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**TERRAIN HANDBOOK 38** 

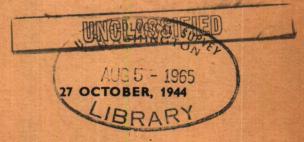
# LINGAYEN

(PHILIPPINE SERIES)

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#### RESTRICTED

ALLIED GEOGRAPHICAL SECTION

Jorces, Southwest Pacific Area

**TERRAIN HANDBOOK 38** 

# LINGAYEN

(PHILIPPINE SERIES)

General Headquarters, Southwest Pacific Area. 27 October 1944.

This Handbook contains information on the Lingayen Gulf (NW Luzon) area, as defined on the Orientation Map.

It is intended to provide basic topographical information of military interest for the use of officers in forward areas.

The maps included are intended as a guide only, to be used in conjunction with operational maps.

By command of General MacARTHUR.

R. K. SUTHERLAND, Lieutenant General, U.S.A. Chief of Staff.

#### Official:

C. A. WILLOUGHBY, Brigadier General, G.S.C., Asst. Chief of Staff, G-2.

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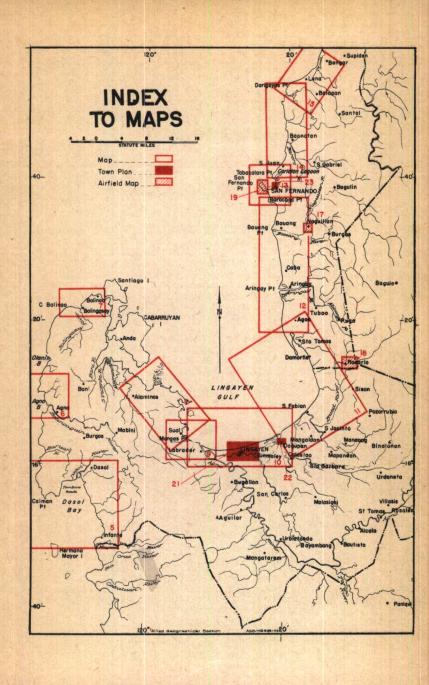
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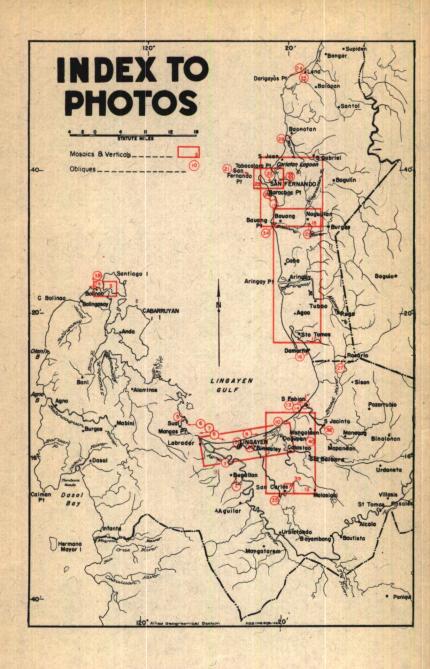
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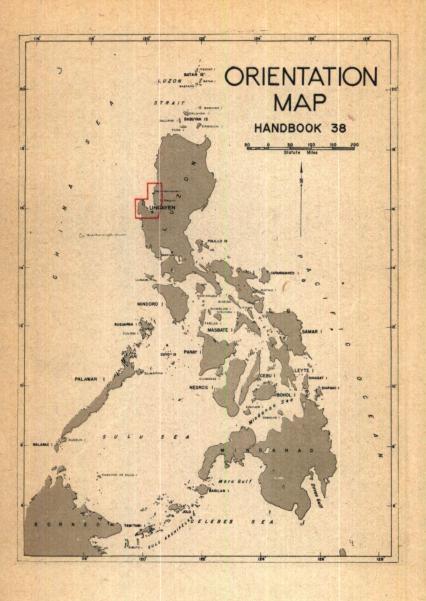
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## LINGAYEN

## Luzon Island, PI

#### SECTION 1.

### INTRODUCTION AND GENERAL DESCRIPTION

1. LOCATION AND AREA COVERED (See Orientation Map):

Area described in this Handbook borders the south, east and west coasts of Lingayen Gulf (NW Luzon). It includes the coastal regions and hinterland from Infanta in the SW to Bangar in the north, covering in general the provinces of Pangasinan and La Union.

The area lies between 15°50' and 16°55'N, and 119°45'

and 120°54' E.

#### 2. GENERAL DESCRIPTION:

Terrain south and SE from the head of Lingayen Gulf is the northern extremity of Central Luzon Plain which stretches south to Manila between Caraballo Mts on the east and Zambales Range on the west.

Between Infanta and Sual the coast is broken and, except in the vicinity of Tambac Bay, the foothills of Zambales Ra

reach generally to within half a mile of the shore.

From Sual to Damortis the terrain near the shoreline consists of low sandy undulations, falling away practically to sea level a short distance inland.

North of Damortis the foothills of Caraballo Mts reach close to the coast and the coastal plain varies in width from 400yds to several miles. Apart from several broad river valleys the terrain behind the coastal plain is mountainous.

Agno-Dagupan Delta area, which forms behind the southern shore of the gulf, is a lowlying alluvial plain, intensely cultivated and cut by numerous sluggish rivers and waterways. (Photos 1 and 2). During the wet season it is subject to

flooding for days at a time.

Landings could be made almost anywhere on the south or east shores of the gulf which are almost continuous sand or sand and shingle beaches, almost entirely reef-free and broken only by small rocky points (see Landing Beach Summary Section 2, for most suitable landing areas).

Vegetation on the lowlands consists entirely of cultivation, whilst on the mountains and ridges *cogon* grass predominates with low scrub and scattered trees.

Rain forest is practically non-existent.

Principal rivers are the Agno, Dagupan, Bued, Aringay, Bauang, Baroro, and Amburayan (see Sec. 3)

There are three operational airfields—Lingayen, Rosales and Naguilian; pre-war commercial fields were located at Luna and Rosario.

Almost unlimited possibilities exist for airfield development throughout the coastal areas and the central plain.

The only existing seaplane base is at San Fernando (Photo 23), but it has not been fully developed. Port Sual (Photos 5, 6) is a possible seaplane base.

The whole area is well served with a network of good roads connecting all towns of importance. Main highways converge on Manila to the south.

A railway connects San Fernando with Manila. It is said to have been extended north to Tagudin by the Japanese.

Lingayen (capital of Pangasinan Prov), Dagupan and Sau Fernando (capital of La Union Prov) are the principal towns. Dagupan is the largest town and was the commercial centre of the whole region.

Population: The lowlands were densely populated by natives belonging to Pangasinan and Ilocano sub-sections of Filipino race. There was a small percentage of Europeans, Americans and Asiatics (See Sec. 7).

Climate is characterized by two pronounced seasons—NE or "dry" season (Nov-Apr), and SW or "wet" season (May-Oct).

Average annual rainfall at Dagupan is 97.8ins and at San Fernando 96.5ins.

Area is sheltered by mountains from NE winds but is open to SW monsoons and cyclonic storms.

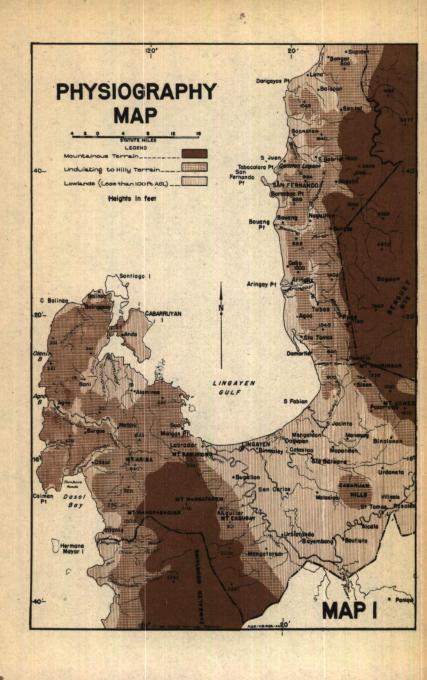
#### 3. MILITARY IMPORTANCE:

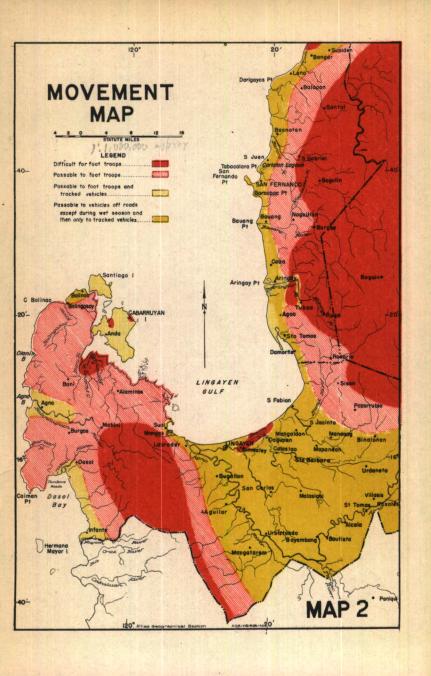
#### i. General:

Lingayen Gulf, with clear approaches from the sea, excellent landing beaches, and flat hinterland extending south to Manila, is of great strategic importance.

The central plain (Photos 1, 2) is suitable for the development of airfields and the extensive road network and N/S railway afford good land communications.

The Damortis and Port Sual vicinities are of particular importance because from good beaches in these areas good roads lead inland, avoiding the low-lying delta region.





Agno R and Dagupan R, connected by Calmay R, are navigable by small craft and are important waterways.

The coastal plains and central plain, being cleared and cultivated, are suitable for paratroop and glider operations.

#### ii. Enemy Activities:

Operational airfields have been developed at Naguilian and Lingayen; San Fernando Hbr is partly developed as a seaplane base; some port improvements have been carried out and a defensive system established and the railway extended north from San Fernando to Tagudin to facilitate shipment of copper ore from mines at Cervantes.

Bridges and roads have been maintained and the railway kept serviceable. Apart from these minor works there has been little Japanese activity in the area.

#### 4. DISTANCES FROM LINGAYEN:

To Enemy Bases	Stat Miles	Geog Miles
Taiwan (Formosa)	490	425
Hongkong	520	451
Singapore	1520	1319
Tokyo	1980	1718
Davao	700	607
Halmahera	1140	989
Manila	107	93
To Allied Bases		
Darwin	2040	1770
Hollandia	1840	1596
Chungking	1330	1154
Biak	1560	1353
Imphal	1840	1596
Morotai	1100	954

#### 5. MAGNETIC VARIATION:

Variation is 0°30'E in 1944. Annual increase 0°1'.

### 6. STANDARD TIME AND MEASUREMENTS:

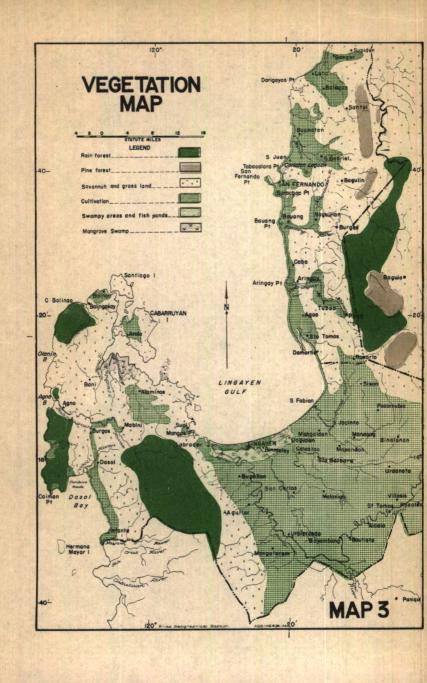
Standard Time is that of the 120th Meridian, 8 hrs ahead of GMT.

The metric system is used throughout the Philippines. For this Handbook measurements are according to the British system. Distances in both miles and kilometers are given in Road Summaries.

#### 7. WATER:

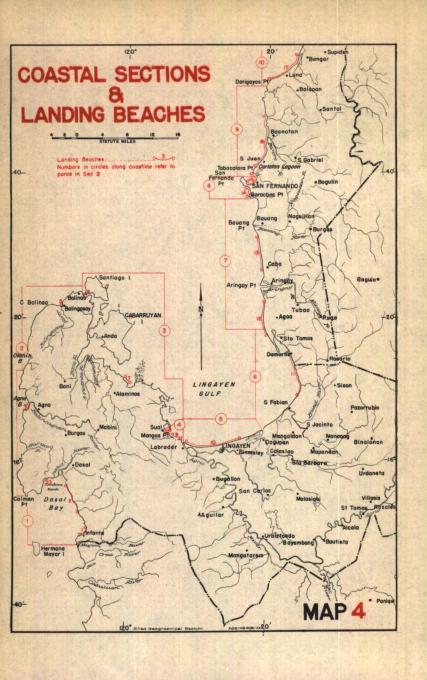
Annual rainfall of 96in approx ensures adequate supply of rain water, and artesian wells are found throughout the area.

Water is also obtainable throughout the area from numerous freshwater streams and springs. River and spring water for use must be chemically treated or boiled.





2 Colmay River 2. Terrain S of Lingayen Gulf. Looking N. Pre-war. Coconues Labrador



#### **SECTION 2**

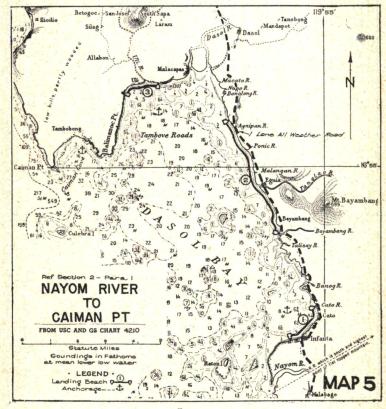
#### COASTAL DESCRIPTION AND LANDING BEACHES

(From SW Pangasinan; anti-clockwise around Lingayen Gulf)

## 1. NAYOM R TO CAIMAN PT (Map 5).

Anchorages:

Dasol Bay: Sheltered and calm in NE season, but exposed and rough in SW season. Clear passages between off-lying



#### SECTION 21

reefs and shoals to anchorages of Infanta, Tambove Roads and Caiman Cove. These anchorages and passages are clearly shown on the charts.

#### Beaches and Foreshore:

There are many off-lying shoal passages with clear channels between.

Generally this section of coast has a shallow coastal reef fringe or sand bars, behind which there are sandy beaches.

For best landing areas see Beaches 1, 2, and 3 in Landing Beach Summary.

#### Hinterland:

Inland from the beach is a narrow sandy coastal plain, beyond which the western foothills of Zambales Ra rise 500ft-600ft several miles inland.

#### Vegetation:

The coastal plain is almost entirely planted with coconuts, with occasional patches of cultivation. The hills are grass-covered, with some light timber and low scrub. Some rivers, such as Dasol R, have small areas of mangrove near the mouth.

#### Rivers:

Nayom R and Dasol R are the largest. Nayom R is navigable for 2-3 mls by vessels of 12ft draught, the latter only to canoes (See Sec. 3).

#### Towns:

Infanta (1123) and Dasol (974) are the largest towns. There are also several coastal barrios.

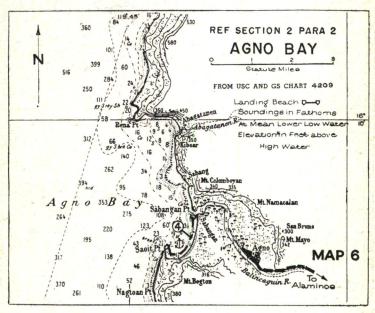
#### Roads:

National Highway, Route 7, parallels coast a short distance inland from Infanta to Hermosa. From this point it turns inland, crossing Zambales Ra, and leads to Sual and Lingayen.

# 2. CAIMAN PT TO BOLINAO (Maps 6, 7; Photos 3, 4). Anchorages:

Agno Bay: Open roadstead, sheltered during NE season. Small craft can anchor close inshore behind Saoit Pt during SW weather.

Olanin Bay: Safe anchorage in NE season, but exposed during SW.



Bolinao Harbor: Reported excellent typhoon anchorage. Best anchorage is between Trinchera Pt and Riripayan Pt on mainland, and Santiago I. No facilities, except telephone and telegraph at Bolinao.

#### Beaches and Foreshore:

This section of coast is exposed during the SW season, and is generally too rough for small craft landings. The coast is reef-fringed, with little or no coastal plain; steep timbered hills rise close to the coastline. (See Beaches 4 and 5 in Beach Summary for most suitable landing beaches.)

#### Hinterland:

Inland from the coast the terrain consists of low, steep undulations, seldom rising above 500ft.

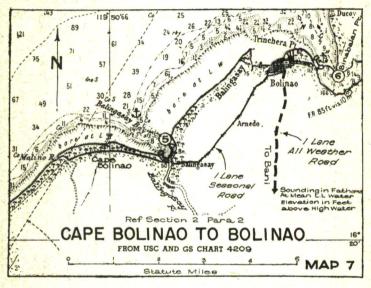
#### SECTION 21

#### Vegetation:

Principally low scrub, scattered trees and grassland, with small areas of forest near coast.

#### Rivers:

Balincaguin R is only river of importance; navigable to vessels 6ft draught to Agno, 2 mls inland.



#### Towns:

Agno (2309) and Bolinao (1349) are the only towns of importance.

#### Roads:

Roads lead inland from Agno and Bolinao, connecting with Route 7 at Alaminos.

SANTIAGO ISLAND

Girological C

3. Bolinao—Coastline and Hinterland. Vertical, 10 Oct. 44.

3

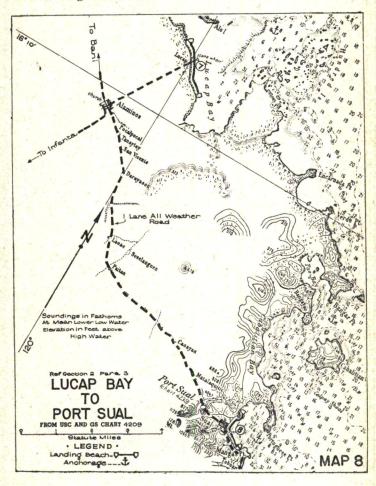


# 3. BOLINAO TO PORT SUAL (Map 8; Photos 4, 5, 6). Anchorages:

Only anchorage for vessels is in the NW portion of Caquiputan Str. Small craft such as LCVs and LCMs can find excellent protected anchorage in the Strait or in Tambac B.

#### Beaches and Foreshore:

Offshore along this section are many shoal patches—chart is the best guide to conditions.



#### SECTION 2]

Coast is generally reef-bound or, where there is no reef—as along the shore of Tambac B—shallow sand and mudbars adjoin the coast, which is swampy mangrove with no beach.

#### Hinterland:

Undulating grassy hills reach close to the coast, except between Tambac Bay and Lucap Bay, where there is a low swampy plain extending 5-6 mls inland. Mangrove extends 2-3 mls inland between Lambes and Namooran Pt.

#### Vegetation:

The hills generally are grass-covered, with scattered trees, while the flat plain is cultivated mainly with rice. A large area of mangrove extends inland south of Tambac B.

#### Rivers:

Alaminos, Bani and S Vicente are the largest rivers, but no details of navigability are available.

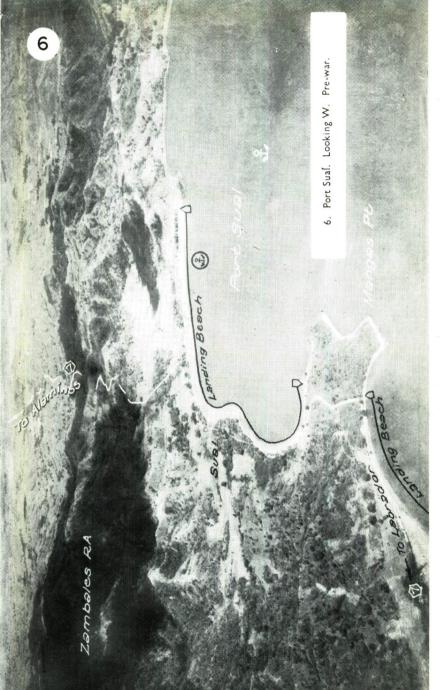
#### Towns:

Bani (1531) and Alaminos (2130), approx. 3 mls inland, are the largest towns in the vicinity. Lucap is a small coastal barrio, from which launches plied to Hundred Is.

#### Roads:

A good road leads from Lucap to Route 7 at Alaminos. Nearest road parallel to coast is Alaminos-Bani-Bolinao road, 3-4 mls inland.



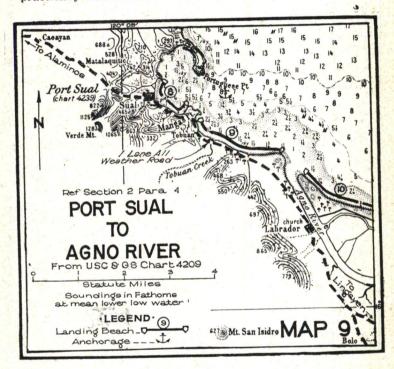


## 4. PORT SUAL TO AGNO R (Map 9; Photos 5, 6, 7).

#### Anchorages:

Port Sual. Restricted anchorage 1 ml diameter in 5-7 fms.

Good anchorage for small craft less than 6ft draught; sheltered in SW, but open to winds from ENE to ESE; currents practically non-existent.



Open roadstead anchorage anywhere along coast in SW season, according to draught. Exposed during NE season.

## Beaches and Foreshore:

Except for rocky Portuguese Pt and Mangas Pt, this section is practically continuous sand beach backed by narrow coastal plain.

From Portuguese Pt to a small point half a mile north of Sual, terrain immediately behind beach is steep. From here to Mangas Pt shore is low and hinterland accessible from

#### SECTION 2]

beach. From Mangas Pt to Agno R the beach is continuous and foreshore low. (See Beaches 8 and 9 in Landing Beach Summary).

#### Hinterland:

From Portuguese Pt to 1 ml north of Sual, terrain rises 200ft-300ft almost from beach. In the vicinity of Sual, coastal plain is approx 1 ml wide and consists mainly of firm cultivated land with isolated paddy fields. From high, rocky Mangas Pt to Agno R coastal plain is ½-¾ ml wide and mainly cultivated.

Immediately behind coastal plain, terrain rises steeply to over 1000ft less than 2 mls inland.

### Vegetation:

Cultivation; upland and paddy rice, corn and sugar cane predominate on the coastal plain. Hills are grass-covered, with low scrub and scattered trees.

#### Rivers:

None of importance.

#### Towns:

Sual (1102) and Labrador are the only towns of importance. Tobuan and Uyong are small barrios on the main highway.

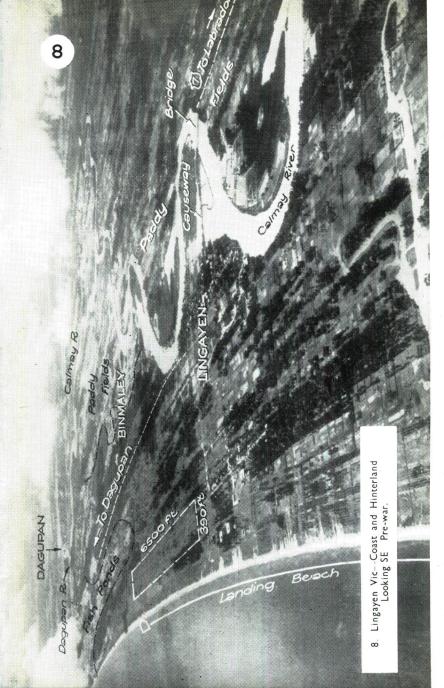
#### Roads:

National Highway, Route 7, parallels coast 100-900yds inland, is easily accessible from beach. It leads east to Lingayen and west from Sual to Alaminos.

Lingayen Gulf

7. Agno R mouth--looking W. Pre-war.

7



# 5. AGNO R TO DAGUPAN R. (Map 10; Photos 7 to 12.)

# Anchorages:

Open roadstead anchorages off the coast in depths of 5-10 fms according to draught. Exposed particularly during Jul-Aug, when Lingayen Gulf is reported rough and surf heavy.

# Beaches and Foreshore:

No off-lying dangers.

From Agno R to Dagupan R there is continuous firm sand beach, and coast in general is low. Excellent area for landings (See Beach 10 in Landing Beach Summary).

Near Dagupan R mouth there are reported granite boulders on beach.

#### Hinterland:

From Agno mouth east for 9 mls terrain is flat and low between beach and Agno R 2-3 mls inland. Near beach, soil is sandy, but farther inland in the low-lying delta region it is swampy, and movement south from beach would be difficult. In dry season, when rivers are confined to their banks, area dries out, and movement is generally possible.

For 4 mls west of Dagupan R hinterland is generally below sea level one to two mls inland and is a series of permanent fish ponds. Movement in this area is almost impossible in any season.

# Vegetation:

Near the coast principally coconuts, bananas, sugar cane and corn. Mainly paddy rice fields near the rivers.

### Rivers:

Agno R—navigable to craft drawing 6ft for 15 mls and to Bautista for craft drawing 3ft. Bar at the mouth difficult.

Dagupan R is navigable for craft drawing 7ft 1½ mls to Dagupan.

Calmay R is navigable to craft drawing 3-4ft to its junction with Agno R.

# Towns:

Lingayen (5329) capital of Pangasinan Prov, Binmaley (1635), and Dagupan (6323) are principal towns. Numerous small barrios near coast.

# Roads:

Sandy seasonal road  $\frac{1}{2}$  ml inland parallel to western section of coast, with Route 7  $1\frac{1}{2}$  mls inland.

Two good all-weather roads lead inland from the beach to Lingayen and one to Binmaley.

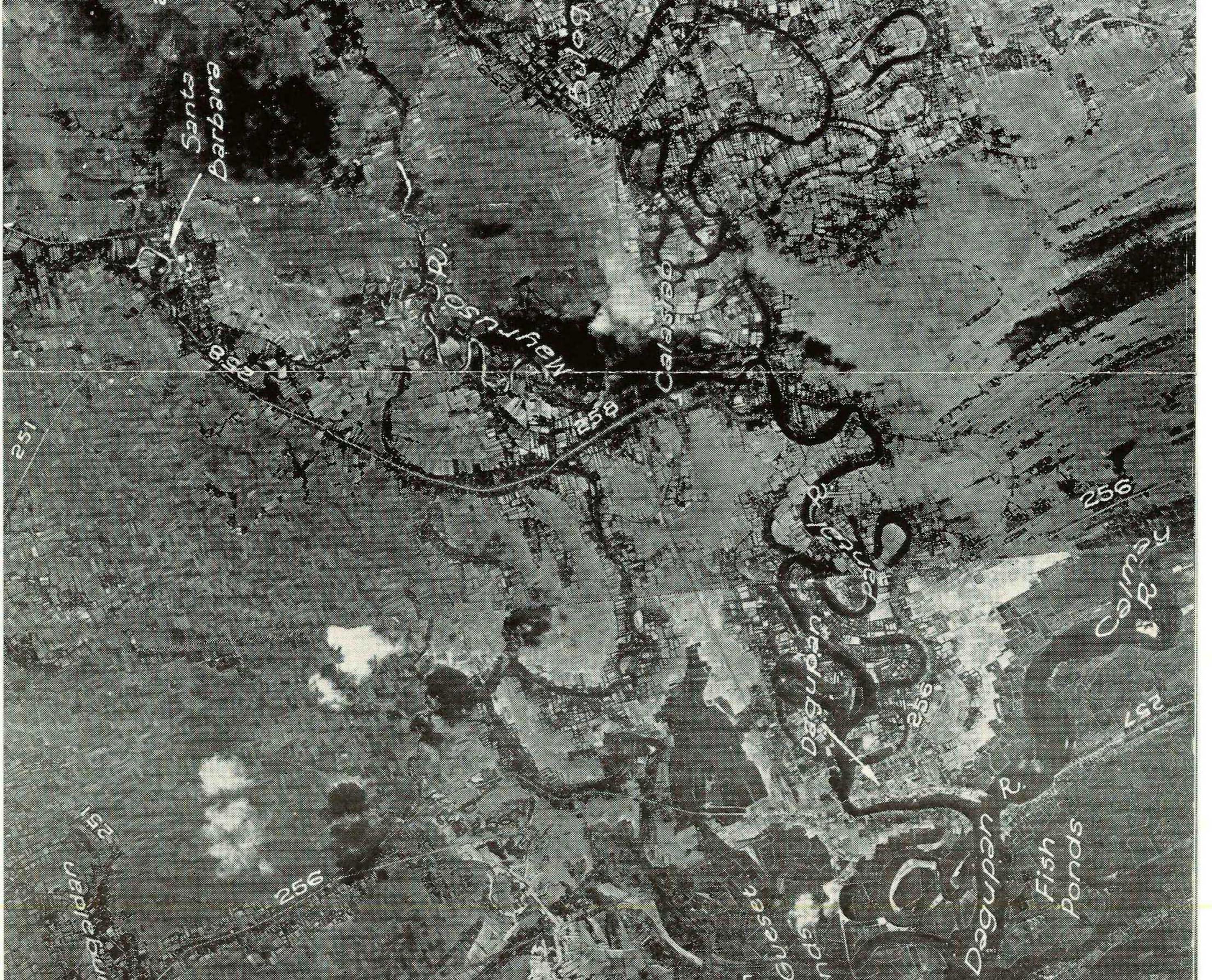
Main Lingayen-Dagupan Rd is one to two mls inland parallel to the coast. Several sandy seasonal roads are between beach and main road.

