen that the existing trails usually serve the purpose of providing connections between streams.

(6) *Northern Celebes sector.*

Because of a mountainous terrain which nearly everywhere extends down to the sea, the streams of the Northern Celebes are



FIGURE VII - 54. *Zamboanga, Mindanao.*
Launch on Selangan River near Goodyear Rubber Company dock.

short and swift, and travel by inland waterways is relatively unimportant. The only exception is afforded by the lakes of the interior, where dugout canoes, without outriggers but sometimes with rough mat or cloth sails, are in use.



FIGURE VII - 55. *Mindanao.*
Steamer on Agusan River near Butuan.



FIGURE VII - 56. *Cotabato, Mindanao.*
Old stern-wheel steamer used on Mindanao River between Cotabato and Fort Pikit.

TABLE VII - 6
RIVERS OF MINDANAO

NAME	LOCATION	MOUTH	NAVIGABILITY	REMARKS
<i>Agusan</i> Tubay	Drains from Lake Mainit into Butuan Bay.	Very little water over bar at mouth.	Natives pole canoes up this river to Lake Mainit.	A swift-flowing stream.
Cabadbaran	Flows into Butuan Bay at Cabadbaran.	Bar bares at low water.		
<i>Agusan</i>	Drains large central valley of Agusan province. Empties into Butuan Bay at southeast corner.	L 9-10 ft. N 12-14 ft. western entrance.	Navigable 11 km. (6.6 mi.) for vessels of 8-ft. draft; 112 km. (67 mi.) for vessels of 4-ft. draft, native craft almost to Davao border.	If entrance channel were dredged, vessels of 12-ft. draft could go up river 11 km. Mouth to north of Ponto Island is blocked by stones and not used for navigation. River very high during rainy season (Dec-Mar.)
<i>Bukidnon</i> Tagoloan	(See Misamis Occidental)			
<i>Cotabato</i> Mindanao	Forms the major drainage system of the province of Cotabato and flows into Moro Gulf about 5 miles west of the town of Cotabato.	Cotabato entrance Low 6 ft. High 8-9 ft. over the bar. Only small native craft use the southern entrance.	Cotabato arm of the river is navigable for small steamers of about 8-ft. draft 27 miles up river at all seasons and about 52 miles at periods of high water. For vessels of 5-ft. draft it is navigable about 70 miles.	Also known as the Rio Grande. The largest river in Mindanao. It discharges west of Cotabato by 2 large and several small mouths. (FIGURE VII - 56).

TABLE VII - 6 (Continued)

NAME	LOCATION	MOUTH	NAVIGABILITY	REMARKS
<i>Davao</i>				
Padada	Flows into Davao Gulf at the town of Padada.			One of the largest rivers along the Gulf.
Talomo	About 7 miles southwest of Davao.	3 feet at high tide.	About 1/2 mi. for 5-ft. draft over mile for bancas.	Channel stable, bed of sand and silt.
Davao	Lies to west of the town of Davao.	6 feet at high tide. 2-3 feet at low.	About 1/2 mi. for 3-ft. draft. About 12 mi. for bancas.	Shoals at mouth. River used little except by fishermen. (FIGURES VII - 32, VIII - 12).
Bunawan and Lasang	About 12 miles north of Davao.	Shifting bars.	Both navigable several miles for launches of 2- or 3-ft. draft.	Both rivers have deltas that of the Lasang being larger.
Tagum	About 25 miles northeast of Davao.	6 feet at high tide.	About 7 mi. for 2 1/2-ft. draft. About 75 mi. for bancas.	Channel changeable. Is most important river in the gulf area.
Madaum		2 feet over bar at low, 12 feet inside mouth.	Bancas and small launches near mouth.	
Hijo	About 32 miles northeast of Davao at the head of the gulf.	1 1/2 feet at high tide.	About 2 miles for 1 1/2-ft. draft. About 8 mi. for bancas.	Is shallow and unimportant for navigation.
Cateel River	East coast near Surigao Davao boundary.	5 feet.	About 25 miles for native boats.	Can only be entered in smooth weather. Strong tidal currents near entrance. (FIGURE VII - 53).
<i>Lanao</i>				
Mandulog				
Agus	About 1 1/2 miles west of Camp Overton near Iligan.	4 feet at low water.		A rapid-flowing river, descending about 2,200 ft. in about 20 miles. Is the outlet of Lake Lanao. (FIGURES VII - 20 and VII - 23).
Malabang	Empties into Illana Bay at Malabang.		For small pulling vessels and launches only to the town.	
<i>Misamis Occidental</i>				
Tudela	About 8 miles north of Misamis.	8 feet.	About 1 mi. for 5-ft. boats, about 1 1/2 mi. for bancas.	Offshore reef, bar difficult to cross and changeable.
Jimenez		8 feet.	About 1 mi. for 6 1/2 ft.	
Aloran	About 24 miles north of Misamis.	8 feet at high tide.	About 1 mi. for 5-ft. draft. About 2 mi. for bancas.	Bar difficult to navigate and changeable.
Pinis	About 3 miles south of Oroquieta.	6 1/2 feet.	About 2 mi. for 5-ft. draft. Over 2 mi. for bancas.	Bar difficult to navigate and changeable. Bottom of silt with occasional sand bars.
Oroquieta	Located on south side of Oroquieta.	8 feet at high tide.	About 1/2 mi. for 5-ft. draft. About 1 mi. for bancas.	Bar hard to navigate, changeable. Channel stable, bottom sand and gravel.
Daisog	About 5 miles north of Oroquieta.	6 1/2 feet at high tide.	About 1/2 mi. for 6 1/2-ft. draft. About 1 mi. for bancas.	Bar of coral, scarcely any channel across it.
Ynamogan	About 13 miles south of Baliangao.	8 feet at high tide.	About 2 1/2 mi. for 6 1/2-ft. draft. About 3 mi. for bancas.	Channel stable.
Langaran	About 12 miles south of Baliangao.	11 feet at high tide.	About 3 mi. for 6 1/2-ft. draft. About 3 1/2 mi. for bancas.	Bar easy to navigate, seldom changes. Navigable channel stable.
Docaling	About 10 miles south of Baliangao.	6 1/2 feet at high tide.	About 3 mi. for 5-ft. draft. Over 4 mi. for bancas.	Coral bar, seldom changes. Channel quite stable.
Sinyang	About 6 miles south of Baliangao.	6 1/2 feet at high tide.	About 2 mi for 5-ft. draft. About 3 mi. for bancas.	Bar difficult to navigate but stable.
Y'susang	About 5 miles south of Baliangao.	6 1/2 feet at high tide.	About 2 mi for 5-ft. draft. About 2 1/2 mi. for bancas.	Bar easy to cross at high tide.

TABLE VII - 6 (Continued)

NAME	LOCATION	MOUTH	NAVIGABILITY	REMARKS
<i>Miamis Oriental</i> Cagayan	Mouth at the town of Cagayan.	9 feet at low water.	Launches and bancas can proceed about 2 mi. upstream to Cagayan. Channel above filled with rocks. Some boats go as far as the highway crossing.	
Iponan	About 4 miles west of Cagayan.	10 feet on bar.	Bancas only can ascend the river about 2 miles.	
<i>Surigao</i> Surigao	River empties at town of Surigao.	6½ feet at high tide.	About ½ mi. for 2-ft. boats. About 6 mi. for bancas.	Channel changeable.
Taganaan	About 8 miles southeast of Surigao.	10 feet at high water. 2 feet at low water.	About 1 mi. for 10-ft. draft. About 2 mi. for bancas.	
Gigaquit	Empties to the east of the town of Gigaquit.	3 feet at low water.	About 4 mi. for bancas.	Little water in river above Gigaquit. There is said to be a boat passage from the Gigaquit River to the Magallanes River and then to the Claver River.
Claver	Discharges at the village of Claver, just east of Gigaquit.	10 feet—but bar is difficult to cross.	About 1 mi. for 5-ft. draft. About 3 mi. for bancas.	
Carrascal	Empties east of the town of Carrascal.	13 feet.	About 2½ mi. for 5-ft. draft. About 5 mi. for bancas.	
Cantilan	Empties east of the town of Cantilan.	13 feet at high tide.	About ½ mi. for 6½-ft. draft. About 3 mi. for bancas.	Pulling boats unable to enter at low water. Network of waterways forms a through inland waterway from Cantilan to Lanuza for small boats.
Lanuza	Empties west of the town of Lanuza.	10 feet.	About 2 mi. for 3-ft. draft. About 3 mi. for bancas.	Bar changeable and difficult to cross.
Tandag	Empties west of the town of Tandag.	10 feet.	River may be entered by small sailing vessels and pulling boats at high tide. Navigable about 6 mi. for bancas.	
Tago	Empties about 1 mile south of town of Tago.	6 feet at low water. 13 feet at high water.	About 2½ mi. for 6½-ft. draft. About 9 mi. for bancas.	Largest river in eastern Mindanao but entrance over the bar is dangerous. Drains a broad valley.
Marihatag	Discharges 3 miles southwest of Umanun Pt. at village of Marihatag.		Small boats for 3 miles.	Town is a port of call for small coastwise steamers.
Hinatuan	Empties at town of Hinatuan on east coast, Surigao prov.	16 feet.	Launches of 7-ft. draft ascend about 3 mi. to the town. Bancas ascend about 20 mi. although rocks obstruct the channel for larger boats.	Safe anchorage at mouth during typhoons and heavy storms. The river drains a large valley area.
Bislig	Enters the head of Bislig Bay.	Launches of 6-8 feet draft enter at half tide.	Navigable for whaleboats (5-ft. draft) beyond San Jose, about 5 mi. upstream.	Bar changeable and hard to navigate.
Lingig	Extreme south part of Surigao prov.	Shallow.	Only native bancas enter and ascend the river about 5 mi.	
<i>Zamboanga</i> Dapitan	North Zamboanga at Dapitan Bay.	Little water over bar at low tide.	Lighters enter at high tide.	
Dipolog	Lies to north of town of Dipolog.		May be entered by pulling boat at high water.	
Siokun	West coast of Zamboanga at Siokun.	4 ft. at half tide.	Small launches can ascend about 3 miles.	

TABLE VII - 6 (Continued)

NAME	LOCATION	MOUTH	NAVIGABILITY	REMARKS
Kabasalan	Northeast corner of Sibuguey Bay.	Mud flats, 8 feet channel.	Vessels of 6 ft. ascend about 2 mi. up main stream and another half mile up the Selangan to Goodyear Dock.	Channel winds through mud flats at delta. Local knowledge necessary for navigation.
Siay	Southeast of Kabasalan River.	Channel flows through same mud flats as Kabasalan.	Launches ascend 3 miles.	
Sibuguey	Just south of Siay River.	Nearly dry at low water.	Was used to some extent for carrying of coal.	
Kumalarang	Empties into head of Damanquilas Bay.	Two entrance channels.	For small craft for about 3 miles.	
Dinas	Flows into Port Sambulauan and Illana Bay.		For small boats as far upstream as the town, about 3 miles.	

74. Radio

The wireless stations of the Netherlands East Indies portion of the Celebes Sea Area were owned and operated by the government with headquarters in Java. None of the stations, with the possible exception of the one at Tondano, was of the broadcast type, while several were only receiving stations (TABLE VII - 7).

The radio stations in Mindanao and Sulu were chiefly those operated or controlled by the Bureau of Posts to supplement the telegraphic communications. There were a few stations operated by lumber mills and large plantations, at airfields and at army posts. None of the stations were of the broadcast variety. Communication with other countries and with ships at sea was offered only via Manila cable and radio. Radio reception of commercial broadcasts from Manila stations was possible throughout the islands.

The radio stations were of medium or high frequency. The average typical equipment for local stations was home-made short wave tube transmitter, gasoline power, frequency 4995, doublet antenna, and RCA receiver. The equipment, which was in most cases efficient, was being replaced by later models. The stations are listed in TABLE VII - 7 with their location, call numbers, power, type of transmitter and ownership. The location of the stations is shown on FIGURE VII - 15.

There were 6 radio-telegraph stations in north Borneo, at Sandakan, Jesselton, Kudat, Tawau, Lahad Datu, and Lamag, and one is believed to be at Selimpopon.

The broadcast radio station VQB was situated about 2 miles from Sandakan. The antenna mast was about 200 feet in height with a 4-wire span extending out to a small pole about 50 inches high situated at one side (FIGURE VII - 57). The power for the transmitter was obtained from an outside source. A gasoline engine was used temporarily when the power gave out. For fixed service with Hong Kong, Japan, and other overseas points, a high-frequency transmitter (about 500 watts) was used. Both the receiver and transmitter were of homemade construction.

There is a radio station at Jesselton, wave length 2,000 meters, call letters VQA.

No information is available as to the number of receiving sets in use in Borneo.

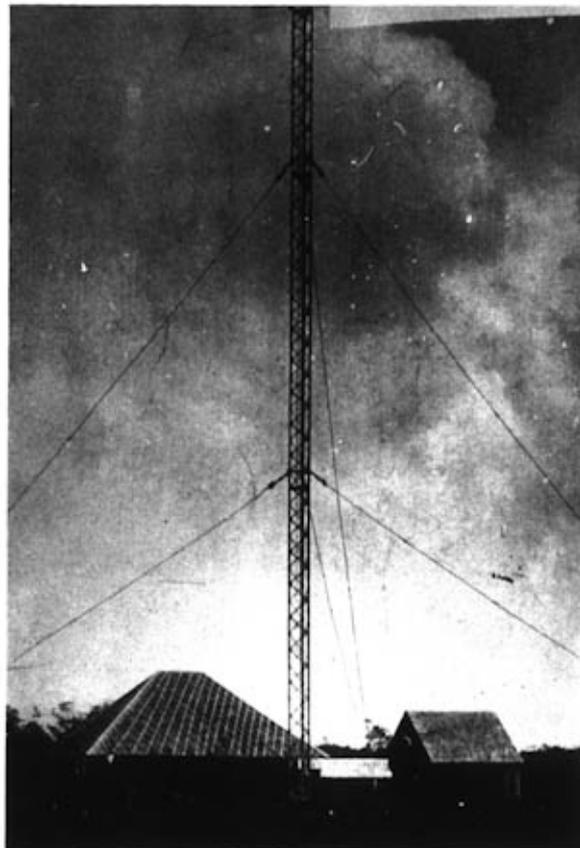


FIGURE VII - 57. Sandakan, British North Borneo.
Mast of the radio station.

TABLE VII - 7
RADIO STATIONS IN THE CELEBES SEA REGION—1940

TOWN	COORDINATES	CALL LETTERS	TYPE OF TRANSMITTER	POWER RATING	REMARKS
<i>Halmahera sector</i>					
Ternate	0° 47' N, 127° 23' E				Broadcasting (?)
Tobelo	1° 43' N, 128° 00' E				Wireless-Telegraph
Djailolo	1° 05' N, 127° 27' E				Wireless-Telegraph receiving only.
Weda	0° 2' N, 127° 50' E				Wireless-Telegraph receiving only.
<i>Sangihe-Talaud sector</i>					
Taboena	3° 40' N, 125° 30' E				Wireless-Telegraph
Beo	4° 40' N, 126° 50' E				Frequency 60-75 Wireless-Telegraph Frequency 60-75
<i>Mindanao sector</i>					
Badas, Surigao	9° 38' N, 125° 34' E	KZOS	RCA, LW tube	50 watts	(Bureau of Post Station unless otherwise indicated) Airfield station Frequency 5,640
Baganga, Davao	7° 34' N, 126° 33' E	KAM	RCA, LW tube	50 watts	
Buruan, Agusan	8° 57' N, 125° 32' E	KZKF	SW tube	50 watts	
Buruan, Agusan	8° 56' N, 125° 53' E	KBT			
Cagayan, Misamis Oriental	8° 29' N, 124° 38' E	KZCG & KZMS	Westinghouse SW tube	200 watts	Butuan Sawmill
Camp Keithley, Lanao	8° 01' N, 124° 17' E		SW tube	100 watts	
Cotabato, Cotabato	7° 15' N, 124° 14' E	KZPN			Phil. Army Station
Dapa, Siargao I.	9° 47' N, 126° 03' E	KZPH			Phil. Army Station
Dapitan, Zamboanga	8° 40' N, 123° 25' E	KBD	SCR 130 LW tube	15 watts	
Davao, Davao	7° 04' N, 125° 36' E	KAD	SW tube	15 watts	
		KIF	Westinghouse SW	200 watts	
		KZDD	RCA LW tube	50 watts	
		KZDV	SW tube	500 watts	
		KZOD	LW tube (emergency)	250 watts	KZOD — airfield Frequency 6,590
Davao Penal Colony, Davao	7° 24' N, 125° 40' E	KZPH			
Del Monte Camp, Bukidnon	8° 22' N, 124° 45' E	KZOM			Frequency 6,590
Dipolog, Zamboanga	8° 55' N, 123° 21' E	KZOG			Airfield station. Frequency 6,590 Santa Clara Lumber Co.
Flecha Point, Zamboanga	7° 23' N, 123° 24' E				
Glan, Cotabato	5° 49' N, 125° 12' E	KZGX	SW tube	100 watts	
Hinatuan, Surigao	8° 23' N, 126° 19' E	KAH & KZKT	RCA spark SW tube	1 kw. 100 watts	
Kabasalan	7° 47' N, 122° 46' E	KZFB		50 watts	
Lebak, Cotabato	6° 31' N, 124° 02' E	KPX	RCA spark	2 kw.	Goodyear Rubber Co.
Liang, Surigao			SW tube	100 watts	
Loreto, Dinagat I.			SW tube	100 watts	
Lumarao, Zamboanga	7° 42' N, 122° 48' E	KZFD		100 watts	
Malabang, Lanao	7° 36' N, 124° 04' E	KRO	RCA LW tube	50 watts	Hercules Lumber Co.
Malangas, Zamboanga			Comp. spark (emergency)	3 kw.	
Malaybalay, Bukidnon			SW tube	115 watts	
Malita, Davao	6° 24' N, 125° 36' E	KPW	SW tube	100 watts	
			RCA spark (emergency use)	1 kw.	
Mambajao, Camiguin I.	9° 15' N, 124° 42' E	KUM	SCR 130 LW tube	15 watts	
Mati, Davao	6° 57' N, 126° 13' E	KPZ			
Milbuk, Cotabato	6° 09' N, 124° 17' E	KZFL	RCA spark (emergency)	1 kw.	
				100 watts	Findlay Millar Lumber Co.
Misamis, Misamis Occidental	8° 10' N, 123° 51' E	KBE	SCR 130 LW tube	15 watts	
Pagadian, Zamboanga					
Port Lamon, Surigao	8° 29' N, 126° 23' E	KZFC	RCA A-SE-ET-8004	50 watts	
Sindangan, Zamboanga	8° 14' N, 123° 01' E	KZFK	RCA—LW tube	50 watts	
Surigao, Surigao	9° 46' N, 125° 29' E	KAS & KZSR	SW tube	100 watts	
Tandag, Surigao	9° 04' N, 126° 10' E	KAG	RCA spark SW tube	2 kw. 100 watts	Control unknown

TABLE VII - 7 (Continued)

TOWN	COORDINATES	CALL LETTERS	TYPE OF TRANSMITTER	POWER RATING	REMARKS
Zamboanga, Zamboanga	6° 55' N, 122° 04' E	KIWI, KZZB	Westinghouse SW tube	200 watts	Airfield station Frequency 6,590 Phil. Army Stations
		KZZG, KZZH	LW tube	250 watts	
		KZOZ	SW tube	500 watts	
		KZPZ			
<i>Sulu</i>					
Bongaw, Tawitawi		KEO	RCA spark LW tube, RCA, ET-8008	8 kw. 50 watts	Bureau of Post Control unless otherwise indicated.
Isabela, Basilan I.	6° 42' N, 121° 58' E	KZBS	SW tube	7 watts	Frequency 326 Phil. Army
Jolo, Jolo I.		KIL	RCA-ET 3650	50 kw.	
Jolo, Jolo I.		KZPI			Basilan Lumber Company
Port Holland Basilan I.	6° 33' N, 121° 52' E	KZHP		15 watts	
Siasi, Siasi I.		KEDQ		1 kw.	100 watts
Si Tangkay			Homemade SW tube		
Cagayan de Sulu New Batu Batu, Tawitawi		KEV			Amateur
<i>Borneo</i>					
Jesselton	6° 00' N, 116° 05' E	VQA			Broadcasting Frequency 150
Kudat	6° 55' N, 116° 50' E				Wireless-telegraph
Lahad Daru	5° 03' N, 118° 20' E				Wireless-telegraph
Lamag	5° 30' N, 117° 50' E				Wireless-telegraph
Sandakan	5° 50' N, 118° 05' E	VQB		500 watts	Broadcasting
Selimpopon	4° 18' N, 117° 30' E				Wireless-telegraph
Tawau	4° 15' N, 117° 55' E				Wireless-telegraph
Tarakan	3° 18' N, 117° 35' E				Wireless-telegraph
<i>Northern Celebes sector</i>					
Manado	1° 30' N, 124° 50' E	PKY			Possible station
Tondano	1° 18' N, 124° 55' E	PKL PNL			Broadcasting Aeradio

75. Telegraph, Telephone, and Submarine Cable

A. Netherlands East Indies.

The only telegraph and telephone networks in the Dutch portion of the Celebes Sea Area were in the Minahasa District of the Northern Celebes (FIGURE VII - 45). Submarine cable connections existed between Ternate and Kema, and Manado and Balikpapan.

B. Philippine Islands.

The northern coastal towns of Mindanao, from Gingoog, Misamis Oriental, to Katipunan, Zamboanga, were connected by telegraph. A line also extends southward through Dansalan and Malabang to Cotabato. Radio-telegraph and telephone supplemented the system. The Bureau of Posts telegraph system was rated as fairly efficient. American equipment, pole fittings and wire were used. The location of lines and station is shown on FIGURE VII - 15.