Mountains

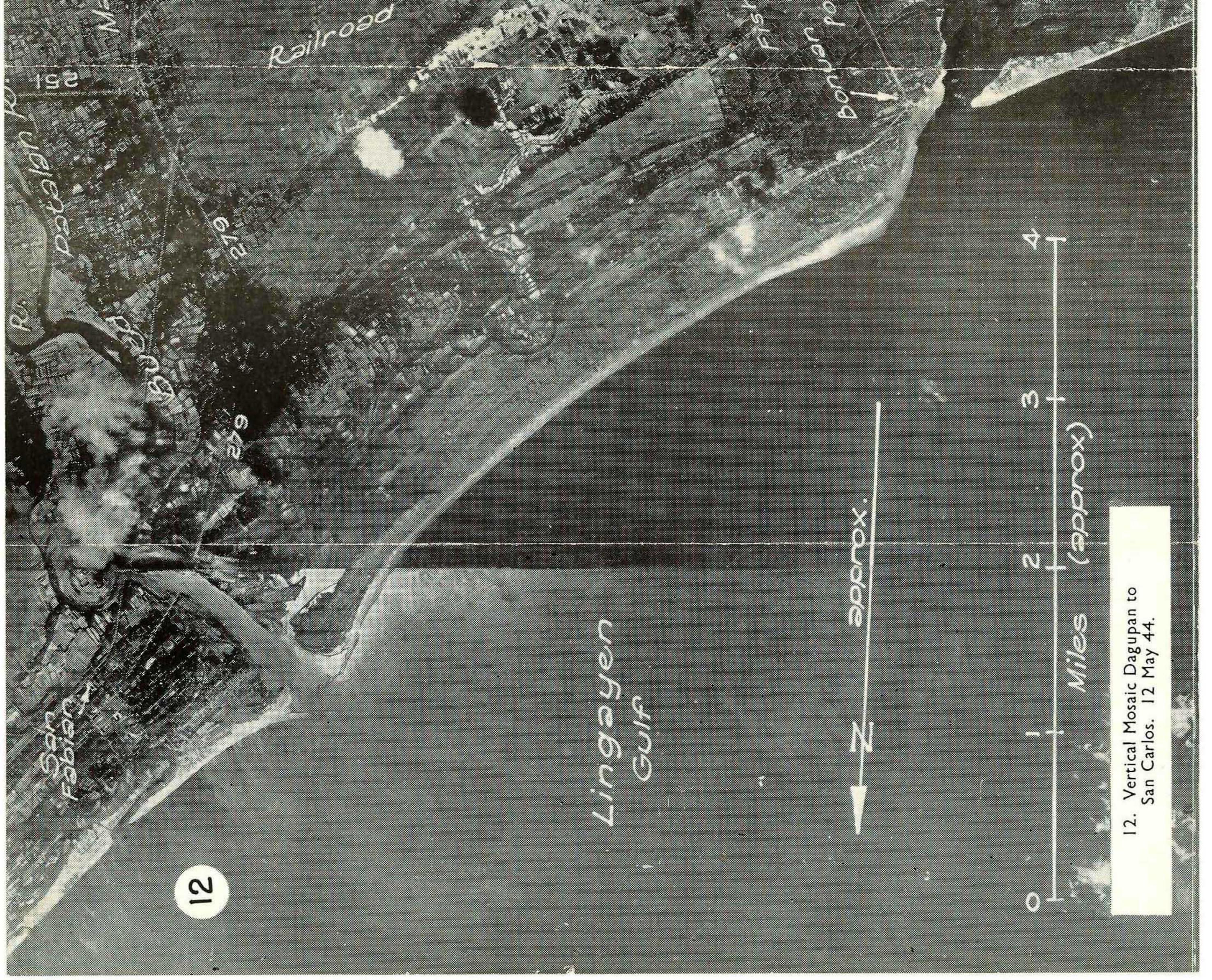
Caraballo

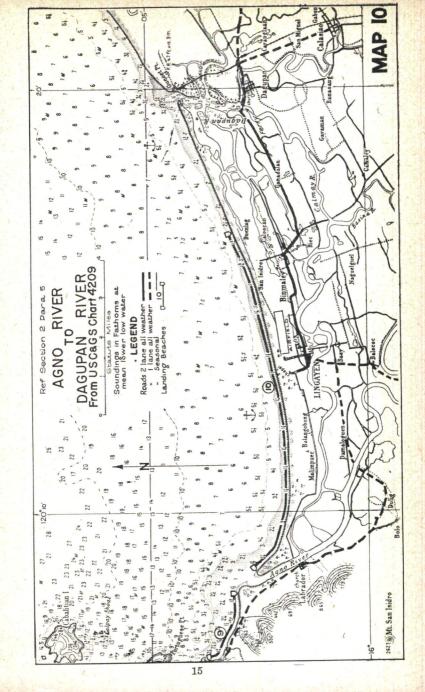
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# 6. DAGUPAN R TO BAYBAY (Map 11; Photos 10, 13 to 16). Anchorages:

Anchorage is west of Damortis between sand spit and shore in 6-10 fms. Minimum depth of 1½ fms over spit at LW. Little or no shelter during SW season.

Head of small bay inside spit is shallow and obstructed by fish corrals.

# Beach and Foreshore:

Granite boulders just covered at LW off sections of beach.

This section is continuous sand beach and the coast is generally low. It is sheltered during NE season but exposed to winds and surf during SW. (See Beach 11 in Landing Beach Summary).

### Hinterland:

Terrain from Dagupan to 3 mls north of San Fabian is low and swampy behind beach with several fish ponds. Movement from beach would be difficult. North from this point, coastal plain varies in width from 200 yds to 1 ml and is sandy and cultivated. Inland from coastal plain the terrain rises steeply to 300ft-400ft 1½ mls inland.

# Vegetation:

Coastal plain—cultivation is mainly rice and sugar cane. Foothills—grass-covered with scattered trees and low scrub.

# Rivers:

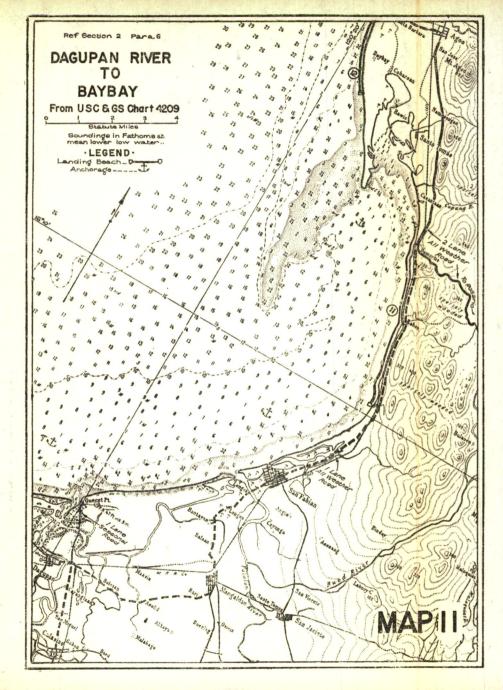
Bued R. Bar can be crossed by vessels drawing 5ft. Navigable for some miles by bancas. Connected to Dagupan R by estuary navigable to small craft.

# Towns:

San Fabian (1671), Damortis (964) and Santo Tomas principal towns. Numerous small coastal barrios.

# Roads:

Good 1-lane all-weather road between San Fabian and Damortis is 100-200 yds inland. At Damortis Route 3 east to Rosario and north to San Fernando are parallel to coast 400-500 yds inland. Railway adjoins road from San Fabian.



Caraballo Mts

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13. Coastal terrain E. of Bued R. Looking E. Pre-war.



15 Lingayen out SE coast of Lingayen Gulf. Mabilao to Baybay. Looking NE. Pre-war. **(** 

# 7. BAYBAY TO BARACBAC PT (Map 12; Photos 17, 19, 20). Anchorages:

Open roadstead only. Partly sheltered NE season but subject to heavy swell. Probably untenable SW season.

## Beach and Foreshore:

Continuous, unobstructed sand beach throughout except for:

i—Bauang R—Rocky points at, and 1m south of, river mouth.

ii—Seaweed-covered rocks just covered at LW reported in small bay east of Baracbac Pt.

iii—For 21 mls south of Aringay Pt numerous tidal lagoons behin I beach.

iv-Barachae Pt is high and rocky at base.

See Beaches 12 and 13 in Landing Beach Summary.

#### Hinterland:

Level cultivated coastal plain 400 yds to 2 mls wide beyond which steep hills rise 500-1000ft 2½-3 mls inland.

# Vegetation:

Coconut groves are close to shore, rice and cornfields inland. Foothills are mainly grass-covered with scattered trees and low scrub.

#### Rivers:

Aringay R—shallow stream navigable by canoes for 5 mls. Bauang R—navigable to craft drawing 3ft for short distance above mouth.

#### Towns:

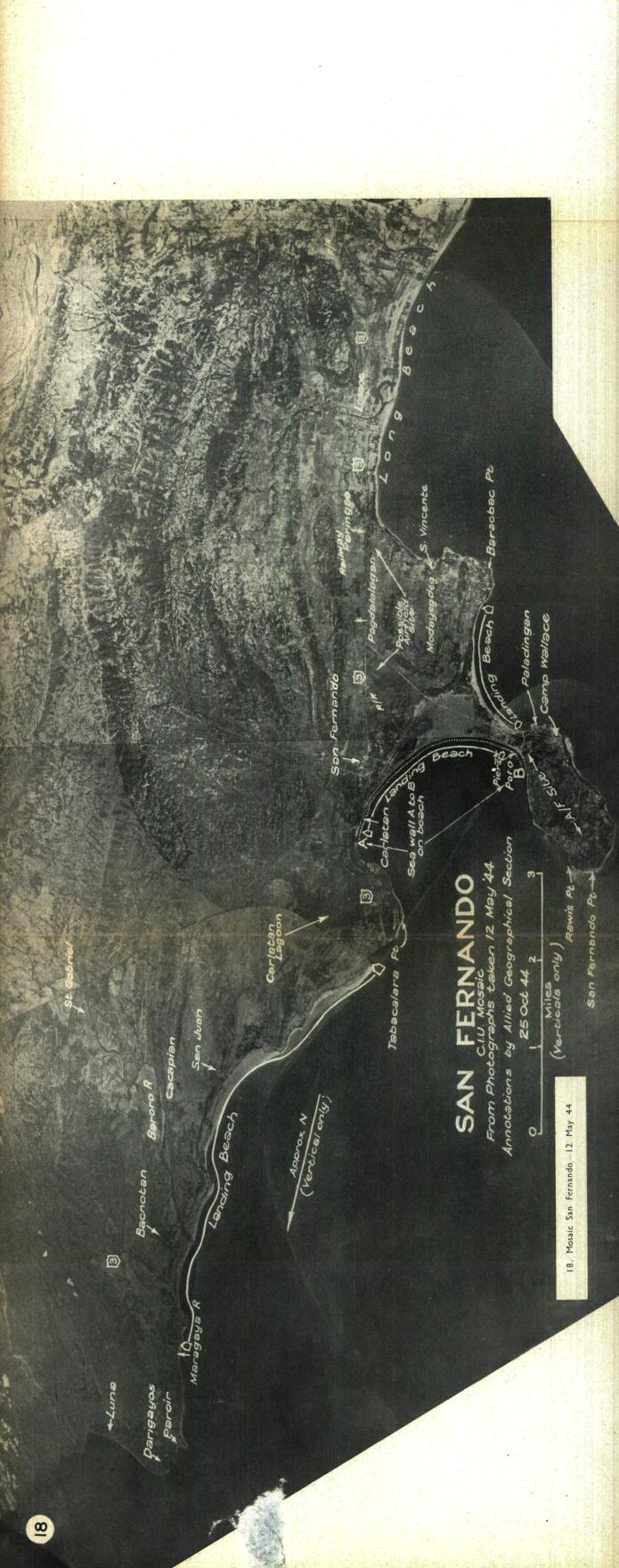
Agoo (674), Aringay (1576), Caba (551), and Bauang (2628) are the principal towns.

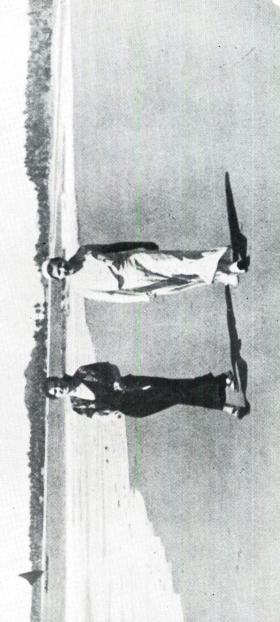
# Roads:

Route 3 parallel to shore ½-1 ml inland connected to beach by roads to Agoo and Aringay.

North of Lossoc, highway is almost on beach.

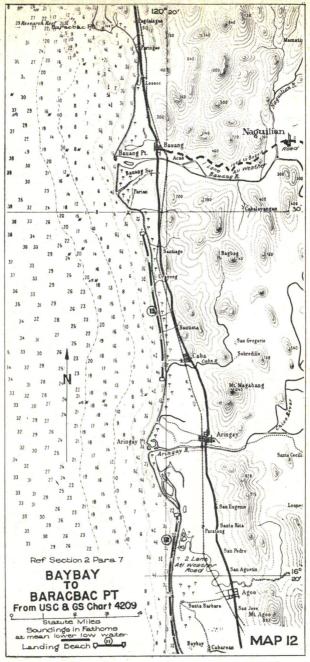






 Beach N of Bauang R (Long Beach) Looking N. Pre-war.



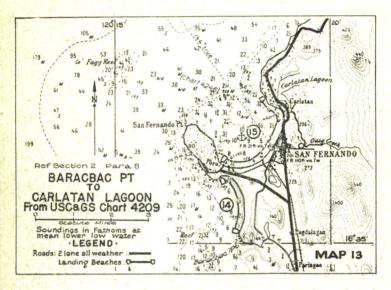


8. BARACBAC PT TO CARLATAN LAGOON (Map 13; Photos 18, 21 to 23).

# Anchorages:

Open roadstead south from Poro in 6-10 fms partially sheltered NE season; difficult in SW season.

San Fernando Hr (Port Poro). Only developed port in the area. Partially sheltered but exposed to winds and surf in NE season. Entrance is clear but restricted by shoals on both sides. Two concrete piers—eastern pier has depth of



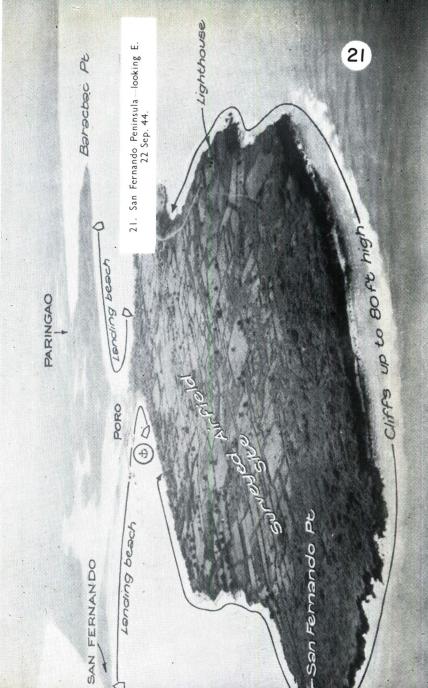
7ft alongside as a result of shoaling; western pier is equipped with rail tracks connected to main railway. Minimum depth alongside is 26ft.

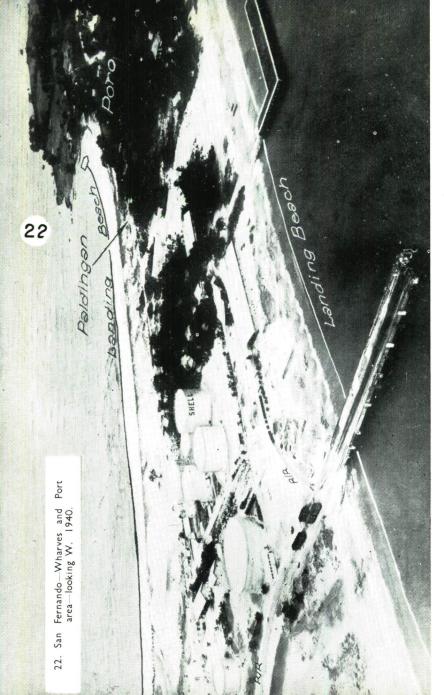
A pier equipped for handling bulk oil supplies, also storage tanks and warehouses, are just south of the pier. Japs are reported to be using port for shipment of copper ore from mines at Cervantes.

# Beaches and Foreshore:

Rocks extend 400-500 yds south of a point SE of Paldingan and Research Reef (least depth  $2\frac{1}{2}$  fms). Research Reef is 1 ml west of Baracbac Pt.

There is good sand beach from Baracbac Pt to Paldingan, then rocky cliffs up to 80ft high from Paldingan around Poro Pt.







From end of the cliffs 1 ml west of the western pier, sand beach continues around bay to Carlatan Lagoon. (See Beaches 14 and 15 in Landing Beach Summary).

#### Hinterland:

Baracbac Pt is 144ft high and rocky at base. North of the point, terrain behind the beach is low and sandy. Isthmus between mainland and San Fernando peninsula consists mainly of sand dunes.

Top of peninsula is flat cultivation and was surveyed before the war as an airfield site, but no field was constructed.

From the piers to Carlatan Lagoon coastal plain is generally ½-1 ml wide except just north of San Fernando where it narrows to 100-200 yds. Behind coastal plain the terrain rises to 800ft-900ft 3 mls inland.

# Vegetation:

Numerous coconut groves are in vicinity of San Fernando, elsewhere cultivation. Hills inland are grass-covered with scattered trees and some scrub.

#### Rivers:

There is none of importance.

#### Towns:

San Fernando (2803) capital of La Union, is the principal town. Paldingan and Poro are small barrios west of piers. Former was site of Army camp. (See Sec. 7—Towns).

#### Roads:

A good road from Poro leads to Route 3 which passes through San Fernando and continues north parallel to shore 50-100 yds inland.

#### SECTION 2]

# 9. CARLATAN LAGOON TO DARIGAYOS PT (Map 14; Photo 18).

### Anchorages:

Open exposed anchorage off coast, in calm weather only, in depths 7-10 fms according to draught.

## Beaches and Foreshore:

There are no off-shore obstructions, but shoal water extends ½ ml offshore NW of Carlatan Lagoon.

Continuous sand beach broken by small reef-fringed rocky points is between Carlatan Lagoon and Maragaya R (See Beach 16 in Landing Beach Summary).

From Maragaya R to Darigayos Pt there is fringing reef 200-400 yds wide, dry at LW.

This section of coast is very exposed during SW season and, although partly sheltered during NE, is subject to heavy swell, particularly in afternoons.

#### Hinterland:

From Carlatan Lagoon, coastal plain is only 200-300 yds wide. North of San Juan it widens to 3-4 mls and is generally flat, with low undulations in places. Inland from coastal plain the terrain rises to hills 600-700 ft high 4-5 mls from coast, giving way to mountainous country to east.

# Vegetation:

Coconuts, rice, corn and sugar cane on the lowlands. Cogon grass and scrub on the hills, with isolated forest on higher peaks.

#### Rivers:

Carlatan Lagoon—shallow and tidal. Baroro R—too deep to wade near mouth, but not navigable by small craft.

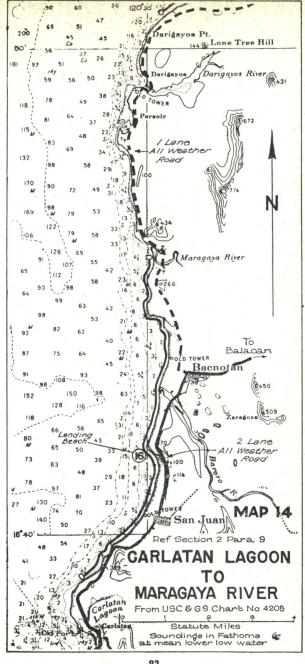
Darigayos R and Inlet affords good anchorage for small vessels near mouth, but is not navigable above road bridge.

#### Towns:

San Juan (1566) and Bacnotan (817) are the principal towns; also a number of small barrios.

#### Roads:

Route 3 is parallel to shore 200-800 yds inland throughout. Jap-built railway north from San Fernando is reported to follow main highway except near Carlatan Lagoon, where it swings inland to avoid low hills near the coast.



# 10. DARIGAYOS PT TO MINDORO (Map 15; Photos 24, 25). Anchorages:

Open, partly sheltered roadstead anchorages according to draught in NE season.

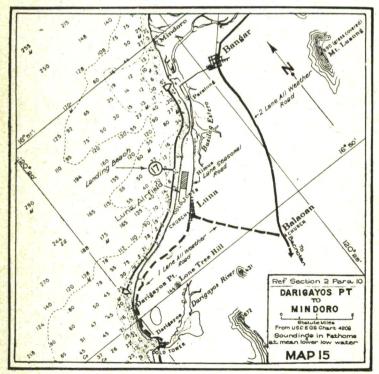
## Beach and Foreshore:

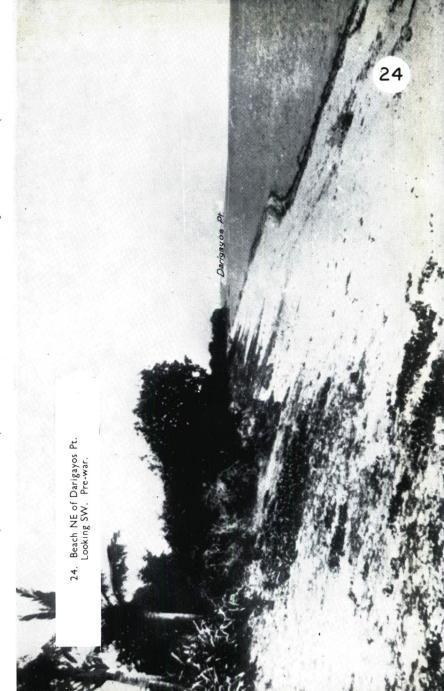
There are no off-lying dangers.

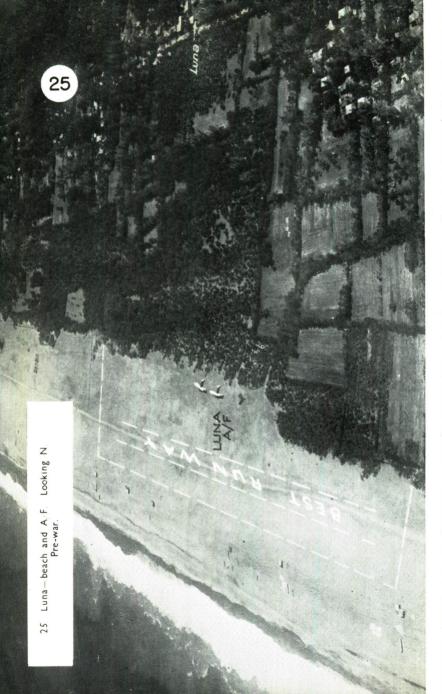
From Darigayos Pt to Busilag Estero wide flat beach is suitable for airfield construction and capable of carrying heavy MT (See Beach 17) in Landing Beach Summary).

Luna A/F (Photo 25) is situated on the beach west of the town. The foreshore is low and sandy, and near the coast there are many coconut groves. Farther inland ricefields predominate.

From Busilag Estero to Mindoro the foreshore is low and swampy and almost impassable even to foot troops.







	LEGEND	
LLW	Lower Low Water	
LW	Low Water	
U.V.	High Water	

## LANDING BEACH SUMMARY

INFORMATION COMMON TO ALL BEACHES
Tidal Range, approximately 4ft
(Higher high water height to lowest tide)

All depths given at Mean LLW. Towns adjacent to most beaches. Water supplies unknown.

### With Handbook No. 38

This summary covers beaches considered to be tactically important. For full description of coastline, see Section 2.

### For Beaches 10-17 inclusive, see over page.

BEACH ORIENTATION Map and Photo Ref.	BEACH No. 1 Maps 4 and 5	BEACH No. 2 Maps 4 and 5	BEACH No. 3 Maps 4 and 5	BEACH No. 4 Maps 4 and 6	BEACH No. 5 Maps 4 and 7	BEACH NO. 6 Maps 4 and 7; Photo 3	BEACH No. 7 Maps 4 and 8	BEACH No. 8 Maps 4, 8, 9; Photos 4, 5	BEACH No. 9 Maps 4, 9; Photo 7
OBJECTIVE	Infanta, Highway 7 (Lingayen to Manila) and possible A/F site A.	Highway 7 (Lingayen to Manila)	Uli and foot tracks leading to Highway 7 N. of Dasol R.	Agno and road network N and E to Lingayen Gulf	Possible A/F site B and Bolinao-Lingayen Rd.	Bolinao ; MT road S from Bolinao to Highway 7 via Bani A/F site B.	Highway 7 at Alaminos.	Port Sual and Highway 7 to Lingayen.	Port Sual and Highway 7 to Lingayen.
APPROACH FROM SEA	Clear channels through foul areas in Dasol B.	Clear channels through foul areas in Dasol B.	Clear channels through foul areas in Dasol B.	Clear	Deep channel restricted by wide fringing reefs.	Clear from NW between Santiago I and main- land.	Clear channel between reef and the Hundred Is. Reef 1400 vds offshore obstructs approach to northern section of beach.	Clear approach from east.	Adela Rock in 10ft water, 850 yds ENE of Mangas Pt is the only obstruction.
DEPTHS OFFSHORE (At mean LLW)	1 fm approx 200 yds offshore 3 fms approx 400-600 yds offshore	1 fm 200-1100 yds offshore 3 ,, 300-1600 ,,	1 fm 200-400 yds offshore 3 ,, 600 ,, 1, 1	1 fm close inshore except N end of beach where is anyrox, 400 yds offshore.  3 fms 200-400 yds offshore 5,, 350-850,,,,	2 fms approx 400 yds offshore	2 fms 75-100 yds offshore. 3 fms 90-110 yds offshore. Shelf 5ft deep extends out 75 yds at N end.	2 fms 1700 yds offshore.	3ft line 100-250 yds offshore. 2 fm line 350-400 yds offshore.	2 fms 325-700 yds offshore.
DIMENSIONS: Length Width HW Width LW	14 mls 50 yds 150 yds	44 mis 50 yds 200-250 yds	1200 yds 100 yds 150 yds	1 ml Reported wide Not known	500 yds Not known Not known	150 yds 10 yds Not known.	14 mls Not known. Not known.	1 ml 5-10 yds 10-70 yds	2 mls Narrow. 20-40 yds
SLOPE at LW line HW line	1-14% from Chart Probably steeper	1.1% Steeper at HW	1-1% Probably steeper at HW	2-3% Probably steeper	1% Probably same at HW.	See under " Depths offshore".	Not known. Not known.	1-21% Somewhat steeper.	1-1% Not known.
SURF CONDITIONS	Rough seas in Dasol B in SW weather Beach somewhat protected in both SW and NE seasons	Heavy surf in SW otherwise calm	vise calm	Partially protected from NE Fully protected from NE	Well protected in both seasons.	Protected.	Calm in SW partially protected in NE.	Protected in SW season, some protection in NE.	Exposed in NE season, reported impossible July and Aug.
BEACH OBSTRUCTIONS for Landing Craft	Sand bar ½ fin deep up to 600 yds offshore NE of Infanta. Four small foul areas:—one awash at LW, others have ½, 1, 1½ fms 3000 yds offshore. Good clear channels.	Several foul areas along entire beach. Some practically awash at LW.	Low narrow coral shelf almost awash at LW 100-150 yds offshore. Three shoal patches with ‡, ½ and 1 fm of water within 1700 yds of beach.	Boulders for 250 yds near shore on S bank of river mouth	Nong-known	None.	Chart shows narrow fringing reef.	East of Sual, 325 yds offshore, 10ft bottom reported "sticky". Reported rocky bottom 3-5ft-water 150-200 yds NE of Ast Sta. Rocks covered by 5ft water 230 yds off SE corners of beach.	Reported silty inclined to be soft. Small patch of rocks in 9ft of water 500 yds off centre of beach,
CHARACTER OF BEACH SOIL: Suitability for MT	Not known	Not known	Not known	Not known	Not known	Not known.	Not known.	Not known.	Not known.
ACCESS TO ROAD SYSTEM	. Highway No. 7 200-300 yds inland	Highway 7 adjacent and parallel to coast	Foot track NW for 4 mls to Highway 7.	MT road at Agno 4 ml inland over Balincaguin R	Unimproved road to Bolinao parallels beach.	Good MT road to Bolinao, adjacent to beach.	Good MT road to Highway 7 and Alaminos.	Highway 7 parallels beach.	Highway easily accessible.
HINTERLAND: Type of soil, terrain and vege- fation, with relation to movement, dispersal and concealment	e Fringe of cocount palms and low flat agricultural al land, some light timber. Movement for MT good: some low grassed hills	Undulating area for 1 ml to foothills. Coconut covered: Movement to foothills possible for MT.	Low flat country then undulating timber and grass hills 100 ft high between Uli and road.  MT movement restricted outside Uli	Coconut palms and light timber. Balincaguin B 200 yds wide. Navigable to Agno minimum depth 6 ft. No	Coconuts on beach, light timber and cultivation in linand.  Balingasa, R. reported fordshle at I.W.;  Balingasay barrio E of river mouth.	Road climbs steep bluff behind beach to undulating grass and scattered timber area.	Undulating hills with light timber, hill rice and grass, coconuts near beach.  Movement off MT road not difficult,	Flat open ground on west, coconut palms with low vegetation on east.	Grass and scattered palms just off beach. Wooded hills inland from Highway.
MISC INFORMATION	Distances and depths offshore mainly from Chart USC and GS 4210. Good shelter behind Hernana I in SW storms.	Distances and depths offshore mainly from Chart USC & GS 4210	Distances and depths offshore mainly from Chart USC & GS 4210	Distances and depths offshore mainly from Chart USC & GS 4209	Distances and depths offshore mainly from 1 Chart USC & 4209.	Reported ships discharged cargo on to beach by launch. Distances offshore mainly from Charts USC & GS 4209 and 4238.	Reported area used by 90 ton launch. Distances and depths offshore mainly from Chart USC & GS 4209.	Some swells, no currents, exclosure of harbor 75%. Distances and depths offshore mainly from Charts USC & GS 4209 and 4239.	Agno R reported navigable for 15 mls to craft of 6th draught. Distances and depths offshore mainly from Charts USC & 68 4209 and 4239.
LANDING SUITABILITY AND REMARKS	Good HW landing beach for LCV and LCM. Possible for LST on N end of beach at Cato.	Good HW landing beach for LCV and LCM. Informants do not recommend this beach at LW.	Possible landing beach for LCV and LCM at HW.	Probably good landing beach all tides. S end best. Chart indicates bluff behind sand beach. River crossings necessary to reach good roads.	Beach at head of bay probably very shallow. Probably limited to LCV and LCM at HW.	Good beaching point for one or two LSTs.	Probably limited to HW LCV and LCM landing	Suitable for small landing craft at ½ tide or over.	LCV and LCM barges may ground 100 yds offshore at HW.

Lower Low Water High Water Low Water LEGEND LLW LW ΜH

# LANDING BEACH SUMMARY—Cont'd.

INFORMATION COMMON TO ALL BEACHES

Tidal Range, approximately 4ft (Higher high water height to lowest tide)
All depths given at Mean LLW.
Towns adjacent to most beaches.
Water supplies unknown.

For Beaches 1-9 inclusive, see over page.

BEACH ORIENTATION Map and Photo Ref.	BEACH No. 10 Maps 4, 10; Photos 8, 11	BEACH No. 11 Maps 4, 11; Photos 15, 16	BEACH No. 12 Maps 4, 11 and 12; Photo 17.	BEACH No. 13 Maps 4 and 12; Photo 17	BEACH No. 14 Maps 4 and 13; Photos 18, 21, 23.	BEACH 15 Maps 4 and 13; Photos 18, 21, 23.	BEACH No. 16 Maps 4 and 14; Photo 18	BEACH No. 17 Maps 4 and 15; Photos 24, 25
OBJECTIVE	Lingayen A/F and Highway system.	Railroad and highway network.	Possible A/F site E. Railroad and Highway 3.	Railroad and Highway 3.	San Fernando Hr	San Fernando Hr	Highway 3.	Luna A/F.
APPROACH FROM SEA	Clear	Sand bank extending 4 mls due south from peninsula south of Baybay, obstructs western approach. Depth 1½ fms.	Clear	Clear	Clear from W and SW except for Research Reef 1600 yds due W of southern end of beach. Least depth 2½ fms.	Hr entrance restricted by shoals both sides of channel.	Clear.	Clear.
DEPTHS OFFSHORE (At mean LLW)	1 fm line 120 yds offshore. 5 fm line 1000 yds offshore.	1 fm 100-200 yds offshore. 5 fms 1400 yds offshore.	3 fm line appróx 450 yds offshore	2 fms 100-200 yds from shore	1 fm line approx 60 yds offshore 3 fm line approx 180 yds offshore	1 fm line usually less than 50 yds offshore. 3 fm line offshore 100 yds W section. 200-270 yds centre section. 300-700 yds E section.	1 fm 50-100 yds offshore. 3 fms 200-400 yds offshore.	5 fm line 100-150 yds offshore.
DIMENSIONS: Longth Width LW	74 mls Not known. 80-100 yds	64 mls Not known. Not known.	4‡ mls Not known 50-100 yds	4 mis wide wide	1½ mls Generally wide Generally wide	3 mls See Misc Information below See Misc Information below	8 mis Wide. Wide.	5 mls Over 400 yds Not known.
SLOPE at LW line	1% Steeper at HW.	1-2% Fairly steep.	2% approx Probably steep	2-4% Probably steeper	Average 3% southern, 4% northern half. Generally steep, very steep N end	See Misc Information below See Misc Information below	1.4% Not known, probably steep.	7% Not known, probably very steep.
SURF CONDITIONS	Precipitous surf common in July and Aug. NE season moderate surf 0200-1000 hrs, otherwise rough.	Sheltered NE season. Partially sheltered SW season.	Partially exposed SW season. Exposed to swell NE season particularly between 1000 and 0200 hrs.	Low surf in early mornings during NE season Increasing rapidly after 1000 hrs.	Exposed to SW season Sheltered in NE season.	Well sheltered in SW season Heavy surf in height of NE monsoon particularly between 1000-0200 hrs.	Exposed in SW season. Sheltered in NE but exposed to heavy surf between 1000 and 0200 hrs.	Probably rough both seasons. Best conditions probably latter part NE season between 0200 and 1000 hrs
BEACH OBSTRUCTIONS for Landing Craft	None.	Large boulders on beach near Damortis.	None	None	None	Wreck approx 90 yds offshore from centre of beach. Rocky patch depth 5 ft 120 yds offshore. See also Misc below.	Coral reef fringes most projecting points.	None.
CHARACTER OF BEACH SOIL : Suitability for MT	Loose sand above HWL. Suitable for MT below HWL.	Not known. Reported 3ft seawall in vicinity of Rabon.	Not known	Firm sand below HWL suitable for MT.	Probably loose white sand difficult to MT	Sandy soil behind seawall probably suitable for MT.	Not known.	Hard flat sand suitable for lateral MT traffic,
ACCESS TO ROAD SYSTEM	Suitable MT tracks from beach to highway.	Road and railroad along edge of beach. Highway No. 3 to E of Damortis.	Good MT rd from Sta' Barbara for 14 mls to Highway 3. MT tracks between beach and highway in dry season.	Probably easy access to highway 800 yds inland.	Highway 3, inland 200 yds N end, 600 yds S end.	Easy access to road and town directly behind beach.	Rd parallels beach 300-800 yds inland.	Fasy access to highway 200-800 yds inland.
HINTERLAND: Type of soil, terrain and vege- tation, with relation to movement, dispersal and concealment	Flat well-drained sandy soil suitable for MT. Swampy areas in vicinity Agno-Calmay R delta.	Low grassy hills inland would limit MT movement.	Coconut palms fringe beach. Paddy fields inland to road.	Coconuts along beach, scattered paddy fields inland to rd.	Very sandy soil behind beach at N end, paddy fields at S end	Wide sandy flat land S and SE of Hr.	Open sandy flat land between beach and rd. Irrigated paddy fields beyond rd.	Flat cultivation with some coconuts and fruit trees between beach and rd.
MISC INFORMATION	Distances and depths from USC & GS Chart 4209.	Numerous freshwater streams. Distances and depths from USC & GS Chart 4209.	Less surf in early mornings during SW season. Distances and depths from USC & GS Chart 4209.	Distances and depths from USC & GS Chart 4209.	Distances and depths from USC & GS Charts 4209 and 4246.	High photos indicate seawall or very steep bank at LW line along entire beach. Difficult to land MT. Distances and depths from USC & GS Charts 4209 and 4246.	Distances and depths from USC & GS Chart 4208.	Luna A/F on hard beach sand. Distances and depthis from USC & GS Chart 4208.
LANDING SUITABILITY AND REMARKS	Good landing beach in SW season except during July and Aug.	Excellent landing beach all LC any season. Beach from Rabon for 300 yds S probably comparatively steep.	Good landing beach particularly in NE season.	Good landing beach in NE season.	Excellent landing beach. Good beach for LST at N end.	Excellent landing beach. Three excellent docks in Hr. One for ships to 9000 tons DW.	Good landing beaches separated by projecting points.	Excellent landing beach. Numerous landing places for LSTs.

### Hinterland:

Wide, flat, sandy coastal plain gives way some miles inland to steep hills 700ft-800ft high. Coastal plain mainly cultivated with upland rice and sugar cane. From Busilag Estero north, swampy delta of Amburayan R is immediately behind beach. This area is practically impassable at all times.

### Vegetation:

Coconuts along foreshore; upland rice and sugar cane on higher areas; paddy rice in delta region.

### Rivers:

Busilag Estero and Amburayan R-No details of navigability.

### Towns:

Luna (2436) and Bangar (1677) are the principal towns near beach.

### Roads:

One-lane all-weather road south along coast from Luna; seasonal road north to Bangar. One-lane all-weather road SE for 3 mls to Route 3, the main highway, at Balaoan.

### SECTION 3

### RIVERS, LAKES AND SWAMPS

### GENERAL:

With the exception of the Agno, Dagupan and Calmay, few rivers are navigable to other than canoes, and river transport was not of great importance. Little information is available on many rivers.

There are no important lakes.

Permanent swamps are confined to coastal areas near mouths of rivers; many have been converted to permanent fish ponds. In the wet season, large areas of the Agno-Dagupan delta region become flooded, forming temporary swamps and marshes,

### 1. RIVERS IN DETAIL:

- i. Agno R: (Photos 1, 7, 11). Length 130 mls. Rises NW of Baguio at an altitude of approx 5500ft; flows south to Santa Maria, SW to Mangatarem, then NW, entering Lingayen Gulf north of Labrador. Minimum depth over bar, 6ft. Navigable 36 mls to Bautista by craft 3ft draught and for 40 mls farther by canoes. Subject to sudden rises up to 40ft.
- ii. Aringay R: (Photo 17). Length 19 mls. Rises SW of Baguio at altitude 6800ft; enters sea at Aringay Pt. Swift mountain stream; navigable by canoes for only 4 mls above mouth.
- iii. Balincaguin R: Length 30 mls. Rises in Zambales Ra; enters sea west of Agno. Boats drawing 10ft can cross bar and anchor near mouth. Channel changeable; bottom sand and silt. Navigable by craft 6ft draught to Agno.
- iv. Bauang R: (Photo 17). Length 29 mls. Rises west of Baguio at altitude of 4500ft. Fast-flowing. May be nayigable for craft drawing 3ft for half a mile above mouth.
- v. Baroro R: Length 15 mls. Rises NE of Bagulin and enters sea SW of Bacnotan. Bar at mouth 1260yds wide can be crossed by craft drawing 3ft, which can ascend for about 1 ml.
- vi. Bued R: (Photo 13). Length 30 mls. Rises SW of Baguio and enters sea SW of San Fabian. Bar changeable and difficult to cross. Navigable for several miles at HW by vessels drawing 5ft and by bancas for 20 mls. Branch also navigable by bancas connects to Dagupan R.

- vii. Dagupan R: (Photos 9, 11, 12). Length 30 mls approx (known as Sinocalan R and Mitura R in middle and upper reaches). Rises north of San Manuel and enters sea north of Dagupan. Minimum depth over bar, 6ft. Navigable at HW by craft of 7ft draught to Dagupan and for 10 mls beyond by vessels 3ft draught. Connected to Agno R by Calmay R which is also navigable to small craft.
- viii. Darigayos R: Length 10 mls. Rises in low hills west of Santol; enters sea at Darigayos Pt 16 miles north of San Fernando. Bar 2140 yds wide behind which is a wide estuary. Bottom silt and sand. Navigable by 3ft draught vessels for 1 ml.
- ix. Dasol R: Length 8 mls. Rises in Zambales Ra at approx altitude 500ft. Navigable only to canoes for 1-2 mls.
- x. Nayom R: Length 18 mls approx. Rises in Zambales Ra 2000ft altitude and enters sea SW of Infanta. Navigable to craft drawing 12ft for 4-5 mls. The headreaches are narrow, swift and shallow.

### 2. SWAMPS:

- i. Lingayen-Dagupan Area (Photos 11, 12): Largest swamp area in vicinity of Lingayen Gulf. Stretches 13 mls parallel to coast from Agno R to 1 ml NE of Dagupan R with average width of 1-2 mls. Separated from coast for 9 mls east of Agno R by sandy strip ½ to 1 ml wide. Region has been converted into a series of permanent tidal fish ponds with depth 4-6ft at HW, approx 2ft at LW. During wet season, due to rise in river levels, terrain becomes swampy for some miles south of Calmay R.
- ii. Amburayan R Delta: Near the coast and extending some miles inland, Amburayan R has formed a swampy delta cut by numerous constantly changing channels. In the wet season the whole delta region between Busilag and Tagudin is flooded and even in dry season is generally impassable.

Considerable areas of mangrove are near coast, with swamp

grassland and paddy fields inland.

- iii. Darigayos R: For two miles above mouth there are limited mangrove areas close to river bank.
- iv. Tambac B: Swampy delta of Bani R, San Vicente R and Alaminos R cover an area 5 mls long by 1½ mls inland. Most of this area is deep muddy mangrove swamp with small fringes of nipa toward the inland edges.



### **SECTION 4**

### AIRFIELDS, POSSIBLE AIRFIELD SITES AND SEAPLANE ANCHORAGES

(Map 16)

### A. AIRFIELDS

### 1. OPERATIONAL

i. Lingayen (Pangasinan Prov)—16°02′ N., 120°15′ E. 10 ft ASL. (Photos 8, 11).

Adjoining beach & ml NE of Lingayen town.

### History and Status:

Pre-war commercial national airport under construction in 1941. Latest photos show dispersal and taxiways, and improvements and extension of runway have been carried out by Japanese.

### Runways:

One E/W, 3960 ft x 390 ft, in 1941. Believed extended to 6500 ft.

### Extensions:

Possible to east.

### Approaches:

North over sea; south over coconut palms; east and west over coconut palms and beach.

### Dispersal:

South of runway in fruit trees and coconut palms.

### Terrain:

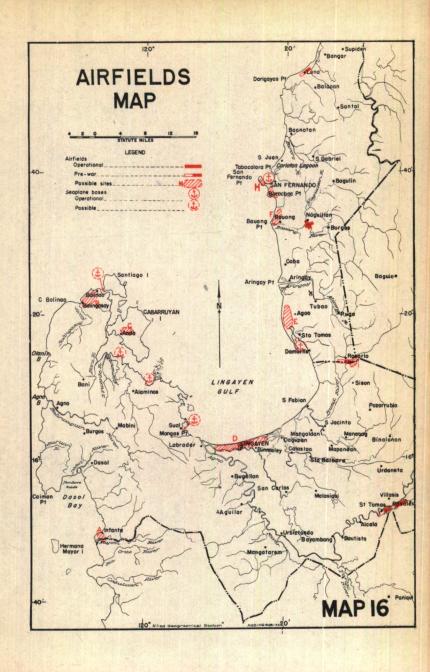
Flat sandy coastal plain inland to Lingayen town and Calmay R.

### Engineer Materials:

Water obtainable from Lingayen or from wells, sand from beach. Coconut palms are only timber in the locality.

### Installations:

It is reported that Capitol Building west of airfield is used for administration and hospital. Workshops and quarters for approx 500 men south and north of field.



### Communications:

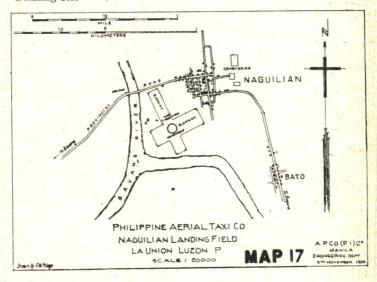
National Highway 7 runs west from Lingayen (1 ml SW of the strip); Road 256, from Lingayen east to Dagupan, is ½ ml south of strip.

Two good roads, one from Capitol Building the other ? ml

west, lead south to Lingayen and main roads.

ii. Naguilian (La Union Prov)—16°32′ N., 120°23′ E. 100 ft ASL: (Map 17; Photo 26).

330 yds SW of Naguilian at junction of Naguilian and Bauang Rs.



### History and Status:

Field was improved and widened in 1941 and was used as alternative to Baguio A/F during bad weather. Reported operational or under construction as operational by Japanese.

### Runways:

Two runways, NW/SE, 2740ft x 330ft. NE/SW 1980ft x 660ft.

AW grassy sandy loam surface.

### Extensions:

Appears feasible to NE at end of NE/SW strip.

### Approaches:

NW over Highway 9, with telephone and telegraph lines; SE over Bauang R; NE over hills rising 360ft 1 ml from field; SE over hills 300ft 3 ml from field.

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### Dispersal:

Possible to north and west of runways.

### Engineer Materials:

Water and river gravel available from river beds.

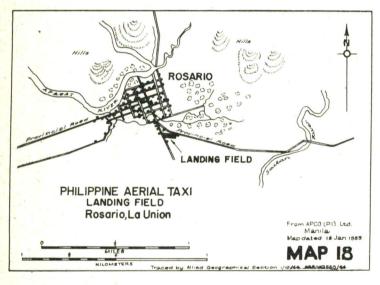
### Communications:

Adjoins National Highway 9 which leads west to Bauang, east to Baguio.

Railway at Bauang 4 mls to west.

### 2. PRE-WAR AIRFIELDS:

i. Rosario (La Union Prov)—15°53′N. 120°30′E: (Map 18; Photo 27). Located approx 700 yds south of Rosario.



Civil ELG, unimproved May 44.

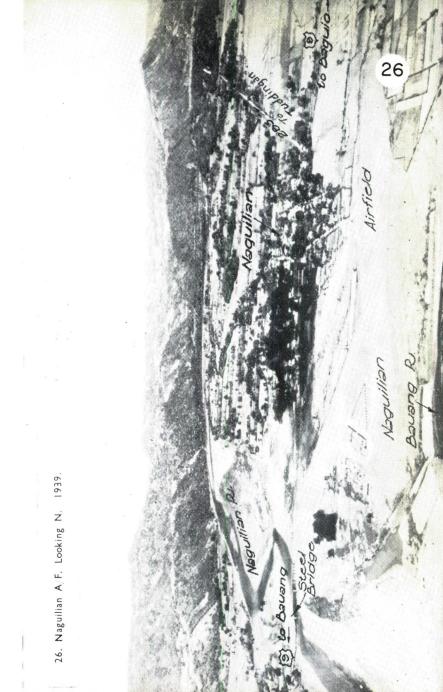
One NE/SW runway 678ft x 330ft. Muddy surface in wet weather.

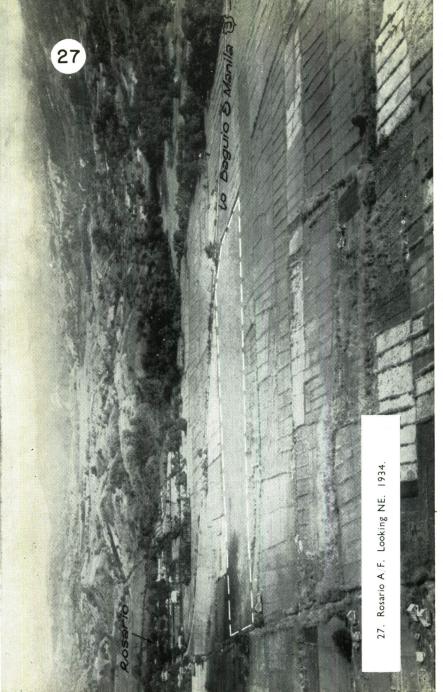
Extension to west would be limited only by drainage.

ii. Luna (La Union Prov)—16°51′ N., 120°23′ E: (Photo 25).

Located on beach sand approx ½ ml NW of Luna civil LG. One all-weather N/S runway 3960ft x 207ft.

Extension possible at either end by grading the beach.





### 3. POSSIBLE SITES

General:

South from Lingayen Gulf and inland of swampy delta region there are unlimited areas which should be suitable for development of airfields (Photos 1, 2, 12). Drainage, particularly in wet season, is only limiting factor.

Other suitable sites can be found in coastal regions.

a. Infanta (Pangasinan Prov):

In coconut plantation west of town extending south to Nayom R. Sandy loam with good natural drainage area approx 1 ml x  $\frac{1}{2}$  ml.

b. Bolinao (Pangasinan Prov):

On low sandy strip 1½ ml by 200-300 yds just SW of town.

c. Cabarruyan I (Pangasinan Prov):

Possible site, which may be under construction by Japanese, just north of Anda.

d. Lingayen Gulf (Pangasinan Prov):

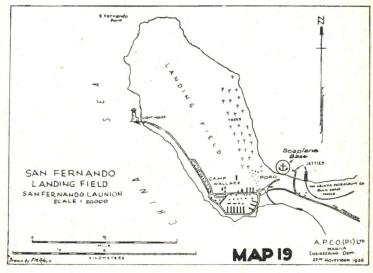
Low sandy ridge up to ½ ml wide between Agno R and Lingayen. Good natural drainage.

e. San Fernando Area (La Union Prov):

Sandy well-drained area south of port area between Paldingan and Baracbac Pt.

f. San Fernando (Poro) Peninsula (La Union Prov): (Photo 21).

Top of peninsula was surveyed for airfield before war.



### SECTION 4]

Good road to port area and San Fernando. Railway at wharves.

### g. Santa Barbara (La Union Prov):

North and south of Santa Barbara on sandy strip between beach and ricefields inland. Good road from Santa Barbara to main highway and railway at Agoo 13 mls east.

### h. Bauang (La Union Prov):

West of railway between Bauang and Lossoc. Flat sandy area. Some coconuts but mainly grassland.

### i. Saiton R (La Union Prov):

West of Saiton R between river and Rosario and adjoining National Highway No 3. Possibly under construction May 44.

### B. SEAPLANE ANCHORAGES

The following sites were surveyed before the war and suitable anchorage for tenders drawing 20 feet has been allowed for.

### i. Bolinao (Photo 3):

Classed as excellent and sufficient anchorage area for 36 seaplanes, with further areas available; 100% enclosed from swell or currents. Perfect typhoon anchorage.

### ii. San Fernando Hr (La Union Prov) (Photo 23):

Classed as poor, and sufficient only to accommodate two seaplanes in SW part of harbor between piers and Poro. Good beach round harbor which is 50% enclosed. Marred by swell from north and NW. No currents.

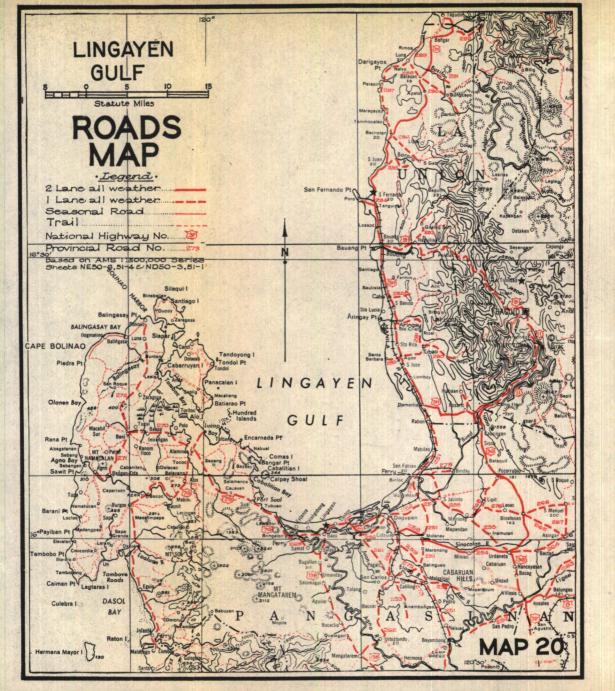
Reported Japanese using this anchorage and constructing some defences in area.

### iii. Sto Tomas (La Union Prov):

On east side of Lingayen Gulf within area enclosed by sandspit south of Baybay. Anchorage 75% enclosed, estimated sufficient for 18 seaplanes. No currents or swell. Good beaches in vicinity. Classed as fair anchorage.

### iv. Port Sual (Pangasinan Prov) (Photo 6):

Classed as fair; sufficient anchorage area for 18 seaplanes. Good sand beach west and SW shore of harbor; 75% enclosed. Some swell, no currents.



### SECTION 5

### ROADS AND TRACKS

(Map 20)

### 1. GENERAL:

Main roads traversing the area are National Highways 3, 7, and 13, which lead from Lingayen Gulf to Manila in the south.

In the area south of Lingayen highways are linked by a well-developed network of provincial roads, which connect with all towns of importance. In La Union Prov, Route 3, parallel to the coast north of Damortis, is the only N/S road. Route 9 from Bauang to Baguio is the only lateral road of importance. Branch roads lead from these two highways to the coast and important inland towns.

Movement off the roads is usually possible in the dry season, except in the swampy delta regions of Agno and Dagupan Rivers. In the wet season movement off roads is generally

impossible.

### Classification:

The following classifications are in accordance with the designation laid down by the pre-war Philippine Bureau of Public Works.

### 2-lane all-weather:

Usually 16ft base and surface, 4ft shoulders. Culverts 16ft. Bridges usually 16ft wide.

### 1-lane all-weather:

Usually 9ft base, 12ft surface, 4ft shoulders. Culverts 16ft, bridges 10ft wide.

### Seasonal:

Usually 9ft surface. Some sections have no added surfacing nor shoulders. Bridges and culverts 10ft. Frequent turnouts for passing.

### WARNING:

Many of the roads in this area are surfaced with loose gravel and are extremely dusty in dry weather. These factors cause many serious accidents.

### Measurements: Abbreviations:

Bridge measurements are in feet in order of length, width, and height above stream bed. Cardinal points are abbreviated in Road Summaries to N, S, E, and W. Bridge materials are designated thus:—

T = Timber; S = Steel; C = Concrete; M = Masonry.

### Trails:

Trails link every settlement. Most of these are passable to light traffic in the dry season, but are impassable in wet season.

### 2. DETAILED DESCRIPTION OF ROADS:

ROUTE 3H.—Ilocos Sur — La Union Border to La Union — Pangasinan Border (63 mls approx):

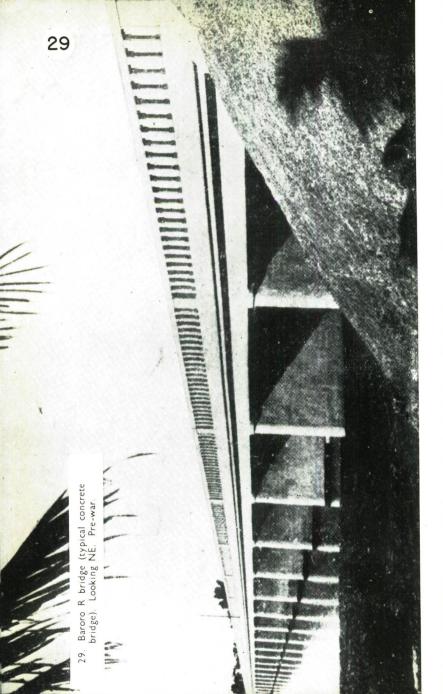
From Ilocos Sur—La Union border the road runs south to Sudipen, thence SW to Bangar, thence to the west coast at Bacnotan, thence south along coast to San Fernando and Damortis, thence east to Rosario and La Union—Pangasinan Border.

Road throughout is 2-lane, all-weather, concrete or asphalt-surfaced.

**Note:** Following distances agree with kilometer posts along road. Subtract 13.1 kms (8.1 mls) to obtain correct distance from Manila.

Road Details	istance Man Kms		Terrain
AMBURAYAN R. 5-span S bridge 1461 x 18 unfordable.	328.0	203.8	For 11 mls flat cultivated plain, rice paddies, canefields and occasional coconut
SUDIPEN Branch road E to Ban- naa (No 292)	327.0	203.2	groves.
June old road N to TAGUDIN	323.4	200.9	
BANGAR. Road W to coast then SW to Luna (No. 289).	322.4	200.3	
BOROBOR R. 4-span C bridge 120 x 15. Fordable.	317.9	197.5	
June Road SSE to SAN FRANCISCO (No 291)	316.2	196.4	
PANTAR R North Branch T bridge 120 x 15	316.0	196.3	These bridges may be replaced by concrete
PANTAR R South branch, T bridge 100 x 15	315.9	196.2	structures.





### Route 3H-Continued.

Road Details D	Man		Terrain
217.0127	Kms	Mls	
BALAOAN Roads NW to LUNA (No. 288) SE to SANTOL (No. 290)	313.4	194.6	
Defile; suitable area for road blocks.	310.1	192.6	For 3½ mls narrow canyon between steep hills.
	304.0	188.9	For $3\frac{1}{2}$ mls flat cultivated plain. Paddy fields and canefarms,
MARAGAYA R. 1-span S bridge 160 x 15 unfordable high steep	302.7	188.0	netus and canerarins,
banks			
BACNOTAN Roads N to Luna (No 28 SE to SAN GABRIEL (No 286)	298.5 37)	185.4	For 4 mls coastal plain ½-1 ml wide. Steep hills to E
BARORO R 22-span C bridge, 650 x 16 (Photo 29)	297.3	184.7	
SAN JUAN Road NE to SAN GABRIEL (No 285)	292.0	181.4	For 5.1 mls road winds along foot of steep bluffs close to sea; suitable road block area.
CARLATAN LAGOON 8-span C bridge 207 x 15 x 8	285.4	177.3	mock area.
SAN FERNANDO, Capital of La Union Prov	283.8	176.3	For 6.1 mls narrow cultivated coastal plain. Railway parallel to road short distance
Junc Road NW to PORO (No 284)	281.4	174.8	Ε.
PARINGAO. 8-span C bridge 169 x 14 x 10	279.0	173.3	
LOSSOC C bridge 90 x 14 x 14	277.3	172.2	
	35		

### Route 3H-Continued.

Road Details	Man		Terrain
	Kms	Mls	The second second
BAUANG Route 9 E to NAGUILIAN and BAGUIO	274.0	170.2	For 15 mls narrow cultivated coastal plain. Rice paddies, cane, and tobacco farms either side. Railway between road and sea to W.
BAUANG R. 16 spans. S and C bridge, 1790 x 20	273.0	169.6	
CABA	263.0	163.4	
CABA R	262.3	162.9	
S-span C bridge 236 x 22 x 18 Fordable in dry season. Road E to SOBREDILLO (No. 282A)		102.3	
Note: Narrow bridges and culverts between Caba R and Agoo.			
Cut-off by-passing Aringay to E. Straight ahead for town	259.0	160.9	
ARINGAY—E outskirts of town.	258.0	160.3	
ARINGAY R. 22-span C bridge 938 x 20.	256.5	159.3	
Fordable, 4ft deep in dry season.			
Junc S end of bridge Road E to TUBAO (No 281)	256.4	159.2	
June road E to TUBAO (No 280)	249.7	155.1	For 6.8 mls flat cultivated coastal plain. Steep brush and
			cogon-covered hills to E. Many good observation posts on hills.
AGOO Junc—Road W to SANTA BARBARA (No. 282)	249.0	154.7	Posts on Marie
Bridge. 4-span C 116 x 11 x 12	245.0	155.2	

### Route 3H-Continued.

Road Details	Distance Man Kms		Terrain
Junc. Road W to STO TOMAS and beach	244.2	151.7	
Junc. Road W to beach.	241.8	150.2	
Bridge, C 98 x 20 x 12 DAMORTIS.	241.5	150.0	Road winds across
Junc. Road S along coast to SAN FABIAN (No. 251). Highway turns E.			series of parallel N/S ridges to Apangar R. Vegetation cogor grass, scattered trees and low scrub, with patches of cultivation CARE NECESSARY ON THIS SECTION DUE TO S H A R F CURVES.
APANGAT R. 1-span S bridge 124 x 9 x 20. Fordable	231-7	144.0	For 3 mls flat Bued Valley cultivated either side of road Some trees near vil- lages. Deployment in wet season hindered by streams.
ROSARIO Junc:— Route 11 Kennon Highway NW to BAGUIO. Route 3H turns S.	228.8	142.0	Airfield south of road
Note:—South of this jun Manila subtract 1.2 km			

by kilometer posts.

La Union - Pangasinan 213.8 132.8 Border

ROUTE 3G-La Union-Pangasinan Border to Pangasinan-Tarlac Border (29 miles):

From provincial border, road runs SE to Pozorrubio thence to barrio Sta Maria Norte, thence south through Urdaneta and Villasis to San Manuel (Tarlac Prov).

Two-lane all-weather throughout, said to be asphalt-sur-

faced. All river crossings are bridged.

Note: Distances shown agree with kilometer posts along road. Subtract 1.2 Kms (0.7 mls) to obtain correct distance from Manila.

Route 3G-Continued.

Road Details	istance: Man Kms		Terrain
La Union - Pangasinan Border	213.8	132.8	For 1.7 mls flat cultivated plain. Rice fields on either side.
BUED R. 5-span S bridge 408 x 20 Probably fordable.	212.8	132.1	For ½ ml wide sandy flats both sides of river. Steep hills N and E.
Junc. Old Baguio road N.	212.2	131.8	For ½ ml narrow level strip between hills and river. Scattered patches of forest.
CAURINGAN R. 2-span C bridge 52 x 20 x 16 Easy ford.			For $6\frac{1}{2}$ mls open undulating cultivated plain. Rice and to-bacco fields b o t h sides of road.
Junc. Cut-off right to SISON (½ ml)	209.4	130.1	
Junc. Cut-off via Sison rejoins from righ	206.4	128.2	
BOBONAN R. 2-span C bridge	205.0	127.4	
Junc. Cut-off left by-passing POZORRUBIO. Road No 268 from POZORRUBIO to MANAOAG	202.0	125.5	
Junc. Road via Pozorrubio rejoins from right	200.9	124.8	For 21 mls flat cultivated plain.
ALORAGAT R. C bridge 10 spans 392 x 20			
STA MARIA NORTE Junc - road left old highway via BINALONAN, right new cut-off direct to URDANETA	193.0	119.9	
STA MARIA SUR crossroad. Road W to PAO (No 276) and E	191.5	119.0	
lo BINALONAN			

ROUTE 7G-Lingayen to Pangasinan-Zambales Boundary (57 mls approx):

From Lingayen Highway No. 7G runs NW to Sual, thence inland to Alaminos, thence SW to Hermosa on the west coast, then south along coast to Santa Cruz, Zambales.

One-lane, all-weather, gravel-surfaced. Heavy dust at times restricts traffic and bridges generally narrow. ferry crossings, one over Agno R the other over Navom R at provincial boundary.

Section Lingayen to Alaminos (23.7 ml) covered in this

summary.

Note: Subtract 5.1 kms (3.2 mls) from distances shown to obtain correct distances from Manila.