There was no overall telephone system in Mindanao. There were, however, several provincial lines which supplemented radio and telegraph and a number of important local systems. The provincial lines were those from Cagayan through the Bukidnon valley to Maramag; south from Iligan through Lake

Lanao, Port Baras, Malabang, Parang, Balut, to Cotabato; and east from Cotabato up the Mindanao valley to Pikit. Zamboanga had a fair local telephone system with lines to San Mateo, Patalon, and Buenavista. The Davao area was well served by a superior Japanese system linking the various plantation towns along the coast. There was also a good local system within the city (TABLE VII - 8).

The only telephone lines in the Sulu Archipelago are on Basilan and Jolo Islands. The one on Basilan connects Isabela, Lamitan, and Bohelelong. The system on Jolo is only within the city limits.

TABLE VII - 8
TELEPHONE COMMUNICATIONS, MINDANAO (1940)

	STATIONS	POLE LINE MILEAGE
Agusan	62	83.8
Bukidnon	51	227.3
Cotabato	107	341.6
Davao	16	131.9
Lanao	41	224.2
Misamis Occ.	16	73.6
Misamis Or.	33	211.8
Surigao	3	37.7
Zamboanga	27	163.3
Totals	356	1,495.2

In Mindanao, there were 2 submarine cables carrying tele-

graph lines. One ran from Misamis to Titunod (south of Kolambagan) and the other from Baliangao under the Mindanao Sea to the island of Negros (FIGURE VII - 15).

C. British North Borneo.

From Mempakul, where the Labuan-Borneo 10-mile submarine cable reaches land, there was a telegraph line to Jesselton. At Labuan the cable connected with the Eastern Telegraph Company submarine cable to Singapore. Branch telegraph lines connected Jesselton with Beaufort and Tenom (FIGURE VII - 39). From Jesselton, messages were sent by wireless radio-telegraphy to Kudat, Sandakan, Tawau, and Lahad Datu. There was a total of some 700 miles of telegraph lines in British North Borneo.

There were 12 telephone exchanges, two of which, at Sandakan and at Jesselton, were automatic. The Sandakan exchange was equipped for 200 subscribers and the Jesselton exchange for 100. Many points in the interior were linked with the Jesselton system by long distance lines (FIGURE VII - 39). The interior circuit covered a total of about 252 miles in 1940. In 1938, about 358 telephone instruments were connected with the exchanges. The telephones are all of British make. In Sandakan, the power was obtained from a power plant and the exchange was concentrated in 1 building in the center of town. The service was owned and controlled by the British North Borneo Company.

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CHAPTER VIII

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JOINT ARMY-NAVY INTELLIGENCE STUDY
OF
CELEBES SEA AREA
TOWNS AND VILLAGES

MAY 1944

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JCS letter 7-25-75
By *SR* Date *JUL 31 1975*

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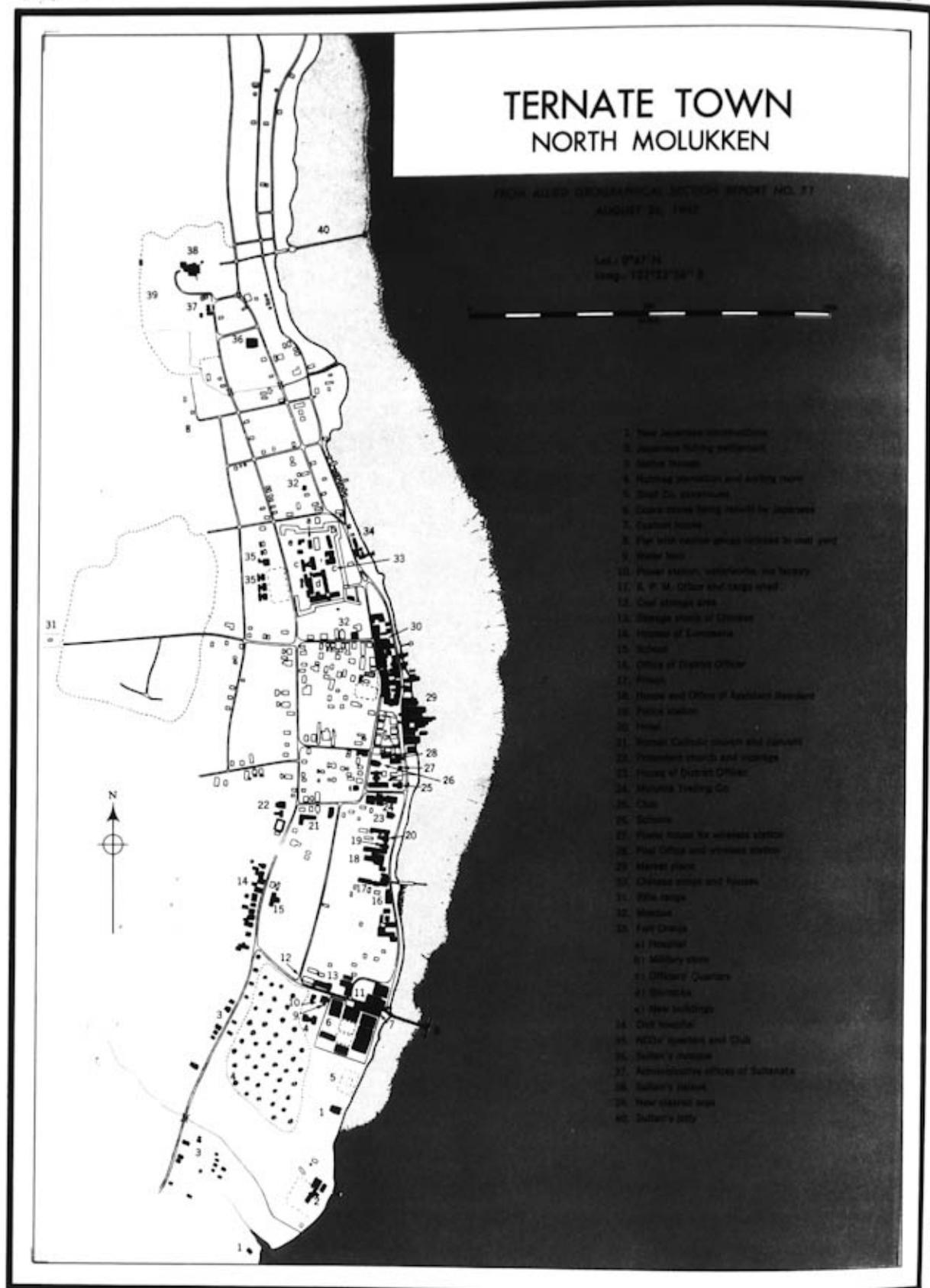


FIGURE VIII - 1.
 Map of Ternate.

TOWNS AND VILLAGES

80. General Description

The Celebes Sea Area contains no large cities and only a few towns, of which not more than a half dozen exceed 10,000 population. The largest, Manado, in northern Celebes, had less than 30,000 inhabitants in 1930. Nearly all the towns are located along the coasts, but even long stretches of shoreline have no settlements except small native villages. The interior regions have been even less affected by urbanizing influences. In areas where the commercial and administrative activities of colonial governments have created towns, the number of white inhabitants was only a very small fraction of the total population. Chinese, on the other hand, are numerous and play an important role in the economic and civic life of all the larger settlements.

Native villages throughout the area vary greatly in size and form. Most of them are self-sufficient units.

81. Halmahera Sector

A. General description.

Most of the settlements on Halmahera and the neighboring islands are primitive native villages. The few places where the Europeans and Chinese are concentrated have become the governmental and commercial centers for the area. Ternate, the Dutch administrative capital, is the largest town, and the villages of Djailolo, Galela, Tobelo, Weda, and Laboeha are locally important. Most of the settlements are on the coast; nearly all are laid out parallel to the shoreline. Interior settlements, which are practically confined to small plains on Halmahera, are in most cases clusters of huts about a central square. Settlements are most numerous on the islands of Ternate and Tidore and the adjacent parts of Halmahera, and least numerous on the southern peninsula of Halmahera.

B. Description of towns.

(1) Ternate.

(1930 population: 7,126; 5,001 natives, 440 Europeans, 954 Chinese, and 721 other foreign Asiatics. FIGURES VIII - 1 to VIII - 5.)

(a) *Importance.* This is the largest town in the area and was the administrative center for Halmahera and part of Netherlands New Guinea. Once the capital of an empire ruled by native sultans, the town today is an important trade center and controls much of the wealth of the area.

(b) *Physical characteristics.* Ternate is on the eastern coast of Ternate Island, across Dodinga Bay from Halmahera. The town, which occupies the outer slopes of an old crater, extends along the shore for about 1½ miles. An almost continuous line of villages skirts the coast for some distance north and south of Ternate, and a strip of intensively cultivated fields occupies the lower slopes of the volcano behind the town.



FIGURE VIII - 2. Ternate.

Annotated aerial oblique of town.

1. Pier, not strongly built, iron and wood construction, suitable for berthing vessels up to 4,000 tons. Narrow gauge rail-track from pier-head to electric power station (No. 6). Pier-head is 198 feet long.
2. Assistant Resident's jetty. Wooden construction; for small boats only.
3. Beach, grey sand.
4. Vehicle roads, asphalted.
5. Site of 8 copra stores, probably destroyed by the Dutch.
6. Electric power station and waterworks, corrugated iron.
7. Manager's house, stone and corrugated iron.
8. Water tank, about 12 feet square.
9. Coconut trees.
10. School, plaster and corrugated iron.
11. Assistant Resident's house, stone and tiles.
12. House of District Officer, stone and wood shingles.
14. Houses: plaster and wood shingles, plaster and corrugated iron.
15. Coal-yard and store, corrugated iron roof.
16. Office and cargo shed of the K.P.M., stone and wood shingles.
17. Storage sheds of Chinese, wood and corrugated iron.
18. Roman Catholic church, reinforced concrete and tiles.
- 18A. Convent and school, reinforced concrete and tiles.
19. Protestant church, stone and wood shingles.
20. Vicarage, stone and wood shingles.
21. Tennis court.
22. Native houses, palm-leaf stems and atap.
34. Custom house, stone and tiles.
35. Customs cargo shed, stone and tiles.
38. Office of Assistant Resident, stone and tiles.
39. "Zeezicht" Hotel, stone and tiles.
40. Police station, wood and shingles.
47. Former storehouse of the Shell Co.
50. Nutmeg plantation.
51. Nutmeg sorting house, stone and tiles.
52. Mooring posts, suitable for mooring large steamers.
53. Office of District Officer and other government offices, stone and shingles.

(c) *Means of access.* K.P.M. (Koninklijke Paketvaart Maatschappij—Royal Packet Navigation Company) vessels formerly called 5 times a month.

The coastal road which encircles the island and passes through the town, is not suitable for all-year use by motor vehicles except near the town.

Seaplanes of the K.N.I.L.M. (Koninklijke Nederlandsch Indië Luchtvaart Maatschappij—Royal Netherlands Indies Air-



FIGURE VIII - 3. Ternate.

Annotated aerial oblique of town.

- 13. Manager's house, office, and store, Molukka Trading Co., stone and wood shingles.
- 23. Ternate Club, stone and wood shingles.
- 24. Post office and wireless station, wood.
- 24A. Power house and wireless station, stone and tiles.
- 25. Chinese shops over the sea, built on wooden piles, palm-leaf stems and atap.
- 26. Chinese shops and houses, wood and corrugated iron.
- 27. Ruins of old Protestant church.
- 28. Football ground.
- 29. Former barracks of "Fort Oranje" garrison.
- 30. Houses formerly occupied by military officers, stone and wood shingles.
- 30A. Officers' Club, stone and wood shingles.
- 32. Vehicle road toward center of island.
- 33. Cemetery.
- 36. Football field.
- 37. Vehicle road encircling the island.
- 41. European primary school, wood and wood shingles.

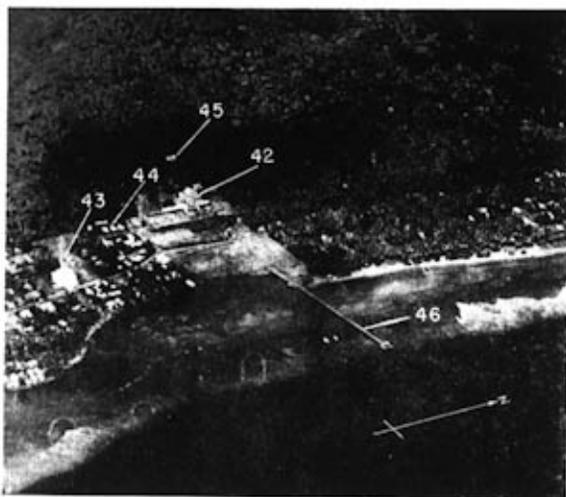


FIGURE VIII - 4. Ternate.

Annotated aerial oblique of town.

- 42. Palace of Sultan of Ternate, stone and tiles.
- 43. Mosque of Sultan of Ternate, stone and corrugated iron.
- 44. Administration offices of the Sultanate.
- 45. Tombs.
- 46. Sultan's private jetty, wood.



FIGURE VIII - 5. Ternate.

Annotated aerial oblique of town.

- 14. Houses, plaster and wood shingles, plaster and corrugated iron.
- 22. Native houses, palm-leaf stems and atap.
- 31. Hospital, stone and wood shingles.
- 36. Football field.
- 43. Mosque of Sultan of Ternate, stone and corrugated iron.
- 48. Mosque, plaster.

line Company) used Ternate Roads as an auxiliary seaplane base. There is no landing strip on Ternate Island; the nearest is at Djailolo on Halmahera.

(d) *Billeting facilities.* The following buildings offered limited billeting: Fort Oranje, Zeezicht Hotel, Ternate Club, assistant resident's house, district officer's house, Sultan's palace, civil hospital, and the schools. Some of the other buildings listed below may also be suitable for billeting.

(e) *Buildings* (FIGURE VIII - 1). The buildings of the town included:

Fort Oranje (barracks, officers' quarters, hospital, military store—stone and tile construction).

Non-commissioned officers' houses and club (stone and shingle).

Assistant resident's office and house (stone and tile).

District officer's office and house (stone and shingle).

Sultan's palace (stone).

Sultan's mosque (stone).

Administrative offices of the Sultanate (wood).

Prison (wood and shingle).

Police station (wood and corrugated iron).

Post office and radio station (wood).

Power house for radio station (stone).

Civil hospital (stone and shingle).

Protestant church and parsonage (stone and shingle).

Roman Catholic church, convent, and school (reinforced concrete and tile).

Two mosques.

European school (wood).

School (plaster and corrugated iron).

Chinese school.

Zeezicht Hotel (stone and tile).

Ternate Club (stone and shingle).

Customs house and sheds (stone and tile).

KPM office and shed (stone and shingle).

Molukka Trading Company office, manager's house, and store (stone and shingle).

Market place (corrugated iron roof).

Chinese and Arab shops, warehouses, and houses (wood and corrugated iron).

Chinese shops (built of palm and atap on piles over the water).

Nutmeg-sorting house (stone and tile).

Coal yard (corrugated iron roof).

Power plant, waterworks, and ice factory (corrugated iron).

Houses of Europeans (mostly stone or plaster).

New Japanese structures on site of destroyed copra sheds.

Newly-built, small sheds.

(f) *Internal transportation.* Prior to the war, there were about 10 private cars and taxis, 5 or 6 trucks, 50 pony carts, and many bicycles. Twenty motor boats operated in the harbor.

(g) *Repair and service facilities.* Repairs to ship motors were made in a small shop in the Japanese fishing village south of Ternate (FIGURE VIII - 1), the only repair shop in the Ternate area. Hull repairs for small sailing vessels could be made at Sidangoli, across Dodinga Bay on Halmahera.

(b) *Public utilities.*

1. Water and electricity. The power plant, waterworks, and ice factory were under one roof near the head of Hertog Hendrik wharf. The lighting system, 120-volt direct current, with a diesel prime mover, supplied 429 consumers in 1939. The waterworks supplied 40 tons of drinking water daily to ships at the wharf. The town obtained its water from wells. A water tank, 12 feet square, as located immediately south of the waterworks.

2. Communications. A radio station with its own plant was located south of the market near the center of the town. Cable connections were maintained with Manado; the cable house was at Bastion, 3 miles south of the town.

(i) *Warehouses and storage.* The main storage area is near the Hertog Hendrik wharf. Eight large copra sheds destroyed by the Dutch are being rebuilt by the Japanese. Warehouses belonging to the K.P.M., the customs house, and some Chinese shops lie just to the north. The coal shed and storage area is reached by a narrow-gauge line from the pier. The B.P.M. (Bataafsche Petroleum Maatschappij—the Shell company) storage area south of the copra sheds was destroyed during the Japanese occupation. Smaller storage facilities were available in the center of the town.

(j) *Health and sanitation facilities.* The civil hospital had 55 beds; the military hospital in Fort Oranje, 13 beds. Most of the European houses had septic tanks.

(k) *War damage estimate.* The copra sheds (now being rebuilt) and the B.P.M. storage area were destroyed at the time of the Japanese occupation, probably both by the Dutch. Bombing raids in November 1943 did considerable damage to Chinese and native shops and houses between the fort and the center of the town.

C. Description of villages.

(1) *Djailolo.*

Djailolo, the most important village on the west coast of Halmahera, is located near the northern entrance of Dodinga Bay about 20 miles north of Ternate. The Dutch maintained a small military garrison here, and the commanding officer served as the acting *Controleur* of the surrounding area. A track suitable for motor vehicles in dry weather leads from Djailolo to Soesoepoe, about 10 miles to the northwest; along this road are

2 clearings which are potential landing strips. There was a radio station for reception only. The village contained the following buildings: government office and post office, jail, barracks, rest house, hospital, Chinese shops, and a government store.

(2) *Galela* (FIGURE VIII - 6).

Galela, on the bay of the same name, is on the eastern shore of Halmahera, about 30 miles from the northernmost tip. It is the outlet to a fertile, well-populated plain. The Japanese were constructing a landing strip 3 miles northwest of the village in October 1943. Galela Lake, 1 mile west of the village, is an emergency alighting area for seaplanes. The roads to Galela Lake and to Tobelo, 15 miles southeast, are only partly usable by motor vehicles. The buildings included a copra warehouse, native market, mosque, office of the Sengadji (a native governmental official), Sengadji's house, and mosque.

(3) *Tobelo* (FIGURE VIII - 7).

Tobelo, 15 miles southeast of Galela, was an important Dutch administrative center, and the residence of a *Gezaghebber* (district officer). A small military garrison was stationed here. In October 1943, the Japanese were constructing a landing strip on Miti Island, 9 miles south of Tobelo. There is a potential landing strip 5 miles south of Tobelo. South and north of Tobelo the roads are usable by motor for short distances only. The buildings of Tobelo included the *Controleur's* office, office of native chieftain, courthouse, barracks, radio station, market, storage sheds, Chinese shops, mosque, Protestant church, Protestant school, mission hospital with 60 beds, Tobelo Club, houses for European residents, and native quarters. The more important buildings have lower walls of stone and upper walls of plaster on wire mesh; roofs are shingle or corrugated iron. Most of the native houses are of palm and atap. The radio station sent and received messages. Water was obtained from wells.

(4) *Weda* (FIGURE VIII - 9).

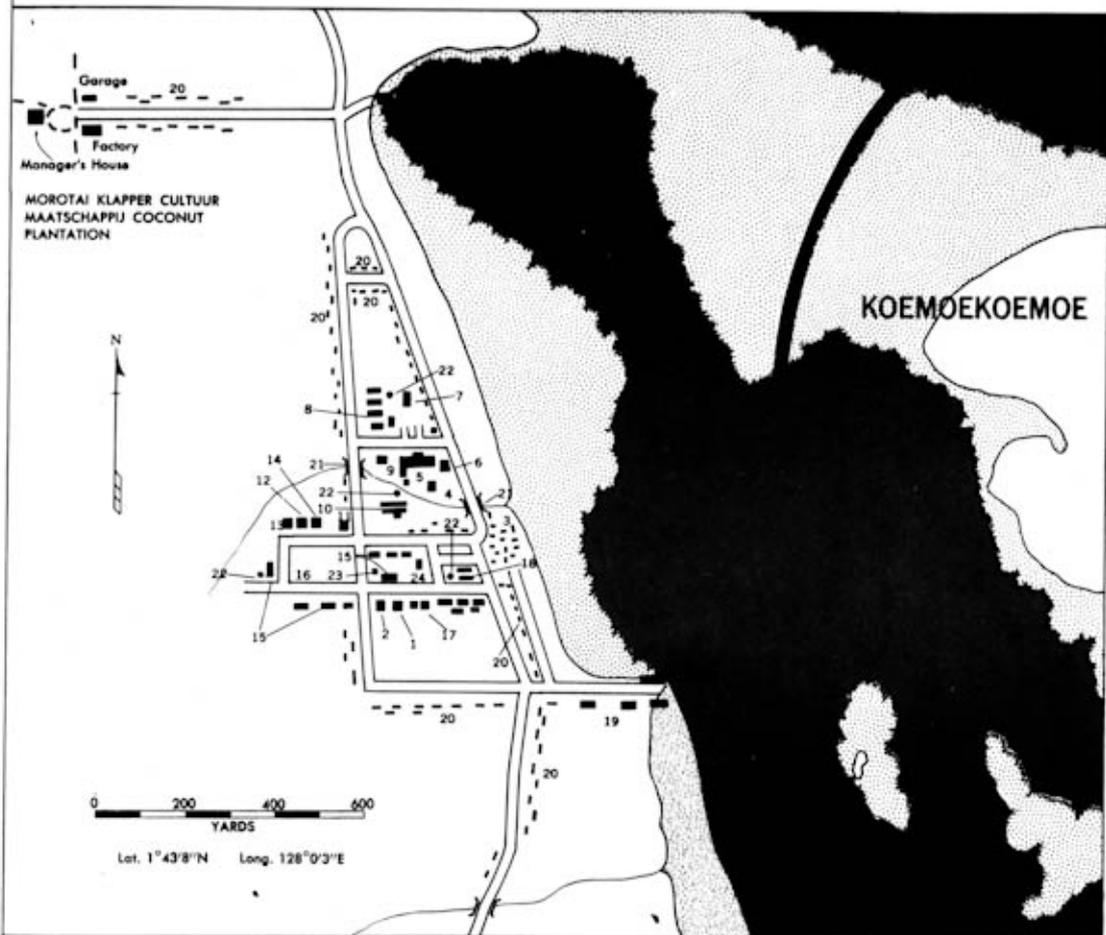
Weda, at the head of Weda Bay on the eastern coast of Halmahera, was the headquarters of a *Gezaghebber*. There are no roads beyond the limits of the village. The buildings included: *Gezaghebber's* office, post office, a radio station (receiver only), barracks, Protestant church, a mission school, a district hospital with 12 beds, and European and native houses. The water in the wells of the town is brackish.

(5) *Laboeha* (FIGURE VIII - 8).

Laboeha, the chief village on the Batjan Islands which lie off southwestern Halmahera, is at the head of Laboeha Bay on the southwestern coast of Batjan Island. Formerly the capital of the Sultan of Batjan, the town remained his home under Dutch rule. The village of Amasing adjoins Laboeha on the north. A gravel road leads to Laboeha from the plantations of the Batjan Archipel Maatschappij, 20 miles northwest. The buildings included: Fort Barneveld (an old stone structure), the Sultan's palace, the *Controleur's* office, rest house, jail, post office, radio station, Protestant church, government schools, clinic, customs shed, K.P.M. office, offices of the Batjan Archipel Maatschappij, and European and native houses.

TOBELO HALMAHERA ISLAND

From: Netherlands Forces Intelligence Service Report No. 886,
 August 26, 1943, in Allied Geographical Section Report No. 71 "Northern Moluccas"



- | | | |
|------------------------------|---------------------------------|---------------------------------------|
| 1 House of Native Chieftain | 9 Wireless Station | 17 Houses of Native Police |
| 2 Office of Native Chieftain | 10 Military Barracks | 18 Market |
| 3 Chinese Shops | 11 Rest House | 19 Copra Storage Sheds (one on piles) |
| 4 House of Hospital Matron | 12 Office of Controller | 20 Native Houses |
| 5 Mission Hospital | 13 Court House | 21 Wooden Bridge |
| 6 Church and Bell Tower | 14 Office of Government Clerk | 22 Well |
| 7 House of Missionary | 15 Houses of European Officials | 23 Tobelo Club |
| 8 Mission School | 16 Football Field | 24 Mosque |

 Sandy Shore

 Reef

LABOEHA BATJAN ISLAND - MOLUKKEN

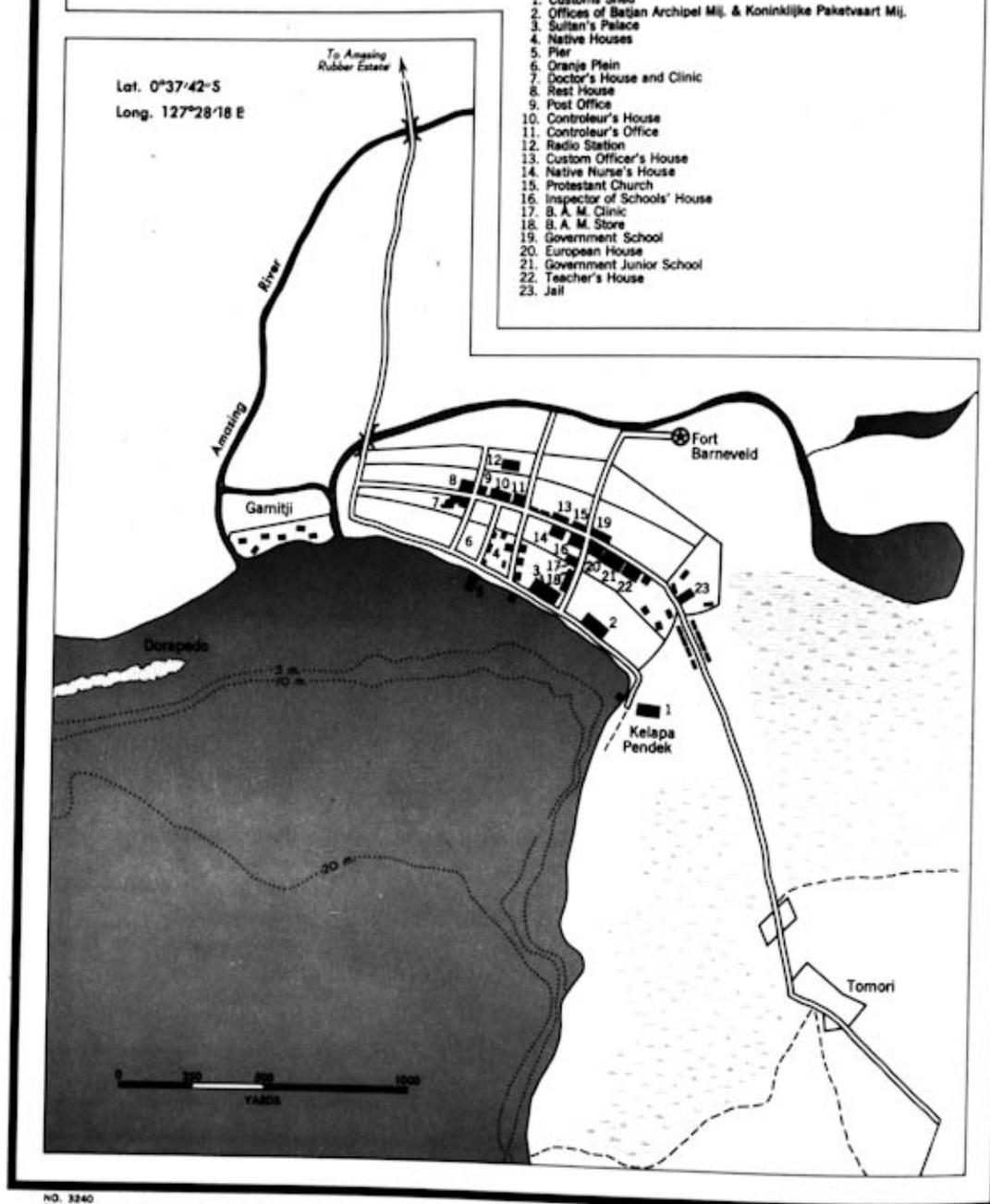
FROM: ALLIED GEOGRAPHICAL SECTION REPORT NO. 71, AUGUST 26, 1943

Data as of August, 1940

VEHICLE ROAD TRACK SWAMP
 SECONDARY ROAD BRIDGE

1. Customs Shed
2. Offices of Batjan Archipel Mij. & Koninklijke Paketvaart Mij.
3. Sultan's Palace
4. Native Houses
5. Pier
6. Oranje Plein
7. Doctor's House and Clinic
8. Rest House
9. Post Office
10. Controleur's House
11. Controleur's Office
12. Radio Station
13. Custom Officer's House
14. Native Nurse's House
15. Protestant Church
16. Inspector of Schools' House
17. B. A. M. Clinic
18. B. A. M. Store
19. Government School
20. European House
21. Government Junior School
22. Teacher's House
23. Jail

Lat. 0°37'42" S
 Long. 127°28'18" E



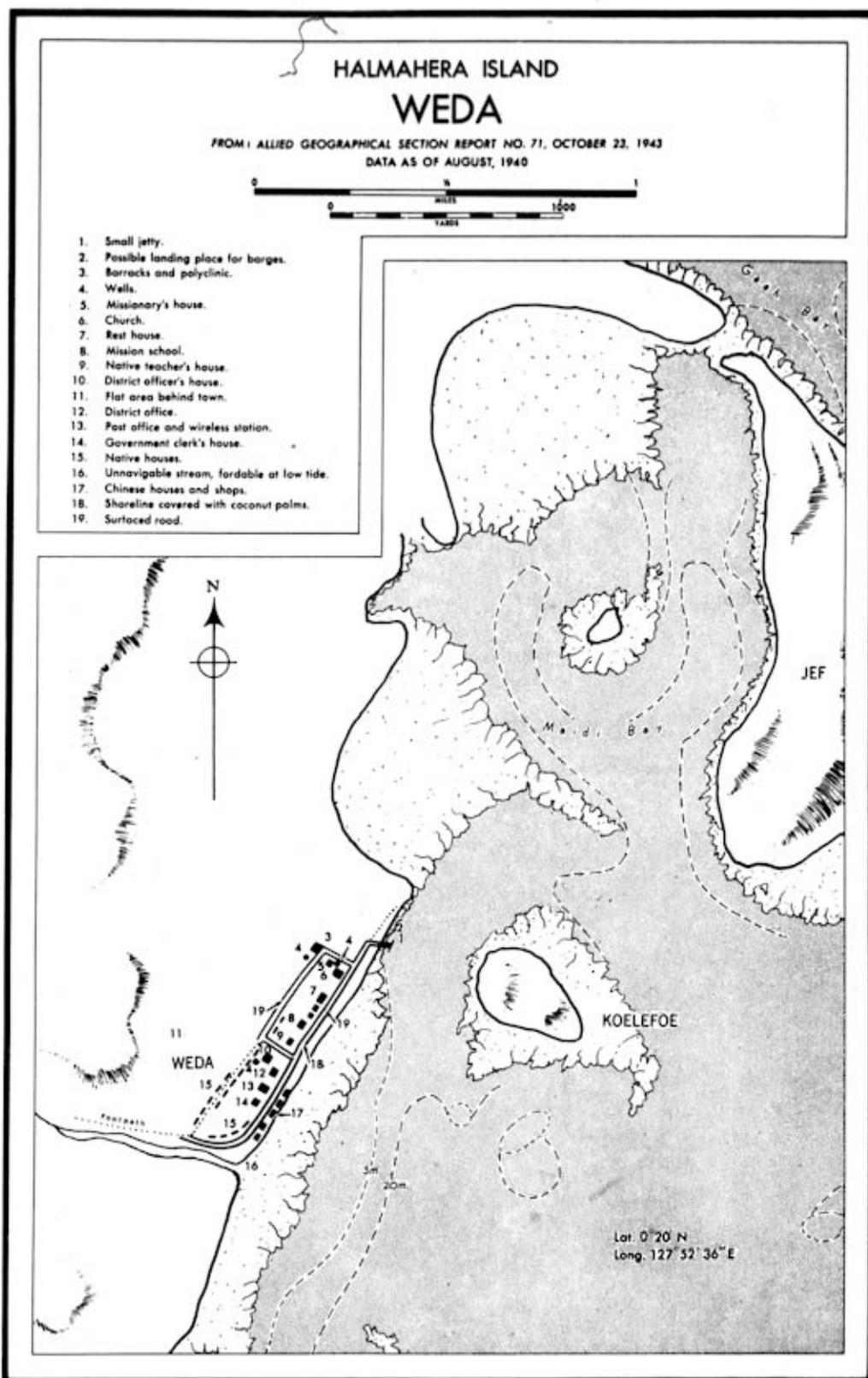


FIGURE VIII - 9.
Map of Weda.

82. Sangihe-Talaud Sector

A. General description.

Settlements on the Sangihe and Talaud Islands consist of a few small, locally-important towns and a large number of native villages. The chief town in the area is Tahoena, an administrative and trading center located on Sangihe Island. Much of the administration and trade, however, is handled from Manado, Celebes. There are practically no commercial or industrial facilities. The natives have been considerably influenced by European missionaries. Their settlements are described as being neat and attractive, and give the impression of considerable prosperity. Other than Tahoena, the chief settlements are Hoeloe and Tahoelandang in the Sangihe group, and Beo in the Talaud group.

B. Description of towns.

(1) Tahoena.

(population estimate: 2,000).

Tahoena (Taroena, Taruna) is on the north side of Tahoena Bay, the northernmost indentation on the western coast of Sangihe Island. Prior to the war, it was visited regularly by vessels of the K.P.M. line. Dry-weather roads connect the town with the main villages on the island. A radio station maintained communication with Manado.

As the administrative center of Sangihe-Talaud Afdeeling (a political division), Tahoena was the seat of an assistant resident. Among the buildings of the town were a school, a rest house, a post office, a prison, a hospital with 10 beds, and a number of Chinese stores. A mission doctor was stationed here in 1938. Japanese fishermen made some use of the town as a center of operations in the surrounding islands.

(2) Hoeloe (Ulu).

Hoeloe, the chief settlement on Siao Island, is located on a bay on the eastern coast (FIGURE VIII - 10). The buildings included a church and school. Hoeloe is connected by road with the western coast. K.P.M. vessels called occasionally before the war.

(3) Tahoelandang (Boebias).

Tahoelandang, on the southern coast of Tahoelandang Island, was the residence of the native rajah and the chief trading center of the island. K.P.M. vessels formerly made occasional visits. A government school had been established here. The natives are noted as woodworkers and boat builders.

(4) Beo.

Beo, located on a bay on the western coast of Karekelong Island, was the administrative center of the Talaud group, and a port of call for K.P.M. vessels. There was a radio station here.

C. Villages.

Settlement is comparatively dense in the Sangihe Islands. Villages are numerous and closely spaced. Manganitoe, Peta, and Tamako on Sangihe Island are locally important. Peta and Tamako and certain other villages on the island were occasionally visited by the K.P.M. vessels. Most of the villages, however, had no direct contact with the outside world.

The Talaud group is less densely populated, and villages are correspondingly fewer. One of the main settlements in the group is Miangas, a small village of 3 streets on the island of Palmas near the southeastern tip of Mindanao. A large school was located here.

83. Mindanao Sector

A. General description.

Settlement in Mindanao is concentrated in the coastal areas and along the few lines of travel which cross the island or penetrate to the interior. Davao, and Zamboanga on the southern coast, are the 2 chief settlements on the island. The towns consisted of a few streets bordered by concrete or frame buildings with galvanized iron roofs, and the nipa huts of the natives, sometimes built out over the water on piles. Industrial installations and commercial facilities were limited and largely connected with the initial processing and handling of primary raw materials.

The villages in the more accessible areas consisted of a few



FIGURE VIII - 10.
Hoeloe, on Siao in the Sangihe Islands. Looking NW.

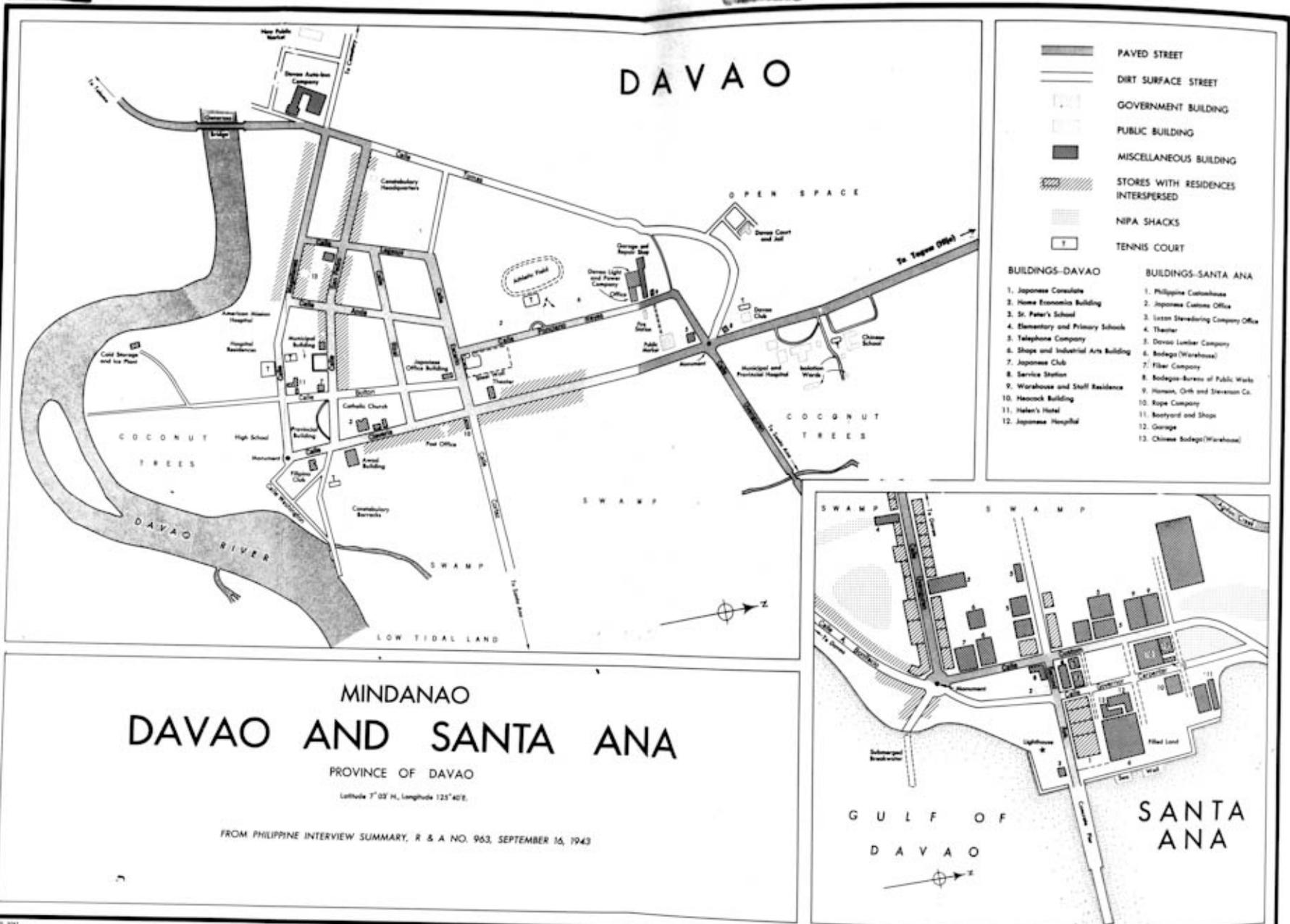


FIGURE VIII - 11.
City plans of Davao and Santa Ana.

EXAMPLES AND DRAWINGS IN THE MARGIN OF THIS BOOK ARE REPRODUCED BY PERMISSION OF THE PHILIPPINE GOVERNMENT.

stores and nipa huts arranged along a single street. In parts of the mountainous interior, away from the main lines of contact, the settlements of the natives are very primitive.

Malaria and the common tropical diseases were prevalent. Small hospitals were located in the larger towns, and dispensaries in some of the villages.

B. Description of towns.

(1) *Davao.*

(a) *Importance.* Davao (FIGURE VIII - 11) is the capital of the province of Davao, and, with its port Santa Ana, constitutes the chief commercial center of Mindanao. Situated in the heart of a great hemp-producing area, the town was the leading world port of shipment for that commodity. Large quantities of copra and lumber were also exported. The largest concentration of Japanese in the Philippine Islands was within a 30-mile radius of Davao. Most of the commercial activity was under their control.

(b) *Physical characteristics* (FIGURES VIII - 12 to VIII -

14). Davao is located in southeastern Mindanao about 1 mile inland from the mouth of the Davao River on the northwest side of Davao gulf. It is built on the low, level coastal plain, which merges into swamp land near Santa Ana. Tidal channels, which are swampy at all times and 5 or 6 feet deep at high tide, separate Davao from its port. The town, which is built across the base of a sharp loop in the river, has an irregular street pattern. The commercial district is located in the southwestern section of the town. There is considerable open space at the northern end.

(c) *Means of access.* Davao was easily reached by ship, as it was connected with Manila and other ports on regular weekly schedule.

Two raised, hard-surface roads cross the swamps from Santa Ana to Davao. Roads from the interior enter the town from the north and south. The provincial road, which has a 2-way width and a good dirt surface, leads to Davao from Moncayo in the north. A trail, connected with other interior trails, leads into the town from the northwest.



FIGURE VIII - 12.
Airview of Davao and Santa Ana.

- | | |
|--------------------------|------------------------------------|
| 1. Theater. | 6. Japanese customs office. |
| 2. Davao Lumber Co. | 7. Philippine customhouse. |
| 3. Fiber company. | 8. Chinese store. |
| 4. Luzon Stevedoring Co. | 9. Hanson, Orth, and Stevenson Co. |
| 5. Lighthouse. | 10. Columbia Hope Co. |

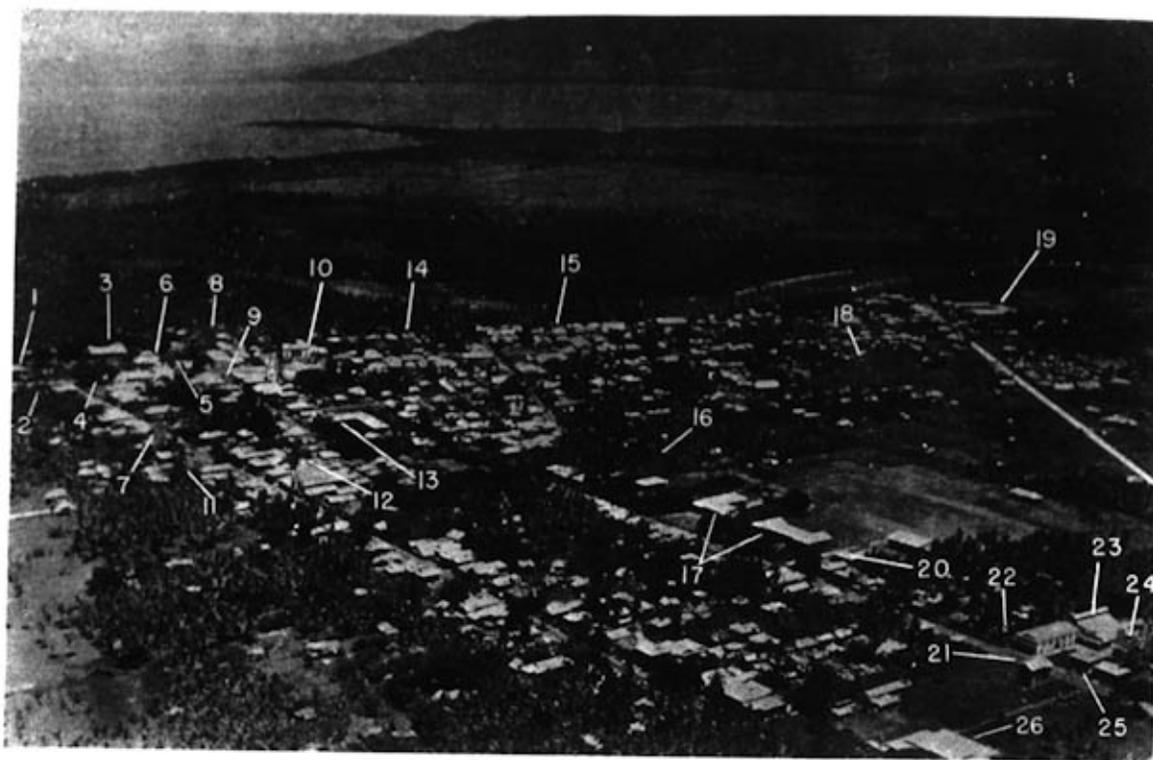


FIGURE VIII - 13.
Airview of Davao. Looking SW.