Road Details	Distance Man Kms		Terrain
LINGAYEN. 207 kms (123.6 mls). from Manila via Route 13B	373.0	231.8	For 54 mls swamp and lagoons both sides of road; movement off roads difficult in any season.
CALMAY R. Bridge 126 x 11 (probably destroyed)	372.0	231.2	season.
BAAY	371.0	230.6	
Junc - Route 13B S to CAMILING	(210.0)	(130.5)	Distance from Manila via Route 13B
AGNO R Ferry	367.5	228.5	
June. Rd SE to Route 13B, No 269	363.2	226.0	For 1¼ mls narrow low-lying marshy strip between Agno R and steep hills to west.
LABRADOR	361.0	224.2	For 4½ mls coastal plain ½ - ½ ml wide. Low-lying rice paddies both sides of road. High hills 400yds S.
	354.0	220.0	For 1 ml - Winding road through low hills overlooking Lingayen Gulf.
SUAL. Road turns W from this town	352.6	219.1	For 5 mls mountain- ous terrain. Vegeta- tion low brush and cogon.

Route 7G-Continued

Route 7G—Continued.			
Road Details	Distance		
Road Details	Man Kms	Mls	Terrain
ALAMINOS R. 1-span S bridge 161 x 18 x 18	344.3	214.0	For 7 miles flat plain, rice paddies both sides of road.
ALAMINOS R. S bridge 157 x 14 x 28	340.5	211.5	
ALAMINOS. Junc. Roads NE to LUCAP, NW to BANI (No 270). Highway turn sharply S.	ıs		
Alaminos R S bridge 126 x 14 x 22	333.5	207.1	For 1 ml undulating cultivation. Ricefields both sides of road.
	331.0	205.9	For 3‡ mls low spurs of Zambales Ra. Road climbs gradually.
Top of climb 220ft altitude approx	325.5	202.2	, and the second
MABINI—road turns NW along right bank of Balincaguin R	323.6	201.1	For 4 mls flat cultivated plain.
BALINCAGUIN R C bridge 220 x 20 x 34	317.0	197.0	Road climbs 290ft in 1½ mls, then continues over wide undulating plateau for 8 mls.
BURGOS	312.5	194.2	Road gradually descends across plateau.
DASOL R T bridge 220 x 10 x 7	304.9	189.5	For 4 mls swampy coastal plain, steep hills to E.
Junc. Branch east to Dasol (½ ml)	304.2	189.0	
HERMOSA	298.5	185.3	For 2 <sup>3</sup> mls coastal plain, 300 - 400 yds wide, swampy in wet season.
TANGLAO R T bridge 165 x 10 x 8	294.0	182.6	For 6 mls flat coastal plain 1 - 3 mls wide. Zambales range to E.
BAYAMBANG R T bridge	290.0	180.7	
81 x 10 x 6			

### Route 7G-Continued.

Road Details	istance: Mani Kms		Terrain
BANOG R T bridge 97 x 10 x 7	287.4	178.5	
CATO R T bridge, 81 x 9 x 7	286.2	177.8	
INFANTA	283.7	176.0	Low swampy area be tween town and river Wide valley to E.
NAYOM R (Pangasinan - Zambales Border)	281.5	174.8	Good approaches to ferry both sides o river 125yds wide 10ft minimum depth.
Ferry 2-car capacity SANTA CRUZ (Zambales Prov)	276.4	171.7	Tort minimum depth.

### ROUTE 9-Bauang to Baguio (31 mls):

Branch E from Route 3H at Bauang along valley of Bauang R for 10 mls then over mountains to Baguio, summer capital of Philippines.

Two-lane all-weather concrete or asphalt throughout. Steep grades and sharp turns would limit military traffic to 1-way.

Road Details	Distances Bauan		Terrain
	Kms	Mls	
BAUANG. Route 9 branches E from			For 3 mls narrow valley of Bauang R.
Route 3H in town	4.8	3.0	For 5 mls flat cultivated wide valley.
NAGUILIAN R 3-span S bridge 590 x 17	7.2	4.5	Naguilian A/F to S of road between bridge and town.
NAGUILIAN	7.5	4.7	
Junc. Rd NNE to TUDDINGAN (No 283)	7.9	4.9	
	12.8	8.0	For 23 mls winding road through mountainous terrain,

Road Details	Distances Bauang Kms		Terrain
RIBSUAN R 1-span S bridge 190 x 21 x 23	15.2	9.5	For 1½ mls steep climb up zig-zag of 5 U- b e n d s. Maximum grade 10%.
	17.2	10.7	Top of climb.
La Union - Mountain Border 17 mls from Baguio	23.0	14.3	

ROUTE 13B-Baay Junc (Route 7G) to Camiling, Tarlac (28 miles):

From Baay Junc, 11 mls SW of Lingayen, road runs SW via Aguilar and Mangatarem to Camiling, Tarlac.

From Camiling, Road 251 to NE crosses Pangasinan Prov and joins Route 3H at Damortis. Lateral roads connect to provincial network.

One-lane AW gravel road throughout. All streams bridged,

some bridges temporary wooden structures.

Dust may be troublesome on this road.

Distances agree with kilometer posts along road. Subtract 5.1 kms (3.2 mls) for correct distances from Manila.

Road Details	Distances from Manila Kms Mls		Terrain	
BAAY JUNC on Route 7G 1½ mls SE of Lingayen	210.0	130.5	For 28 mls flat cultivated swampy plain between Agno R and foothills of Zambales Ra. Owing to numerous streams movement to S off roads difficult in any season. Rice paddies both	
			sides of road through- out.	
AGNO S bridge 492 x 20 x 19	208.0	129.2		
Junc. Road NW to Route 7G No 269	205.5	127.7		
BUGALLON	203.8	126.6		
UMANDAY R T bridge 112 x 16 x 8	202.0	125.5		



### Route 13B-Continued.

Road Details	Distance Man Kms		Terrain	
DUMULOC R C bridge 99 x 11 x 12	201.4	125.1		
AGUILAR	196.0	121.8		
BAYAOAS R 2-span S bridge 266ft	189.6	117.8		
MANGATAREM	183.0	113.7		

Road continues 5.9 mls to provincial boundary; 11.5 mls to Camiling.

### 3—BRANCH AND CONNECTING ROADS:

### PANGASINAN PROVINCE:

### Road No. 251:

From Route 3H at Damortis road runs S along coast to San Fabian, thence SE to San Jacinto, thence west to Mangaldan, thence S via Sta Barbara, Malasiqui, Bayambang to Camiling, Tarlac, where it connects with Route 13B.

One-lane AW gravel-surfaced throughout except for short 2-lane concrete section north of Santa Barbara.

Road Details	Distances Damor Kms		Terrain
Damortis Route 3H			For 5 mls narrow cultivated coastal plain 200 - 400 yds wide. Steep hills to E grass and brush covered. R i c e and tobaccofields both sides of road.
T bridge 79 x 10 x 11	1.7	1.0	
RABON. Provincial Border. S bridge 158 x 12 x 9	3.3	2.2	
Bridge 120 x 10 x 8	8.0	5.0	For 1.8 mls cultivated central plain.
Bridge 99 x 10 x 4	11.0	6.8	For 2 mls salt marsh both sides of road which is probably ele- vated.

### SECTION 5]

Road No 251-Continued.

Road Details	Distances Damoi		Terrain -
	Kms	Mls	
Bridge 285 x 11 x 6	12.4	7.7	
SAN FABIAN—Road turns SE, Branch road SW to MANGALDAN (No 279)	14.0	8.7	For 36 mls flat cultivated central plain. Some trees near villages, but ricefields,
			corn and sugar cane farms predominate.
BUED R Ford 300ft wide 1 - 2 ft deep	19.5	12.0	
SAN JACINTO	21.0	13.0	
PATALAN R	22.5	13.9	
8-span S and C bridge 406 x 16 x 22 (Photo 32)			
June. Road SE to MAPANDAN	24.0	14.9	
MANGALDAN. Sharp turn S in town. Branch road NW to SAN FABIAN (No. 279).	25.0	15.5	
Junc. Branch road SW to DAGUPAN (No. 256)	26.2	16.4	
Junc. Road E to MAPANDAN	30.5	18.9	
June. Road NW to CALASIAO (No 258)	34.0	21.4	2-lane concrete road from here to Santa Barbara
MAYRUSO R Bridge 190ft	35.0	21.7	
Santa Barbara Road SE to URDANETA (No 254)	35.5	22.0	1-lane AW gravel road to Camiling.
T bridge 52 x 9 x 9	35.8	22.3	
T bridge 49 x 9 x 9	* 39.5	24.5	
MACABITO. Junc road NW to CALASIAO (No. 259); SW to SAN CARLOS (No 275)			

Road No 251-Continued

Road Details	Distances Damo Kms		Terrain
MALASIQUI. Junc roads W to SAN CARL (No 273); E to MAPARANUM (274)	.OS 45.0	27.9	
BAYAMBANG	58.0	36.0	
AGNO R (No bridge)	63.7	39.5	
CAMILING, Tarlac	72.8	45.1	

Road No 254: Santa Barbara to Urdaneta (12 mls): 2-lane AW, concrete surface. All streams bridged.

Road No 255—San Jacinto to Urdaneta via Manaoag (12 mls): 1-lane AW. Connects Road 251 and Route 3H. All streams bridged.

Road No 256—Lingayen to Mangaldan via Binmaley and Dagupan (15 mls): Main lateral connection between Routes 7G, 13B and Road 251. (Photo 30).

Two-lane AW for 23 mls to Binmaley, then 1-lane AW. Bridged throughout. Branch roads N to coast; two 2-lane roads from Lingayen (Photos 11, 31); seasonal road from Binmaley; seasonal road from Dagupan.

Road Details Dis	tances from Kms	Ling Mls	ayen Terrain
LINGAYEN			For 2.8 mls lowlying paddy fields and fish ponds S to Calmay R. Sandy area N to coast.
BINMALEY	4.0	2.4	
C bridge 6 spans 197 x 18 x 1	2 4.1	2.5	
Junc. Old Road E to DAGUPAN (No 2	57)	2.8	For $5\frac{1}{2}$ mls ricefields and fish ponds both sides of road.
CALMAY R C bridge 178ft	6.0	3.7	
Junc. Road SE to SAN CARLOS (No 26	6.2	3.8	
S bridge 1 span 213 x 20	8.0	5.0	
	45		

### Road No 256-Continued.

Road Details Distan	ces from Kms	n Ling	gayen Terrain
DAGUPAN	12.9	8.3	4 1 2 1 4 1 4 1 5
PANTAL R 7-span C bridge 275 x 20	13.0	8.4	For 1½ mls fish ponds both sides. Movement impossible off road.
Junc—seasonal road N to coast	13.1	8.6	
C bridge 186 x 16 x 12	16.0	9.9	For 5 mls flat cultivated plain; rice paddies, canefields
New cut-off, old road to right	16.1	10.1	both sides of road.
Old road rejoins	19.9	12.6	
Junc. Road joins Road No 251	23.0	14.5	
MANGALDAN	24.1	15.0	

Road No 257—Binmaley to Dagupan (5 mls): Alternative to Road 256 and former main road.

Two-lane AW said to be asphalt-surfaced.

Ferry crossing at Calmay R west of Dagupan. Ferry capacity 6 trucks or 125 troops.

Road No 258—Calasiao to Santa Barbara (4 mls): Two-lane concrete-surfaced. Connects Roads 260 and 261.

Road No 259—Road No 260—Macabito (4 mls): 1-lane AW gravel-surfaced. Branches SE from Bulog, 13 mls south of Calasiao.

Road No 260—Dagupan to San Carlos via Calasiao (9 mls): 1-lane AW asphalt-surfaced for 2.7 mls to Calasiao, then gravel to San Carlos. Bridged throughout.

Road No 261—Road 256 to San Carlos (7½ mls): 1-lane gravel road. Branches SE from Road 256, 1½ mls SE of Binmaley.

Road No 262—San Carlos to Mangatarem (12 mls): Onelane gravel road. 3-span S and C bridge 210 x 16 at San Juan, 1½ mls SW of San Carlos (Photo 33). Ferry at Agno R, ½ ml SW of Urbiztondo.

Road No 268—Manaoag to Pozorrubio (7 mls): One-lane AW. With Road 255 forms lateral connection between Road 251 and Route 3G. 4-span S and C bridge (332 x 20 x 27) over Pao R at Sapang.



32. Bridge over Patalan R near Mangaldan (typical steel and concrete bridge). Pre-war.

33. Bridge over San Juan R—looking S. Pre-war,

Road No 269—Route 7G to Route 13B (4 mls): One-lane AW. Connects Routes 7G and 13B, avoiding crossing of Agno R and skirting swampy delta region. All bridges timber.

Road No 270—Alaminos to Bani (9 mls): One-lane AW gravel-surfaced. 1-span S bridge 182 x 20ft, 1 ml NW of Alaminos. All other bridges timber.

Road No 271—Bani to Agno (8½ mls): One-lane AW. Follows north bank of Balincaguin R for last 2½ mls into Agno.

Road No 272—Bani to Bolinao (15 mls): 1-Lane AW gravelsurfaced. Branch E to Lasip, 8 mls north of Bani, leads to ferry crossing to Cabarruyan I. In 1941 a continuation from Bolinao to Cape Bolinao was under construction.

Road No 273—San Carlos to Malasiqui (4½ mls): 1-lane AW gravel-surfaced. All stream crossings bridged.

Road No 275—San Carlos to Macabito—Calasiao Road (No 259) (4 mls): One-lane AW gravel. No major streams.

Road No 276—Pao to Binalonan (6 mls): 1-lane AW gravel. 3-span S bridge 166 x 17 over Immanduyan R 1 ml from Pao.

Road No 278—Road 251 to Binday (3-mls): 1-lane AW from Angio barrio to Binday on W bank of Bued R.

Road No 279—Mangaldan to San Fabian (4½ mls): 1-lane AW. Alternative to Road 251 between Mangaldan and San Fabian. No bridge at Bued R SW of Mangaldan.

### LA UNION PROVINCE

Road No 280:—Agoo to Pugo, via Tubao (9½ mls):

1-lane AW winding along narrow valley for 2 mls, then
over saddle 200ft high followed by down grade to Tubao,

thence 4½ mls across Aringay R valley. All stream crossings bridged by temporary timber structures.

Road No 281—Aringay to Tubao (7 mls): 1-lane AW from Route 3H at Aringay. Follows Aringay R valley. Joins road 280 at Tubao.

Road No 282—Agoo to Santa Barbara (13 mls): 1-lane AW gravel. From Route 3H west to beach.

Road No 282A—Caba to Sobredillo (1½ mls): 1-lane AW gravel. E from 3H at S end of Gaba R bridge.

Road No 283—Naguilian to Tuddingan (34 mls): No details available. Probably 1-lane AW gravel.

Road No 284—Route 3H to San Fernando (Poro) Port Area (2 mls):

2-lane AW probably concrete-surfaced. Continuation W from piers to lighthouse on W coast of peninsula.

Road No 285—San Juan toward San Gabriel (5 mls approx):
1-lane AW. From Route 3H follows Baroro R valley for 6 mls. No information of proposed extension to San Gabriel.

Road No 286—Bacnotan to San Gabriel (5 mls):
1-lane AW along Baroro R valley. All streams bridged with timber structures.

Road No. 287—Luna to Bacnotan (12 mls): 1-lane AW gravel-surfaced. Alternative route to main highway.

Road Details	Distances Kms	from I		Terrain
LUNA Junc road SE to Balaoan No 288; north to Bangar No 289	.00	.00		4 mls flat cultid coastal plain.
DARIGAYOS R T bridge	7.0	4.3	For 2	$2\frac{1}{2}$ mls undulating
MARAGAYA R T Bridge 317ft	15.0	9.3	2-3 1	mls coastal plain nls wide. Sea 400-
BACNOTAN Joins Route 3H	19.5	12.1	500	yds W of road.

Road No 288—Balaoan to Luna (24 mls):
1-lane AW gravel road connecting coastal road to main highway.

Road No 289—Bangar to Luna (4 mls):

Seasonal road. Ferry at Busilag Estero. Joins Roads 288 and 289 at Luna.

Road No 290-Balaoan to Santol (64 mls):

1-lane AW gravel. Flat cultivation either side for 3½ mls from Balaoan; winding road with many narrow bridges from Busilag R to Santol Rd.

Road No 291—Pantar Norte to San Francisco (3 mls): No information. Probably 1-lane gravel.

Road No 292—Sudipen to Bannaa (3 mls): 1-lane AW gravel. Follows south bank of Amburayan R. Timber bridges over small streams.

#### TRANSPORT

The area was well served by road and rail transport systems, the former carrying 60% of internal freight and 70% of passenger traffic. River transport was important in Agno-Dagupan delta region.

#### 1. ROADS

(See Sec. 5.)

#### 2. RAILWAYS

The main Manila-San Fernando railway passes through the area; reported to have been extended to Tagudin (Ilocos Sur) by the Japanese.

A branch line from Paniqui, Tarlac, runs NE to San Quintin, eastern Pangasinan. Short 2ft gauge agricultural spur lines lead off the main lines.

#### Details of Lines:

#### i. Tracks and Distances:

Line	Type of Track	Distance in mls.
Manila to San Fernando San Fernando to Tagudin	Single Track Single Track (Japanese-built)	165.4 34.5
Paniqui to Rosales		18.3
Calanutan Junc to San Quintin San Fabian to Binday	Single Track Single Track	14.9 3.3

ii. Gauge, etc.

Gauge: 3ft 6in Rail: 65lb a yd

Ties: Molave and Ilip (local timber) Grades: Ruling grade 1.2% compensated

Curves: Minimum radius 984.5ft

Control System: Telegraph and telephone to train order points along lines.

Present condition: Lines believed to be kept in good con-

dition by Japanese.

Speeds: Normal speeds 20mph

iii. Rolling Stock:

In 1940 total rolling stock, inter-changeable for northern and southern lines, was:—

Locomotives 159, passenger cars 209, rail motors 98, mail and caboose cars 84, freight cars 2053, service cars 102.

iv. Fuel:

Lignite, soft coal, diesel oil, and petrol.

v. Bridges:

Most bridges were trestle-type on cement piles, capped with I-beams encased in concrete, with I-beam stringers.

#### 3. RIVER TRANSPORT:

Many shallow-draught cargo launches and power barges One specially built steamship (200 tons) drawing 2½ft was on Calmay R. Most river craft were based on Dagupan.

#### 4. NATIVE CRAFT:

Numerous native craft are found at all coastal barrios, but the number available cannot be estimated. They are not registered.

Depths required for operating the various native craft

Over 6ft (used by native larcha, batil or viray).

3ft to 6ft (used by native casco.)

 $1\frac{1}{2}$ ft to 3ft (used by native banca).

A larcha is a large wood vessel with deck and cabin; capacity 60 to 100 tons cargo (no outrigger).

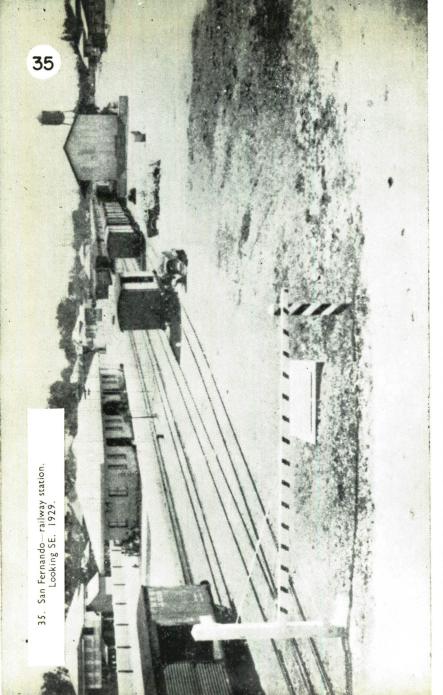
A batil is similar to larcha except that it has no cabin, capacity 10-50 tons.

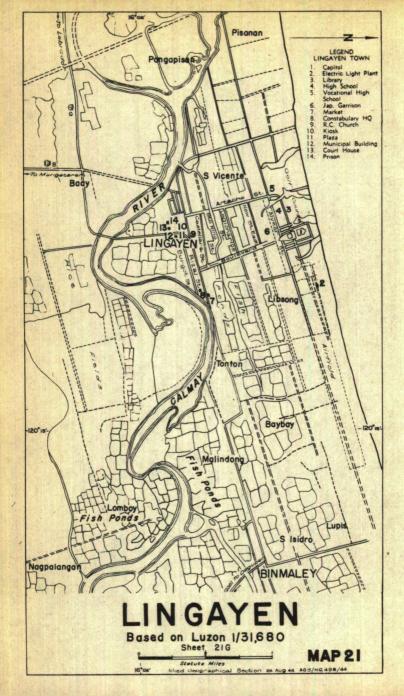
A viray has a keel from a hollow log, and built-up sides. It has outriggers. Capacity about 20 tons.

A casco is a large flat-bottom barge, about 8ft beam. No decking, Capacity usually about 30 tons. Seldom used outside Manila area.

A banca is a small craft hewn from a solid log; no outriggers; draft seldom over 18in.







#### SECTION 7.

#### POPULATION.

#### GENERAL -

Total population of La Union and Pangasinan Provinces in 1939 was 950,176 — 207,701 and 742,475 respectively. Largest non-Filipino population was Chinese. Following figures are from 1939 Census.

#### 1. EUROPEAN AND AMERICAN:

American 74; Spanish 73; French 11; Others 89,

#### 2. ASIATIC:

a. Chinese 2,258: Chinese controlled 80% of pre-war trade of Philippines.

b. Japanese 167: Pre-war Japanese influence slight, except in fishing industry.

#### 3. FILIPINO:

Total Filipino population 947,504. Approximate annual increase 1.08% or 10,270. Natives are mainly Christians belonging to Pangasinan, Ilocano and Sambali racial groups, with a small number of Negritos. The majority are agriculturialists. There are three main native dialects with similar names to racial groups.

English was spoken by 281,400 persons, Spanish by 11,473.

Tagalog — spoken by 78,572 persons in this area — and Japanese

have been adopted by Japanese as official languages.

#### Loyalties:

People in this area are pro-American generally.

#### 4. TOWNS AND VILLAGES:

LINGAYEN (Pangasinan Prov.) —  $16^{\circ}01\frac{1}{2}$ 'N.,  $120^{\circ}13$ 'E approx.: (Map 21. Photos 8, 11).

Capital of Pangasinan Prov. and centre of large agricultural area. Fishing is important.

#### Terrain:

See Coastal Section.

#### Population:

Municipality 30,655; poblacion 5,320.

#### Description:

Residential and business district is spread along Route 7, or Rizal-street, the principal thoroughfare. Capitol Building and schools are situated about 1 ml north of this area and close to the beach. Most buildings are of substantial wooden construction.

#### Water Supply:

Pumped from artesian wells to a tower located near plaza. Daily capacity 288,600gal serving a population of 7000. School and market have independent supplies.

Electric Supply:

Diesel 220kw plant owned by Provincial Government. Current 3-phase 60-cycle 220-volt.

#### Communications:

Routes 7 and 13 from Manila terminate at town. Road connections to all principal provincial towns.

Airfield situated east of municipal building.

Telephone and telegraph communication to all towns in province and long distance phone to Manila.

**DAGUPAN** =  $16^{\circ}03'$ N.,  $120^{\circ}20'$ E approx.: (Map 22. Photos 11, 36).

Largest town in area and commercial centre for large agricultural district. Fishing principal occupation of inhabitants.

#### Terrain:

See Coastal Section.

#### Population:

Municipality 32,602; poblacion 6323.

#### Description:

Town is situated at junction of Pantal, Dagupan and Calmay Rs. Business district is spread along main Lingayen-Mangaldan Road which forms the principal street. Buildings are substantial. East and north of Calmay R were several warehouses and small mills.

#### Water Supply:

Town system, capacity 288,000gal daily. Market had independent supply, probably from wells.

#### Electric Supply:

Manila Electric Coy plant 900hp, 722kw capacity. Current 3phase, 60-cycle, 220-volt. Served also following provincial towns:

Balungao, Bautista, Bayambang, Binalonan, Calasiao, Malasiqui, Manaoag, Mangaldan, Mangatarem, Rosales, Pozorrubio, San Carlos, San Jacinto, Santa Barbara, Urbiztondo, Urdaneta, Villasis.

#### Communications:

Connected by road to provincial and national network.

Telephone and telegraph to all towns in province, and Manila railway to San Fernando and Manila.

**SAN FERNANDO** — 16°37′N., 120°19′E approx: (Map 23. Photos 23. 37).

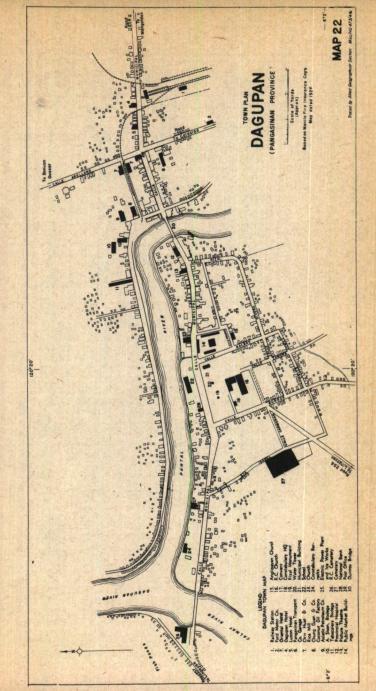
Capital of La Union Prov, and only developed port in area. Formerly terminus of northern railway. It is one of largest and most important towns on west coast north of Lingayen Gulf.

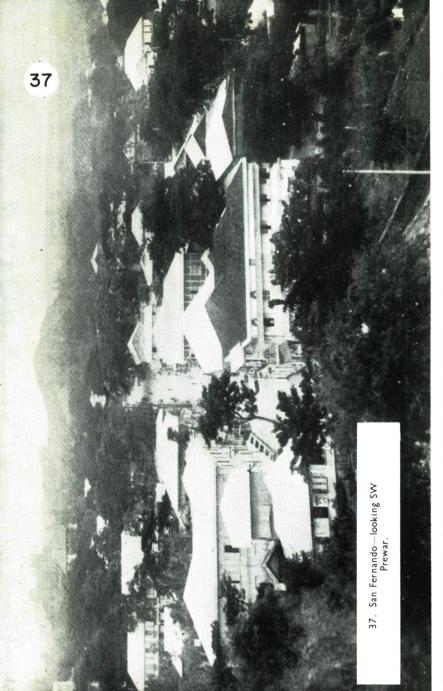
#### Terrain:

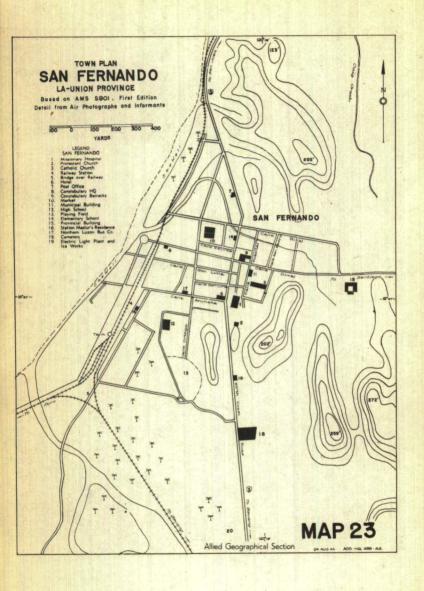
See Coastal Section.

#### Population:

Municipality 23,366; poblacion 2803.







Description:

A well laid-out town with a number of substantial buildings. Wharves and port facilities are situated near Poro, about 2 mls west of the business and residential section. Some streets are paved, the remainder gravel.

Water Supply:

Gravity system 300,000gal daily, serving 5000 people.

Electric Supply:

Manila Electric Coy plant San Fernando extension, current 3phase 220-volt, 60-cycle.

#### Communications:

Route 3 passes through town and leads to all points north along coast and south to Manila.

Railroad from Manila is now reported to extend north to Tagudin.

Poro was a port-of-call for overseas and inter-island shipping.

Telephone and telegraph to main provincial towns and Manila.

For details of provincial towns see Table A which follows—

# TABLE A - PROVINCIAL TOWNS

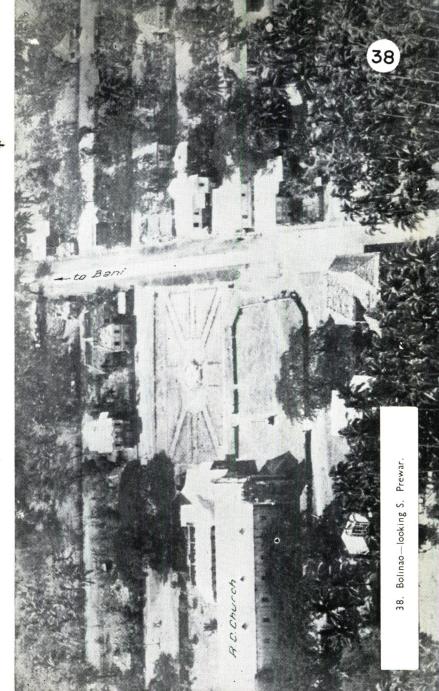
Pangasinan Province.

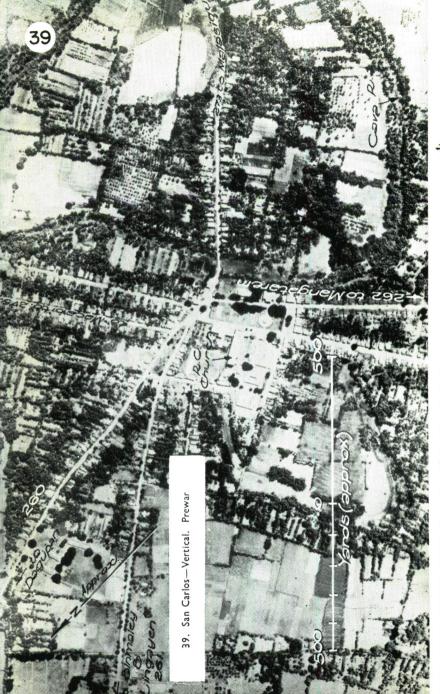
Name	Loca	Location	Population	ation	Communications	Hoorities	
			Poblacion Munc'p'y	Munc'p'y	Committanions	racinites	Terrain
AGNO	16°07'N,	16°07'N, 119°48'E	2,309	9,533	Road 271 to Bani	No details.	Undulating valley of
AGUILAR	15°52′N,	15°52′N, 120°14′E	1,077	8,178	Route 13B to Lingayen	Electric power from Lingayen.	Flat cultivation. Zambales Ra close on
ALAMINOS	16°10′N,	16°10′N, 119°59′E	2,130	19,960		No details.	W. Flat cultivated plain.
					Lingayen and Infanta. Road NE to Lucap. Road 270 to Bani.		Undulating E and W of town.
ANDA	16°18′N,	16°18'N, 119°57'E	1,681	8,989	Seasonal road con No details, nects to Road 272 on mainland.	No details.	Flat cultivation,
BANI	16°11′N,	16°11′N, 119°52′E	1,531	14,565	Roads 270 to Alam- No details, inos, 272 to Bolinao and 271 to Agno.	No details.	Undulating S and W. Lowlying and swampy N and E.
BINALONAN	16°03′N,	16°03′N, 120°35′E	2,610	19,736	Route 3 and Roads 7 266 and 276.	artesian Capacity 4 gal daily.	wells. Flat rice and cornfields in all directions.
BINMALEY	16°02′N,	16°02′N, 120°17′E	1,635	20,455	Roads 256, 257 and Electric power 261.	Electric power from Dagupan.	Sandy coastal plain N and W. Swampy delta region S and E.