1. Filipino club.
2. Awad Building.
3. High school.
4. St. Peter's School.
5. Catholic church.
6. Provincial building.
7. Post office.
8. Helen's Hotel.
9. Japanese club.
10. Municipal building.
11. Heacock building.
12. Theater.
13. Japanese office building.

14. Mission hospital.
15. Japanese hospital.
16. Home economics building.
17. Elementary and primary schools.
18. Constabulary headquarters.
19. Davao Autobus Co.
20. Shops and industrial arts.
21. Fire station.
22. Light company's offices and showroom.
23. Electric power plant.
24. Garage and repair shop.
25. Warehouse and staff residence.
26. Public market.

There was a commercial airport $6\frac{1}{4}$ miles north of Davao. A landing field, $1\frac{1}{4}$ miles northeast of the city, was abandoned because of the swampy ground. Cabaguio Field, $\frac{3}{4}$ mile north of Davao, was used for emergencies only.

(d) *Billeting facilities.* The constabulary barracks, located in the eastern part of Davao, offer good billeting possibilities. Accommodations were also available in the hotel, the 3 schools, and possibly some of the other buildings.

(e) *Buildings.* Most of the buildings in Davao were 1- or 2-story wooden structures with galvanized iron roofs. A few had concrete first-floor walls and frame second stories. There are a few 3-story buildings, the most important being the Awad Building, with a 4- or 5-story tower. The important buildings in Davao are:

- Provincial building.
- Municipal building.
- Davao court and jail.
- Constabulary headquarters.
- Constabulary barracks.
- Japanese Consulate.

- Japanese office building.
- Electric power plant.
- Fire station.
- Post office.
- Telephone company.
- Public market.
- Church.
- St. Peter's School.
- High school.
- Elementary and primary schools.
- Home Economics Building.
- Shops and industrial arts.
- Chinese school.
- Mission hospital.
- Residences of doctors, nurses and missionaries.
- Japanese hospital.
- Municipal and provincial hospital.
- Isolation wards of hospital.
- Filipino club.
- Davao Club.
- Japanese club.
- Two theaters.
- Davao Autobus Company.

Service station.
Cold storage and ice plant.
Light company's offices and show room.
Warehouse and staff residence.
Helen's Hotel.
Awad Building.
Heacock Building.
Stores.

(f) *Repair and service facilities.* Only minor repairs were possible in Davao. A machine shop adjoined the Davao Light and Power Company. Welding and casting equipment were available.

(g) *Public utilities.*

1. *Water.* Davao's water supply comes from springs in the hills behind the town. A reservoir gives the necessary pressure for the city water system. There were fire hydrants throughout the town, but the fire hose purchased by the city would not fit them.

2. *Electricity.* Electricity was furnished by a 551.5 kilo watt diesel plant. In 1941, the system was fairly new and supplied the needs of the town, though it did not serve any plantations. The current was carried on overhead wires strung on cement poles.

3. *Communications.* The Bureau of Posts maintained a radio station with the call letters KIF. In addition, there were 3 other stations in the city. There was a good telephone system within the city. Another system connected the Japanese plantations along the coast.

(b) *Warehouses and storage.* Santa Ana, the port for Davao, is the main warehouse center. Davao had a *godown* (warehouse) which was used for storing copper wire and light and power accessories. There was a smaller wooden godown beside it.

(i) *Health and sanitation facilities.* Davao had the following hospitals: the American mission hospital with 34 beds; the

Japanese hospital in the western section with 100 beds; the municipal and provincial hospital with 40 beds, at the eastern edge of the city; the Mati Emergency hospital with 6 beds; the Penal Colony hospital with 72 beds; and the Oriental Hospital, Inc. with 30 beds.

(2) *Santa Ana.*

(a) *Importance.* Santa Ana (FIGURE VIII - 11) functions as the port for Davao. Together, the two form the chief commercial center of southern Mindanao.

(b) *Physical characteristics.* Santa Ana (FIGURE VIII - 12) is located on low, swampy land along Davao Gulf. Since 1935, the shoreline has been straightened and protected by the erection of a low sea wall. There are tidal channels between Santa Ana and Davao which are swampy at all times and flooded to a depth of 5 or 6 feet at high tide. The drier ridges in this area are planted with coconut groves.

(c) *Means of access.* The only inland approaches to Santa Ana are 2 paved roads from Davo. (Topic 83, B, (1), (b)).

(d) *Buildings.* The majority of the buildings in Santa Ana are warehouses or shops. The residential areas extend along the beach and border the edge of the swamp behind the warehouses. Most of the dwellings are flimsy nipa shacks. Few large buildings have been built in Santa Ana recently because of the swampy character of the ground.

The buildings in Santa Ana included:

- Philippine customs house.
- Japanese customs house.
- Luzon stevedoring office.
- Theater.
- Davao Lumber Company.
- Seven *bodegas* (warehouses).
- Hanson, Orth, & Stevenson Company.
- Rope Company.



FIGURE VIII - 14.
Airview of Davao.

Boyard and shops.
Garage.

(e) *Repair and service facilities.* (Topic 83, B, (1), (f)).

(f) *Public utilities* (Topic 83, B, (1), (g)).

(g) *Warehouses and storage.* The blocks directly behind Santa Ana's pier were largely occupied by warehouses and offices, constructed of concrete and wood with galvanized iron roofs.

(b) *Health and sanitation facilities* (Topic 83, B, (1), (i)).

(i) *War damage estimate.* During the Japanese invasion, Santa Ana was shelled and a large part of the town destroyed by fire. The warehouse of Kerr and Company was reported to have been seriously damaged, and the Saleeby Fiber Company completely destroyed.

(3) Zamboanga.

(a) *Importance.* Zamboanga (FIGURE VIII - 15), the capital of Zamboanga province and the only large town in western Mindanao, is one of the most important ports on the island. The commercial center of the southwest section of Mindanao, Zamboanga exported copra and coconut products, and, to a lesser extent, hemp, lumber, and canned fish. One of the city's landmarks is the large desiccated coconut factory at Caldera Bay.

(b) *Physical characteristics.* Zamboanga (FIGURE VIII - 16) is located on the narrow coastal plain facing Basilan Strait on the southwestern tip of Zamboanga Peninsula. Eight or 10 miles inland, the mountains rise to elevations up to 4,000 or 5,000 feet, cutting off approach from the interior. The town is laid out on an irregular pattern with the wharf as a focal point. The commercial section is about 4 blocks north of the pier. The streets are surfaced with asphalt.

(c) *Means of access.* Zamboanga maintained regular steamship connections with Jolo, Manila, and other Philippine ports. Vessels called from the United States, Australia, Celebes, Singapore, and Hong Kong.

Roads paralleling the east and west coasts of the peninsula lead to Zamboanga from Patalon on the west and Pagadian on the east. There are no road connections with the main part of the island. Trails from the interior lead into Zamboanga from the north.

Wolfe Field, a United States Army Airfield, was located approximately 3½ miles north-northwest of Zamboanga.

(d) *Billeting facilities.* Billeting accommodations included 2 or 3 hotels, 3 schools, a constabulary barracks, and a military reservation. The Plaza hotel, located about 3 blocks from the waterfront on the street leading from the wharf, consisted of a 2-story concrete and frame building, and an annex on the opposite side of the street. About 10 rooms were available. Pettit Barracks, on the United States Army post in the southeast section of the city, will house about 500 men.

(e) *Buildings.* Most of the buildings in Zamboanga were concrete structures with galvanized iron roofs. The majority of them are not over 2 stories high.

The main buildings were:

Municipal building.	Catholic church.
City hall.	Brent hospital.
Court house.	Army hospital.
Customs house.	Hospital.
San Ramon Prison.	Broad building.

Pettit Barracks.
Primary school.
Normal school.
Ateneo school.

Ideal theater.
Overseas Club.
Plaza Hotel.

(f) *Repair and service facilities.* Zamboanga had a machine shop in which small repairs could be made.

(g) *Public utilities.*

1. *Water.* Zamboanga's water supply is pumped from the Pasonanca River into a reservoir about 5 or 6 miles outside the city, and a pipeline leads to the pier. The water is famous for its purity, and need not be boiled before drinking.

2. *Electricity.* The light plant at Pasonanca, equipped with 2 diesel engines, supplied current via overhead wires to most of the buildings in Zamboanga.

3. *Communications.* The airfield had a government telegraph office directly connected with the transmitter at the Broad building. There was a radio station at the field, with the call letters KZOZ. The Pettit Barracks had its own station with direct connections to Manila. Its call letters were KZPZ. There were 4 other transmitters in the area. The telephone exchange was located on the waterfront, and the town was well supplied with telephones.

(b) *Warehouses and storage.* Zamboanga had at least 5 warehouses with a total storage capacity of 5,000 tons. Most of them were concrete buildings located along the street that leads from the pier. In some cases the second floors were occupied by offices.

(i) *Health and sanitation facilities.* There were 4 hospitals in the city, one in the northwestern part of the town, another at the army post, a third in the eastern section of the city, and the Zamboanga General hospital. There were 3 additional hospitals in Zamboanga province: the Margosatubig Emergency hospital, with 12 beds, at Margosatubig; the Rigal Memorial hospital, with 30 beds, at Dapitan; and the Mindanao Central Treatment Station, with 50 beds, at Santa Cruz.

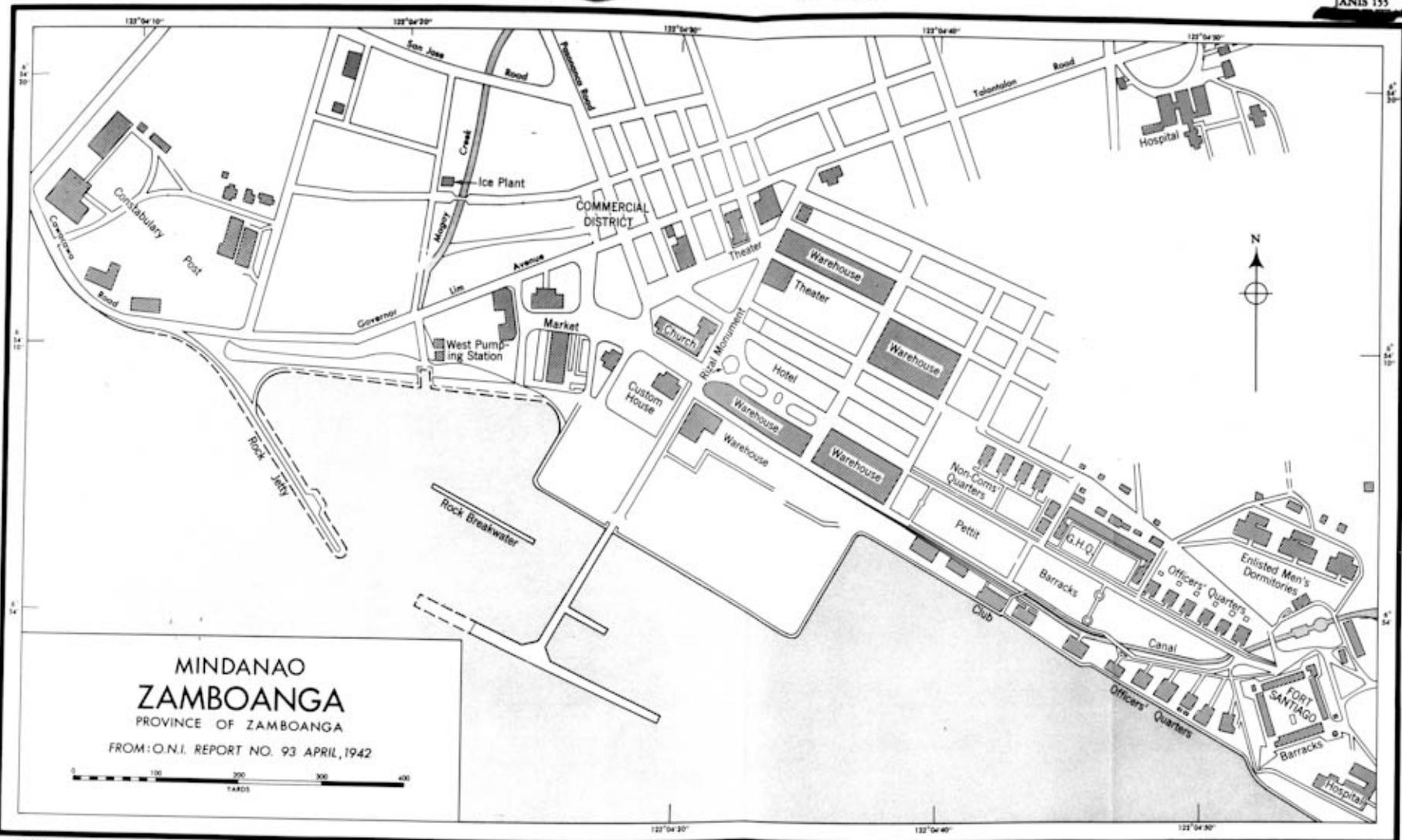
(j) *War damage.* It is reported that Japanese ships operating in the strait shelled Zamboanga heavily for about 2 days during the invasion.

(4) Cotabato.

(a) *Importance.* Cotabato, capital of Cotabato Province and the third largest city on the island, was the center of trade for the Mindanao Valley and the surrounding coastal area. In 1939, rice, corn, and copra were exported in quantity. There were numerous stores where supplies of food, diesel oil, gasoline, and kerosene were obtainable.

(b) *Physical characteristics.* Cotabato (FIGURE VIII - 17), on the west coast of Mindanao, is built on low land, 5 miles upstream from the mouth of the Mindanao River. The town, which is laid out on a rectangular street pattern, extends from the river to Cotabato Hill, a small but conspicuous knob, rising to a height of 185 feet, about ½ mile southward from the river. Cotabato Hill is the site of the old provincial building, the hospital, and other buildings and residences. The main part of the town, however, is along the river, and separated from Cotabato Hill by an extensive open area.

(c) *Means of access.* Large vessels do not have direct access to Cotabato. Loading and unloading was carried on by lighters. Regular boat connections were maintained with Cebu and Manila, and prior to the war, several small commercial



MINDANAO
ZAMBOANGA
 PROVINCE OF ZAMBOANGA
 FROM: O.N.I. REPORT NO. 93 APRIL, 1942



FIGURE VIII - 15.
 City plan of Zamboanga.

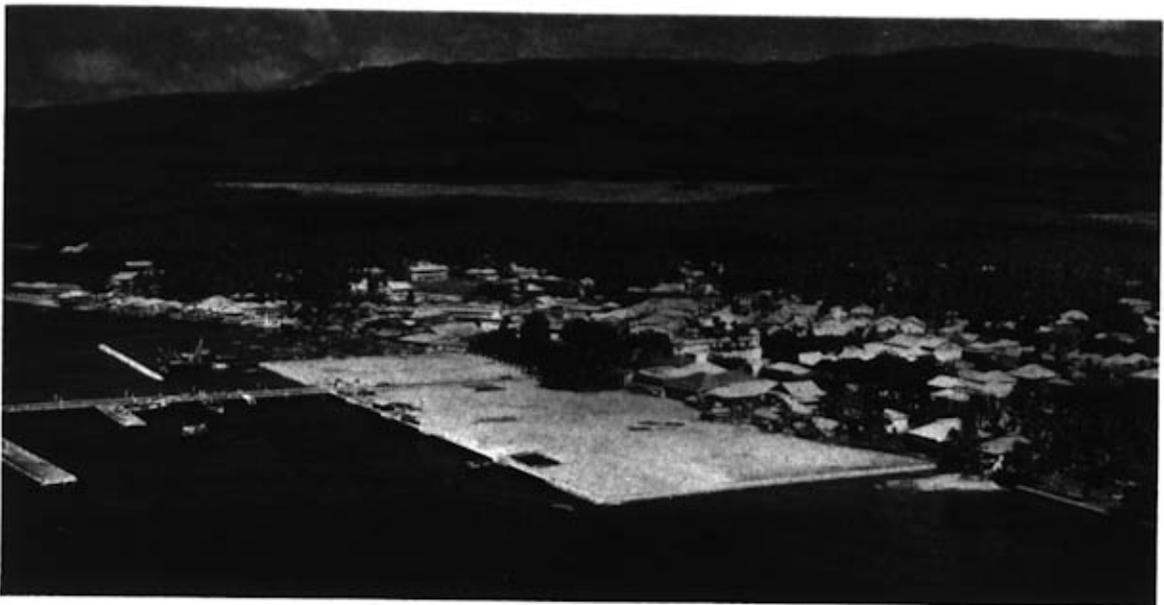


FIGURE VIII - 16.

Airview of Zamboanga, showing concrete wharf and surroundings.

river boats and motor boats made daily trips to Paidu-Pulangi, 27 miles upriver from Cotabato.

Cotabato can be reached from the north coastal road via Dansalan, from Davao via Sinauilan and Pagsalungan, and from Buayan via Lutayan and Talayan. Bus connections were maintained with Iligan and Davao.

There was a commercial airport about 2 miles southeast of Cotabato. A road connected the field with the town.

(d) *Billeting facilities.* A hotel, a girls' dormitory, the hospital, the provincial building, and the constabulary barracks afforded billeting.

(e) *Buildings.* The buildings of the town included:

The post office building.	Hospital.
The old provincial building.	Constabulary barracks.
The new provincial building.	Girls' dormitory.
Provincial jail.	Four theaters.
Municipal building.	School.
Bureau of Public Works.	Rice mill.
Roman Catholic church.	Storehouse for explosives.
Former leper detention building.	Government storehouses.
Midway Hotel (upper 2 stories of government storehouse).	The International Harvester Company Building.

The majority of the public buildings had 2 stories and galvanized iron roofs; some were of frame construction throughout, while others had first floors of concrete. The native huts are built of nipa.

(f) *Repair and service facilities.* The International Harvester Company and 1 small machine shop offered the only facilities for repairs (1941). Welding equipment was available.

(g) *Public utilities.*

1. *Water.* A new municipal water supply had been developed which serviced the city by a pipeline, probably from the mountainous region to the south.

2. *Ice.* Before the war, ice could be purchased at the ice plant located on Cotabato Hill.

3. *Electricity.* The Cotabato Light and Power Com-

pany, Incorporated (location unknown) had a 122 kilowatt capacity; exact area serviced is unknown.

4. *Communications.* Cotabato was connected by telephone northward with Iligan and Cagayan; westward, with Pikit via the Mindanao River valley and Bukidnon valley. A 200-watt Westinghouse shortwave radio station (call letters KBY, KZKP), maintained by the Bureau of Posts, was located in the post office building.

(b) *Warehouses and storage.* The Bureau of Public Works building was used as a storehouse for surveying tools and road machinery. The rice mill is a 2-story building which may be used for storage. A storehouse for explosives was located on the small island nearest the town.

(i) *Health and sanitation facilities.* The hospital on Cotabato Hill had 6 beds, and the Pikit Emergency hospital at Pikit had eight.

(5) *Surigao.*

(a) *Importance.* Surigao (FIGURE VIII - 19), the capital of Surigao Province, is the largest and most important town on the northeastern coast of the island. Much of the trade of eastern Mindanao passes through the town and its port, Bilanbilan, located about $\frac{2}{3}$ mile south from the center of Surigao. A few years prior to the war, Surigao experienced a boom as a result of extensive gold mining operations in the surrounding area. In 1933, Surigao Province ranked third in the production of gold and silver in the Philippines. Lumber, corn, and rice mills were operated in the town. Copra was exported in quantity. Strategically, the city is important because of its position at the eastern entrance to the Mindanao Sea.

(b) *Physical characteristics.* Surigao is located in a low, marshy area east of the mouth of the Surigao River. In some sections of the town, the houses are built on piles above the tidal flats. In 1939, the area behind the town was chiefly wooded and palm trees bordered the coast.



FIGURE VIII - 17.
Airview of Cotabato.

- | | |
|---------------------------------|---------------------------------------|
| 1. Municipal Building. | 11. Midway Hotel. |
| 2. The Old Provincial Building. | 12. Constabulary barracks. |
| 3. The New Provincial Building. | 13. Girls' dormitory. |
| 4. Post Office Building. | 14. Two theaters. |
| 5. Bureau of Public Works. | 15. Rice mill. |
| 6. Provincial Jail vicinity. | 16. Lumber mill. |
| 7. Roman Catholic church. | 17. Government storehouses. |
| 8. School. | 18. International Harvester Co. site. |
| 9. Hospital. | 19. Storehouse for explosives. |
| 10. Leprosarium. | |

(c) *Means of access.* Before the war, boats maintained weekly connections between Bilanbilan, Cebu, and Manila. Ocean-going vessels cannot reach Surigao itself because of the ruins of an iron bridge at the mouth of the Surigao River.

Surigao is approached from the south by the North Coastal Road which connects it with Davao and Cotabato via Cagayan, with Placer, and by a minor trail with Bilaa Point. One small bus made regular trips between Surigao and Butuan.

Lake Mainit, located 18 miles southwest of Surigao and accessible to the town by road, offers a good alighting area for seaplanes. The nearest airplane landing area was a small emergency airfield about 16 miles south of the town. A road connected the field with the town.

(d) *Billeting facilities.* The schools, the hotel, the constabulary quarters, the provincial building, and the hospitals afforded billeting accommodations.

(e) *Buildings.* Most of the public buildings and official residences were built of concrete with galvanized iron roofs.

Some are 2-story buildings with concrete or masonry first-story walls, and wooden second-story walls. The native huts are built of bamboo and nipa. Other buildings besides those mentioned above (Topic 83, (4), (d)) were the treasury, jail, church, clock tower, and principal's house.

(f) *Internal transportation.* A mill railway extended about 2 miles inland from the beach.

(g) *Repair and service facilities.* Minor repairs could be made in a small machine shop; location is unknown.

(b) *Public utilities.*

1. Electricity. The Surigao Electric Diesel Plant (location unknown) had a 40-kilowatt capacity.

2. Communications. A radio station with call letters KAS and KZSR was located in the provincial building. Surigao had telegraph connections with Cantilan via Placer and Gigacquit.

(i) *Warehouses and storage.* A hemp *bodega* (warehouse), built of stone and masonry, and other warehouses were

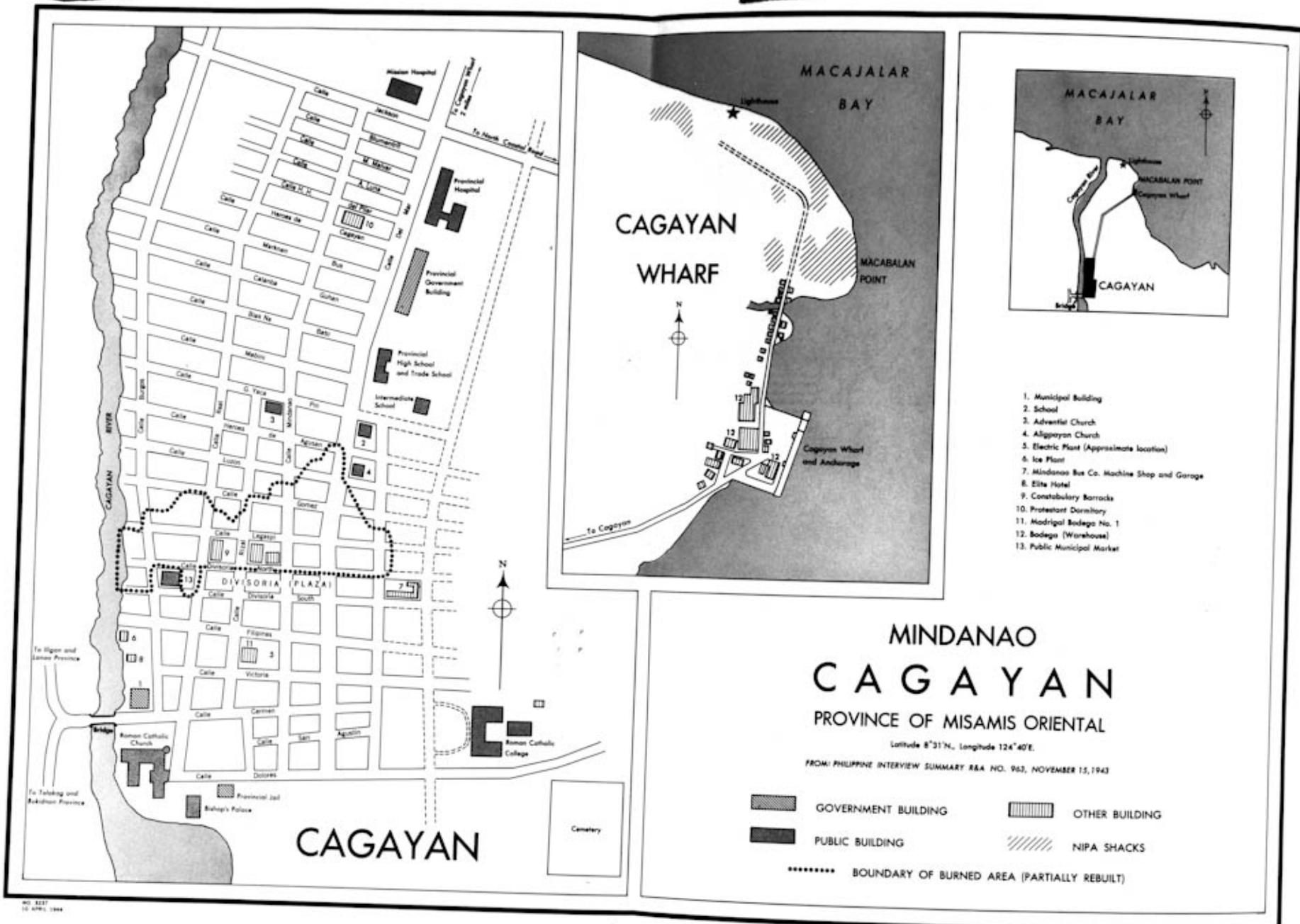


FIGURE VIII - 18.
 City plan of Cagayan.



FIGURE VIII - 19.
Airview of Surigao.

- | | |
|-------------------------|------------------------------|
| 1. Provincial Building. | 5. Church. |
| 2. Treasury. | 6. Clock tower. |
| 3. Schools. | 7. School Principal's house. |
| 4. Jail. | |

located at Bilanbilan. There were 2 oil tanks about 20 feet in diameter and 10 to 12 feet high on the wharf at Bilanbilan.

(j) *Health and sanitation facilities.* The Bureau of Health maintained an 8-bed maternity hospital; the Cantilan Maternity House had 4 beds; and the Surigao Consolidated had a dispensary.

(6) *Cagayan.*

(a) *Importance.* Cagayan, (FIGURE VIII - 18) was the capital of Misamis Province and the terminus of the north-south road which crosses central Mindanao to the Cotabato-Davao highway. Although it was the only all-weather port on the northern coast of Mindanao Island, it was open to coastwise trade.

(b) *Physical characteristics.* Cagayan (FIGURES VIII - 20 and VIII - 21) is located on the eastern bank of Cagayan River, less than 2 miles inland from Macajalar Bay. The town, which is laid out on an irregular street plan, is built on low level ground. The river was spanned by a steel bridge, west of which is the barrio of Carmen, a small village with no stone or concrete buildings.

(c) *Means of access.* Considerable inter-island traffic, including large passenger vessels, stops at Cagayan wharf, the port area for Cagayan at Macabalan Point, less than 2 miles from the town. A number of vessels called on weekly schedule from Cebu. Only small launches and bancas could enter Cagayan River and proceed to the town.

Cagayan was easily accessible from points along the North Coastal Road. The town is also the terminus of a road leading in from Talakag in the interior.

An emergency airfield was located 1 mile north of Carmen village.

(d) *Billeting facilities.* The Mission hospital, Provincial hospital, Protestant dormitory, several schools, and 1 hotel afforded billeting accommodations.

(e) *Buildings.* Most of the buildings in Cagayan were concrete structures with galvanized iron roofs. They included:

- | | |
|---------------------------------|----------------------|
| Provincial government building. | Mission hospital. |
| Municipal building. | Provincial hospital. |
| Provincial jail. | Electric plant. |
| School. | Ice plant. |
| Intermediate school buildings. | Elite Hotel. |



FIGURE VIII - 20.
Airview of Cagayan. Before 1935.

1. Municipal Building.
2. Provincial Jail.
3. Schools.
4. Roman Catholic College.
5. Roman Catholic church.

6. Adventist church.
7. Aglipayan church.
8. Roman Catholic Bishop's Palace.
9. Mindanao Bus Co. and garage, machine shop.
10. Elite Hotel.

11. Constabulary barracks.
12. Madrigal Bodega No. 1.
13. Public municipal market.
14. Carmen Village.

Provincial High School
and Trade School.
Roman Catholic college.
Roman Catholic church.
Adventist church.
Aglipayan church.
Roman Catholic bishop's palace.

Mindanao Bus Company—
Machine shop and garage.
Constabulary barracks.
Protestant dormitory.
Madrigal Bodega No. 1.
Public municipal market.

(f) *Repair and service facilities.* In addition to the Mindanao Bus Company machine shops and garage, there were several small machine shops where minor repairs could be made.

(g) *Public utilities.*

1. *Water.* In 1941, Cagayan obtained water from a mountain stream which had a capacity of 158,400 gallons per day, or enough to supply 8,000 people. It has been reported that there were 16 fire hydrants throughout the city; some, however, are probably water taps.

2. *Electricity.* The Cagayan Power and Light Company had a 160-kilowatt diesel plant.

3. *Radio.* In June 1940, 2 radio stations were operated by the Philippine Bureau of Posts; one had a 200-watt and the other a 100-watt Westinghouse shortwave tube. Both stations were probably located in the municipal building.

(b) *Warehouses and storage.* Madrigal Bodega No. 1, a 2-story frame construction, is the only known storage and warehouse building. A number of *bodegas* of galvanized iron have also been reported near the Cagayan wharf.

(i) *Health and sanitation.* There were 3 hospitals in Cagayan: the Misamis Mission hospital with 52 beds, the Milwaukee hospital with 29 beds, and the Misamis Oriental hospital, with 25 beds.

(7) *Malaybalay.*

(a) *Importance.* Malaybalay is the capital and largest town of Bukidnon Province.

(b) *Physical characteristics.* Malaybalay (FIGURE VIII - 22) is located on the central upland of Mindanao, about 66 miles southeast of Cagayan. The Keabalabag Mountains rise above the town on the east. To the south and west the level surface of the upland has been deeply cut by streams. Small muddy ravines border Malaybalay on the north and west. The Suaga River cuts through a 20-foot gorge on the western outskirts of the town. Close to the town on the east is Barrio Sumpung, usually considered a part of Malaybalay; on the west is Barrio Impalambong. Ranches occupy much of the surround-



FIGURE VIII - 21. *Cagayan*.
Airview showing burned area. After 1935.

ing country. Sayre highway forms the main street. The other streets, all gravel-surfaced, run perpendicular or parallel to the highway. The buildings are well spaced except in the compact business section, located along both sides of the highway near the center of the town.

(c) *Means of access.*

1. Land. Malaybalay can be reached by road from the Cagayan, Cotabato, and Davao coastal areas. Access is indirect except from Cagayan. Two trails leading in from the interior area east of Malaybalay meet the main highway north and south of the town.

2. Air. There was a commercial airport 2 miles west of Malaybalay. Planes could also land in front of the provincial building. (FIGURE VIII - 18).

(d) *Billeting facilities.* Billeting accommodations in Malaybalay included the Catholic girls' dormitory, the government rest house, and the constabulary barracks. Other possible billeting places are the elementary school, normal school, and Bethel Mission.

(e) *Buildings.* Most of the buildings in Malaybalay are wooden structures with galvanized iron roofs. The buildings of the town included:

A municipal building.	Domestic science building.
Post office and telegraph building.	Roman Catholic church.

Provincial jail.	Bethel Mission.
Constabulary barracks.	Elementary school.
Captain's residence.	Normal school.
Division office of education.	Catholic girls' dormitory.
Government rest house.	Provincial hospital.
Provincial building.	Telephone exchange.

(f) *Public utilities.*

1. Water. Malaybalay obtains its water supply from a watershed north of the town. Water is piped to an underground reservoir in Barrio Sumpong and from there to Malaybalay by an underground watermain.

2. Communications. Malaybalay had telegraph, radio, and telephone connections.

(g) *Warehouses and storage.* Malaybalay had no warehouses. An open space, covering an entire block in the center of the town, may be suitable for open storage.

(h) *Health and sanitation facilities.* Malaybalay had a provincial hospital.

(8) *Dansalan.*

(a) *Importance.* Dansalan, the capital of Lanao Province and the largest town in the interior, was the nucleus of Moro political and social life in the western part of Mindanao. Much of the political unrest among the Moros had its origin here. Camp Keithley, the Philippine army training camp, was located at Dansalan.

(b) *Physical characteristics.* Dansalan (FIGURE VIII - 24) is built on low, rolling land at the north end of Lake Lanao. The 2 sections into which the town is divided by the Agus River were linked by a steel bridge. The buildings of the town are widely spaced. Camp Keithley is closely connected with Dansalan on the northwest.

(c) *Means of access.* Small craft gave contact with the lake and river villages in the area.

Dansalan is on the main road between the Iligan and Cotabato coastal areas.

An emergency landing field was located at Camp Keithley, ½ mile north of Lake Lanao. The lake provides ample room for the landing and take-off of seaplanes.

(d) *Billeting facilities.* The hotel, schools, hospitals and barracks, and possibly other buildings, offer billeting facilities.

(e) *Buildings.* Most of the buildings were 2-story frame

structures with galvanized iron roofs. The principal buildings were:

The municipal building.	Schools.
The provincial jail and dispensary.	The Lanao Hotel.
The Catholic dispensary.	The Catholic school.
The provincial hospital.	The Catholic church.
The leprosarium.	The Governor's residence.
Barracks.	

(f) *Public utilities.*

1. Water. There was a waterworks at Dansalan.

2. Electricity. The Lanao Electric Light and Power Supply Company had a 105-kilowatt capacity.

3. Communications. Dansalan had radio, telegraph, and probably telephone facilities. The radio station (KZPN) was located at Camp Keithley.

(g) *Health and sanitation facilities.* The provincial hospital had 45 beds. Another hospital, with 4 beds, was reported. There was also a leprosarium in Dansalan, with 35 beds.



FIGURE VIII - 22.
Airview of Malaybalay. 1935.

1. Governor's house.
2. Roman Catholic girls' dormitory.
3. Division office of education.
4. Constabulary captain's residence.
5. Constabulary barracks.
6. Municipal building.
7. Post office and telegraph building.

8. Roman Catholic church.
9. Telephone exchange.
10. Provincial jail.
11. Government resthouse.
12. Provincial hospital.
13. Provincial building.
14. Domestic science building.
15. Elementary school.

16. Market.
17. Normal school building.
18. Residences and farmhouses.
19. Bridge over Suaga River.
20. Bridge over ravine.
21. Bridge built since 1935.
22. Trail over Kebalabag Range.



FIGURE VIII - 23.
 City plan of Misamis.

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FIGURE VIII - 24.
Airview of Dansalan.

- | | | |
|------------------------------------|---|----------------------------------|
| 1. Municipal Building. | 4. Provincial Hospital. | 7. Catholic church. |
| 2. Provincial Jail and dispensary. | 5. Leprosarium. | 8. Governor's residence. |
| 3. Catholic dispensary and school. | 6. Former barracks: schools and government buildings. | 9. Camp Keithley landing ground. |

(9) *Misamis.*

(a) *Importance.* Misamis (FIGURE VIII - 23) is the westernmost port of importance on the north coast of Mindanao and the business center for the surrounding agricultural area. It was a base for small motorboats which operated up the coast and a trans-shipment point for the Kolambugan Lumber Company, located across Port Misamis Channel in Lanao Province. Corn, a major export, was shipped largely to Cebu.

(b) *Physical characteristics.* Misamis is located on the coastal plain near the entrances to Panguil Bay. A triangle-shaped island, separated from the town by a creek, lies between Misamis and open water. Small creeks bound the town on the east and west. The land on which the town is built is low and wet. Since Misamis is the commercial center of northwestern Mindanao, the business area is unusually large. Two-thirds of the town consisted of stores. The streets intersect at right angles, forming a rectangular pattern. Only the 4 principal streets were hard-surfaced. According to a 1941 report, the middle blocks of Commercial Street, one of the main thoroughfares, were knee-deep in mud.

(c) *Means of access.* Ships do not have direct access to the town. Docking facilities are located on the island. Vessels from Cebu called regularly at Misamis.

Misamis is located on the road which skirts the northern coast of Mindanao. It is, however, not directly accessible from most parts of the island.

(d) *Billeting facilities.* Three schools, a large 1-story wooden private high school for 400 students, a 1-story, wood and stucco elementary school accommodating about 800 children, and a wooden 2-story, Catholic school for 500 children, could be used for billeting. The Catholic school had an artesian well and 10 storage tanks; the rooms were equipped with running water. The wooden Philippine military barracks, about 5 miles south from Misamis, also offer facilities.

(e) *Buildings.* The principal buildings of the town were constructed of wood or concrete. A few have concrete first-story walls and wooden second-story walls. There are no stone or brick buildings. The natives live in flimsily built nipa huts, large numbers of which are concentrated along the west beach and in the northeast section of the town. Most of the buildings in Misamis are highly inflammable. The inadequate water supply makes fire protection difficult. The buildings included:

- | | |
|---------------------|----------------------------------|
| Post office. | Misamis Lumber Company building. |
| Municipal building. | Theaters. |
| High school. | Bus station. |
| Catholic school. | Fort. |

Protestant church.
Catholic church.
Aglipayan church.

Public markets.
A lighthouse.

(f) *Internal transportation.* A narrow-gauge railroad connected the wooden pier with the lumber yard on the island.

(g) *Public utilities.*

1. *Water.* Misamis had no municipal water system. Adequate supplies were obtained, however, from wells, a few of which are artesian. Rain water is also stored for drinking purposes. The Misamis Lumber Company had an artesian well from which water was pumped to elevated storage tanks and then piped to the wooden pier.

2. *Electricity.* The Lumber Company operated a 125-kilowatt plant which, in addition to supplying electricity for its own use and light for both piers, possibly furnished a little power for Misamis.

3. *Communications.* A telegraph station connected Misamis with the north coastal system. A radio station with the call letters KBE was maintained by the Bureau of Posts.

(10) *Butuan.*

(a) *Importance.* Butuan, the capital of Agusan Province, served as a port for the products of the Agusan River Valley. A

large trade in hemp and copra was carried on, principally with Cebu.

(b) *Physical characteristics.* Butuan (FIGURE VIII - 25) is located in northeastern Mindanao, on the west bank of the Agusan River, about 5 miles inland from the coast. The streets are laid out at right angles to one another and surfaced with crushed coral. Although soft when wet, they are well drained and serviceable soon after rain. The buildings, mostly 1- and 2-story structures with galvanized iron roofs, are compactly grouped.

(c) *Means of access.* Boat connections were maintained with Cebu. Vessels of 12-foot draft had access to the town, and boats drawing 4 to 5 feet gave contact with points as far as 40 or 50 miles up-stream. Before the war, ferries crossed diagonally upstream from Butuan to a settlement consisting of a few houses and stores on the east bank of the river.

Butuan was easily accessible from points along the north-western coast by way of the coastal road which passes through the town. Land connections with the interior were by trail only. A bus line gave connections with Surigao from the village diagonally opposite the town.

A small commercial airfield was located about 1/2 mile south



FIGURE VIII - 25.
Airview of Butuan.

1. Municipal Building.
2. Constabulary building.
3. Monastery.

4. Catholic church.
5. Schools.
6. Sawmill.

7. Market.
8. Wharves.
9. Airfield.



FIGURE VIII - 26.
Airview of Iligan. Looking SW.

of the town. A road gave access to Butuan from the field. No scheduled air service was maintained.

(d) *Billeting facilities.* The schools, the monastery, and 2 small hospitals offered limited billeting facilities. The other buildings of the town may also offer some accommodations.

(e) *Buildings.* The buildings of the town included:

The municipal building and jail.	Two schools.
The constabulary building.	A market.
A Catholic church.	Stores.
A monastery.	Two hospitals.
	A sawmill.

(f) *Public utilities.*

1. Water. The waterworks at Butuan Army Cadre had a pumping system which supplied 400 people.

2. Electricity. There was no municipal electric plant. Most of the stores in the shopping district, however, were lighted with electricity, probably supplied from the 40-kilowatt power plant at the sawmill.

3. Communications. There were 2 radio stations, one maintained by the Bureau of Posts with call letters KZKF and the other privately owned by the Butuan Sawmill, with call letters KBT.

(g) *Warehouses and storage.* A small cargo shed has been reported at one of the wharves.

(h) *Health and sanitation facilities.* There were 3 hospitals, 1 with a 24-bed capacity, 1 with 12 beds, and a 7-bed private clinic.

(11) *Iligan.*

(a) *Importance.* The port of Iligan on the north coast

of Mindanao handled the commerce of the Lake Lanao district. Copra and corn were the chief exports.

(b) *Physical characteristics.* The town (FIGURE VIII - 26) is built on low swampy ground north of the mouth of the Iligan River on the east shore of the Iligan Bay. The streets intersect at right angles, forming a regular pattern.

(c) *Means of access.* Prior to Japanese occupation, Iligan maintained regular steamship connections with Cebu.

Iligan was easily accessible from points along the north coastal road and the Cotabato and coastal areas. Two trails lead into Iligan from the interior area east of the town.

(d) *Billeting facilities.* Billeting facilities were very limited. The Lanao Hotel near the center of the town had 6 to 8 beds. In the same block were 2 schools, 1 concrete. Two blocks east was a wooden Catholic school building. Another concrete school was on the southeastern edge of the town.

(e) *Buildings.* The buildings in Iligan are all of wooden construction except the 2 concrete school buildings. The main buildings are:

The municipal buildings.	A Catholic church.
Post office.	Electric light plant.
Four schools.	A hospital (first aid station).

(f) *Public utilities.*

1. Electricity. An electric light plant with a 55-kilowatt diesel engine was located in the north central section of the town.

2. Communications. Iligan had a telegraph station with connections to Cebu.

(g) *Health and sanitation facilities.* There was a frame hospital with 4 beds at the extreme southern end of town.

(12) Isabela.

(a) *Importance.* Isabela is the principal town on Basilan Island, the headquarters of a constabulary post, and the port for the nearby coconut and rubber plantations and the local lumber industry. Lumber was the main export.

(b) *Physical characteristics.* Isabela (FIGURE VIII - 27) is located on the narrow mangrove-fringed coastal plain of northwestern Basilan. Most of the buildings of the town bordered the main street. The area south and southwest of Isabela is mountainous and forested; on the east there are plantations.

(c) *Means of access.* Before the war, inter-island steamship connections were maintained.



FIGURE VIII - 27.

Airview of Isabela. Looking SW. Malamam Island in left foreground.

Most of the villages on the island had connections by road with Isabela. A bus line was operated between the town and Bohelebong. A trail from the southwest with branches from the interior enters Isabela.

(d) Public utilities.

1. *Water.* Water was available at the ice plant. Rain water was collected for drinking purposes.

2. *Communications.* Isabela had telephone connections with Lamitan and Bohelebong. A 7-kilowatt radio station with the call letters KZBS connected with outside circuits through the more powerful station at Zamboanga.