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Name	Location	ion	Population Poblacion Munc'p'y	tion Munc'p'y	Communications	Facilities	Terrain
BOLINAO (Photo 4)	16°23′N, 119°54′E	119°54'E	1,349	14,914	14,914 Road 272. No	No details.	Flat coastal plain to W. Undulating to S and E.
BUGALLON	15°57′N, 120°13′E	120°13′E	1,732	14,469	Route 13B north to Electric power Lingayen, S to probably froi Camiling.	lectric power probably from Lingayen.	Flat cultivation in all directions.
BURGOS	16°04′N, 119°52′E	119°52′E	1,143	8,075	Route 7G to Lingayen No details, and Infanta.	o details.	Undulating to hilly plateau.
CALASIAO	16°01′N, 120°21′E	120°21/E	1,035	19,325	Roads 258, 259 and Electric power 260. Main RR from Dagupan.	ectric power from Dagupan.	Flat cultivation all directions.
DASOL	15°59′N, 119°53′E	119°53′E	974	7,472	Route 7G to Lingayen No details.	o details.	Flat valley of Dasol R. Steep hills S and E of town.
INFANTA	15°50′N, 119°54′E	119°54′E	1,123	5,453	Route 7G south to No details. Manila, N to Lingayen.	o details.	Flat coastal plain, swampy to SE. Wide valley to E.
LABRADOR	16°01′N, 120°09′E	120°09′E	658	5,446	east NW	to No details.	Flat cultivated area between Agno R on E and Zambales Ra to W.
MABINI	16°04′N, 119°56′E	119°56′E	626	7,510	Route 7G NE to No details. Alaminos and S to	o details.	Narrow cultivated river valley. Steep hills in vicinity of town.

	-	TO CONTROLL	Poblacion Munc'p'y	Munc'p'y	Communications	racinites	
MANAOAG 16	16°03′N,	120°29′E	3,071	29,030	Roads 255 and 268.	Electric power from Dagupan.	S, E and W flat culti-
MANGALDAN 16	5°04′N,	16°04′N, 120°24′E	2,113	18,997	Roads 251, 256, and Electric power 279. Main RR from Dagupt through town.	Electric power from Dagupan.	Flat cultivation all directions.
MAPANDAN 10	16°02′N,	120°27′E	1,132	7,286	Roads connect to Electric power Roads 251 and 255. from Dagupa	Electric power from Dagupan	Flat cultivation.
PGZORRUBIO 16	5°06′N,	16°06′N, 120°32′E	2,496	18,627	Route 3G to E of Electric power town. Road 268 from Dagups SW to Manaoag.	of Electric power 268 from Dagupan.	r Flat cultivation with steep hills 1-2 mls N and E.
SAN CARLOS 15 (Photo 39)	15°56′N,	120°21′E	5,835	47,334	Roads 253, 260, 261, Electric power 262, 273 and 275. from Dagup. Main RR skirts town.	Electric power from Dagupan.	Flat cultivation all round.
SAN FABIAN 16 (Photo 14)	5°07'N,	16°07′N, 120°24′E	1,671	19,362	Roads 251 and 279. Electric power Main RR through from Dagup town.	Electric power from Dagupan.	Swampy NE and SW. Flat cultivation to W.
SAN JACINTO 16	5°04′N,	16°04′N, 120°26′E	1,687	7,853	Roads 251 and 255.	Electric power from Dagupan	Flat cultivation.
SANTA BARBARA 116	16°00′N,	120°24′E	1,080	15,125	Roads 251, 254 and Electric power 258.	Electric power from Dagupan	Flat cultivation.





40. Mangaldan-looking NE. Prewar.

Terrain	Situated on low hill commanding road. Terrain in vicinity undulating. High hills to N.	Narrow coastal strip. Steep hills close to town.
Facilities	No details.	to No details.
Communications	Route 3G S to No details.  Manila, N to Rosario.	Route 7G east to Lingayen, NW to Alaminos.
tion Munc'p'y	13,168	6,396
Population Poblacion Munc'p'y	1,414	1,102
Location	16°10′N, 120°30′E	16°04′N, 120°06′E
Name	SISON	SUAL (Photo 6)

## La Union Province.

						The state of the s	
Name	Loc	Location	Population Poblacion Munc	ation Munc'p'y	Communications	s. Facilities	Terrain NO
AG00	16°19′N, 120°22′E	120°22′E	<b>674</b>	13,938	Route 3H to N and Road 282 west beach. RR 1 m of town.	Route 3H to N and S. Water supply Road 282 west to 17,000gal daily. beach. RR 1 m W 27kw electric of town. plant. Current 3-phase, 220v, 60-cycle.	Flat ricefields and coconut groves. Steep hills to NE and SE.
ARINGAY	16°24′N, 120°21′E	120°21′E	1,576	12,487	Route 3H and main No details. RR through town.	nain No details.	W, N and S flat cultivated coastal plain. Hilly to E.
BACNOTAN	16°43′N, 120°21′E	120°21′E	817	11,678	Route 3H and R. 286 and 287.	oads Water from well and river.	Route 3H and Roads Water from wells Flat plain with low 286 and 287.
BAGULIN	16°37'N, 120°27'E	120°27′E	322	3,584		No details.	Mountainous.
BALAOAN	16°49'N, 120°24'E	120°24′E	2,396	12,773	Route 3H and R. 288 and 290.	Route 3H and Roads Well and spring Broad level 288 and 290. water only vated plai domestic supply. vicinity of	ell and spring Broad level culti- water only vated plain in domestic supply, vicinity of town.
BANGAR	16°54′N, 120°25′E	120°25′E	1,677	12,484	Route 3H and Road Water from 289.	toad Water from shallow wells.	Broad coastal plain swampy to W of town.
BAUANG	16°32′N, 120°20′E	120°20′E	2,628	15,304	RR. Water from surface wand river.	nain Water from surface wells and river.	Flat cultivated coastal plain steep hills short distance E.
BURGOS	16°31'N, 120°26'E	120°26'E	431	1,774	1,774 Route 9.	No details.	Narrow valley be- tween steep hills.

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	Terrain	Flat and swampy to S and W. Hilly to N and E.	Roads 287, 288 and Water from wells. Flat cultivated plain. 289. Undulating 2 mls S of town.	Route 9 and Road Water from wells Flat valley of Aringay and nearby rivers. Electric Steep hills to NE plant, diesel drivers, 3-phase, 220v, 60-cycle.	Mountainous.	Hilly to N and E. Flat cultivation S and W.	Cultivated valley between steep hills to S, E and N.	Flat cultivation to N and E. Hilly to S and SE.
The second secon	Facilities	No details.	Water from wells.	Water from wells and nearby rivers. Electric plant, diesel driven. Current 3-phase, 220v, 60-cycle.	No details.	Water supply 43,200gal daily. Electric power from Dagupan.	No details.	Water from surface Flat wells and river. N Electric power probably from San Fernando.
No. of the last of	Communications	Route 3H and Road No details.	Roads 287, 288 and 289.	Route 9 and Road 283.	Road 280.	Route 3H.	Road 286.	Route 3H.
1	ation Munc'p'y	6,873	14,624	15,933	4,733	11,280	5,293	10,941
	Population Poblacion Mun	551	2,436	2,015	846	1,477	693	1,566
	tion	120°21′E	120°23′E	120°24′E	120°28′E	120°29′E	120°24′E	120°20′E
	Location	16°25′N, 120°21′E	16°51′N, 120°23′E	16°32′N,	16°19'N, 120°28'E	16°14′N, 120°29′E	16°40′N,	16°40′N, 120°20′E
The state of the s	Name	CABA	LUNA	NAGUILIAN	PUGO	ROSARIO	SAN GABRIEL 16°40'N, 120°24'E	SAN JUAN

2	ECTION	N 7]			2.1
The state of the s	Terrain	Flat cultivated coastal plain.	Narrow cultivated valley. Steep hills to E, N and S.	Water from wells Swampy to N. Hills and river. 700ft high SE of plain to E and W.	Undulating valley of Aringay R. Steep hills close to town except to NW.
The state of the state of the	Facilities	No details.	No details.	Water from wells and river.	No details.
and the state of the state of the	Communications	Route 3H one mile No details. E. Main RR 400 yds E.	Road 290.	6,039 Route 3H.	8,344 Roads 280 and 281. No details.
All Property Contract	Population Poblacion Municipality	10,352	4,901	6,039	8,344
- To - To -	Popu Pobl Munic	715	488	099	1,146
	tion	120°23′E	16°47′N, 120°27′E	16°55′N, 120°28′E	16°21′N, 120°24′E
	Location	16°17′N,	16°47′N,	16°55′N,	16°21′N,
	Name	SANTO TOMAS 16°17′N, 120°23′E	SANTOL	SUDIPEN	TUBAO

#### 5. ADMINISTRATION:

#### a. Prewar:

Philippine government was highly centralised. Nearly all powers were centralised in National Government at Manila.

Local government consisted of 48 provinces and 12 chartered cities. The provinces, apart from chartered cities within their boundaries, were divided into municipalities, these into poblacions and several barrios.

The poblacion consisted of two or more barrios.

The governing body of a province was the Provincial Board—a provincial governor and two members elected by the people.

The area under discussion was divided into two provinces—Pangasinan, consisting of 46 municipalities with the seat of government at Lingayen; and La Union, consisting of 20 municipalities with the seat of government at San Fernando.

The municipal council, consisting of a mayor, vice-mayor and a varying number of councillors, all elected by the people and holding office for 3 years, was the legislative body in a municipality.

#### b. Police Force:

Laws were enforced and order maintained by the Philippine Constabulary, the municipal police, and a few guards controlled by provincial authorities.

The Japanese are reported to have increased size and authority of constabulary but, according to reports, co-operation with Japanese is not good and its effectiveness has decreased. Personnel report to Japanese MP.

#### c. Government since Japanese Occupation:

In Manila a puppet government appointed by Japanese continues to exercise authority through old provincial system but provincial governors, formerly elected by the people, are now appointed by President of Republic.

Japanese Military Administration is the liaison between Japanese Army and Philippine Executive Commission or civil government. Japanese MP are responsible for spreading Japanese propaganda and collecting enemy intelligence and information.

#### 6. COMMUNICATIONS:

#### Telephone:

Philippine Long Distance Telephone Coy has 14 exchanges in Pangasinan towns. Dagupan exchange is largest with 86 subscribers. Provincial Telephone System, connected to LD through Dagupan exchange, links almost all towns of importance. It was formerly used mainly for official purposes.

Manila Railroad Coy operated its own telephone system along the RR.

#### SECTION 7]

#### Telegraph:

Telegraph system operated by Bureau of Posts was available at most large towns.

Manila Railroad Coy operated its own telegraph system.

#### Postal:

An effective and comprehensive postal service served the provinces.

#### RESOURCES

#### 1. FOODSTUFFS

Area is highly developed agriculturally but, although 650,000 acres were under cultivation, foodstuffs produced were insufficient for local requirements.

Rice (upland and lowland), sugar, tobacco, coconuts, corn, root crops, fruit, and vegetables were principal foodstuffs produced. Tobacco and indigo were also produced in considerable quantities.

Fish: Large quantities of fish were produced in fish ponds in the vicinity of Dagupan and there were also large fishing fleets based on Sto Tomas and Damortis. Dried and fresh fish were exported.

#### 2. WATER

Rain water, river water and artesian wells principal sources of supply for many towns and barrios. Some larger towns had municipal reticulation systems (see Sec 7).

#### 3. CONSTRUCTION MATERIALS

#### a. Timber:

There is little timber in the area. One sawmill at Mangatarem. Bamboo and nipa are the most important building materials found in area.

#### b. Gravel and Sand:

Obtainable from practically all rivers.

#### c. Coral and Limestone:

Scattered deposits throughout provinces, inland, and in coastal regions.

#### 4. MINERALS

Small deposits of chromite and manganese mixed, in Zambales Ra. Outcrops of copper, gold and silver have been discovered in various localities, also indications of coal and petroleum. No commercial development of any of these has been undertaken.

#### 5. REPAIR FACILITIES

Pantranco Bus Coy maintained workshop at Dagupan, Aringay and San Fernando. Local utilities also maintained small workshop at principal towns.

#### 6. POWER

See Lingayen (Sec 7).

#### 7. LABOR

Native labor available in Pangasinan and La Union Provinces is estimated to be approx 186,000 males. Filipinos in this area are generally willing workers.

#### 8. CATTLE, HORSES, ETC.

According to the 1939 Census there were 62,862 cattle, 199,182 carabaos, 27,749 horses in the area.

#### 9. TRANSPORT

Motor cars numbered 622, trucks and buses 733, carts 29,531, sleds 89,257.

#### MEDICAL PROBLEMS

#### 1. GENERAL

Climate is tropical, with well-defined wet and dry seasons; annual average rainfall is approx 96 in. Wettest months, May-Oct. During these months humidity is high and climate enervating. Annual average temperature 80° F approx.

Maximum temperature 100° F approx. Minimum temperature 63° F approx.

#### 2. DISEASES

a. Malaria: Occurs throughout the area, the principal form being benign tertian. Some sub-tertian occurs and occasional cases of quartan.

Splenic index varies from 3% at Lingayen to 28% at Mabini, with 11% at Infanta, 14% at Bauang, 19% at Alaminos, 22% at Burgos, and 24% at Saiton.

Mosquito vectors include Anopheline barbirostris, A filipinae, A maculatus, A minimus var flavirostris, A philippinersis, A pseudobarbirostris, A subpictus var indefinitus. A minimus var flavirostris is the most dangerous, breeds in shallow shaded streams, especially in foothills. A maculatus—typical of cleared hill jungle—and A filipinae are also efficient vectors, while some of the others occasionally carry the disease.

- b. Dengue: Occurs in area. Carrier mosquitoes are Aedes aegypti and A albopictus.
- c. Typhus: Mite-borne or endemic typhus is known. Mites which carry it are widespread. In the past it has not constituted a great danger, but care should be exercised.
  - d. Filariasis: Uncommon.
  - e. Dysentery:
- i. Bacillary: Commonest form of enteric infection met with; normally outbreak is sporadic, but following Japanese occupation the position is likely to be more serious. All precautions should be taken by entering troops.
  - ii. Amoebic: Not so prevalent.
- iii. Balantidial, due to Balantidium coli, and other forms occur, but are not prevalent.
- f. Typhoid and Paratyphoid Fevers: Common but less prevalent than dysentery in normal times. Appear to have spread under Japanese occupation.

- g. CHOLERA: None was recorded for some years before the war. An epidemic in Philippines was reported in 1943. All troops must maintain the highest standards of hygiene to guard against this and other bowel diseases.
  - h. Diarrhoea: Common diarrhoea is widespread.
- i. Yaws (Framboesia): Common, responds to NAB injections.
- j. Fungus Infections of the Skin: Various forms of tinea, Seborrhoea, and Pityriasis are very common.
  - k. Scabies: Caused by an acarine mite. Very prevalent.
- I. Tropical Ulcer: May occur unless abrasions and scratches are promptly dressed.
  - m. Leprosy: Occurs in area. Cases were previously isolated.
- n. Venereal Diseases: Gonorrhoea is widespread. Syphitis is less common, and chancroid is uncommon.
- o. Tuberculosis: Prevalent, and ranks as greatest single cause of death in Philippines.
- p. Worm Diseases: Worm infestations are widespread and include:

Round worms, Ascaris lumbricoides, hookworms, Ankylostoma duodenale and Nector americanus; flat worms, Taenia saginata, T solium and Sparganum mansoni; and whip worms, Trichuris trichiura.

Other rare types also occur.

#### q. Other Diseases:

Plague, rare; influenza, common; bronchitis, broncho-pneumonia and lobar pneumonia, common; smallpox, rare. Chicken pox sometimes occurs; measles are common; trachoma, very common. Malnutrition is prevalent, and beri-beri occurred.

#### 3. HOSPITALS

The largest hospitals were 3 at Dagupan (75, 25, and 8 beds), 2 at San Fernando (38 and 17 beds) and one at Rosales (12 beds).

#### 4. PESTS AND DANGEROUS ANIMALS

Mosquitoes, flies, cockroaches, mites, spiders, rats, and snakes.

#### METEOROLOGICAL CONDITIONS

#### 1. CLIMATIC TYPE

Of four types which may be identified in Philippines, one (Type A) occurs in the region covered.

Type A—Two pronounced seasons, one dry in winter and spring (Nov-Apr) the other wet in summer and autumn (May-Oct).

#### 2. WIND

- a. NE (winter) monsoon: Oct-Apr or May. Direction mainly NNW, speed 10-20mph but sometimes 20-35mph. Remarkably steady.
- b. SW (summer) monsoon: Jun-Sep. Steadiest in Jul and Aug, averaging 10-18mph. Short transition period precedes onset of NE monsoon.

Squalls are frequent in SW season, especially near land. Wind may reach gale force in gusts. Strong and squally SW or west winds sometimes blow for several consecutive days in summer and early autumn. Generally associated with typhoons centred to the north. They are usually accompanied by heavy rains.

Land and sea breezes are well marked near coast, particularly when and where prevailing monsoon is weak.

#### 3. TYPHOONS

From 30%-35% of all typhoons are experienced north of 15°N. In this area the typhoon season extends from May to Oct or Nov. Once in about every five years a typhoon centre passes over this area. They are accompanied by heavy squalls, torrential rain, overcast low clouds, and disturbed seas.

#### 4. RAIN

Annual rainfall is great and the seasonal incidence striking. Baguio (about 4000ft) has been added to the following table to indicate increase of rainfall from coast to highlands.

In wet season rain falls on more than 20 days a month; occasionally 50-70 consecutive wet days are experienced. Normally in the dry season wet days number about 3-5 but rainless periods may extend 40-60 days.

Average monthly and annual rainfall in inches for Dagupan, San Fernando and Baguio:—

 Jan Feb Mar Apr
 May
 Jun
 Jul
 Aug
 Sep
 Oct
 Nov Dec.
 Year

 Dagupan
 .43 .59 .90 2.91
 8.75 12.87 23.11 21.49 15.78
 7.09 3.07 .86 97.85

 San Fernando
 .35 .27 .31 .82 7.24 13.11 23.72 26.61 15.94 5.51 1.88 .72 96.48

 Baguio
 .90 .86 1.69 4.29 15.82 17.24 42.28 45.66 28.07 15.03 4.88 1.96 178.68

Serious floods occur; they generally follow abnormal typhoon rains. Heaviest rainfall recorded on one day in the Philippines (45.9), fell at Baguio.

Torrential rain of short duration occurs at times during thunderstorms of spring and summer.

#### 5. CLOUD AND VISIBILITY

Cloudiness is relatively high in all months with least in spring (average 3/10 to 5/10). In summer average exceeds 7/10 from Jun to Aug. In all months cloudiness is least at nights and early mornings, and reaches a maximum during the afternoons.

When SW winds blow uninterruptedly for several days, overcast skies with low cloud bases 1000-2000ft prevail.

Visibility is generally good. Fog is rare; early morning mists over land are not unusual. In the mountainous regions low clouds against hillsides constitute fog.

Along coastal areas exposed in summer to SW monsoon, periods of only moderate visibility due to heavy rain and low cloud are probable.

#### 6. TEMPERATURE

Comparatively uniform with maximum temperatures in May (max 93°F, min 75°F), minimum in Jan (max 86°, min 69°). Temperatures above 100°F and as low as 60°F may be experienced in coastal regions. Above 3000ft very cold conditions may be met.

#### 7. HUMIDITY

Relatively great at sea level, usually exceeding 70%. Minimum values probably occur in Apr; maximum in Sep.

#### 8. MISCELLANEOUS PHENOMENA

Thunderstorms: Frequent over and near land during May-Oct. Generally accompanied by squalls and heavy rains.

Earthquakes: Very severe earthquakes have been experienced.

Swell: Very heavy swell in Lingayen Gulf particularly in afternoons in both seasons.

#### APPENDIX A.

#### GAZETTEER OF PLACE NAMES

Abbreviations:	A/F — airfield lagoon Mt —	G — gulf I	— island Is — t — point Ra —
range R —	river Str — str	rait T — tow	vn V — village.
NAME.	FEATURE		ND DIRECTION
		FROM	LINGAYEN.
AGNO	T	$29\frac{1}{2}$	WNW
AGNO	Bay	32	WNW
AGNO	R	6	WNW
AGOO	T	$22\frac{1}{2}$	NE
AGUILAR	T	6	S
ALAMINOS	T	26	NW
ALAMINOS	R	19	NW
ALCALA	T	22	SE
ALORAGAT	R	15	E
AMBURAYAN	R	63	NNE
ANDA	T	26	NW
ANGIO	V	$13\frac{1}{2}$	ENE
APANGAT	R	19	NE
ARINGAY	Pt	26	NNE
ARINGAY	R	26	NNE
ARINGAY	T	27	NNE
ASINGAN	_ I	29	E
BAAY	v	1	SW
BACNOTAN	Ť	481/2	NNE
BAGUIO	$\hat{T}$	36	NE
BAGUIO	A/F	36	NE
BAGULIN	T	$43\frac{1}{2}$	NNE
BALAOAN	Ť	56	NNE
BALINCAGUIN		31	WNW
BALUNGAO	T	30	ESE
BANGAR	Ť	61	NNE
BANI	Ř	26	NW
BANI	$\hat{\mathbf{T}}$	27	NW
BANNAA	v	64	NNE
BANOG	R	$24\frac{1}{2}$	SW
BARACBAC	Pt	39	NNE
BARORO	R	48	NNE
BAUANG	T	35	NNE
BAUANG	R	35	NNE
BAUTISTA	T	21	SE
BAYAMBANG	T	$20\frac{1}{2}$	SE
BAYAMBANG	R	$24\frac{1}{2}$	SW
BAYAOAS	R	$12\frac{1}{2}$	S
BAYBAY	V	20	NE
BINALONAN	T	$23\frac{1}{2}$	E
BINDAY	V	$16\frac{1}{2}$	ENE
BINMALEY	T	$2rac{1}{2}$	E

NAME.	FEATURE.	DISTANCE	AND DIRECTION LINGAYEN.
nonow (a)	D		NE
BOBONAN	R	$\frac{20\frac{1}{2}}{201}$	NW
BOLINAO	T	$33\frac{1}{2}$	NW -
BOLINAO	Cape	36	NW -
BOLINAO	Hr	34	NNE
BOROBOR	R	59 12	NE
BUED	R		S
BUGALLON	T	$4\frac{1}{2}$	SE
BULOG	V	9	W
BURGOS	T	25	NE NE
BURGOS (Ripsuan)	T	$36\frac{1}{2}$	NNE
BUSILAG	Estero	$61\frac{1}{2}$	NNE
BUSILAG	V	61	NNE
CABA	T	29	NE
CABA	R	28	NE
CABARRUYAN	I	24	NW
CAIMAN	Cove	31	WSW
CAIMAN	Pt	$31\frac{1}{2}$	WSW
CALANUTAN	Junct	29	SE
CALASIAO	T	8	ESE
CALMAY	R	6	E
CAMILING	T	26	SSE
CAQUIPUTAN	Str	28	NW
CARABALLO	Mts	46	E
CARLATAN	L	43	NNE
CATO	R	$24\frac{1}{2}$	SW
CAURINGAN	R	22	NE
CERVANTES	T	75	NE
DAGUPAN	T	7	ENE
DAGUPAN	R	7	NE
DAMORTIS	V	$18\frac{1}{2}$	NE
DARIGAYOS	Inlet	55	NNE
DARIGAYOS	Pt	56	NNE
DARIGAYOS	R	56	NNE
DASOL	T	$23\frac{1}{2}$	W
DASOL	R	26	WSW
DUMULOC	R	5	S
HERMOSA	v	25	WSW
HÜNDRED	Is	17	NW
TMMANDINAN	R	18	E
IMMANDUYAN INFANTA	T	$25\frac{1}{2}$	SW.
	T.	5 11 1 THE	W
LABRADOR	T	6	NW-
LAMBES	V	27	NW NW
LASIP	V	28	N
LINGAYEN	G	1	NNE
LOSSOC	V	37	
LUCAP	V	19	NW

NAME.	FEATURE.	DISTANCE	AND DIRECTION LINGAYEN.
LUCAP	Bay	18	NW
LUNA	T	58	NNE
LUNA	A/F	58	NNE
	STONE STATE	30	THE DESIGNATION OF SMILE
MABINI	T	20	WNW
MACABITO	V	12	SE
MALASIQUI	T	14	SE USA
MANAOAG	T	161	E VIALA
MANGALDAN	T	$11\frac{1}{2}$	ENE
MANGAS	Pt	$8\frac{1}{2}$	NW
MANGATAREM	T	16	SSE
MANILA	City	107	SSE
MAPANDAN	Ť	$14\frac{1}{2}$	E
MAPARANUM	V	18	SE
MARAGAYA	R	51	NNE
MAYRUSO	R	$7\frac{1}{2}$	E CON
MINDORO	V	$62\frac{1}{2}$	NNE
MITURA	R	20	ESE
NAGUILIAN	T	36	NNE
NAGUILIAN	A/F	36½	NNE
NAGUILIAN	R	36	NNE
NAMOORAN	Pt	231	NW
NATIVIDAD	T	37	E
NAYOM	R	271	SW
104 10 10 10 10 10 10 10 10 10 10 10 10 10		2.12	5"
OLANIN	Bay	$23\frac{1}{2}$	NW
DILDINGIN			
PALDINGAN	V	401	N
PANIQUI PANTAL	T	33	SE
PANTAR	R	$\frac{6\frac{1}{4}}{}$	E
PANTAR NORTE	R	$57\frac{1}{2}$	NNE
PAO PAO	R	57½	NNE
PARINGAO	V	15	E
PATALAN	R	$\frac{38\frac{1}{2}}{12\frac{1}{2}}$	NNE
PORO	Port	401	NE
PORO	V	$40\frac{1}{2}$	N N
PORTUGUESE	Pt	9	NW
POZORRUBIO	T	21	ENE
PUGO	Ť	26	NE
RABON	V	$17\frac{1}{2}$	NE
RESEARCH	Reef	39	N
RIBSUAN	R	37	NNE
RIRIPAYAN	Pt	32	NW
ROSALES	T	$27\frac{1}{2}$	ESE
ROSARIO	T	22	NE
SAITON	D	7.0	ATT
SAN CARLOS	R	19	NE
SAN CARLOS	1	10	SE

NAME.	FEATURE.		ND DIRECTION INGAYEN.
SAN FABIAN	Т	13	NE
SAN FERNANDO	Ť	41	N
SAN FERNANDO	Hr	41	N
SAN FERNANDO	Pt	41	N
	V	$41\frac{1}{2}$	
SAN FRANCISCO		$57\frac{1}{2}$	NNE
SAN GABRIEL	T	46	NNE
SAN JACINTO	T	14	NE
SAN JUAN	T	45	NNE
SAN MANUEL	T	29	ENE
SAN QUINTIN	$\mathbf{T}$	38	E
SAN VICENTE	R	26	NW
SANTA BARBARA	$\mathbf{T}$	11	ESE
SANTA CRUZ	$\mathbf{T}$	28	SW
SANTA MARIA	$\mathbf{T}$	31	ESE
SANTA MARIA NOR	TE V	$23\frac{1}{2}$	E
SANTO TOMAS	T	20	NE
SANTIAGO	I	33	NW
SANTOL	$\mathbf{T}$	54	NNE
SAOIT	Pt	32	WNW
SAPANG	V	19	ENE
SINOCALAN	R	13	ESE
SISON	T	21	NE
SOBREDILLO	V	$29\frac{1}{2}$	NNE
SUAL	Ť	10	NW
SUAL	Port	91	NW
SUDIPEN	T	63	NNE
TAGUDIN	V	64	NNE
TAMBAC	Bay	26	NW
TAMBOVE	Roads	27	WSW
TANGLAO	$\mathbf{R}$	$24\frac{1}{2}$	WSW
TAYUG	$\mathbf{T}$	$33\frac{1}{2}$	$\mathbf{E}$
TOBUAN	$\mathbf{v}$	8	NW
TRINCHERA	Pt	34	NW
TUBAO	T	25	NE
TUDDINGAN	V	$39\frac{1}{2}$	NNE
UMANDAY	v	$5\frac{1}{2}$	S
UMINGAN	T	41	ESE
URBIZTONDO	Ť	15	SE
URDANETA	Ť	22	ESE
UYONG	$\hat{\mathbf{v}}$	7	WNW
A Commence of the Commence of			
VILLASIS	$\mathbf{T}$	$24\frac{1}{2}$	SE
ZAMBALES	Ra	14	SW

#### APPENDIX "B"

### DIAGRAMS OF TIDES, SUNLIGHT AND MOONLIGHT EXPLANATION OF DIAGRAMS

NOTE: To find times for Lingayen 16°02' N. 120°14' E. Add 3 minutes to times shown on diagram.

#### Area Covered:

The astronomical data is for sea level and will not vary more than 5 minutes over a radius of 60 miles in the lower latitudes; in the higher latitudes the area covered is less.

A footnote is inserted below the diagram when both the tidal and astronomical data are applicable to places some distance from the one shown in the heading.

#### Time Used:

Times on the diagram are for the time meridian indicated in the heading. When another time meridian is to be used in the field, it will be found convenient to change the figures representing hours on the left of the large diagram to conform to the new time. If the time meridian to be used is east of the one shown on the diagram, increase the figures by 1 hour for each 15°; if west, decrease the figures similarly.

#### Dates:

In the upper diagram, each day from midnight to midnight is represented by a space between two lines. In the lower diagram, where the days are represented by vertical lines covering the period from noon of one day to noon of the next, the dates at the bottom differ from those at the top because the date changes in passing through midnight.

#### Tides:

The times of the tides are shown by curves in the lower diagram. By noting the sequence of the tides during a day, the height of any particular tide can be found from the upper diagram.

#### Twilight:

Three types of twilight are shown. In the evening, civil twilight starts at sunset and ends when the sun is 6° below the borizon. Objects can be readily distinguished and a newspaper can be read. At the end of civil twilight, the brightness of the sky is still about 20 times as great as when the full moon is at zenith. Civil twilight is followed by nautical twilight which ends when the sun is 12° below the horizon. All the brighter stars are visible, general outlines can be distinguished, but the horizon will usually be indis-

#### APPENDIX B]

tinct. The end of nautical twilight may appear to be the beginning of solar darkness, but a small amount of light from the sun may still be refracted or reflected until the end of astronomical twilight when the sun is 18° below the horizon. In the morning the twilights occur in reverse order.

#### Moonlight:

During astronomical twilight and solar darkness, periods of moonlight and dim moonlight are shown. During the period of moonlight, the intensity of light will vary between the brightness of the full moon at zenith and about one-third of this value. During the period of dim moonlight, the intensity varies from about one-third to one-tenth of the brightness of full moon at zenith.