(e) *Health and sanitation facilities.* There was a provincial dispensary at the constabulary post and a maternity home in the town.

(13) Lamitan.

The village of Lamitan, located a short distance inland from the mouth of the Gubauan River on the northeast coast of Basilan, is one of the larger settlements on the island. Cattle, copra, rice, corn, and hemp are exported.

The road which runs from Isabela to Bohelebong passes through Lamitan, and a local road leads to the pier. Before the war, there was daily ferry service to Zamboanga and inter-island steamship connection. A telephone on the pier gave connection to Isabela and Bohelebong; autobuses provided trans-

portation to and from the same towns. There was a 10-kilowatt power plant operated by a diesel engine.

(14) Bohelebong.

Bohelebong is the most important town on the east coast of Basilan. The chief industry is fishing. Telephone and autobus connections were maintained with Isabela and Lamitan.

84. Sulu Archipelago

A. General description.

The greater part of the population in the Sulu Archipelago is concentrated on Jolo and 3 or 4 of the small islands immediately south of it. The principal towns in the archipelago are Jolo and Siasi.

Jolo was the port of entry and the commercial and administrative center for the island group. Siasi is the second largest town in the Sulu Province and offers fair seaplane anchorage.

The public buildings of the towns are usually either coral and lime or frame structures with galvanized iron roofs. The native huts are of nipa and bamboo. The majority of the towns and villages are in the coastal area. Villages consist of a few nipa huts, a store or two, and 1 muddy street.

There were small radio stations at Jolo, Siasi, Bangao, and Cagayan de Sulu. There is a manual telephone system in Jolo.

All types of malaria, dengue fever, and bacillary dysentery are prevalent in the Sulu Islands. Cases of leprosy which appeared were confined to the leprosarium near Jolo, then transferred to the leper colony on Culion Island, Palawan. There are a few small hospitals and dispensaries in the towns.

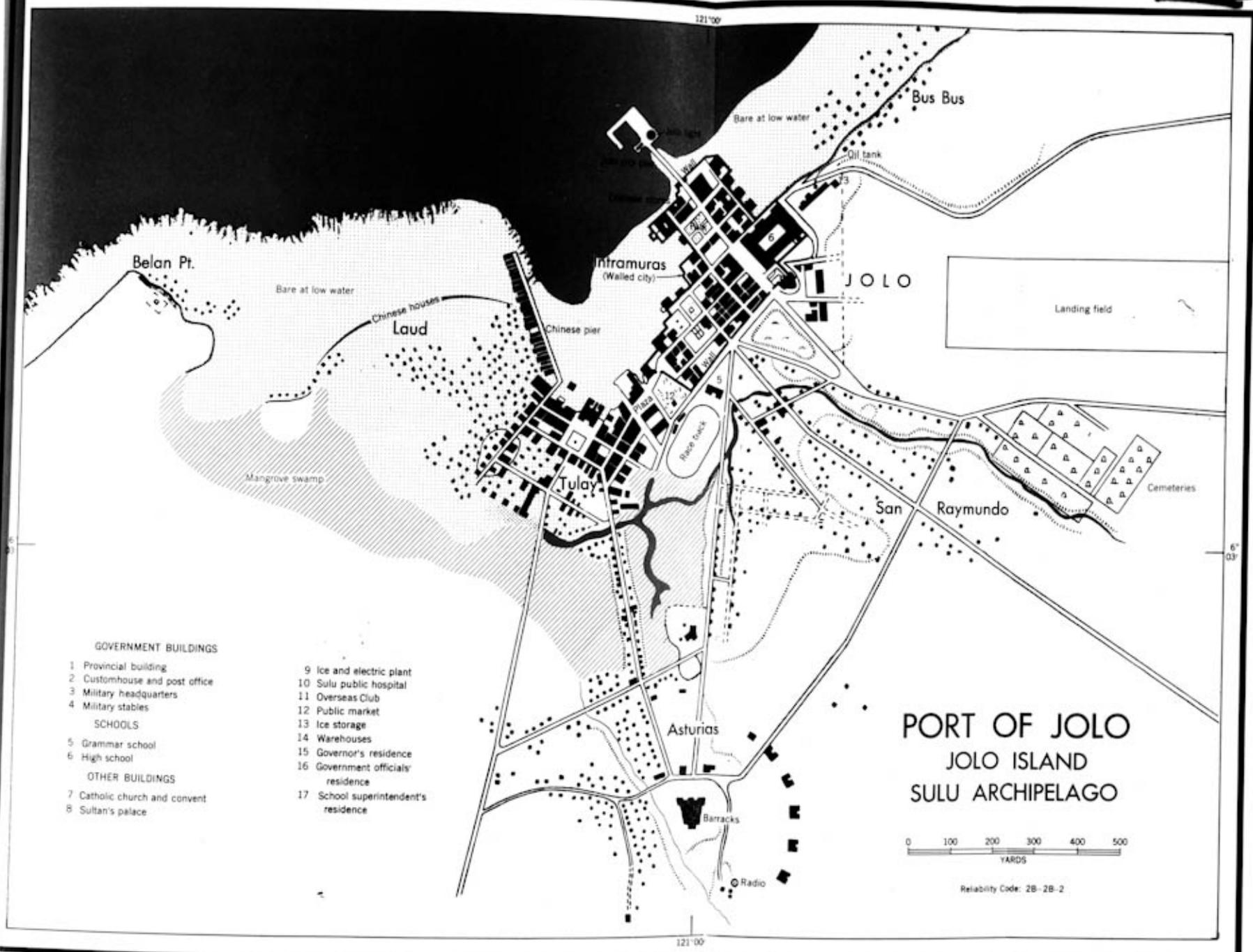
B. Description of towns.**(1) Jolo.**

(a) *Importance.* Jolo (FIGURE VIII - 28) the capital and most important city of Sulu Province, was the main port in the Sulu Archipelago. The headquarters of the Provincial detachment of the Philippine constabulary and units of the Philippine army were stationed here prior to the war. The town was also the hub of the Moro culture and the home of the Sultan of Sulu, the political and religious leader of the Moros.

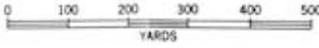
(b) *Physical characteristics.* Jolo (FIGURE VIII - 29) is situated on a bight on the northwestern coast of Jolo Island. The town, built on low land along the coast, is laid out in 3 or 4 main streets. One section of the town is partially surrounded by a wall. The business district is located southwest of and outside the wall, extending from the market to the Chinese pier upon which the Chinese town is built.

The city is divided into 6 barrios or districts: Intramuras (The Walled City), Tulay, Laud, Asturias, San Raymundo, and Bus Bus. Most of the government buildings and government residences, including the customs house, warehouses, stores, and the high school were located within the barrio of Intramuras. The Sulu Hospital, the Sultan's palace, the grammar school and the main business section were in the barrio of Tulay.

(c) *Means of access.* Jolo has the only harbor of importance in Sulu Province. Boat connections were maintained with Sandakan and Singapore, besides regular trips to Philippine ports. Within the Sulu Archipelago, regular motor launch



PORT OF JOLO
 JOLO ISLAND
 SULU ARCHIPELAGO



Reliability Code: 28-28-2

FIGURE VIII - 28.
 City plan of Jolo.



FIGURE VIII - 29.
Airview of Jolo.

1. Provincial Building.
2. Custom House and Post Office.
3. Military headquarters.
4. Military stables.
5. Grammar school.
6. High school.
7. Catholic church and convent.
8. Sultan's Palace.
9. Ice and electric plant.

10. Sulu Public Hospital.
11. Overseas Club.
12. Public market.
13. Storage for ice.
14. Warehouses.
15. Governor's residence.
16. Government officials' residences.
17. Superintendent of Schools' residence.

inter-island service every 2 weeks was maintained between Jolo and Zamboanga, Siasi, Bangao, and Sitankai.

Jolo was connected by coral roads, suitable for light traffic, with all other settlements on the island. There are numerous good trails on the island which are easily traveled except through timbered areas.

Jolo Harbor could be used as an alighting and take-off area for seaplanes; anchorage and mooring were available northeast of the city pier. Zettell Field, an emergency landing area, is located $\frac{1}{4}$ mile east of Jolo. A dirt road gives access to the town.

(d) *Commerce and industry.* Jolo was the center of trade in the Sulu Archipelago, and the only point of outside contact except for the Basilan Island towns, which are closely linked with Zamboanga. Trade connections were maintained with Manila, Zamboanga, Borneo, and Singapore.

The principal imports were rice, hardware, and cotton goods; the chief exports were copra and hemp. Rice mills and hemp presses were in operation at the time of the Japanese invasion.

(e) *Billeting facilities.* The school, (a former army barracks), the military headquarters, a hospital, the Sultan's palace, the Governor's and government officials residences, the school superintendent's residence, and the Overseas Club offer limited billeting.

(f) *Buildings.* With the exception of the native huts, most of the buildings are 1- or 2-story structures built of coral and lime, or frame with galvanized iron roofs. Other than those listed under B, (1), (c), the buildings included:

- A customs house and post office.
- The provincial building.
- A Catholic church and convent.
- Chinese houses and shops.
- An ice and electric plant.
- An ice storehouse.
- A warehouse.

(g) *Internal transportation.* Taxis and public utility cars were numerous in Jolo before the war and could be hired for local transportation. According to report, all vehicles were dis-

mantled and shipped to Japan as scrap iron after the Japanese invasion.

(b) *Repair and service facilities.* Before the war, minor repairs could be made in the small machine shops, at the ice plant, and at garages. The Jolo Garage and Transportation Company maintained an auto garage and machine shop. In 1939, a small marine railway, capable of handling launches up to 50 feet in length and of 5-foot draft, was located north of the city pier.

(i) *Public utilities.*

1. *Water.* Jolo had the best water supply on the island. Distilled water for the foreign population was produced at the ice plant. All water used for drinking had to be boiled. Water was piped through a 6-inch main to the pier east of the town.

2. *Electricity.* The Jolo Power Company operated a 240-kilowatt diesel-driven power plant; current was supplied at 40 cycles and 220 volts for use within the city limits.

3. *Communications.* The commercial radio station KIL at Jolo, maintained by the Bureau of Posts, had a 50-kilowatt capacity and operated on a normal frequency of 326 kilocycles as well as 250, 400, and 500 kilocycles. The transmitter was an RCA model ET 3650. Power was normally supplied by Jolo Power Company, but the station had an emergency 60-horsepower gasoline engine. There was also a Philippine Army station (KZPJ) at Jolo. No telegraph lines or cables existed in Sulu. A manual telephone system served the town of Jolo.

(j) *Warehouses and storage facilities.* A warehouse with approximate dimensions of 200 x 300 feet and a storehouse for ice are believed to exist, but their exact location is unknown. There are a number of *bodegas* in Intramuras near the pier.

(k) *Health and sanitation facilities.* The hospital maintained about 46 beds and was fairly well equipped. There was also a treatment station with 40 beds. Jolo had a closed sewer system which emptied into the sea. It is doubtful, however, whether this served more than a small part of the town.

(2) *Siasi.*

(a) *Importance.* Siasi is the capital of the Tapul Island Group and the second largest town in the Sulu Archipelago. The town was of little commercial importance; small quantities of copra and shell were exported.

(b) *Physical characteristics.* Siasi (FIGURE VIII - 30) is located on a small point which projects into Siasi Channel from the west coast of Siasi Island. The buildings of the town were largely concentrated along the 2 main streets and many small huts were built out over the water on piles.

(c) *Means of access.* Regular communication was maintained by small boat with Jolo, Zamboanga, Bangao, and Sitan-kai.

Trails gave access to the town from other points on the island.



FIGURE VIII - 30.
Airview of Siasi.

1. Constabulary headquarters.
2. Post office.
3. School.
4. Chinese wholesale house.

5. Radio tower.
6. Market.
7. Constabulary barracks.
8. Pier.

It may be possible to use Siasi Channel as a seaplane alighting area, but the tidal currents are very rapid and dangerous.

(d) *Billeting facilities.* Limited billeting was available in the constabulary barracks, the constabulary headquarters, the school, and the army quarters.

(e) *Buildings.* The public buildings were frame with galvanized iron roofs. They were, in addition to the buildings listed in B, (2), (d), the school, a post office, a hospital, dispensary, and the public market.

(f) *Public utilities.*

1. *Water.* Water was very difficult to obtain. During the dry season, the natives refused to give water away or sell it at any price. Water could be purchased by the can at a Chinese store on the main street about a half block east of the wharf. Two or three hundred gallons were available at one time. All water used for drinking purposes had to be boiled.

2. *Electricity.* A small light and power plant served the municipal buildings and a few others near the pier.

3. *Communications.* A radio station with call letters KED was operated by the Bureau of Posts.

(g) *Health and sanitation facilities.* A provincial dispensary and a small 6-bed hospital were maintained. A government physician and a sanitary inspector were in residence.

85. Northeast Borneo

A. General description.

There are few towns in northeast Borneo. Most of the people of the region live in native villages or *kampongs*, which, with few exceptions, are located either along the coast or along the rivers.

Sandakan, the capital of British North Borneo, is the largest and most important. Jesselton, the chief west coast port, also had some of the functions of a colonial capital. A large proportion of the 340 European residents in British North Borneo at the time of the 1931 census lived in these 2 towns. Nearly all the remainder were in Kudat, Tawau, Lahad Datu, and Beaufort.

The part of northeast Borneo formerly under Dutch control has only one important center of population, on Tarakan Island.

Most of the towns were primarily commercial centers, but in practically all cases they also served as administrative headquarters of government departments or officials. With the exception of Beaufort, all the towns mentioned are ports. The communities on Tarakan Island are entirely dependent on the exploitation of petroleum, for which they furnish the labor supply. The native villages, with few exceptions, are self-sufficient units.

B. Description of towns.

(1) Sandakan.

(1931 population: 13,723, of whom 10,692 were Chinese).

(a) *Importance.* Sandakan is the largest town and chief port of northeast Borneo, and the capital of British North Borneo. Its position with reference to the Philippines and the route from southern China to Australia gives it high strategic importance. Before Japanese occupation, an extensive trade was carried on with Hong Kong and other Far Eastern ports.

(b) *Physical characteristics.* (FIGURES VIII - 31 and VIII - 32). Sandakan is located on the northwest shore of Sandakan Harbor, about 1 mile from its entrance. The main section of the town is built on a narrow strip of low land, part of which has been reclaimed from the sea. Wooded hills rise close to the shore, reaching a height of 850 feet about 2 miles west of the town, and 669 feet on the east, where they overlook the entrance to the bay. The European residential section is located on the slopes back of the main section of the town, where the hills are much lower and permit easy access to the north coast. The slopes facing south and east are much steeper than those toward the north and west.

(c) *Means of access.* (FIGURES VIII - 31 and VI - 29). Before the war, service was maintained weekly between Sandakan and Singapore, and fortnightly to and from Hong Kong. In 1938, vessels of the Nanyo Kaiun Kaisha line made 29 trips between Sandakan and ports in Japan and Java. There was also regular service to the southern Philippines and to ports in Borneo.

Leila Road, which runs along the coast for about 8 miles, enters at the waterfront at the west end of the town, where it leads into Jalan Tiga. This road has an asphalt surface about 20 feet wide.

Kabon China Road, an asphalt-surfaced highway 17 miles long, which connects at its western end with a bridle path from Beluran, enters Sandakan from the north by several branches. One of these leads into Hospital Road, another leads into Beatrice Road at the Residency, and a third follows the north-south part of Ernestina Road to the eastern end of Daly Road.

A narrow-gauge railroad used for hauling timber extended from Sandakan into the jungle for 8 or 10 miles. Little information is available concerning this line.

No airfields or other facilities for land planes existed at the time of the Japanese conquest. The harbor affords a good landing and take-off area for seaplanes, with a runway of at least 2½ miles in all directions. An emergency seaplane anchorage was located ¾ mile west-southwest of the government pier.

(d) *Billeting facilities* (FIGURE VI - 7). Possible billeting places include:

Barracks.

Two buildings: one at the west end of the town, near the waterfront, the other near Fort Pryer, east of the main section of town. Capacity unknown, but small.

Sandakan Hotel: 10 bedrooms.

Roman Catholic Mission School: west of Church Road, accommodations for 150 boarders.

Boys' and girls' schools at St. Michael's (Anglican) church.

Albany Mansion (club building).

Government office buildings.

Government House; ¼ mile north of government wharf.

Customs house.

Residency.

Motion picture theatre.

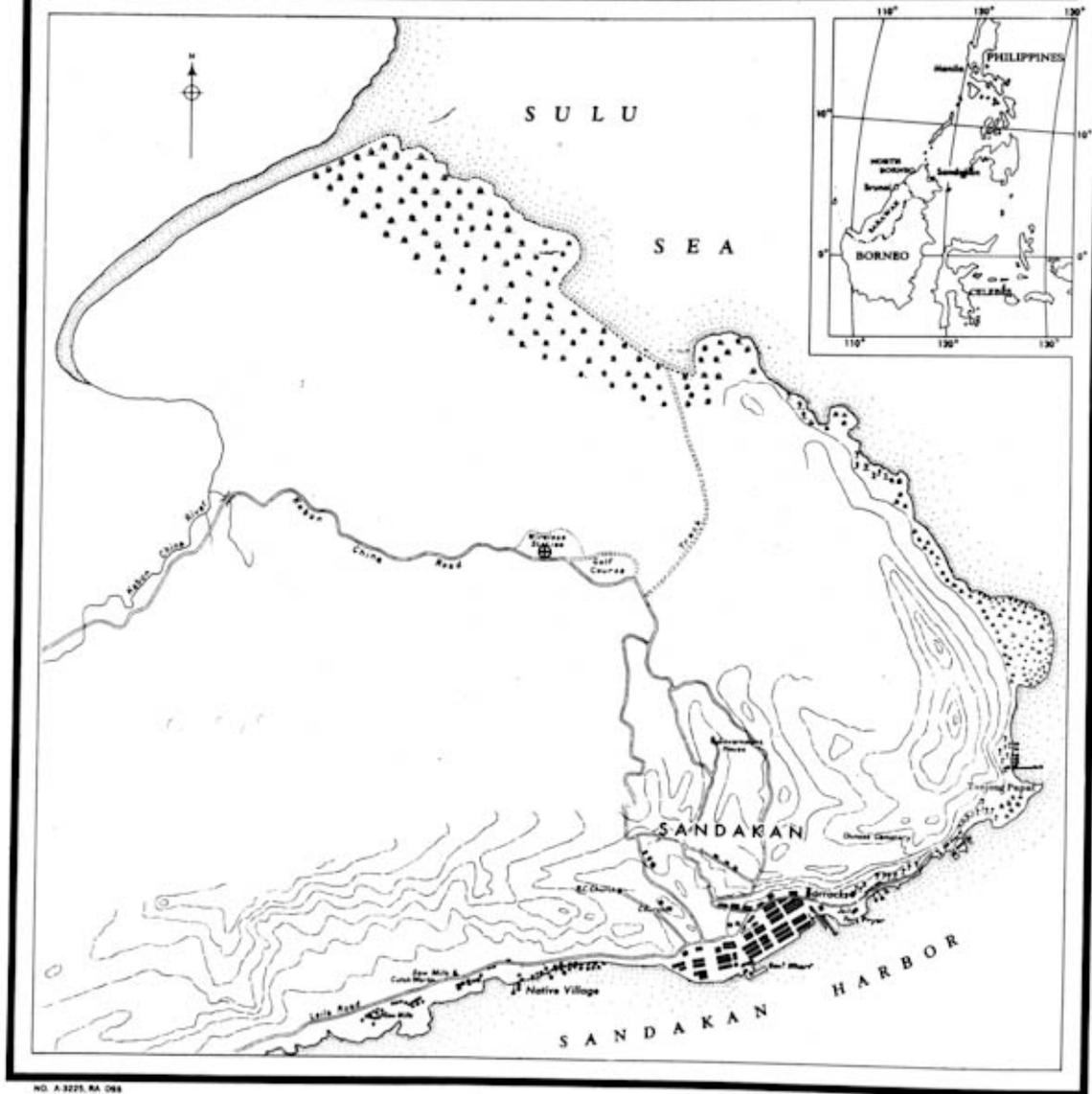
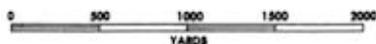
(e) *Buildings.*

1. Construction and height (FIGURES VIII - 33 and VIII - 34). Most of the buildings in Sandakan were 2-story wooden structures, but some had 3 stories. Many were built with overhanging second stories, thus providing sheltered passageways along the sides of the streets. In the older part of the town, the houses were originally mounted on piles, but this type of construction has been almost completely replaced by foundations.

2. The principal buildings besides those named above were:

NORTH BORNEO SANDAKAN AREA

FROM SURVEY OF NORTH BORNEO, BRUNEI AND SARAWAK,
WAR DEPARTMENT, 530-676, JUNE 15, 1943



NO. A 3225, RA 088
4 APRIL 1944

FIGURE VIII - 31.
Map of Sandakan and vicinity.

Anglican church (stone).
 Mosque.
 Hospital.
 Shops at British Borneo Company's Engineering works.
 Radio station, 1½ miles north-northwest of customs house.
 Clock tower, Humphreys Street, next to government offices.
 Mental hospital.
 Office building of Messrs. Harrisons and Crosfield.
 The power and ice plant.

(f) *Repair and service facilities.* No facilities for large-scale repairs were available. Machine equipment was limited. The British Borneo Company's engineering works included a foundry capable of forging shafts up to 6 inches, and equipment for turning 12-inch shafts 20 feet long.

(g) *Public utilities.*

1. *Water.* There was a waterworks system that could supply a daily minimum of 180,000 gallons of filtered and sterilized water. There was also an ice and aerated water plant.

2. *Electricity.* The Sandakan Light and Power Company had a steam plant with a capacity of 700 kilowatts. It furnished 3-phase, 60-cycle current at 110-220 volts.

3. *Communications.* A Siemens automatic telephone service, with an exchange equipped for 200 subscribers, was in operation. There was also a radio-telegraph station, with 2½ kilowatt capacity.

(b) *Warehouses and storage.* There were 2 warehouses at the Government Wharf.