#### Moon's Phases:

The phases of the moon are shown below the day on which they occur.

#### Temperatures:

The average monthly temperatures of the air and sea water in the vicinity are shown below the diagram.

#### Winds:

A wind rose is given showing for the month the average frequency and strength of the winds. The top of the rose is north. The length of the arrow, measured from the outside of the circle and compared to the scale to the right, shows the percentage of observations during which the wind has blown from the direction indicated. The number of feathers shows the average force of the wind on the Beaufort scale. The figure in the circle gives the percentage of calms.

#### Sources:

Tide predictions are from the annual or special tide tables issued by the US Coast and Geodetic Survey. Other data are obtained from publications of the US Navy Department, the British Admiralty, and other sources.

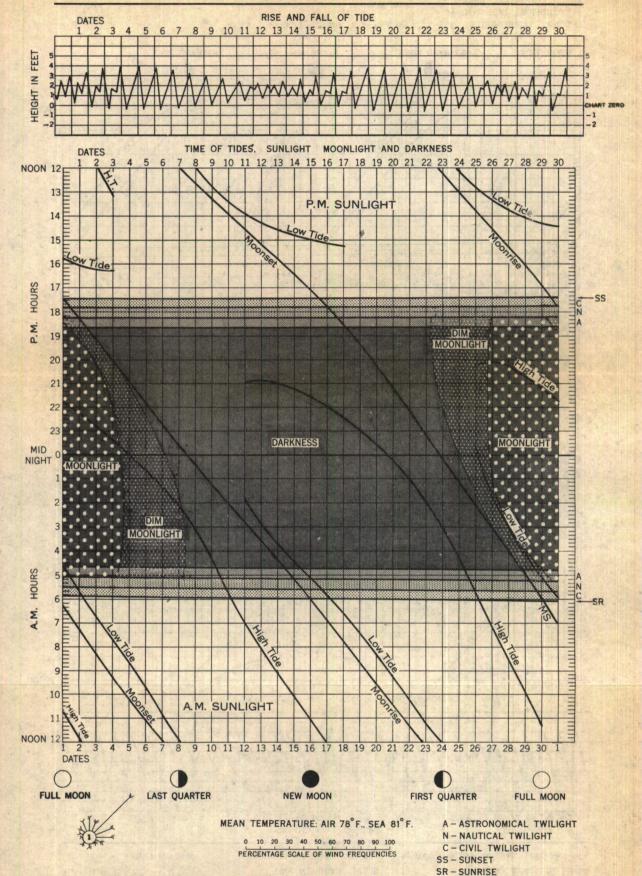
MANILA BAY\*

TIME MERIDIAN: 120°E.

NOVEMBER, 1944

LAT. 14°35'N. LONG. 120°58'E

SUNLIGHT AND MOONLIGHT DATA COMPUTED FOR LAT. 14°35'N. LONG. 120°58'E.



\*This diagram is also applicable, without change, to the coast of Luzon from BALAYAN BAY to SUBIC BAY inclusive and to LUBANG ISLAND.

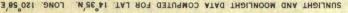
(OVER)

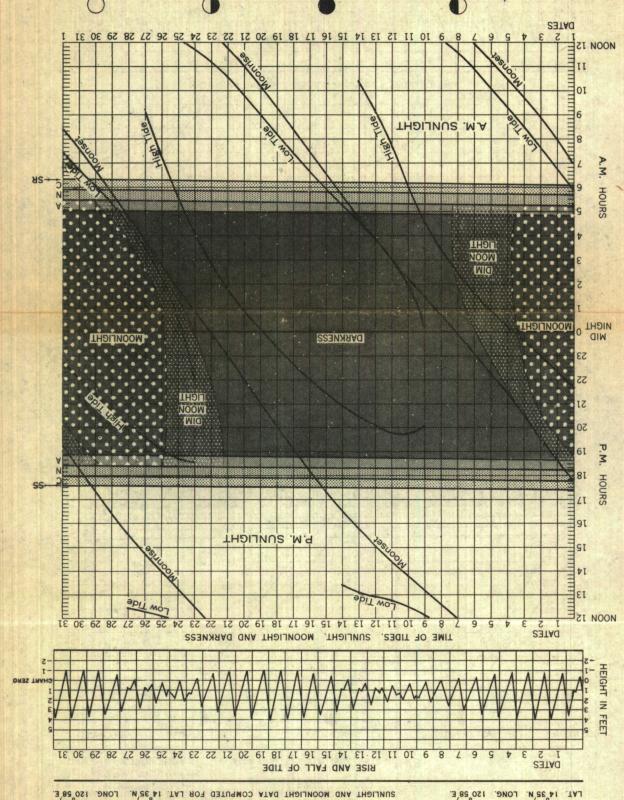
# DIAGRAM OF TIDES, SUNLIGHT AND MOONLIGHT

DECEMBER, 1944

TIME MERIDIAN: 120'E.

**WANILA BAY\*** 





RIBET QUARTER

PERCENTAGE SCALE OF WIND FREQUENCIES

0 10 50 30 40 20 60 10 80 30 100

MEAN TEMPERATURE: AIR 77 F., SEA 80 F.

NEM WOOM

FULL MOON

SR - SUNRISE 25 - SUNSET

C - CIVIL TWILIGHT

N - NAUTICAL TWILIGHT A - ASTRONOMICAL TWILIGHT

LAST QUARTER

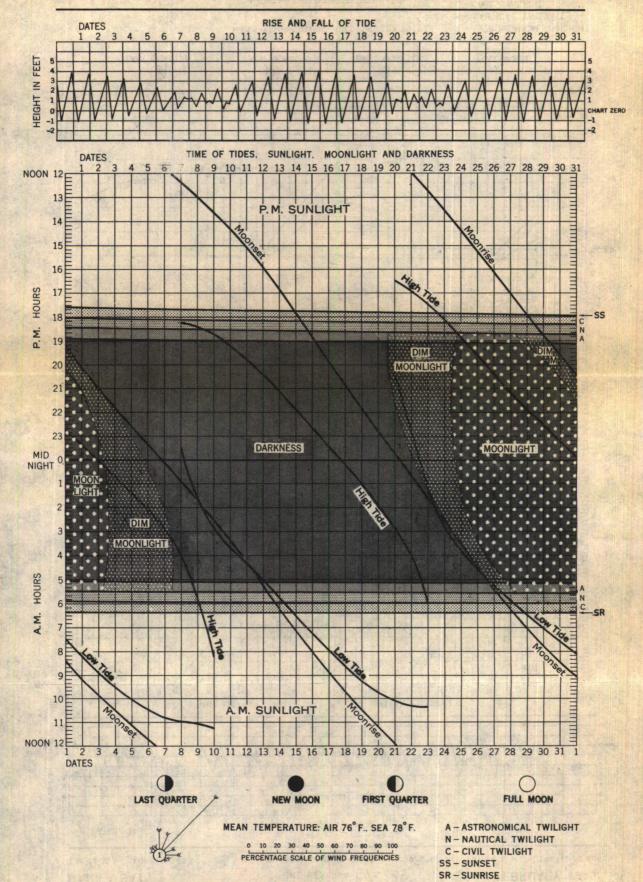
MANILA BAY\*

TIME MERIDIAN: 120°E.

JANUARY 1945

LAT. 14°35'N. LONG. 120°58'E.

SUNLIGHT AND MOONLIGHT DATA COMPUTED FOR LAT. 14°35'N. LONG. 120°58'E.



\*This diagram is also applicable, without change, to the coast of Luzon from BALAYAN BAY to SUBIC BAY inclusive and to LUBANG ISLAND.

(OVER)

25 - SUNSET PERCENTAGE SCALE OF WIND FREQUENCIES C - CIVIL TWILIGHT 0 10 50 30 40 20 90 10 30 80 60 100 N - NAUTICAL TWILIGHT A - ASTRONOMICAL TWILIGHT MEAN TEMPERATURE: AIR 77° F., SEA 29° F. RIRST QUARTER NAST QUARTER FULL MOON NEM WOON DATES 9 10 11 15 13 14 12 16 17 18 19 20 21 22 23 24 25 26 27 28 NOON 15 6 8 7 II OI A.M. SUNLIGHT A.M. NS-3 HOURS ¥ MOONLIGHT MIO MICHT MID DARKNESS 53 THOIL MOONLIGHT MOOM 22 DIW 21 50 D.X 61 18 HOURS LI 12 Per 15 SUNLIGHT P.M. 1 S MOONLIGHT AND DARKNESS SUNLIGHT, TIME OF TIDES, F- 01 HEIGHT IN T-18 19 20 21 91 OI DATES RISE AND FALL OF TIDE SUNLIGHT AND MOONLIGHT DATA COMPUTED FOR LAT. 14 35'N. LONG. 120 58'E. TYT'14 32 N TONG 150 28 E TIME MERIDIAN: 120°E. FEBRUARY, 1945 \*YAB AJINAM DIAGRAM OF TIDES, SUNLIGHT AND MOONLIGHT

SR - SUNRISE

### APPENDIX C.

# JAPANESE EQUIVALENTS OF PLACE NAMES

The following list of Japanese equivalents of geographical names in the Lingayen area has been supplied by Allied Translator and Interpreter Section, SWPA:

### LINGAYEN

Name	Romaji	Characters
AGAT	AGATTO	マガット
AGNO	AGUNO	マグノ
AGOO	AKOO	マコオ
AGUILLAR	AGIRARU	アギラル
ALAMINOS	ARAMINOSU	アラミノス
ANGIO	ANGIO	アンギオ
ARINGAY	ARINGAI ARINGAIN GAWA	アリンガイ アリンガイン 河
ASINGAN	ASHINGAN	マシンガン
BACNOTAN	BAKUNOOTAN	バクノオタン
BALAOAN	BARAOAN	バラオアン
BANGAR	BANGARU	バンガル
BANI	BANI	バニイ
BAOANG (BAUANG)	BOANGU BOUAN	ボマングボウマン
BAOANG RIVER	BAWAAKU GAWA	バワアクラ可
BARORO RIVER	BARORO GAWA	バロロ河
BAUANG	BAUANGU	バウアング

# JAPANESE EQUIVALENTS OF PLACE NAMES—(cont.)

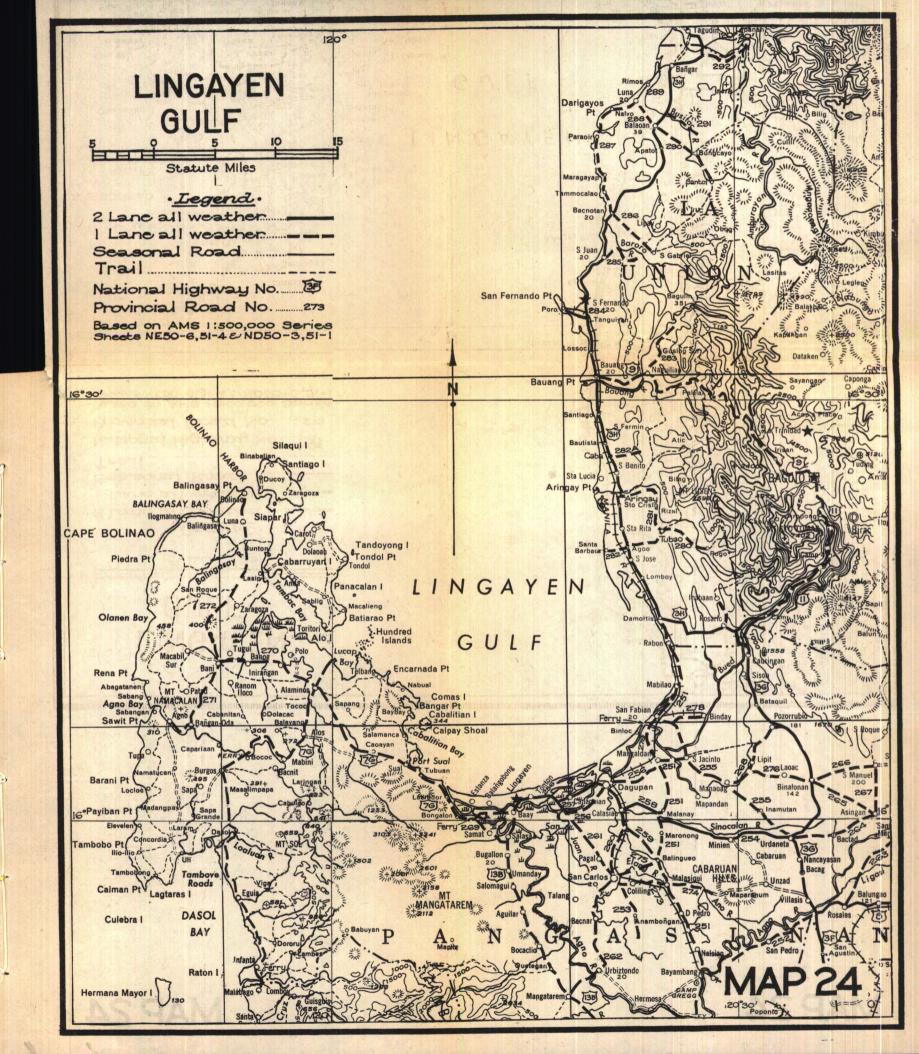
the Part of the state of the st		
Name BAYAMBANG	Romaji BAYANBAN	Characters
BAYAMBANG	DATANDAN	バヤンバン
	BANBAKKU	バンバック
	BAYONBON	バヨンボン
BURGOS	BURUGOSU	ブルゴス
CABA	KABA GAWA	カバ河
CAMP ONE	KIYAMUPUWAN	キヤムプワン
	KIYANPU I	キヤンプー
CARMEN	KARUMEN	カレメン
	KAREMEN	
	RAREMEN	カル×ン
DAGUPAN	DAGUBAN	ダガバン
	DAKUPAN	ダグパン
	DAGUPAN	ダクハー
DAMORTIS	DAMORUCHISU	ダモルチス
	DAMORUTESU	ダモルテス
DARIGAYOS POINT	DARIGAYOSU MISAKI	グリガヨス山門
LINGAYEN	RINGAEN	リンガエン
LUNA	RUNA	ルナ
MABILAO	MABIRAO	マビラオ

# JAPANESE EQUIVALENTS OF PLACE NAMES—(cont).

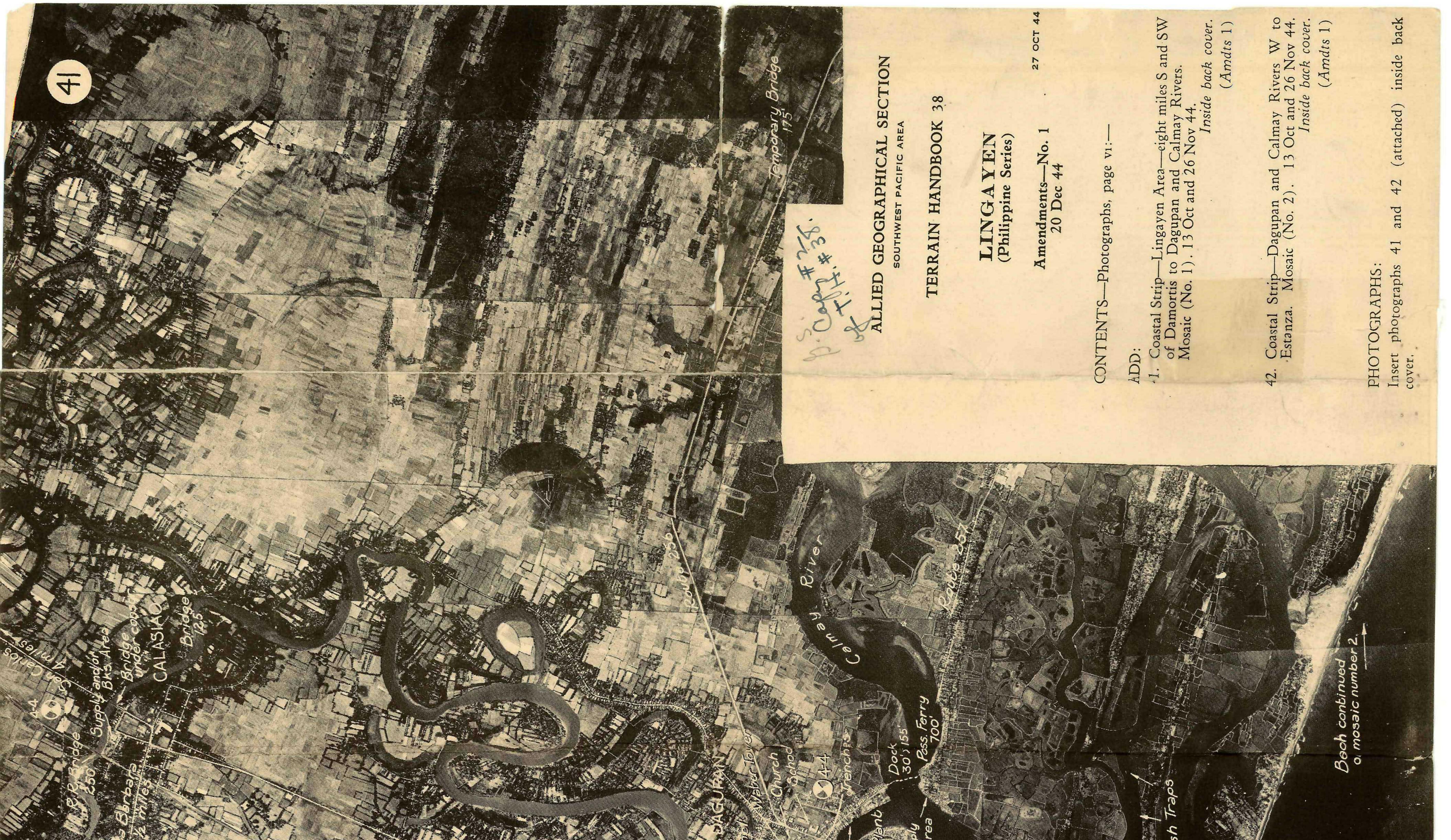
Name	Romaji	Characters
MANAOAG	MANAOAGU	マナオアグ
MANGALDAN	MANGARUDAN	マンガルダン
	MANKARUDAN	マンカルダン
MANGATAREM	MANGATAREN	マンガタレン
	YANGARETAMU	ヤンガレタム
NAGUILIAN	NAGIRIAN	ナギリアン
NANCAYASAN	NAGANSAN	ナガンサン
POZORRUBIO	POSOROBIO	ポッロビオ
ROSARIO	ROSARIO	ロサリオ
SALASA	SARASA	サラサ
SAN CARLOS	SAN KARUROSU	サンカルロス
	KARAROSU	カラロス
SAN FABIAN	SAN FUABIAN	サン フアビアン
SAN FERNANDO	SAN FUERUNANDO	サン・フェルナンド
	SAN FURONANDO	サンフロナンド
SAN JUAN	SAN FUAN	サンフアン
SAN LEON	SAN REON	サンレオン

# JAPANESE EQUIVALENTS OF PLACE NAMES—(cont.)

Name	Romaji	Characters
SAN MANUEL	SAN MANIERU	サンマニエル
	SAN MANUERU	サンマヌエル
SANTIAGO	SANTEAGO	サンテアゴ
SANTO TOMAS	SANTO TOMASU	サント トマス
SAN QUINTIN	SAN KUINTA	サンクインタ
	SAN KUINTEN	サン クインテン
SUAL	SUARU	スアル
SUDIPEN (SAN FARAEL)	SUJIPEN	スジペン
TAYUG	TAEGU	タエグ
	TAEUGU	タエウグ
	TAYOUGU	タョウグ
UMINGAN	UMINGAN	ウミンガン
URBIZTONDO	URUBISUTONDO	ウルビストンド
URDANETA	URUDANEITO	ウルダネイト



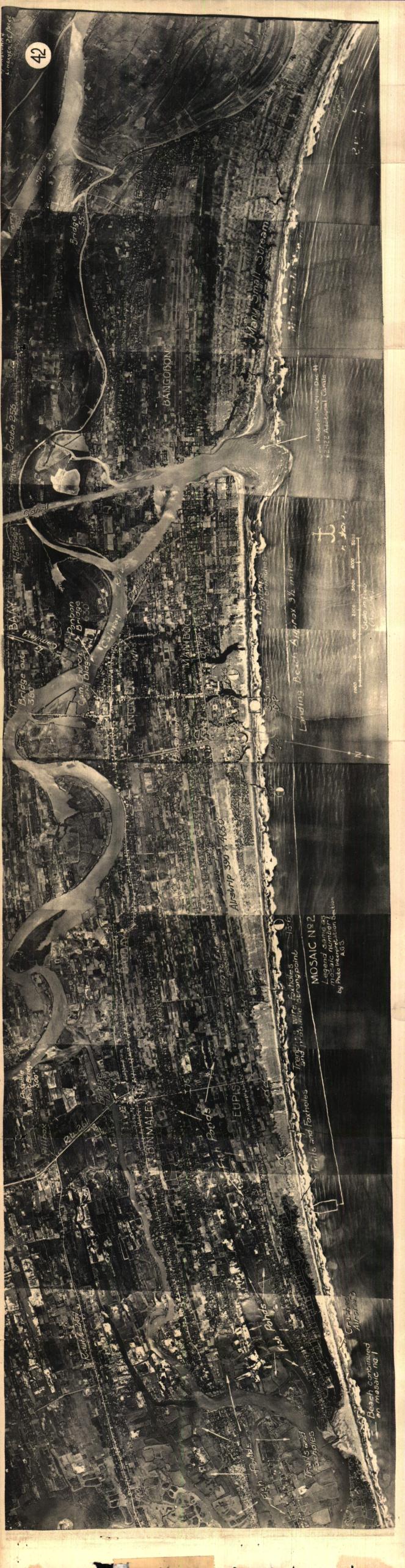




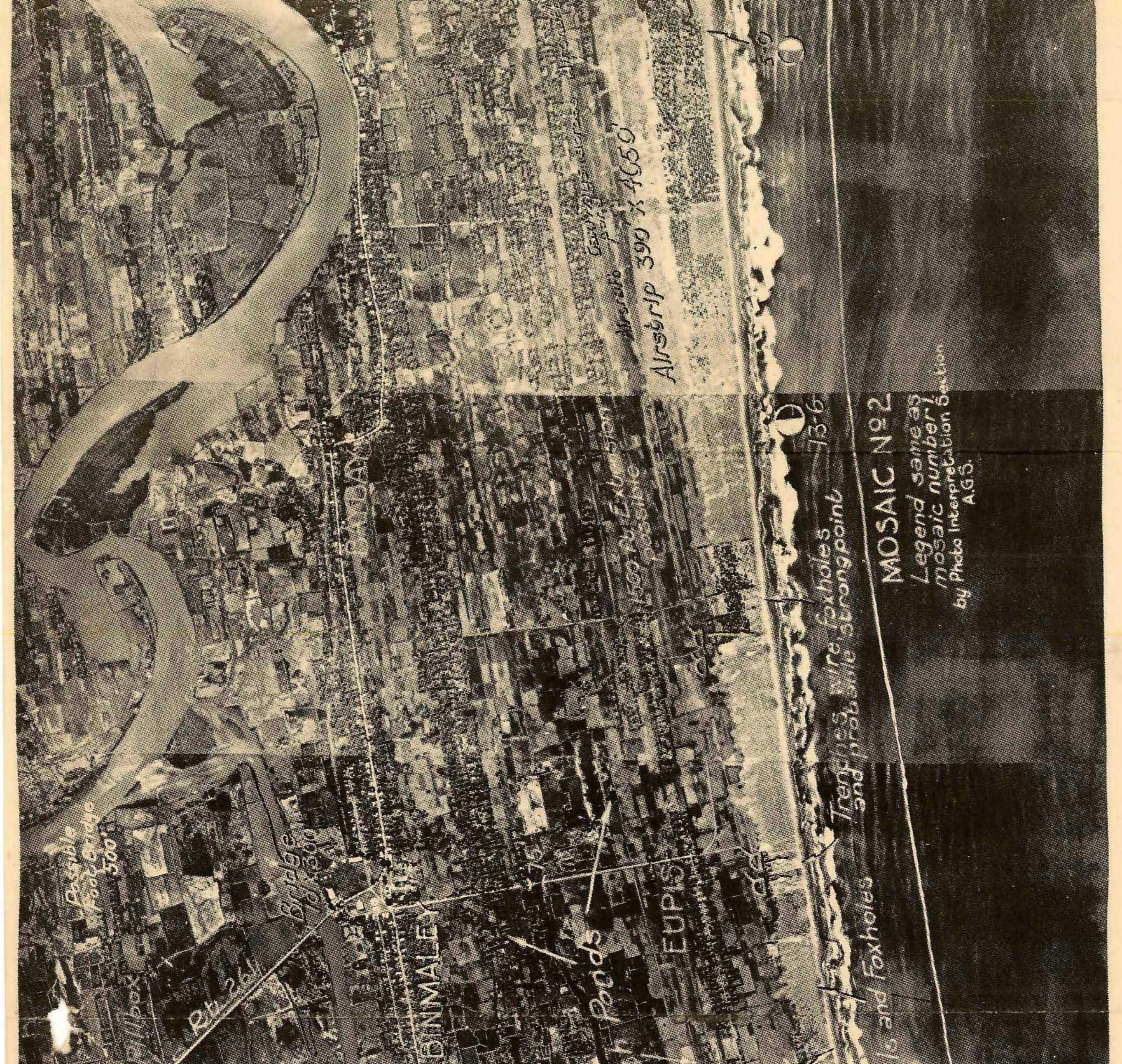














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Allied Jones Southwest Pacific Area

TERRAIN HANDBOOK 39

# TARLAC-DAGUPAN

(Central Luzon)

(PHILIPPINE SERIES)

01239

### IMPORTANT

- a. This document contains information of value to the enemy.
- b. It will be destroyed if in danger of falling into enemy hands.

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ALLIED GEOGRAPHICAL SECTION Allied Jorces, Southwest Pacific Area

**TERRAIN HANDBOOK 39** 

# TARLAC-DAGUPAN

(Central Luzon)

(PHILIPPINE SERIES)

01939

2 NOVEMBER 1944

General Headquarters, Southwest Pacific Area, 2 November 1944.

This Handbook contains information on the Tarlac-Dagupan area (Central Luzon) as defined in the Orientation Map.

It is intended to provide basic topographical information of military interest for the use of officers in forward areas.

The maps included are intended as guides only, to be used in conjunction with operational maps.

By command of General MacARTHUR.

R. K. SUTHERLAND, Lieutenant General, U.S.A., Chief of Staff.

Official:

C. A. WILLOUGHBY, Brigadier General, G.S.C., Asst. Chief of Staff, G-2.

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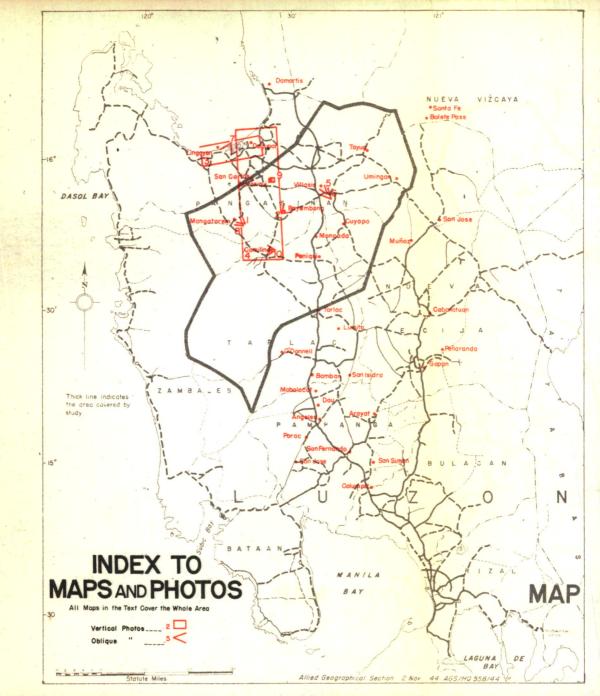
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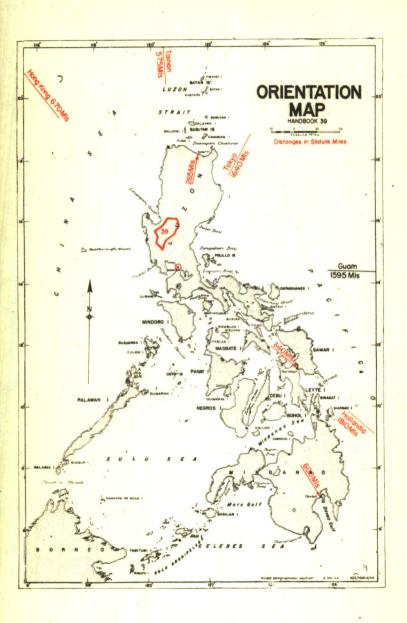
# **PHOTOGRAPHS**

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ORIENTATION MAP



# TARLAC—DAGUPAN

#### Central Luzon

#### SECTION 1

# INTRODUCTION AND GENERAL DESCRIPTION

(Map 1; Photos 1, 2.)

### 1. LOCATION AND AREA COVERED (See Orientation Map):

Area described in this Handbook consists of approximately the northern third of Central Luzon Plain, and includes portions of Pangasinan, Tarlac and Nueva Ecija Provinces.

#### 2. GENERAL DESCRIPTION:

Central Luzon Plain is a level, alluvial plain extending NW/SE for about 120 mls. About 35 mls of this length on the NW end are covered by this Handbook.

The valley is easily acce ible only from the NW and the SE ends, high mountains walling it on either side.

The area is mostly cultivated and is agriculturally rich. Rice, sugarcane, fruit, corn, and root crops comprise the more important products. The mountains contain quantities of good timber, among which are pine forests in the foothills of Zambales Mts.

The road net is well developed and extensive. Main roads are either asphalt or concrete. Secondary roads are mainly all-weather, rock-surfaced.

Principal towns in the area include Camiling, Tarlac Province; Bayambang, Pangasinan; Tayog, Pangasinan; Umingan, Pangasinan; Urdaneta, Pangasinan; and Paniqui, Pangasinan. These towns are all agricultural centers and are located on main roads.

Population throughout the Central Plain is the most dense of the Philippines.

#### 3. SPELLING.

Spellings in this Handbook are in accordance with Directions for Treatment of Geographical Names in the Philippines (5 May 44), issued by the U.S. Board on Geographical Names. (See Terrain Studies, Philippine Series.)

Different maps and charts may substitute certain letters for others in spelling place names. Most common of these are: the c to k; the qu to k; the j and k to j; and the k and k to k. These changes will also be noticed in pronunciation by the inhabitants.

### 4. STANDARD TIME—METRIC SYSTEM—CURRENCY.

Standard time is eight hours ahead of Greenwich mean time. The metric system is used throughout the Philippines.

The peso is the main item of coinage. 100 centavos equals 1 peso. 1 peso equals \$0.50 (US), or approx. 3/1 Aust. Copper, silver and paper money are used.