(i) *Health and sanitation facilities.* Sanitary conditions in general were fair to good, but special precautions should be

taken against malaria. The town has a closed sewerage system. Septic tanks were installed at the constabulary barracks. The water supply is carried in mains. Public health activities included anti-malarial work and regular medical examinations and treatment of all government workers and school children. A well-equipped civil hospital, with operating facilities, a laboratory and a dispensary, was located in the western part of the town. Its capacity was 90 beds (6 European, 84 native). There were also a mental asylum, a clinic for the treatment of venereal diseases, and a pauper institution. A colony for lepers was maintained on the island of Berhala, about 3 miles from Sandakan.

(2) *Jesselton.*

(1931 population—4,594).

(a) *Importance.* Jesselton (renamed Api by the Japanese) is the chief port on the west coast of British North Borneo and the northern terminus and administrative headquarters of the State Railway. It is the center of the west coast rubber-growing and other agricultural industries, and was also important as the seat of several government departments and the residence of the Governor for about half the year.

(b) *Physical characteristics* (FIGURE VIII - 35). Jesselton is located on the east side of Gaya Bay, about 1¼ miles south-southwest of Lipat Point (Tanjong Lipat). The harbor is well sheltered by Gaya and Sapangar Islands. The public buildings, business houses, and Chinese shops are ranged along two or three streets close to the sea; back of these are low hills dotted with the residences of the European community. (FIGURES VIII - 37 and VI - 26).

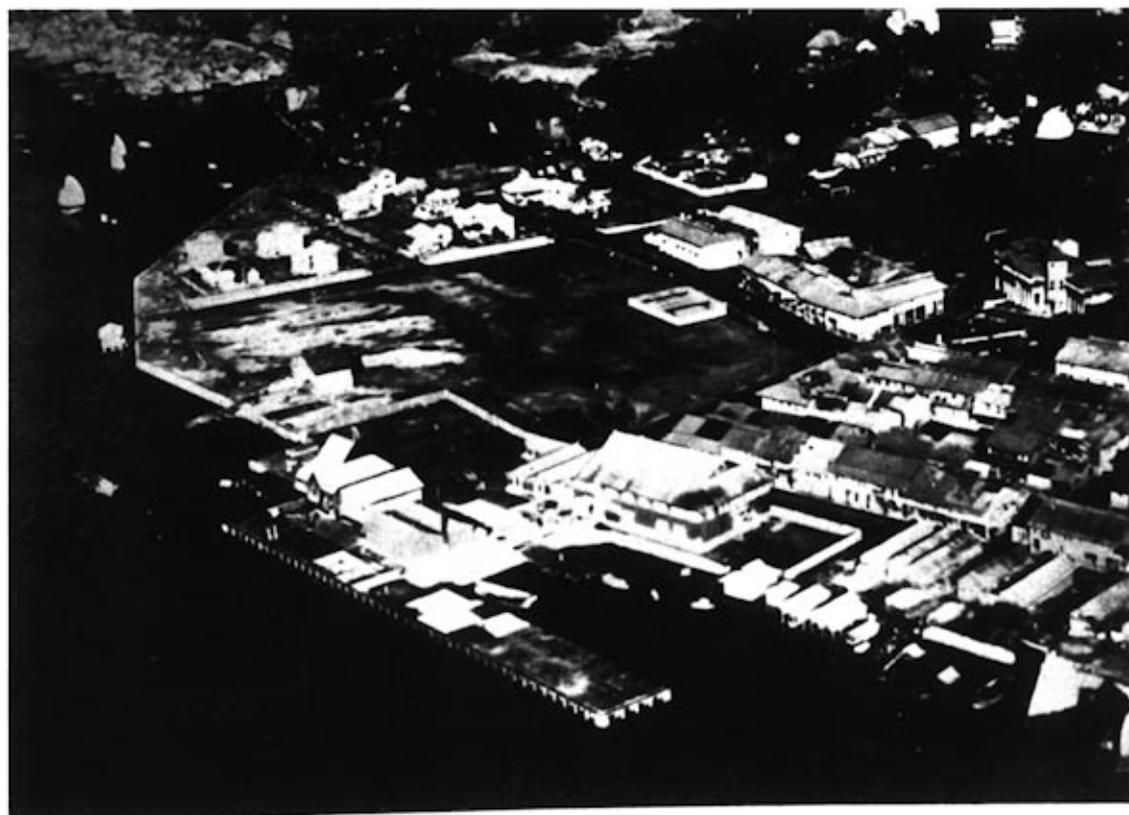


FIGURE VIII - 32.
 Airview of Sandakan.



FIGURE VIII - 33. Sandakan.
Buildings, showing construction, 1937.



FIGURE VIII - 34. Sandakan.
Chinese shops along waterfront.

(c) *Means of access.* Regular service was maintained on a weekly or biweekly schedule between Jesselton and other North Borneo ports and Singapore.

The best road system in Borneo centers on Jesselton. (FIGURES VIII - 35 and VI - 25). A highway from Tuaran, via Tenghilan, crosses the hills behind the town and leads into Atkinson Road at the railroad station. South Road extends from Tanjong Aru, 5 miles southwest, past the race course, golf course, and constabulary barracks to the railroad station. From Penampang, 7¼ miles southeast, 2 roads enter Jesselton by different routes. One of them leads into Atkinson Road; the other joins South Road at the constabulary barracks about 2 miles south of the town.

Jesselton is accessible by rail from the south via the State Railway, which connects it with Melalap, Tenom, Beaufort and Weston.

(d) *Billeting facilities* (FIGURE VI - 25). The Victoria Barracks were the headquarters of the North Borneo constabulary. About 350 men were stationed there. Other buildings that might be used for billeting are:

Railroad station.
Hotel.

Recreation club.
Sports club.
Government offices.
Customs house.
Clerks' and boatmen's quarters at the Government Pier.
Anglican school and mission on South Road.
Gap House—government quarters on Atkinson Road.
Government house, east of the South Road, near the barracks.

(e) *Buildings.* Most of the buildings in the commercial section of the town are 2-storied and of wooden construction (FIGURE VIII - 38). Other important buildings not listed above are:

Hospital—Hospital Road, 1 mile south of railroad station.
Locomotive shops—¾ mile southwest of barracks.
Radio station—near Tanjong Aru and race course.
Roman Catholic mission—South Road.
Jail—adjacent to barracks.

(f) *Repair and service facilities.* The State Railway had a repair shop and a locomotive shop. There were 2 garages, and the Jesselton Ice and Power Company had facilities for electrical repairs.

(g) *Public utilities.*

1. *Water.* The town has a public water supply obtained from a reservoir about 4 miles to the southeast. In 1939 the consumption was 34,350,600 gallons. Ice was also available.

2. *Electricity.* A diesel plant operated by the Jesselton Ice and Power Company, Ltd., furnished both alternating and direct current at 230 volts. The plant had a capacity of 366 kilowatts. The streets were electrically lighted.

3. *Communications.* There was a small automatic telephone exchange. Long-distance lines reached many points in the interior. A radio station was in operation, and there were also overland telegraph lines to Beaufort, Tenom, and Mempakul.

(b) *Warehouses and storage.* Two warehouses were located on the government pier. The Public Works Department also had several storage buildings located near the pier. A vault adjoined the government offices on the water front.

(i) *Health and sanitation facilities.* Malaria is said to be a serious menace at Jesselton. Yaws is also prevalent among the natives. Public health services of various sorts were maintained, including medical examination of public employees and school children. The civil hospital had been enlarged and improved and in 1941 had 66 beds, including 4 for Europeans. It was provided with good surgical facilities and a special ward for female patients. No public sewage system existed. Most of the larger buildings and some private homes were supplied with septic tanks. There were several public latrines.

(3) *Tarakan Island.*

The name "Tarakan" has been used in several different ways and is a cause of much confusion. It is primarily the name of an island, but the Dutch have given the same name to a political sub-district and also to a municipality. The distinction between these latter two is not clear. In order to avoid confusion, the name "Tarakan" is used in the following discussion to designate only the island. The chief settlement is called "Pamoesian," the name of the most important oil field. Persons familiar with the region state that this is the local usage.

Population in 1930:

Tarakan municipality: 11,589, including 164 Europeans and 2,987 Chinese.

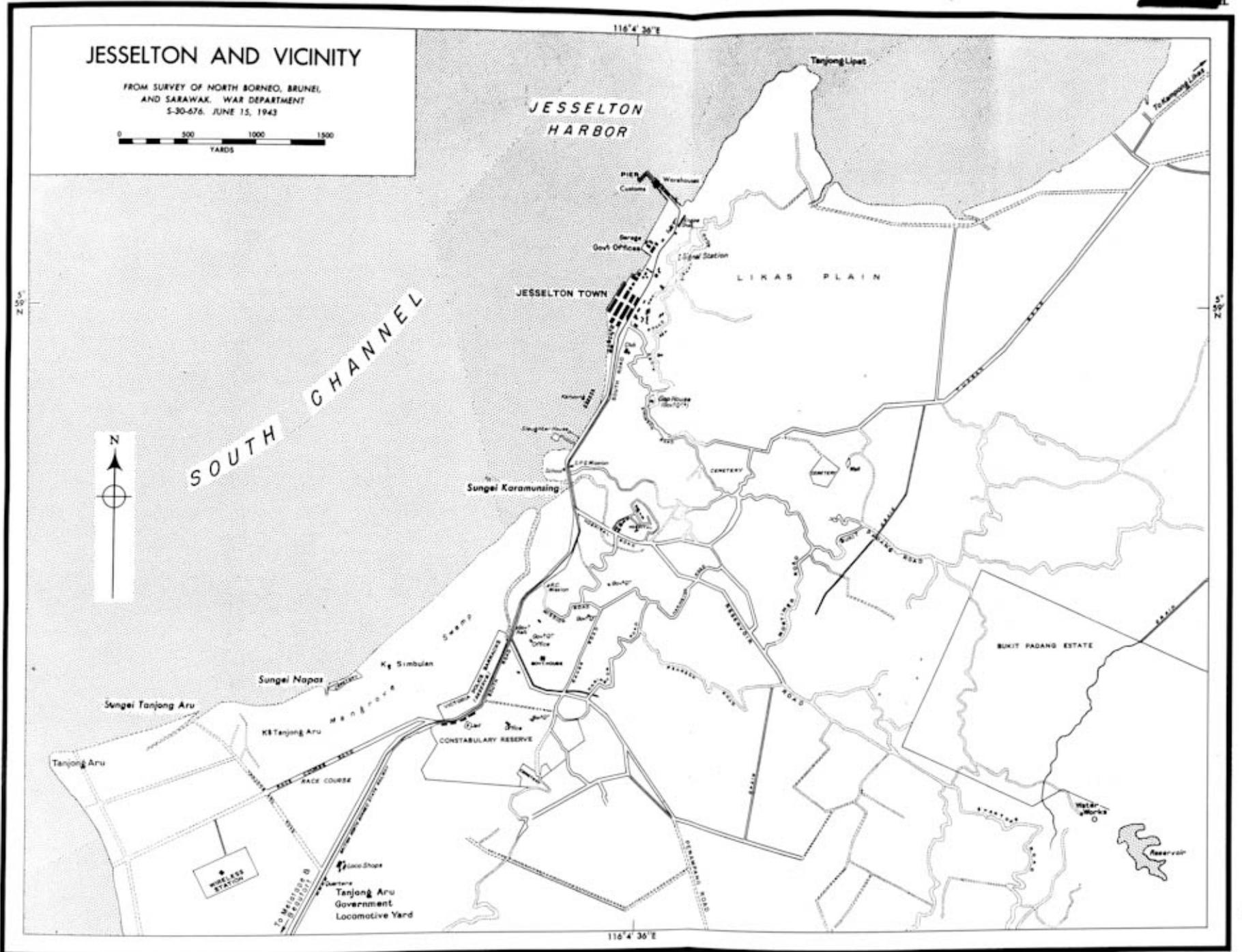


FIGURE VIII - 35.
Map of Jesselton and vicinity.

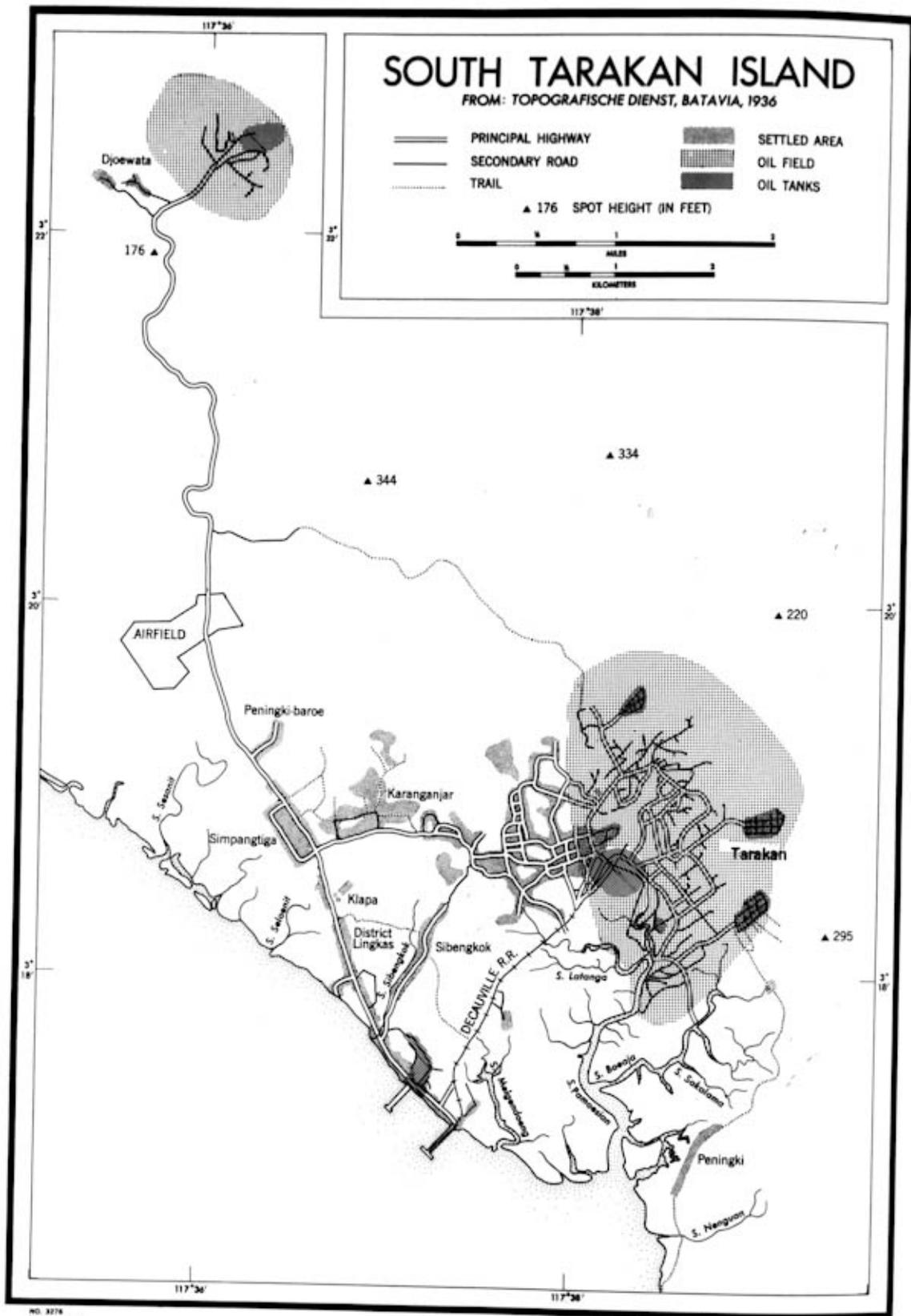


FIGURE VIII - 36. Tarakan Island.
 Waterfront at Lingkas.

Tarakan sub-district: 13,598, including 567 Europeans and 3,063 Chinese.

(a) *Importance.* Tarakan Island is important only for its petroleum. At the time of the Japanese occupation, it produced little else; food was almost wholly imported.

(b) *Physical characteristics.* (FIGURE VI - 32). The island is at the mouth of the Sesajap River. It is hilly, and rises to a



FIGURE VIII - 37. Jesselton.
From hill back of town.

maximum elevation of 512 feet. Most of it is covered with dense jungle. Lingkas, on the southwest coast, is the export harbor for the oil obtained at the 2 inland oil fields. There is a tank farm close to the shore, and a small village, with a number of Chinese shops, along the water front (FIGURE VIII - 36). Further back were the homes of many of the European employees of the oil company. The chief center of population is the Pamoesian oil field, located about 2 miles inland. This relatively densely settled area is often called the town of Tarakan. It is not, however, a continuous settlement. Small communities of natives (FIGURE VIII - 39), groups of houses for Europeans, Chinese shops, and offices are scattered among the oil installations. The headquarters of the Bataafsche Petroleum Maatschappij were located along the Pamoesian River at the terminus of the railroad and highway from Lingkas.

(c) *Means of access.* Lingkas was a port of call for ships of the Royal Netherlands Packet Navigation Company.

There is an airfield near the west coast of Tarakan Island, on the road between Lingkas and Djoewata oil field, about 4 miles north-northwest of Lingkas. Seaplanes can land and take off in the harbor at Lingkas, where there is a good anchorage and a seaplane dock.

A narrow-gauge railway connects the oilfield at Pamoesian with Lingkas.

There was a paved road from Lingkas to the oil company headquarters at Pamoesian. A road from Djoewata oil field and Tarakan airfield connects with it.

(d) *Billeting facilities.* Dutch soldiers were stationed at Tarakan. No information is available as to the location of their barracks, or whether these have been destroyed. Other facilities for billeting were very limited.

(e) *Buildings.* Practically all the buildings were wooden. None was of large size, and many were of 1 story only. At Lingkas the houses at the waterfront were built on piles.

(f) *Repair and service facilities.* The oil company had a machine shop and engine repair shop at Pamoesian.

(g) *Public utilities.* There were 2 electric power plants, one operated by the oil company, and the other by the N. V. Houtaankap Maatschappij. The former, and presumably the latter, were at Pamoesian. Rain water was used for drinking, but for other purposes a pumping station drew water from a stream. There was a radio station at Pamoesian, and telephone service connected Lingkas, Pamoesian, and various parts of the oil fields.

(h) *Health and sanitation facilities.* A modern pavilion-type hospital with 120 beds was maintained by the oil company, and there was also a military hospital, said to be poorly equipped.

(i) *War damage estimate.* Tarakan was bombed by the Japanese several times before they occupied the island on 13 January, 1942. The Dutch were reported to have destroyed the topping plant and most of the oil wells before they retired.

(4) Kudat.

(1931 population: 3,850).

(a) *Importance.* Kudat, located at the west side of the entrance to Marudu Bay, is the most northerly port in Borneo. It was the collecting and distributing center for an important agricultural and livestock district, whose chief commercial prod-



FIGURE VIII - 38. Jesselton.
A main street. 1932.



FIGURE VIII - 39. Tarakan Island.
Native village.

ucts were rubber, copra, and corn. Before the war the town exported 50,000 cases of eggs annually to Singapore. Kudat was also an administrative headquarters; a government station was located there.

(b) *Physical characteristics.* (FIGURES VIII - 40, VIII - 41, and VI - 136). Kudat Harbor is a small arm of Marudu Bay. The town, on the north side of the entrance to the harbor, is surrounded by low land, much of which is swampy.

(c) *Means of access* (FIGURE VIII - 40). Kudat was a regular port of call for ships trading between North Borneo and Singapore.

There were about 30 miles of metalled roads centering on Kudat from the north and west, most of them only a few miles in length. The longest extends from Sikuati, on the west coast; it connects with Tai Pah Road and Upper Road and enters the town from the north. A bridle path, connecting with a road to Jesselton, terminates on the south side of Kudat Harbor.

(d) *Billeting facilities and buildings.* There was a barracks for a small number of soldiers, and a customs house. The government offices and courthouse are small 1-story buildings (FIGURE VIII - 42).

(e) *Public utilities.* There was a water supply system, but the quality of the water was reported to be poor. A small local telephone exchange was in operation. Telegraph lines connected Kudat with Labuan, Jesselton, and Sandakan, and there

was a submarine cable to Singapore. A radio station was located on the outskirts of the town.

(f) *Health and sanitation facilities.* The civil hospital at Kudat had 28 in-patients on 1 January 1941; no information regarding its capacity is available. Special precautions against malaria are said to be necessary, especially during the southwest monsoon.

(5) Tawau.

(population 1931: 1,840).

(a) *Importance.* Tawau is the commercial center of a rich region producing rubber, coconuts, manila hemp, livestock, and timber. In addition, a large-scale tuna fishing industry was carried on by Japanese interests in the adjacent waters. Tawau was also the capital of the residency of Tawau.

(b) *Physical characteristics.* Tawau is located on Tawau Point, on the northern side of the entrance to Cowie Bay, 1½ miles west of the mouth of Tawau River. The valley of the River, from 1½ to about 2½ miles wide, extends north of the town for some 13 miles, and is bordered by mountain spurs that reach the coast 6 miles east and about 2 miles north-northwest of Tawau.

(c) *Means of access* (FIGURE VIII - 43). Tawau had direct steamship connections with Japan, China, Hong Kong, Manila, and Java. Ships of the Koninklijke Paketvaart Maatschappij called every 2 weeks, and the Sabah Steamship Com-



FIGURE VIII - 41. *Kudat.*
From the harbor. 1936.



FIGURE VIII - 42. *Kudat.*
Government offices and courthouse. 1926.

pany maintained a weekly service to Sandakan and ports on the west coast of North Borneo.

A road about 10 miles long enters Tawau from the east via Apas Road; another extends to Tanjong Batu, about 3 miles northwest. There is also a short road to the mouth of Tawau River. A tramway, with several branches, extended from Tawau Rubber Estate, about 6 miles distant, to the pier.

(d) *Billeting facilities and buildings.* There are barracks in the town, but no information is available regarding their capacity. A new customs house was completed in 1939. Other important buildings, some of which may be suitable for billeting purposes, are:

- The government rest house.
- The government offices.
- The club house.
- The Anglican and Roman Catholic missions.
- The Residency.