#### 5. WATER.

There are many artesian wells—some free-flowing, some pumped. Water from shallow wells, streams, and rivers should always be treated if intended for consumption by troops.

#### 6. MILITARY IMPORTANCE:

The Philippine Islands generally are strategically placed across

the important trade routes of the Far East.

Central Luzon Plain is the most developed area economically and militarily of the Philippines. Through this plain passes all land transportation going north from Manila to Northern Luzon.

Although the Philippine Army as organized by USAFFE in 1941 does not exist to-day, these partially trained men can still be used

as a nucleus for reorganizing army and constabulary forces.

Japanese Army activity is limited mostly to garrison and administrative duties except in the immediate vicinity of air bases. Japanese defenses are mainly localised ground defenses and A/A positions.

In this area there are only two airfields; both are of limited

consequence.

The potential development of the area is practically limitless. Additional airfield sites, warehouse and camp areas can be located nearly everywhere on the level plain and in the Savannah foothills of Zambales Range.

#### 7. APPROACHES.

The two most easily accessible avenues of approach are from Lingayen Gulf beaches of Pangasinan to the NW, and from Manila Bay and Tayabas Prov beaches to the south. Approaches from the east or west require traversing mountainous country, and making use of narrow, easily defended mountain passes.

#### 8. MOVEMENT:

Two types of terrain are encountered in the area—mountainous country to the east and west, and the level plain between. The plain also has two major divisions, the eastern portion consisting of heavy black clay soils liable to swampy conditions (now mostly rice paddy area), and the western portion having coarse-textured gravelly soils which drain rapidly (cane country).

Movement by MT on the extensive road net is possible at any season except during severe floods. MT movement across country is

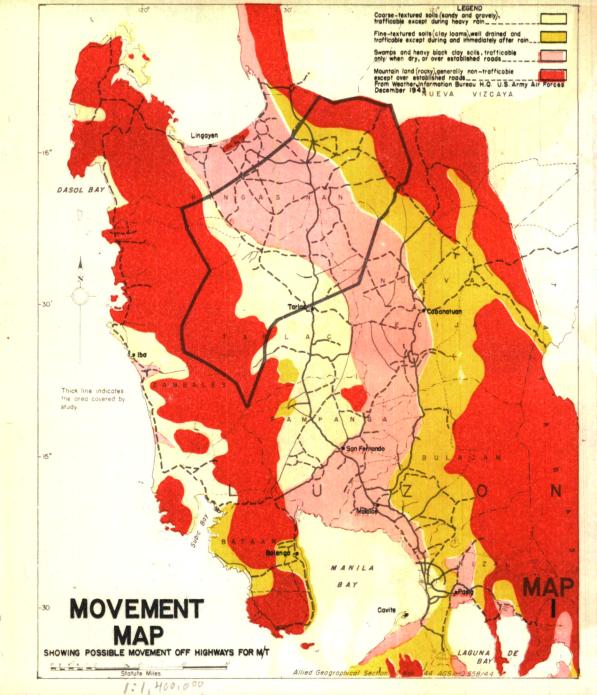
possible generally only during dry season.

Tracked vehicles can move through the western portion of the valley in any season except during unusually heavy precipitation. Such movement in the eastern part of the valley would be limited to dry season.

Foot troops can move easily throughout the area during the dry season, but would have to use the road net in the eastern portion

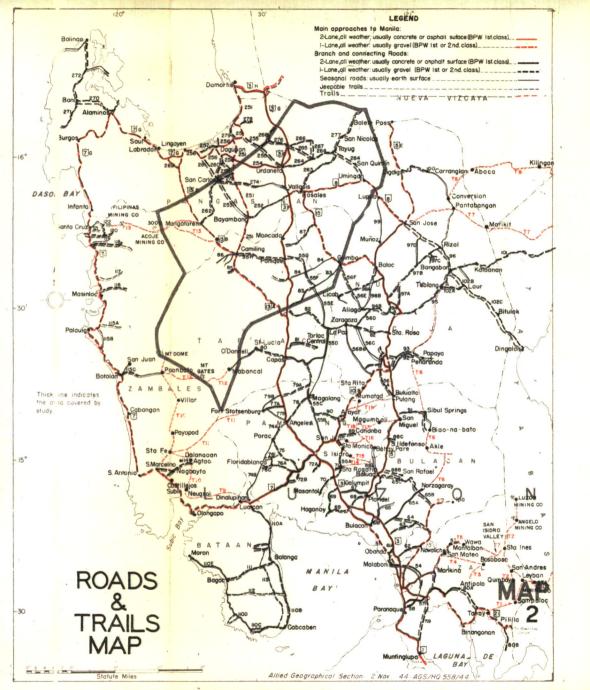
during the rainy season.

Days with wet soil increase sharply to a peak in Jul and decrease gradually to Dec. The section of the plain covered in this Handbook is fairly severely affected by rainy weather, and the drainage pattern is intricate. Ricefields are normally dry in this area during Oct-Nov, and Apr-May. They are flooded during Jun, Jul, Feb, and Mar.









### ROADS AND TRAILS

(Map 2; Photos 3, 4, 5)

#### 1. GENERAL.

The area covered by this Handbook has a highly developed road net, connecting Lingayen Gulf with Central Luzon Plain by good all-weather roads.

Map 2 shows most of the important roads; those in red are main highways.

Most roads run through flat, lowlying farmland planted with rice, corn, sugarcane, or tobacco; some through large areas of poor sandy grassland with occasional small isolated trees; and some cross open swamp land.

In general, driving off the road is difficult in dry weather, due to numerous small ditches, swamps and the earth banks around each small rice paddy; in wet weather it becomes impossible, vast areas being partly submerged.

Cover can sometimes be found in the form of large acacia trees or bamboo clumps along the roadside; most streams have a narrow fringe of bushy vegetation along each bank; towns and barrios (villages) usually have many large trees and clumps of bamboo and bananas, and nipa huts often line each side of the roadway near each settlement.

Drinking water is seldom likely to be more than a mile away. All water for drinking should be treated. Most towns have excellent artesian well water, but great care should be taken to avoid contamination from containers used by the natives.

Drivers should be warned that loose river gravel is often scattered on otherwise well-surfaced roads.

#### Road Classification:

2-lane, AW: At least 16ft base and surface usually concrete or asphalt; 4ft shoulders; bridges and culverts at least 16ft wide. Maintained as a "First-class Road" by the Philippine Bureau of Public Works.

(Philippine BPW classification for the above road type is: "First-class Roads: Well graded and surfaced, thoroughly drained and constantly maintained. Bridges and culverts usually complete and permanent and, when missing, their places are almost always supplied by ferries capable of carrying automobiles weighing two tons or more. Continuously passable at all times with possible exceptions during typhoon periods.")

1-lane, AW: Usually 9ft base, and 12ft surface of gravel; 4ft shoulders; vehicles pass by driving on the thinly-surfaced shoulders. Culverts usually 16ft and bridges 10ft wide. Maintained as a "First-class Road" by the Philippine BPW.

Seasonal: Usually graded for at least 20ft crown in flat areas and 16ft or less in mountain areas. Usually unsurfaced and may become impassable during wet weather. Bridges and culverts usually 10ft wide. Maintained as a "Second-class Road" by the Philippine BPW,

(Philippine BPW classification: "Second-class Roads: Fairly graded, partially or naturally surfaced and generally intermittently maintained. Bridges and culverts usually complete and partially temporary. Continuously passable for vehicle traffic during dry season but more or less impassable during rainy season.")

Most water obstacles in this area are wide, deep, but slow-moving except in flood; low soil banks.

Bridges on may sections have been destroyed, but details are given here of some of the pre-war structures. Several types of bridges were used, the most common being reinforced concrete slab and girder type over the smaller streams, and steel truss types over larger rivers or where high clearance was required. The intended loadings of these bridges were usually 10 tons for main highways (marked in red on Map 2) and five tons or less for secondary roads.

Road distances in the text are given in both miles and kilometers. Concrete distance posts giving kilometers to various points were installed along most roads before war. Distance tables are attached.

Good roadmetal has usually to be hauled long distances. Banks of adobe stone (consolidated volcanic ash) can sometimes be found near roadside, and gravel in most of the streams. Timber suitable for making even temporary bridge repairs is seldom readily at hand.

### Abbreviations used include-

Prov Bdry — Provincial Boundary

Km - Kilometer (1000 meters or 1093 yards)

Ml - Statute Mile (1760 yards)

RRX — Railroad Crossing
Rd June — Road Junction
Rd X — Road Crossing

Rd X — Road R — River

AW — All-weather

BRIDGES: TW — Temporary Wood WTs — Wood Truss

WTs — Wood Truss STs — Steel Truss SG — Steel Girder

CG — Reinforced Concrete slab and girder

M — Masonry A — Arch

Dimensions: Length; Width; Height above normal water level or dry flood plain, in that order, in feet.

#### 2. TRAILS.

Foot trails link almost every settlement and lead from the plain up into the mountain areas to the north and west.

In the vast areas of agricultural land to south there are foot trails around the edges of nearly every field.

Earthen dikes are built around rice paddies and across the large fish pond areas near Lingayen Gulf. Foot troops can find good footing along the tops of these even in flood time.

Some detail of Trail 13 from Santa Cruz, on Zambales coast, to San Clemente, on Route 13B, are given at the end of sub-sec 3, Roads.

# 3. DETAILED DESCRIPTION OF ROADS.

ROUTE 3. (Sections 3H, 3G, 3F).

Summary: Part of main national highway down west coast of Northern Luzon, southwards over Central Luzon Plain to Manila.

From Damortis, La Union (16°14'N, 120°24'E) on eastern shore of Lingayen Gulf to Tarlac, Tarlac, in Central Luzon is 101.2 km (62.9 ml), 2-lane AW concrete or blacktop throughout.

Section 3H: From Damortis eastwards 11.8 km (7.4 ml) to a triangular intersection on Prov Bdry La Union-Pangasinan.

First over low parallel ridges, then flat farm land. Very little cover. Route 11 runs NE to Baguio. Discrepancy of about 13 km (8 ml) on distance to Manila at this point.

Section 3G: From above triangular intersection Route 3G runs southwards 40.8 km (25.3 ml) to Carmen, a barrio on south (left) bank of Agno R. Mostly through cultivated plain.

Section 3F: From Carmen southwards for 48.6 km (30.2 ml) to Tarlac, Tarlac. Mostly through lowlying cultivated plain, surroundings subject to flooding in wet weather.

ROUTE 3H			
Detail	Distance to Manila Km Ml		Class and Terrain
DAMORTIS. Rd Junc. Branch south to SAN FABIAN (251). Route 3H turns east. Winding, many side cuts.	238.7	148.3	2-LANE AW CONCRETE OR BLACKTOP. Series of parallel ridges. Scat- tered trees; low brush; cogon grass. Small patches cultivation.
APANGAT R. STs 124 x 9 x 20 (1 span). Fordable dry weather.	231.7	144.0	Flat plain of BUEDValley. Mostly rice. Some cogon grass, low brush and occasional trees.
ROSARIO.	228.8	142.0	Airfield.
Triangular intersection. Branch NE is Route 11 ("Kennon Highway") to BAGUIO. Route 3H turns south.	ion is km (1	141.0 junct- at 215 33.6 ml) Manila Route	Note: Distance discrepancy marked on maps and probably on km posts. Deduct 13.1 km (8.1 ml) from indicated distances west and north of here.
Prov Bdry LA UNION- PANGASINAN. Route 3H ends: 3G begins.	213.8	132.8	2-lane AW CONCRETE OR BLACKTOP. 3H-3G. Rice paddies both sides.

# ROUTE 3G

Detail	Distar Mar km		Class and Terrain
BUED R. STs 408 x 20. (5-span). Probably fordable.	212.8	132.1	Wide sandy flats each bank.
Rd June. Branch north (left) is old road to BAGUIO	212.2	131.8	Narrow flat strip between steep hills and BUED R. Scattered patches forest.
CAURINGAN R. CG 52 x 20 x 16 (2-span). Easy ford.	211.3	131.3	Open undulating plain. Rice paddies, tobacco and sugarcane. PROBABLY BLACKTOP.
Rd June cut-off east (left) by-passes SISON. Branch SW (right) to SISON.	209.4	130.1	
End of above cut-off.	206.4	128.2	
BOBONAN R. CG 92 x 20 (2-span).	205.0	127.4	
Rd Junc. Cut-off SE (left) by-passes POZORRUBIO. Branch SW is Route 268 to MANAOAG.	202.0	125.5	
End of above cut-off.	200.9	124.8	2-lane AW. PROBABLY BLACKTOP. Flat cultivated plain.
ALORAGAT R. CG 392 x 20 (10-span) steel piles.	196.3	121.9	
STA MARIA NORTE Rd June. Branch south (left) is old road via BINALONAN which rejoins at URDAN- ETA. Route 3G runs SSW.	193.0	119.9	
STA MARIA SUR Rd X. Route 276 west to PAO. East to BINALONAN.	191.5	119.0	

# ROUTE 3G-Continued

	THE PARTY OF THE P		
Detail	Distance to Manila km ml		Class and Terrain
TAGUMISING R. CG 144 x 20.	187.8	116.6	
MITURA R. STs $148 \times 20$ .	185.0	114.9	
URDANETA. Rd Junc. Route 255 NW to MANAOAG. Route 254 west to STA BARBARA. Route 264 east to ASINGA Branch NE is old road via BINALONAN.		114.3	
Route 3G runs south.			2-LANE AW. PROBABLY BLACK- TOP.
MACALONG R. CG 82ft River. CG 115ft (5-spans).	183.7 176.2	114.2 109.4	Flat cultivated plain.
VILLASIS Rd June. Branch NW is Rd 274 to MALASIQUI.	175.0	108.7	
AGNO R. STs 2080 x 16 x 30 (13 spans 160ft each). Reported to be in final stages of repair by enemy Jul 44.	173.7	107.9	North end of "VILLASIS BRIDGE" – longest bridge on LUZON. (Photo 5).
CARMEN Rd Junc. Route 8A runs east to ROSALES. Route 252 runs west to BAUTISTA. Route 3G ends; 3F begins and runs south.	This 171.	107.5  point is 7 km 7 ml) Manila.	South end of bridge.  3G:3F.  Note: Distance discrepancy marked on maps and probably on km posts.  Deduct 1.3 km (0.8 ml) from indicated distances north of here.

# ROUTE 3F

Detail	Distar Mar km	nila	Class and Terrain
ROSALES A/F west of	171.1	106.3	2-LANE AW. BLACK-
road. Prov Bdry PANGASINAN- TARLAC.	168.8	104.9	101.
Creek. CG 38 x 20 x 10.	167.5	104.1	
Rd June west (right) to SAN FELIPE, about 0.5 km (0.3 ml)	164.9	102.5	Flat cultivated plain.
SAN MANUEL. Creek CG 33 x 20 x 6.	161.9	100.6	
RRX.	155.3	96.5	
MONCADA. Turn left at Plaza 1 block.	153.9	95.6	
Creek. CG 33 x 20 x 9.	152.2	94.6	
SAN JULIAN Rd Junc. Branch east (left) is Route 87—1-lane AW to Route 15, total 15.9 km (9.9 ml).	151.5	94.1	
BAKA R. River CG 145 x 18 x 16.	150.1	93.3	
PANIQUI. RR Junc. Branch NE (left) seasonal 5.8 km (3.6 ml) to Route 87 near SAN FRANCISCO.	146.9	91.3	
PANIQUI. Branch east is Route 55G west is 55H. Route 3F continues south.	145.9	90.7	2-lane except at 5 small bridges 14ft wide this section. Rice paddies and patches of coconuts.
			2-LANE AW. BLACK- TOP.

# ROUTE 3F-Continued

ROUTE 3F—Continued	- Language	1	
Detail	Distan Man km		Class and Terrain
GERONA. Route 84 runs NE (left) seasonal for 17.3 km (10.8 ml) to Route 15 near GUIMBA and west 4.6 km (2.9 ml) to TAGUMBAO. Route 3F runs south.	138.1	85.8	Many built-up sections. 2-LANE AW. BLACK- TOP.
River. Two CG bridges each 46 x 14 x 12.	137.0	85.1	Many built-up sections.
Low section of river flood plain.	129.3	80.4	
Road June. Branch NE (left). Route 83, 2-lane AW 12.8 km (8.0 ml) to VICTORIA.	126.5	78.6	
Rd June. Branch SE (left) 2-lane AW $2\frac{1}{2}$ km (1.6 ml) to Route 82.	125.5	78.0	
Main street runs SW (right) 1 km (0.6 ml) to TARLAC. Route 3F swings SE (left) and south between town and RR.	125.2	77.8	
TARLAC Rd X. Branch west (right) 2-lane AW 0.8 km (0.5 ml) to Tarlac. East (left) Route 82, to Route 5B. Route 13A runs SW from TARLAC.	124.1	77.1	Route 3 continues southwards to Manila.

Route 3F ends here.

#### ROUTE 7G

Summary: From Lingayen (16°01'N; 120°14'E) at the head of Lingayen Gulf, Route 7 runs westwards near the shore to Port Sual, thence inland across northern end of Zambales Mts, and southwards down the west coast of Luzon. It runs eastwards again in Bataan, joining the Central Plain road net again at San Fernando, Pampanga.

Distance to Port Sual 20.4 km (12.7 ml), 1-lane AW gravel surface.

Distance to Manila via 7		Class and Terrain
km	ml	
373.0	231.8	1-LANE AW, GRAVEL- SURFACED. Heavy dust on this road during dry season would, probably
372.0	231.2	restrict flow of traffic. Swamps and lagoons on both sides of the road. Movement off roads difficult in any season.
371.0	230.6	
367.5	228.5	
363.2	226.0	Narrow lowlying marshy strip between steep hills to west and AGNO R to east.
361.0	224.2	Coastal plain ½ to ½ ml wide. Lowlying rice paddies on both sides of road. High hill ½ ml to south.
354.0	220.0	Road winds through low hills over-looking LIN- GAYEN Gulf.
	Mar via km 373.0 372.0 371.0 367.5 363.2 361.0	Manila via 7 km ml  373.0 231.8  372.0 231.2  371.0 230.6  367.5 228.5

PORT SUAL. On west side 352.6 219.1 of LINGAYEN Gulf.

Route 7G continues westwards inland through mountainous country. (See Handbook 42: Zambales—Bataan).

### ROUTE 8

Summary: From Carmen, Pangasinan (15°53′N; 120°36′E) on Route 3G: 3F, Route 8 runs east and SE for 51.4 km (32.8 ml) to Route 5D: 5E at San Jose, Nueva Ecija. First 4 mls 2-lane AW, thence 1-lane AW. All streams bridged, usually by wood structures 16-18ft wide.

An important E/W link connecting Routes 5, 15 and 3.

	Distance from Carmen,		1
Detail	Pan km	g.	Class and Terrain
CARMEN, Pang on Route 3G:3F 171.7 km (106.7 ml) to Manila. Just south of Villasis Bridge over AGNO R. Route 8 runs eastwards.	00.00	00.00	2-LANE AW BLACK-TOP. (Photos 5 and 6). Flat cultivation, rice and sugarcane, some trees close to road. Rosales A/F 250 yds south of road.
Bridge. 85 x 18 x 19.	3.1	1.9	
ROSALES Rd Junc. Branch NE (left) is Route 263 to TAYUG.	4.0	2.5	Railroad spur on south.
Bridge; C. 121 x 15 x 18.	6.5	4.0	Undulating grassland and cultivation gradually rising to south and east.
June. Branch south (right) is Route 15 to GUIMBA and Route 5C: 5D at BALOC.		4.1	1-LANE AW GRAVEL- SURFACED. RR parallel south.
BALUNGAO.	9.0	5.6	Undulating grassland and cultivation rising south to Mt. BALUNGAO.
SAN LEON. RRX. Line NE to SAN QUINTIN. Route 8 continues east.	14.5	9.0	
KARAYOGAN R. TW 90 x 10 x 16.	19.3	11.9	
UMINGAN Rd June north of the town. (Elev 340ft Route 8 runs east and SE Route 264 NW to TAYUG	)	17.4	1-LANE AW. GRAVEL- SURFACE. Gently roll- ing. Mountain NE.

### ROUTE 8-Continued

Detail	Distance from Carmen, Pang		Class and Terrain
	km	ml	
ALOU R TW 49ft. Prov Bdry PANGASINAN- NUEVA ECIJA.	34.3	21.3	
LUPAO. Branch south is	37.7	23.4	
Route 99, seasonal to Munoz on Route 5D, total 19.0			
km (11.8 ml). Route 8 runs SE. 3 small wood bridges.			
River. TW. 100 x 9 x 6	38.6	24.0	
River. TW 99 x 10 x 6. 4 small wood bridges.	38.8	24.1	1-LANE AW. GRAVEL SURFACE.
River. TW 80 x 10 x 9.	40.4	25.1	1
River. TW 59 x 10 x 11.	41.5	25.8	
River. TW 52.	42.1	26.2	
River. TW 84 x 10 x 7.	43.2	26.8	
River. TW 59 x 10 x 11.	45.2	28.1	
River. TW 55 x 10 x 10.	49.0	30.5	
SAN JOSE on Route 5D: 5E 161.3 km (99.3 ml) to Manila.	51.9	32.2	
	Route 8	ends	

#### ROUTE 13.

Summary: From Baay Rd June (16°01'N; 120°13'E), 1½ mls SW of Lingayen on Route 7G, runs south and SE for 80.3 km (49.9 ml) to Tarlac, Tarlac, in Central Luzon, 1-lane AW, gravel surface throughout.

An important direct route from Lingayen to the main Central Luzon road net.

Section 13B runs from Baay to San Clemente, 38.4 km (23.8 ml) mostly through lowlying rice paddies. Surroundings flooded in wet weather.

Section 13A from San Clemente to Tarlac, 41.9 km (26.1 ml), mostly through rolling open grassland.

Detail	Distance to Manila km ml		Class and Terrain	
BAAY Rd June on Route 7G 14 mls SW of Lingayen; Route 13B runs south. (Photo 3).	204.9	127.3	I-LANE AW GRAVEL SURFACE. All stream crossings are bridged usually with TW structures. Flat cultivated swampy plain between AGNO R and foothills of ZAMBALES Ra. Owing to numerous streams crossing the road movement to south off roads would be difficult in any season. Rice paddies both sides of road throughout.	
AGNO R. STs 492 x 20 x 19	202.9	126.0	1-LANE AW GRAVEL SURFACE.	
Rd Junc. Branch NW (right) is Route 269 to Route 7G.	200.4	124.5		
BUGALLON.	198.7	123.4		
UMANDAY. TW 122 x 16 x 8.	196.9	122.3		
DUMULOC R. CG 99 x 11 x 12.	196.3	121.9		
AGUILAR.	190.9	118.6		
BAYAOAS R. Steel bridge 2 spans 261ft.	184.5	114.6		
MANGATAREM. Rd Junc. Branch NE is Route 262 to URBIZ- TONDO and SAN CARLO Trails SW to Trail No. 13	177.9 3 S.		and the provincial bound- ary there are several smal narrow temporary timber bridges. (Photos 1 and 2)	
OLO R. TW 180 x 10 x 14		6 108.	4	
River. TW 80 x 10 x 15.	169.	0 104.	9	
Prov Bdry; PANGASINAN-TARLAC.	168.	4 104.		
BACATAN R. TW 100 x 8 x 17.	, 166	7 103.	6 1-LANE AW, GRAVE SURFACE. Rice paddies	

# ROUTE 13A

Detail	Dista Man km	nce to ila ml	Class and Terrain
SAN CLEMENTE. Route 13B ends: 13A begins, runs SE. Several small streams. Trail No. 13 west to SANTA CRUZ, ZAMBALES.	166.5	103.5	13B:13A (Photo 4).
River. TW 39 x 13 x 8.	164.0	101.9	
River. TW 78 x 10 x 8.	161.6	100.4	
CAMILING.	159.9	99.4	(Photo 10 and 4).
CAMILING R. STs 304 x 16 x 26.	159.5	99.1	
Rd X. Branch north (left) is Route 251, 1-lane AW, 14.8 km (9.2ml) to BAYAM-BANG in PANGASINAN Prov. Branch east (ahead) is Route 55H, 1-lane AW, 17.4 km (10.8 ml) to PANIQUI on Route 3F.  Route 13 turns south (right).	159.4	99.0	1-LANE AW, GRAVEL SURFACE.
Rd June. Branch SW (right) is Route 85. 1-lane AW, 5 km (3.1 ml) to MAYANTOC. Route 13A turns SE.	154.2	95.8	Level, rice paddies.
BAYATING R. CG 145 x 20 x 24.	150.8	93.7	
STA IGNACIA.	150.3	93.4	Gently rolling grassland. Occasional small isolated trees.
River. TW 43 x 9 x 5.	146.1	90.8	
River. TW 54 x 10 x 15	144.4	89.7	

# ROUTE 13A-Continued

Detail	Distance to Manila km ml		Class and Terrain
BINIG Cr. TW 115 x 10 x 12.	136.9	85.1	Winds in low hills.
SAN JUAN DE MATA. Several trails suitable for jeeps run west.	134.0	83.3	
River. TW 43 x 10 x 7. Route 13A turns south.	129.8	80.7	Low rice paddies.
River, TW 38 x 10 x 5.	129.5	80.5	
TUBANG. Barrio on north (left) bank of Tarlac R. Many trails usable by jeeps.	127.9	79.5	
TARLAC R. STs 460 x 18 x 22.	127.5	79.2	
River. TW 53 x 10 x 10.	127.0	78.9	
Route 13A swings east. River TW 111 x 10 x 11.	125.9	78.2	
Rd Junc. Branch south (right) 1-lane AW, 1 km (0.6 ml) to landing field. Route 13A turns north (left)		78.0	
TARLAC Rd Junc. Street NE to main town area Route 13A turns SE (right 2-lane AW, 1 km (.6 ml) to Route 3E at 123.5, km (76.7 ml).		77.4	2

Route 13A ends.

#### SECTION 2]

#### ROUTE 15

Summary: From Rd June just east of ROSALES (15°54'N; 120°38'E) on Route 8, runs south and SE for 34.1 km (21.2 ml) to GUIMBA thence 14.2 km (8.8 ml) to BALOC Rd X on Route 5C:5D.

In 1941 it was 1-lane AW throughout, mostly blacktop.

It forms part of a direct route from Lingayen Gulf to Cabanatuan in central Nueva Ecija.

Detail			nce to nila ml	Class and Terrain
	Rd June on Route 8, 6.4 km (4.0 ml) east of CARMEN on Route 3F. Route 15A runs south.	188.6	117.2	1-LANE, AW, BLACK-TOP.
	River. Rf C; I-beam 26 x 15 x 9.	185.5	115.3	RR east. Rice paddies occasional patches light timber.
	RRX	184.6	114.7	
	S. ANTONIO. Route 15A turns east.	179.0	111.2	RR west; mountains east.
	Prov Bdry PANGASINAN- NUEVA ECIJA.	178.0	110.6	
	River. CG 36 x 18 x 10.	177.5	110.3	
	Rd X. Seasonal roads run east and west. Route 15A runs south.	176.4	109.6	
	River. TW 60 x 19 x 19. MALANING small barrio on south bank.	173.4	107.8	
	Rd Junc. Branch west (right) is Route 87 to CUYAPO thence to Route 3F.	171.3	106.5	
	BURGOS Rd Junc. Seasonal roads west and NW to CUYAPO.	170.0	105.6	BLACKTOP ends; GRAVEL SURFACE starts.

# ROUTE 15-Continued

Rd June. Seasonal branch	164.6	102.3	1-LANE AW GRAVEL SURFACE. Level rice
Rd June. Seasonal branch			paddies.
west to Route 87.	161.0	100.0	GRAVEL ENDS, BLACKTOP STARTS.
Rd June. Branch SW (right) is Route 84 seasonal to Route 3F at GERONA. 17.3 km (10.8 ml).	157.0	97.6	
BALOY R. STs 164 x 16 x 23.	156.9	97.5	
GUIMBA. Route 15A turns south.	154.5	96.0	
Rd Junc. Branch south (ahead) is Route 56F.	154.2	95.8	
Route 15A turns east (left).			
River. TW 74 x 11 x 9.	146.8	91.2	
River. TW 37 x 10 x 10.	146.5	91.0	
RIO CHICO R. STs 360 x 16 x 18.	144.5	89.8	
STO ROSARIO Rd June. Branch SW (right). 1 km (.6 ml) to town.	142.2	2 88.4	Į.
BALOC Rd X on Route 5.	140.3	3 87.	2

#### ROUTE 55

Summary: Commencing at CAMILING (15°41'N; 120°25'E) on Route 13A this road runs east then south and consists of a series of short connecting road sections approx parallel to the main N/S highways for 132.1 km (82.1 ml) to CALUMPIT (14°55'N; 120°46'E) on Route 3D.

It is mostly 1-lane AW with the exception of two sections totalling 27.2 km (16.9 ml) of seasonal road.

There are numerous good lateral roads and the possibility of using this route to relieve traffic on the main highways appears possible, particularly in dry weather.

Important towns include VICTORIA, CONCEPCION, MAGALANG and MEXICO; and large rivers are the BYANTIG near CAMILING and the CUTCUT near CONCEPCION.

Detail	Distance to Manila via Route 55 to Calumpit km ml		Class and Terrain
CAMILING Rd X on Route 13A.  Route 55H runs east.	182.8	113.6	1-LANE AW, GRAVEL SURFACE. Low rice pad- dies.
River. TW 58 x 9 x 8.	178.5	110.0	Money built are and one
BYANTIG R. STs 304 x 16 x 26.	178.2	110.9	Many built-up sections.
River. TW 68 x 10 x 2.	178.1	110.7	
River. TW 156 x 11 x 12.	177.9	110.5	
River. TW 60 x 11 x 13.	177.7	110.4	
Rd X. Trails suitable for jeeps run north and south into rolling farm land.	175.9	109.3	
BURGOS, small barrio.	172.2	107.0	Gently rolling farm land.
River. TW 60 x 10 x 13.	171.3	106.5	
Three small streams. Total TW 148ft.	169.3	105.2	
TARLAC R. Collapsible deck bridge TW 440ft (22 spans).	165.7	103.0	

Route	via 55 to	Class and Terrain
162.3	100.9	55H: 55G.
160.4	99.7	
159.7	99.2	1-LANE AW, GRAVEL SURFACE.
157.1	97.6	Rice paddies.
156.9	97.5	
152.1	94.4	55G: 55F.
146.1	90.8	55F: 55E. 1 - LANE METALLEI BUT SAID TO BI SEASONAL. Rice pad dies.
146.0	90.7	
145.6	90.5	
142.6	88.6	
	84.5	
132.0	82.0	
N.		55E: 55D.
	Manila Route Calum km 162.3 160.4 159.7 157.1 156.9 152.1 146.1 145.6 142.6 136.0 132.0	Manila via Route 55 to Calumpit km ml  162.3 100.9  160.4 99.7  159.7 99.2  157.1 97.6  156.9 97.5  152.1 94.4  146.1 90.8  146.0 90.7  145.6 90.5  142.6 88.6  136.0 84.5

#### ROUTE 83

Summary: From Route 3F just north of TARLAC, Route 83 runs NE to GUIMBA Rd June on Route 15A, crossing Route 56E at VICTORIA. Total 25.5 km (15.8 ml).