(e) *Public utilities.* No information is available regarding water supply or electricity. A radio station was located about $\frac{3}{4}$ mile north-northwest of the pier. There was a telephone exchange, but no telegraph.

(f) *Health and sanitation facilities.* A civil hospital was maintained at Tawau, but it is reported that there were no accommodations for Europeans. There were several public latrines.

(6) *Lahad Datu.*

(population: 600).

Lahad Datu (FIGURE VI - 137), a port on the north shore of Darvel Bay, is almost directly south of Sandakan. It was the headquarters and shipping point of the Darvel Bay Tobacco Company, and also the commercial center of a rapidly growing coconut producing district.

The town is located in the northwest portion of an indenta-

tion of the coast north of Sakar Island. The estate of the tobacco company occupied a large area of flat land back of the settlement.

Lahad Datu was a port of call for coastwise steamers, and had weekly service to Sandakan. Access by land was limited to 2 roads, 1 of which extended about 8 miles east of the town, and the other about 7 miles north-northwest. There was telephone and telegraph connection with Sandakan, but no radio station.

(7) *Beaufort.*

Beaufort is a small town on the railroad and Padas River, 56 miles southwest of Jesselton. It is the center of a rubber- and sago-producing district, and was also the administrative headquarters of Beaufort District. The railroad is the chief means of access to the town, both by the main line from Jesselton, Tenom, and Melalap, and by a branch from Weston. There are no roads, but a bridle path connects Beaufort and Karukan, Mempakul, and Kuala Penyu. Beaufort had a rest house, a European club, and a civil hospital with 16 in-patients on 1 January 1941. The town is subject to periodic floods.

C. Native villages.

The native villages of northeastern Borneo are of 2 strikingly different structural types:

- (1) Villages composed of small family-unit houses.
- (2) Villages composed of 1 or several communal houses.

The first type is universal among the so-called "Malay" people of the coasts, who never build communal houses. It is also found in some parts of the interior inhabited by aboriginal tribes. The most characteristic of the villages of the interior, however, are those in which the entire community is housed in a single building—the "Long House."

Nearly all the native villages of Borneo have one feature in common: the houses are built on piles or poles, with an open space under the floor. This type of construction (FIGURES VIII - 44 and VIII - 45) is used for small houses and "Long Houses," by peoples of widely different race and culture in the coastal region, and the interior. It seems to be absent only in communities that have been Europeanized.

The "Malay" people of the coast region often build their villages in the water off-shore or in rivers. (FIGURES VIII - 45 and VIII - 46). The sanitary advantages of such a location are obvious, but the custom is by no means universal, as many settlements are placed on the shore or the river banks. In the interior, the native villages are sometimes built close to a river's edge, but they are frequently 100 feet or more from the stream, and may even be located on hillsides high above the stream.

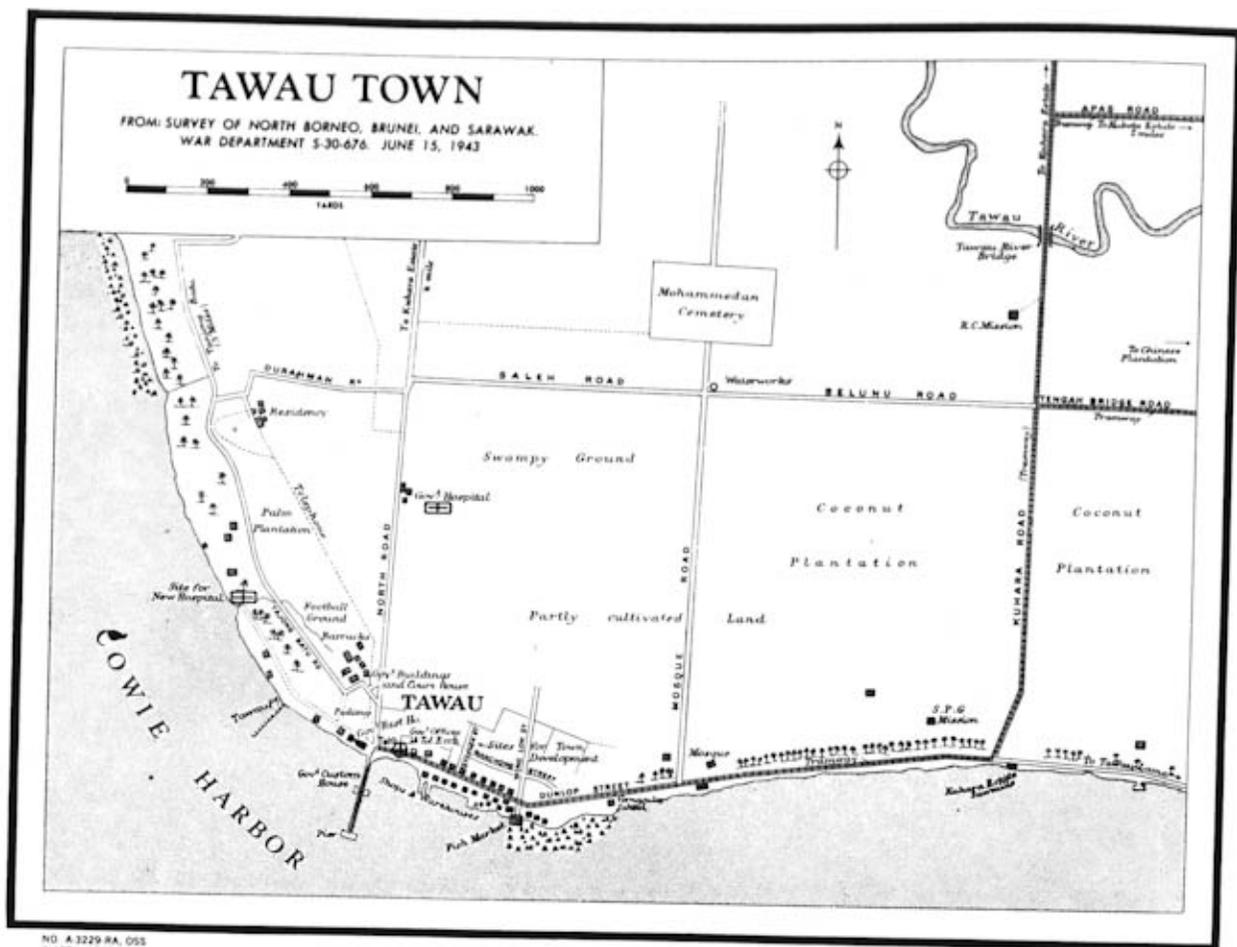


FIGURE VIII - 43.
Map of Tawau and vicinity.



FIGURE VIII - 44. Borneo.
Native village in the interior, 1937.



FIGURE VIII - 45. Borneo.
River village in the coastal belt.

Sanitary considerations have not entered into the thoughts of the builders, as the space under the houses is used as a pen for pigs and other livestock and is a general repository for all sorts of filth.

The famous "Long Houses" of the tribes of interior Borneo are remarkable structures (FIGURE VIII - 47). They vary in size, depending on the number of families to be accommodated. The average length is perhaps 300 or 400 feet, but some are much longer and may provide shelter for 600 or more people; one house (in Sarawak) was found by actual measurement to be 1680 feet long.

Although the design of these "Long Houses" varies considerably among different tribes, the following description may be taken as fairly typical:

"The framework of the roof is supported at a height of some 20 to 30 feet from the ground on massive piles of ironwood, and the floor is supported by the same piles at a level some 7 or 8 feet below the cross-beams of the roof—[which] is made of shingles of ironwood. The front part of the house is undivided and forms a single long gallery serving as a common ante-chamber to all the private rooms (FIGURE VIII - 48). It is, in a sense, though roofed and raised some 20 feet above the ground, the village street, as well as a common living and reception hall.

"The gallery is reached from the ground by several ladders, each of which consists of a notched beam sloping at an angle of about 75°."



FIGURE VIII - 46. *Borneo.*
Native village on the coast (Kudat).



FIGURE VIII - 47. *Borneo.*
Native Long House village. Before 1925.



FIGURE VIII - 48. Borneo.
Gallery of native Long House. Before 1925.

86. Northern Celebes Sector

A. General description.

Northern Celebes contained 2 markedly different settlement areas. The first, consisting of the Minahasa region around Manado and a belt across the island from Gorontalo to Kocandang, is characterized by dense population, intensive cultivation, numerous closely-spaced villages, and several sizeable towns. The Minahasa population is mainly Christian and has been under European influence for many years. Towns and villages are regularly laid out and in many respects resemble European communities. Manado, the chief settlement, is a substantial colonial town with modern facilities and excellent connections with the outside world. The Gorontalo area, much smaller than Minahasa, more Oriental in character, and populated mainly by Mohammedans, has 1 important town, Gorontalo. In contrast to these areas, the remainder of northern Celebes is largely wilderness; much of which is unexplored. There are no towns, and the widely scattered villages are inhabited by natives on a low cultural level.

B. Description of towns.

(1) Manado.

(1930 population: 20,047 natives; 1,392 Europeans; 5,519 Chinese; 586 other foreign orientals; total 27,544).

(a) *Importance.* Manado (FIGURES VIII - 49 and VIII - 50), the largest town in the Celebes Sea area, was the Dutch administrative center for approximately half of Celebes and the Sangihe and Talaud Islands. The town served as the commercial hub for the Celebes, the Sangihe and Talaud Islands, and a part of the Molukkas. Because of its proximity to the Palaus and its location on the shipping route between Japan and northern and western Australia, the Japanese were interested in the town for some years prior to the war.

(b) *Physical characteristics.* The town is located at the mouth of the Manado (Tondano) River, a small stream flowing into the head of Manado Bay, about 20 miles southwest of the northernmost point of the island. Extending about 1½ miles along the harbor, and nearly ¾ miles inland at its greatest extent, Manado is laid out on an irregular street plan. Residentie Laan, the main street, which is 40 feet wide and paved with asphalt, runs parallel with the beach about 1/10 mile from the shore. Two bridges span the river, which divides the town into 2 unequal sections, the southern being the larger.

(c) *Means of access.* Manado was visited in 1939 by 486 vessels with a tonnage of 1,875,000 tons. There are, however, no docking facilities, and vessels are serviced by praus. From December to February strong northwesterly winds make the anchorage unsafe, and Kima to the north and Kema to the east are used instead.



FIGURE VIII - 50.
Aerial view of Manado. 1943.

Roads reach Manado from Kima, a small village on Wori Bay about 10 miles to the north; from Kema on the opposite side of the peninsula to the east; from Tomohon and Tondano in the interior to the south; and from Amoerang on Amoerang Bay to the southwest. All these roads support motor traffic. Bus services are maintained between Manado and the surrounding towns.

There is a landing strip at Langoan, 2 miles south of Lake Tondano and 32 miles south of Manado. A road connects the field with the town. A landing strip was under construction by the Dutch in 1941 at Mapanget, 7 miles east of Manado. Lake Tondano was a seaplane stop on the K.N.I.L.M. route from Macassar to New Guinea. Manado Bay is rarely used as an alighting area.

(d) *Billeting facilities.* Billeting is possible at the barracks area (southeast of the town), Fort Amsterdam, the Wilhelmina Hotel, the Harmonie Club, the resident's and assistant resident's houses, and at the various schools. Other buildings mentioned below may also be suitable for billeting.

(e) *Buildings.* The buildings of the town included:
Fort Amsterdam, an old stone fort surrounded by a stone wall 10 feet high.

Barracks.
Government offices (concrete).
Land registry.
Resident's house (wood and concrete).
Assistant resident's house.
Courthouse (concrete).
Post office (concrete).
Police headquarters (concrete).
Police station.

Prison (concrete).
Queen Wilhelmina Hospital (reinforced concrete).
A small hospital.
Two churches.
European, Manadoese, and 3 other schools.
Wilhelmina Hotel.
Harmonie Club.
Customs house (concrete and wood).
Copra sheds.
K.P.M., Mohrman Trading Company and Manado Product Company warehouse.
Other warehouses (wood with corrugated iron roofs).
B.P.M. and Socony-Vacuum petroleum storage sheds.
Markets.
Telephone building (concrete).
Cable house.
European, Chinese, and Arab houses.
Radio station.
Military hospital.
Power plant.
Mitsui Company warehouse.
Banks.
A cannery and other buildings of Japanese fishing colony north of the town.

The better residences are built of concrete or wood and concrete; the poorer ones are mostly of wood. The huts of the natives are largely palm and thatch. Corrugated iron is the common roofing material.

(f) *Internal transportation.* There were bus services within the town. Some taxis and carts could be hired.

(g) *Repair and service facilities.* There were 2 small shipbuilding and repair concerns, N. V. Cekumij and Mokumij.

The first of these had 3 slipways, for 200-, 100-, and 50-ton vessels; the yard contained a repair yard workshop, a carpenter's workshop, and a smithery. The second had one 200-ton slipway and the yard contained a fitting-and-turning shop, a smithery, and a carpenter's workshop. There is a small government wrecking tug.

(b) *Public utilities.*

1. Water. The town has a municipal water system with 14 miles of pipe, which served 1,491 private consumers, 113 services and plants, and 40 public hydrants in 1939. The total distribution for that year was 317,000 cubic meters. The reservoirs, located in the mountains, are supplied by springs and rain. No information is available as to the exact location of the reservoirs or the water works. There are also wells. Two water barges supplied the needs of ships.

2. Electricity. The Nederlandsch Indie Gas Maatschappij power plant (location unknown), with 3 diesel engines of 300 horsepower each, furnished power to Manado and several of the neighboring communities. Ten miles of streets were lighted. Development of the water power of the Malalajang River south of Manado was projected and may have been completed.

3. Communications. Manado was connected by cable with Balikpapan and Java, and with Ternate and Gorontalo via an overland line to Kema. The former cable to Palau and Yap has been out of service for several years. A radio station with the call letters PKY is reported. A local telephone system served the town. The location of the cable house and telephone buildings is shown in FIGURE VIII - 49.

(i) *Warehouse and storage facilities.* The total storage space is estimated at 40,000 square feet. Most of the warehouses are near the prau harbor. The Manado Produce Company's warehouse and the B.P.M. storage area were located in the southern part of the town. In 1936, the B.P.M. and Socony-Vacuum storage areas had a combined capacity of 450,000 barrels of gasoline and 2,100 barrels of diesel oil. A sectional, portable pipe line was used to supply bulk oil to shops. No pumps were available.

(j) *Health and sanitation facilities.* Epidemics are rare in Manado. Measures had been taken by the government to control worm diseases. The Queen Wilhelmina Hospital is a modern building, which, prior to the war, was staffed with European and European-trained doctors and nurses. It had 124 beds. A military hospital with 8 beds, a mission hospital, and a leper asylum are reported.

(2) *Gorontalo.*

(1930 population: 15,603, including 13,490 natives, 221 Europeans, 1,101 Chinese, 791 other foreign Orientals).

(a) *Importance.* Gorontalo, the second largest town in northern Celebes and the trade center for the areas bordering the Gulf of Tomini, was the administrative center of the *afdeling* of Gorontalo, a political unit including the central portion of the northern peninsula.

(b) *Physical characteristics.* The main portion of Gorontalo is located about 1½ miles north of Gorontalo Bay at a point where the Bolango and Bone rivers join to form the Gorontalo River, a short stream flowing into Gorontalo Bay. This portion of the town, which is regularly laid out with a rectangular street pattern, occupies part of an interior basin

bordered on the south by a narrow range of rugged coastal hills. Gorontalo Bay is a fjord-like gap through this range, with steep sides and a deep, narrow channel. Outlying portions of the town, containing the limited harbor facilities occupy small patches of low ground along the sides of the bay.

(c) *Means of access.* Gorontalo Bay can be entered from the Gulf of Tomini by the largest vessels but anchorage is not good because of great depths, confined space, and strong currents. The Gorontalo River is navigable only for the smallest native craft. Large vessels tie up to mooring buoys in the bay and are serviced by lighters which make use of the small wharves on the sides of the bay. K.P.M. vessels visited the Bay regularly and vessels of the Gorontalo Trading Company operated throughout the Gulf of Tomini with Gorontalo as its base. In 1939, 483 steamships and motor vessels with a tonnage of 594,000 tons stopped at Gorontalo.

A good motor road about 25 miles long connects Gorontalo with Koeandang on the northern coast; other short roads extend to outlying villages of the neighboring plain.

Prior to the war the Dutch had planned a landing strip (0° 31' N, 123° 30' E) in the vicinity of Gorontalo. The Japanese may have proceeded with its development. Lake Limboto was used as an alighting area by K.N.I.L.M. seaplanes. Gorontalo Bay had been used occasionally for landing and take-off.

(d) *Billeting facilities.* There are 2 small hotels in Gorontalo: the Gorontalo with 8 rooms and the Veldberg with 6 rooms. The old Dutch fort and the assistant resident's house may offer additional facilities.

(e) *Buildings.* The buildings of the town include:

- Fort Nassau, (in the center of the town).
- Police station.
- Customs house.
- House of assistant resident.
- Radio station (2 miles north of the town).
- Government hospital.
- Mosque.
- Gorontalo and Veldberg hotels.
- Covered market.
- K.P.M. warehouses (west side of Gorontalo Bay).
- B.P.M. buildings (northeastern end of the bay).
- Power plant.

(f) *Internal transportation.* There are good roads from the main port of Gorontalo to the harbor settlements on either side of Gorontalo Bay.

(g) *Repair and service facilities.* Ledeboer and Company did repair work, including autogenic welding, on motor vehicles; it had a lathe.

(b) *Public utilities.*

1. Electricity. The local power company (Electriciteit Bali en Lombok Maatschappij) had a 400-horsepower diesel engine.

2. Communications. A radio station and a local telephone service are reported. Telegraphic communication is by cable to Kema with an overland connection from Kema to Manado. An overland connection with Koeandang, where the Manado-Balikpapan cable is landed, has been reported.

(i) *Warehouses and storage facilities.* Storage facilities in the town consist of the K.P.M. warehouses on the west side of Gorontalo Bay and the B.P.M. oil and gasoline storage installations at the northeastern end of Gorontalo Bay. The K.P.M. buildings were damaged during the Japanese occupation.

(j) *Health and sanitation facilities.* A government hospital with 44 beds was located at Gorontalo.

(3) *Tondano.*

(1930 population: 15,007, composed of 14,319 natives, 129 Europeans, 472 Chinese, 87 other foreign Asiatics).

Tondano, the chief inland town in Minahasa, is used frequently by Europeans as a health resort. It is about a mile north of the northern end of Lake Tondano on the Manado (Tondano) River. The town, roughly square in outline, has a rectangular pattern with 10 streets each way (FIGURE VIII - 51). It is surrounded by an intensively cultivated area. Motor roads from Manado reach Tondano from the west by way of Tomohon and from the north by way of Ajer Madidi (FIGURE VIII - 45). Another road encircles Lake Tondano. The buildings include a government hospital, a Mission hospital with 36 beds, a school for the sons of important native families, a hotel, a jail, and a radio station (PKL, PNL).

C. Villages.

(1) *Kampoengbaroe.*

Kampoengbaroe, on the bay of the same name on the north-eastern coast, was the administrative center for a large area in northeastern Celebes. The village was visited regularly by K.P.M. vessels, and the bay is an emergency landing area for seaplanes. Kampoengbaroe had a rest house, barracks, and a radio station. The small water system with about $\frac{3}{4}$ mile of pipe, takes water from a stream. A doctor was stationed here.

(2) *Paleleh.*

Paleleh (FIGURE VIII - 52), on the northern coast about 80 miles east of Kampoengbaroe, is a gold-mining center. It was formerly very active, but now of little importance. K.P.M. vessels stopped here regularly.



FIGURE VIII - 51.

Tondano, showing rectangular street pattern. 1945.



FIGURE VIII - 52.
Goldmining camp near Paleleh. Looking SW. 1926.

(3) *Koeandang.*

Koeandang is important because of its road and reported telegraph and telephone connections with Gorontalo, 25 miles southeast. The Manado-Balikpapan cable landed here. The only known building is a police station.

(4) *Amoerang.*

(estimated population: 2,000).

Amoerang (FIGURE VIII - 53), on the south side of Amoerang Bay, is about 30 miles southwest of Manado. It was the local administrative center of a portion of Minahasa. K.P.M. vessels called regularly and seaplanes can alight in the bay. Roads connect the town with Manado, and with the Lake Tondano area in the interior. There are 2 streets parallel to the coastline; these are crossed by short streets at right angles. A bridge crosses the Ranoiapo River to the neighboring village of Roemoön. The buildings include the following: customs house, government official's house, old fortification, prison, covered market, and coffee warehouse. A doctor was stationed in the town in 1938.

(5) *Tomohon.*

Tomohon is an interior village 22 miles south of Manado and 8 miles west of Tondano. Nearly all its buildings are along the one main street. It has a post office, a large church, and a 130-bed hospital, all of modern construction. Near Tomohon, a Japanese mulberry plantation for silk-worm production has a commanding situation, from which much of the Minahasa coastline can be seen.



FIGURE VIII - 53.
Portion of waterfront of Amoerang, looking S. 1937.

(6) *Kakas.*

Kakas, a small village at the southern end of Lake Tondano, was the site of the K.N.I.L.M. seaplane base. The Dutch naval seaplane base was across the end of Lake Tondano at Tasoeka. Five miles southwest of Kakas is the Langoan landing strip, with which it is connected by a good road; Kakas can be reached from Tondano by another good road. The town had a government office, a rest house, and a covered market.

(7) *Talise (Talisei).*

Talise, on Talise Island northeast of the northern tip of Celebes, was used by the Dutch as a small coaling station, from which lighters could furnish ships 200 tons of coal a day. It has an emergency alighting area for seaplanes; small stores of aviation fuel were maintained.

(8) *Kema.*

Kema, on the southeastern coast of Minahasa and 30 miles east-southeast of Manado, is used as an alternate port to Manado from December to February, when the winds are unfavorable on much of the northern coast. A motor road connects the 2 ports. Lembeh Bay, 5 miles northeast of Kema, is an emergency seaplane landing area. No information concerning buildings is available.



FIGURE VIII - 54. *Amoerang.*
Portion of waterfront.

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