Detail	Distance to Manila via Tarlac		Class and Terrain
	km	ml	
Rd June on Route 3F, Route 83 runs NE.	126.5	78.6	1-LANE AW, BLACK TOP. Rice paddies.
RRX. RR spur on SE (right).	127.0	78.9	
River. 68 x 15 x 11.	134.6	83.6	
VICTORIA. Branch south is Route 55E, branch north is 55F. Route 83 continues NE	139.3	86.6	1-LANE AW ENDS; SEASONAL STARTS.
crossing many small streams, total 280ft of TW bridges.			
RRX.	144.0	89.5	1-LANE SEASONAL.
Rd June on Route 56F 1.5 km (0.9 ml) south of GUIMBA.	152.0	94.5	
	Route 8	33 ends	

#### ROUTE 84.

Summary: Another lateral between Route 3F at GERONA and Route 15A just west of GUIMBA, total 17.3 km (10.8 ml) and west from GERONA to TAGUMBAO, 4.6 km (2.9 ml).

Detail	Distar Manile Gero km	a via	Class and Terrain
GERONA, on Route 3F, Route 84 runs NE.	138.1	85.8	1-LANE SEASONAL. Many small streams
RRX.	139.0	86.4	
PURA. Branch SE (right) is Route 55F. Branch NW (left) is Route 55G.	144.0	89.5	

# ROUTE 84-Continued

Detail	Distance Manila Gerone km	via	Class	and Terrain
Rivr. TW 58 x 11 x 9. Prov Bdry TARLAC- NUEVA ECIJA.	147.3	91.5	1-LANE	SEASONAL.
River. TW 27 x 10 x 9	147.5	91.7		
River. TW 39 x 10 x 6.	148.0	92.0		
Rd June on Route 15A. 2.5 km (1.6 ml) west of GUIMBA.	155.4  Route 84	96.6 ends.		

### ROUTE 85.

Summary: From 13A, 5.7 km (3.5 ml) south of CAMILING (15°41'N; 120 25'E), Route 85 runs SW to MAYANTOC 4.5 km (2.8 ml).

It is 1-lane AW with rice paddies to the north and rolling grassland to the south.

#### ROUTE 86.

Summary: This is a seasonal road running SW from CAMILING (15°41'N; 120°25'E) for about 7 km (4.4 ml) up the CAMILING R Valley.

Mostly through rice paddies, with many seasonal branch roads and

trails to the mountains on the west and SW.

ROUTE 87. Summary: Commencing at SAN JULIAN Rd June (15°43'N; 120'35'E) on Route 3F just south of MONCADA, Route 87 runs east and NE to Route 15, total distance 15.9 km (9.9 ml).

It is 1-lane AW, through rice paddies almost continuously, with

many small wood bridges.

Important towns on this route are ANAO, NAMPICUAN and

The Provincial Boundary between TARLAC and PANGASINAN CUYAPO. cuts this route about 1 km (0.6 ml) east of ANAO.

# ROUTE 251.

Summary: From Damortis, La Union (16°14'N; 120°24'E), on the eastern shore of Lingayen Gulf, on Route 3H, southwards for 72.8 km (45.1 ml) to Camiling, Tarlac. Said to be 1-lane AW throughout with bridges at all streams except Agno R near Pangasinan-Tarlac

A useful central route intersecting all the main routes leading SE

from the gulf.

# ROUTE 251—Continued

Detail	Distance Damo km		Class and Terrain
DAMORTIS Rd June on Route 3H, 238.7 km (148.3 ml) from Manila. Route 251 runs south.	00.00	00.00	1-LANE, AW, PROB- ABLY GRAVEL SUR- FACE. Narrow coastal plain 200-400 yards wide between hills and sea. Hills
River TW 79 x 10 x 11.	1.7	1.0	to east are a succession of grass and bush-covered ridges parallel to coast. Coastal plain is cultivated. Rice and tobacco are principal crops.
RABON — Prov Bdry La Union-Pangasinan. STs 158 x 12 x 9.	3.3	2.2	
River. Bridge 120 x 10 x 8.	8.0	5.0	LINGAYEN Plain. Flat cultivation.
River. Bridge 99 x 10 x 4.	11.0	6.8	Road is probably elevated on this section. Salt marsh on both sides of road.
River bridge 285 x 11 x 6.	12.4	7.7	
SAN FABIAN Rd June on northern outskirts of town. Branch SW (right) is Route 279 to MANGALDAN. Route 251 turns SE.	14.0	8.7	Cultivated plain. Sugarcane, abaca and coconuts on both sides of road.
Rd Junc. Branch NE (left) is Route 278 to Binday.	16.2	10.1	
BUED R-Ford 300ft wide, 1-2ft deep.	19.5	12.0	
SAN JACINTO. Route 255 SE (left) to URDANETA. Route 251 turns west.	21.0	13.0	
PATALAN R Bridge. S. and C., concrete piers. 406 x 16 x 22 (8 spans).	22.5	13.9	
Rd June. Branch SE (left) to MAPANDAN.	24.0		1-LANE AW, GRAVEL SURFACE.

Detail	Distance Damor km		Class and Terrain.
MANGALDAN. Rd June. Branch NW (right) is Route 279 to San Fabian. Sharp turn left (south) in town.	25.0	15.5	Flat cultivation on both sides of road.
Rd June. Branch SW (right) is Route 256 to DAGUPAN.	26.2	16.4	
Rd June. Branch east to MAPANDAN.	30.5	18.9	
Rd June. Branch NW (right) is Route 258 to CALASIAO.	34.0	21.1	2-LANE, AW, concrete or asphalt-surfaced.
MAYRUSO R. Bridge 190ft approx.	35.0	21.7	
SANTA BARBARA Rd Junc. Branch SE (left) is Route 254 to URDAN- ETA.		22.0	I-LANE, AW, GRAVE SURFACE. Cultivate plain country. Coconu- trees along road and in villages. (Photo 4).
River. TW 52 x 9 x 9	35.8	22.3	
River. TW 49 x 9 x 12	39.5	24.5	
MACABITO Rd June. Branch NW (right) is Route 259 to CALASIAO		25.4	
Also SW to San Carlos Route 275.			
River. TW 79 x 9 x 16	41.2	25.5	5
MALASIQUI Rd X Branch west is Route 27 to San Carlos. Branch eas is Route 274 to Maparanun	3 st	27.9	9 (Photos 9 and 4).
BAYAMBANG Rd 2 Branch NW (left) is Rou 253 to San Carlos. Branc NE is Route 252 to Carme	en	36.	0 (Photo 2).
		23	

#### ROUTE 251-Continued

Detail		nce from mortis ml	Class and Terrain
AGNO R. No bridge at this crossing. Originally TW 385 x 10 x 4. Fordable dry weather 200 yds west old bridge site. 2ft x 30 to 50ft; 2-knot current. Shifting sandy bottom. Banks about 15ft high, but many old approaches.	63.7	39.5	1-LANE, AW, GRAVEL SURFACE.
Prov Bdry PANGASINAN- TARLAC.	65.7	40.7	
CAMILING Rd X with Routes 13A and 55H. 159.4 km (99.0 ml) to Manila.	72.8	45.1	(Photos 10 and 4).
_	e 251	ends her	·e.

### ROUTE 252.

Summary: From Bayambang (15°49'N; 120°27'E) on Route 251 runs NE for 19.0 km (11.8 ml) to Carmen on Route 3F; 3G. A main E/W connecting link over Agno R and along its south (left) bank.

Detail	Distance Bayam km	bang	Class and Terrain
BAYAMBANG Rd X. Route 252 runs NE from Route 251.	00.00	00.00	1-LANE, AW, GRAVEL SURFACE. Flat plain, mainly paddy field. Agno R a short distance north of road.
AGNO R. S and C bridge. 532 x 16 x 18 (4 spans).	0.2	0.1	(Photo 2).
ALCALA	9.6	5.6	
SANTO TOMAS	17.0	10.6	Airfield on north side of road.
CARMEN. Joins Routes 3F: 3G and 8.	19.0 Route 252	11.8	

# ROUTE 253

Summary: From a Rd June on Route 273, 1.3 km (0.8 ml) SE of San Carlos (15°56′N; 120°21′E), Route 253 runs SE for 16.8 km (10.5 ml) to Bayambang on Route 251. Southern portion seasonal road.

Detail	Distance San Ca km	from rlos ml	Class and Terrain
SAN CARLOS on Route 273. Go SE.	00.00	00.00	1-LANE AW GRAVEL SURFACE. Flat culti- vated plain.
Rd Junc. Route 273 continues eastwards. Route 253 runs SE (right).	1.3	0.8	
Rd Junc. Seasonal branch runs southwards to AGNO R.	5.3	3.3	
MABOLOTAC R. Bridge	6.1	, 3.8	
Small bridge	7.3	4.5	
,, ,,	10.1	6.3	
,, ,,	10.4	6.5	
,, ,,	11.7	7.3	1-LANE AW ENDS. SEASONAL ROAD BE GINS.
	17.3	10.8	8 SEASONAL ROA ENDS. 1-LANE A' BEGINS.
BAYAMBANG Rd Jun	e 18.3	11.	4 (Photo 2).
on Route 251.	Route 2	253 end	ls.

#### ROUTE 254

Summary: From Sta Barbara (16°00'N; 120°24'E) on Route 251, runs SE for 19.3 km (12.0 ml) to Urdaneta on Route 3G. A newly constructed 2-lane AW road link between two main N/S roads in Central Pangasinan.

Detail		ce from arbara ml	Class and Terrain
STA BARBARA on Route 251. Go SE.	00.00	00.00	2-LANE AW. NEW CON- CRETE CONSTRUC- TION. (Photo 4).
CATABLAN R. CG 140 x 16 x 32 (5-span).	10.6	6.6	Flat cultivation; rice paddies and sugarcane. Some coconut palms in villages.
	17.8	11.1	End of concrete road. 2-LANE AW GRAVEL OR BLACKTOP.
URDANETA Rd X on Route 3G.	19.3 Route 25	12.0	

#### ROUTE 255.

Summary: From San Jacinto (16°04'N; 120°26'E) on Route 251, runs SE for 19.3 km (12.0 ml) to Urdaneta on Route 3G. 1-lane AW throughout. All streams said to have temporary wood bridges Largest river is Mitura, 1½ mls NW of Urdaneta, TW 194 x 10.

Terrain flat cultivation throughout.

Manaoag Rd Junc is 6.4 km (4.0 ml) SE of San Jacinto. Here Route 268 runs NE (left) to Route 3G.

#### ROUTE 256.

Summary: From Lingayen (16°01'N; 120°14'E) Route 256 runs eastwards via Calmay R bridge and Dagupan for 24.1 km (15.0 ml) to Mangaldan on Route 251.

An important E/W link near southern shore of Lingayen gulf.

Detail		ce from gayen ml	Class and Terrain
LINGAYEN. Go ea (Photo 3).	st. 00.00	00.00	2-LANE, AW, BLACK-TOP. Low-lying rice paddies and fish ponds. Calmay R south of road.
BINMALEY Rd Jun Branch north to coast.		2.4	and the space of road
River CG 197 x 18 x (6-span).	12 4.1	2.5	

# ROUTE 256-Continued

Detail -	Distance : Lingay km	from en ml	Class and Terrain			
Rd June. Branch east (left) is old main road to Dagupan.	4.6	2.8	1-LANE, AW. BLACK- TOP probably ends. GRAVEL begins. Rice paddies, fish ponds and lowlying swampy areas off road.			
CALMAY R. CG 178ft long.	6.0	3.7				
Rd June. Branch SE (ahead) is Route 261 to SAN CARLOS. Route 256 turns NE (left).	6.2	3.8				
River STs. 235 x 20 (1-span).	8.0	5.0				
DAGUPAN. Route 257 rejoins from west.	12.9	8.3	1-LANE, AW, GRAVEL SURFACE. (Photos 3 and 4).			
QUINTOS Bridge CG 275 x 20 (7-span). Cut-off SE from eastern end of bridge to Route 260.	13.0	8.4	Fish ponds both sides.  Movement off road is impracticable.			
Rd Junc. Branch south (right) is Route 260 to CALASIAO. Road north to coast. There are two weak wooden bridges on latter road.	13.1	8.6				
RRX	14.3	8.9				
River CG 186 x 16 x 12	16.0	9.9	Flat cultivation. Rice paddies, cornfields and sugarcane both sides of road.			
New cut-off. Old road branches right.	16.1	10.1	The state of the s			
Rd Junc. Old road rejoins from right.	19.9	12.6				
Rd Junc. Branch east (ahead) is Route 251. Turn south (right).	23.0	14.5				
MANGALDAN		15.0				
Hilliam	Route 2	56 end	8.			

#### ROUTE 257

Summary: From Dagupan (Photo 3) (16°03'N; 120°20'E), runs west for about 8 km (5.0 ml) to Route 256 near Binmaley.

Originally said to be 2-lane AW blacktop throughout, but little used since bridge at Calmay destroyed in 1936, and replaced by power-driven ferry, capacity 6 trucks or 125 persons; good approaches.

#### ROUTE 258.

Summary: From Calasiao (16°01'N; 120°21'E) runs e astwards abou 6.4 km (4 ml) to Sta Barbara on Route 251. (Photo 4).

It was a new 2-lane AW concrete road with a concrete bridge 34 x 16 a mile east of Calasiao.

#### ROUTE 259.

Summary: From Bulog Rd June on Route 260, 2.7 km (1.7 ml) south of Calasiao (16 01'N, 120 21'E) runs SE 6.4 km (4.0 ml) to Macabito on Route 251. 1-lane, AW, gravel surface.

#### ROUTE 260.

Summary: From Dagupan (16°03'N, 120°20'E) on Route 256, runs SE then SW for 14.4 km (9.0 ml) to San Carlos.

Carlotte and the second			
Detail	Distance Dagu km		Class and Terrain
Rd June on Route 256 east of DAGUPAN. Go south.	00.00	00.00	1-LANE, AW, BLACK-TOP. Flat lowlying country. Rice paddies and fish ponds. (Photos 3 and 4).
Rd June. Cut-off to bridge rejoins from NW (right).	0.6	0.2	
CALASIAO. Rd June east of church. Branch NE (left) is Route 258 to Santa Barbara. 90° turn at junction then another 90° turn in front of church. Go south.	4.3	2.7	1-LANE, AW, BLACK-TOP ENDS; GRAVEL BEGINS. Flat cultivation. Coconuts close to road.
MAYRUSO R. CG 260 x 16 x 17.	4.6	2.9	
Rd June. Branch SE (left). Road is Route 259 to MACABITO. Route 260 turns SW.	7.2	4.5	

# ROUTE 260-Continued

Detail	Distance Dagup km		Class	and Terrain
MALABAGO R. TW 138 x 10 x 16.	8.8	5.5		
Rd June. Branch NE (left) is Route 275 to MACA-BITO.	13.6	8.5		
SAN CARLOS. Rd X east of church. Branch NW (right) is Route 261 to LINGAYEN. Branch SW (right) is Route 262 to MANGATAREM. Branch road SE to MALASIQUI and BAYAMBANG (253 and 273).		9.0	(Photo 4	

### ROUTE 261.

Summary: From Calmay R bridge, 2.0 km (1.3 ml) south of Binmaley (16°02'N; 120°16'E), runs SE about 12 km (7½ mls) to San Carlos. (Photo 4).

It is 1-lane, AW, gravel surface, about 14ft wide with temporary wood bridges 9ft wide at streams.

### ROUTE 262.

Summary: From San Carlos (15°56'N, 120°21'E) runs SW for 19.3 km (12.0 ml) to Mangatarem (Photos 1 and 2) on Route 13B. It is 1-lane, AW, throughout, with a steel and concrete bridge 210 x 16 at San Juan, 2.4 km (1.5 ml) SW of San Carlos and a ferry crossing on Agno R about 0.8 km (0.5 ml) south of Urbiztondo. (Photo 4).

## ROUTE 263.

Summary: From Rosales (15°54'N; 120°38'E) on Route 8, Route 263 runs NE for about 22.5 km (14.0 ml) to Tayug. Said to be 1-lane, AW, gravel surface. Temporary wood bridges 9ft wide at streams.

### ROUTE 264.

Summary: From Urdaneta (15°59'N; 120°34'E) on Route 3G, Route 264 runs east and SE for 37.0 km (23.0 ml) to Umingan, via Asingan and Tayug.

1-lane AW throughout; a useful alternative route to Route 8.

### ROUTE 264—Continued

Detail	Distance Urdan km	neta	Class and Terrain
URDANETA, on Route 3G. Route 264 runs east.	00.00	00.00	1-LANE, AW. Flat cultivated plain.
ASINGAN. Rd Junc. Branch NW is Route 265 to BINALONAN. Branch north is Route 267 to SAN MANUEL. Route 264 turns SE then NE.	11.3	7.0	
AGNO R. Two ferry crossings, may be impassable in high flood. In dry season two collapsible bridges were used.	17.7	11.0	Road very sandy.
TAYUG Rd X. Branch NE (left) Route 277 to Villa Verde trail. Branch ENE about 6.5 km (4.0 ml) to NATIVIDAD. Route 264 turns SE.	20.1	12.5	1-LANE, AW.
Rd June. Branch SW (right) is Route 263 to ROSALES.	20.9	13.0	1-LANE, AW, GRAVEL SURFACE.
SAN QUINTIN, terminus of RR from PANIQUI, TARLAC.	29.8	18.5	Rolling grassland or cultivation.
UMINGAN on Route 8	37.8	23.5	
I.	Route 264	ends.	

#### ROUTE 265.

Summary: From Rd June on east loop of Route 3, 1.2 km (0.75 ml) south of Binalonan (16°03′N; 120°35′E), runs SE 9.7 km (6.0 ml) to Asingan on Route 264. 1-lane, AW, gravel surface throughout; cultivated plain.

### ROUTE 266.

Summary: From Binalonan (16°03′N; 120°35′E), runs east 8.9 km (5.5 ml) to San Manuel on Route 267. 1-lane, AW, gravel surface. Streams had temporary wood bridges, largest 99 x 11 about 2 km (1.2 ml) west of San Manuel.

### ROUTE 267

Summary: From San Manuel (16°04'N; 120°40'E) runs south 6.4 km (4.0 ml) to Asingan on Route 264. 1-lane AW.

### ROUTE 268.

Summary: From Manaoag (16°03'N; 120°29'E) on Route 255, runs NE 11.3 km (7.0 ml) to Pozorrubio on Route 3G.

Detail	Distance from Manaoag km ml		Class and Terrain
MANAOAG on Route 255. Route 268 runs NE.	00.00	00.00	1-LANE, AW, GRAVEL SURFACE. In excep- tionally wet weather stretches of the road may
SAPANG. PAO R. S and C 322 x 20 x 27 (4-span).	2.5	1.5	be under water. Cultivated plain. Ricc paddies, bananas, and sugarcane both sides o road. Terrain low and marshy and probably
PAO. Rd June. Branch east (right) is Route 276 to Binalonan.	3.5	2.1	
POZORRUBIO. Branch roads to north and SE con necting to Route 3G.		7.0	

### ROUTE 269.

Summary: A short road link between Routes 7G and 13B, avoiding the ferry at Agno R and skirting the lowlying swampy areas close to Agno R. Road is said to be elevated above flood levels and asphaltsurfaced. All streams are spanned by TW bridges. These are small with the exception of one, situated one mile west of the junction with Route 13B. This bridge was 305 x 10.

Note.—Routes 270, 271, 272 in NW Pangasinan (see Handbook No. 42: Zambales-Bataan).

### ROUTE 273.

Summary: From San Carlos (Photo 4) (15°56'N; 120°21'E) runs east 7.2 km (4.5 ml) to Malasiqui (Photos 4 and 9) on Route 251. 1-lane AW gravel surface. All streams were bridged. RRX 11 mls west of Malasiqui. (Photo 9).

#### ROUTE 274

Summary: From Malasiqui (Photos 4 and 9) (15°55′N; 120°25′E) on Route 251, runs east 20.9 km (13.0 ml) to Villasis on Route 3G.

1-lane AW gravel surface for first 8 km (5 ml) thence about 9.7 km (6.0 ml) seasonal through low hills via Unzad; thence SE 3.2 km (2 ml) of 1-lane AW gravel surface to Villasis on Route 3G.

#### ROUTE 275.

Summary: From San Carlos (Photo 4) (15°56'N; 120°21'E) runs NE 6.4 km (4 ml) to Route 259 near Macabito. 1-lane AW gravel surface.

#### **ROUTE 276.**

Summary: From Pao (16°03'N; 120°31'E) on Route 268, runs east 9.7 km (6 ml) to Binalonan on Route 3G, 1-lane AW gravel surface.

About 1.6 km (1 ml) east of Pao a STs 166 x 17 (I-span) was over Immanduyan R.

#### ROUTE 277.

Summary: From Tayug (16°02'N; 120°45'E) on Route 264 runs NE 9.7 km (6.0 ml) to Cabalican R. 1-lane AW. From here a trail continues to Imugan, Nueva Vizcaya; no details of work done on proposed road.

#### **ROUTE 278.**

Summary: From Binday (16°06'N; 120°28'E) on the Bued R a 1-lane AW road runs WSW for 5.0 km (3.1 ml) to Route 251, SE of San Fabian.

Soil said to be sandy; abaca and sugarcane each side of road.

#### ROUTE 279.

Summary: From San Fabian (16°08'N; 120°24'E) runs SW and SE to Mangaldan. Said to be of recent construction, the southern half only being AW. No bridge over Bued R SW of San Fabian.

### 4. DETAILED DESCRIPTION OF TRAILS.

# Trail No. 13: Santa Cruz to San Clemente (3 days):

Commencing at SANTA CRUZ (15°46'N; 119°55'E) on the Zambales coast near Prov Bdry ZAMBALES-PANGASINAN. Go east for about 9 miles to Filipinas Mining Co. This section was a rough jeepable trail with several steep pinches, and may now be badly washed out.

Trail 13 continues eastwards. Well-beaten foot trail with fairly easy

grades, mostly in fairly heavy forest.

High point is about 3,000ft elevation some 3 miles east of Acoje Mining Co. It turns NE, descending by easy grades for about 4 miles to a trail junction. A branch trail continues NE and eastwards to MANGATAREM on Route 13B; Trail 13 turns eastwards, descending by fairly easy grades to the lowlands at SAN CLEMENTE on Route 13B.

No recent information has been obtained concerning the condition of these trails.

# 5. HIGHWAY MILEAGES BETWEEN MAIN POINTS ON LUZON.

	MANILA (Manila)	APARRI (Cagayan)	BAGUIO (Benguet)	BATANGAS (Batangas)	CABANATUAN (Nueva Ecija)	LEGASPI (Albay)	LINGAYEN (Pangasinan)	SAN FERNANDO (Pampanga)	TARLAC
MANILA (Manila)	0	368	157	72	73	320	128	41	77
APARRI (Cagayan)	368	0	339	440	293	688	329	338	309
BAGUIO (Benguet)	157	339	0	229	107	477	60	116	80
BATANGAS (Batangas)	72	440	229	0	145	282	200	113	150
CABANATUAN (Nueva Ecija)	73	293	107	145	0	394	91	46	30
LEGASPI (Albay)	320	688	477	282	394	0	448	361	397
LINGAYEN (Pangasinan)	128	329	60	200	91	448	0	88	52
SAN FERNANDO (Pampanga)	41	338	116	113	46	361	88	0	37
TARLAC (Tarlac)	77	309	80	150	30	397	52	37	0

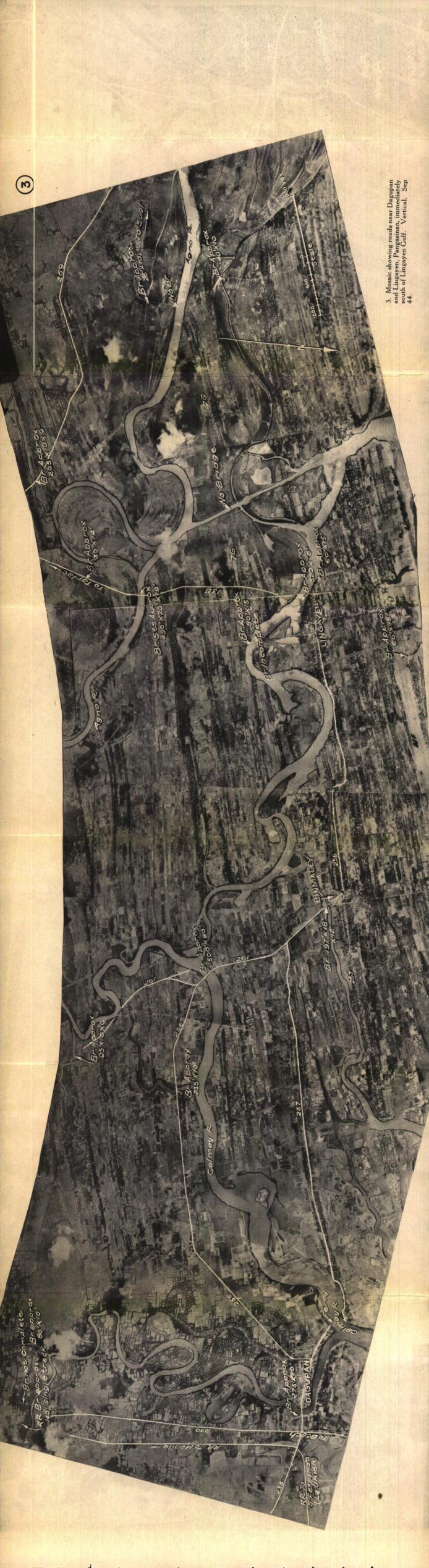
## ROAD DISTANCES FROM LINGAYEN.

Approximate shortest road distances from Lingayen.

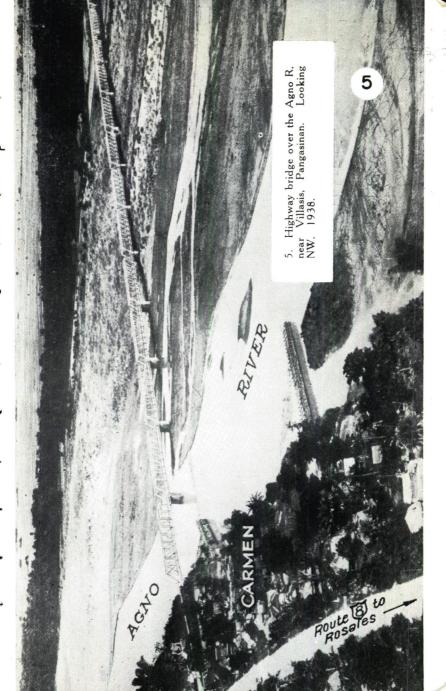
(Province and main route number shown in brackets)

(Pang — Pangasinan ; Nv.Ec. — Nueva Ecija ; Tar — Tarlac)

	* *		1	
Town			Lingay	
			Km	ml
			0= 0'	10
AGNO (Pang 271)	• •		67.6	42
AGUILAR (Pang 13B)			16.1	10
ALAMINOS (Pang 7G)			38.6	24
ALCALA (Pang 252)	Een		49.9	31
ANAO (Tar 87)			78.9	49
ANDA (Pang off 272)			74.0	46
ASINGAN (Pang 264)			56.3	35
BALUNGAO (Pang 8)			64.4	40
BANI (Pang 270)			53.1	33
BAUTISTA (Pang 252)	,		43.5	27
BAYAMBANG (Pang 251)			41.8	26
BINALONAN (Pang 3G)			48.3	30
BINMALEY (Pang 256)			4.8	3
BOLINAO (Pang 272)			78.9	49
BUGALLON (Pang 13B)		.,	8.0	5
BURGOS (Pang 7G)			61.1	38
CALASIAO (Pang 258)			17.7	11
CAMILING (Tar 13A)			48.3	30
CARMEN (Pang 3F)			54.7	34
CUYAPO (Nv Ec 87)			77.3	48
DAGUPAN (Pang 256)			12.9	8
DAMORTIS (Pang 3H)			48.3	30
DASOL (Pang 7G)			69.2	43
GERONA (Tar 3F)			88.5	55
GUIMBA (Ny Ec 15)			95.0	59
INFANTA (Pang 7G)			90.1	56
LABRADOR (Pang 7G)		7.	12.9	8







# ROAD DISTANCES FROM LINGAYEN—Continued

Town	*	Linga Km	yen Ml
MABINI (Pang 7G)		49.9	31
MALASIQUI (Pang 251)	7.	27.4	17
MANAOAG (Pang 255)	1	35.4	
MANGALDAN (Pang 251)		24.1	15
MANGATAREM (Pang 13B)		30.6	19
MAPANDAN (Pang off 251)		33.8	21
MAYANTOC (Tar 85)		57.9	36
MONCADA (Tar 3F)		72.4	45
NAMPICUAN (Nv Ec 87)		80.5	50
NATIVIDAD (Pang off 264)		72.4	45
PANIQUI (Tar 3F)		78.9	49
POZORRUBIO (Pang 3G)		46.7	29
PURA (Tar 84) /		95.0	59
RAMOS (Tar 55G)		85.3	53
ROSALES (Pang 8)		59.6	37
SAN CARLOS (Pang 262)		19.3	12
SAN CLEMENTE (Tar 13B)		43.5	27
SAN FABIAN (Pang 251)		35.4	22
SAN JACINTO (Pang 251)		29.0	18
SAN JOSE (Nv Ec 5D)		104.6	65
SAN MANUEL (Pang 266)		57.9	36
SAN MANUEL (Tar 3F)		64.4	40
SAN NICOLAS (Pang 277)		70.8	44
SAN QUINTIN (Pang 264)		75.6	47
SANTA BARBARA (Pang 251)		24.1	15
SANTA IGNACIA (Tar 13A)		57.9	36
SANTA MARIA (Pang 263)		72.4	45
SISON (Pang 3G)		56.3	35
SUAL (Pang 7G)		20.9	13
TARLAC (Tar 3E)		83.7	52
TAYUG (Pang 264)		66.0	41
UMINGAN (Pang 8)		80.5	50
URBIZTONDO (Pang 262)		33.8	21
URDANETA (Pang 3G)		43.5	27
VILLASIS (Pang 3G)		53.1	33
VICTORIA (Tar 83)		98.2	61
nr.			

# AIRFIELDS AND POSSIBLE AIRFIELD SITES

(Map 3; Photo 6.)

### A.—AIRFIELDS:

There are only two airfields in the area covered by this Handbook -Rosales and Villasis, both pre-war fields. Intelligence reports state that the former field has been improved by the enemy and may now be operational. The latter site has been abandoned.

(Airfields 1-25 are covered in Terrain Handbooks 40, 41, 42.) 26.—ROSALES, PANGASINAN—15°53'N., 120°36'E. 26ft ASL.

At barrio Carmen, S of Agno R, and 250 yds from Plaridel (Villasis) bridge, 3 mls W of Rosales.

History and Status:

Commercial National Airport. Probably made operational, or is under construction, by the Japanese.

Area 5670ft x 2494ft with a clipped grass NE/SW runway of 3630ft x 330ft on grassy clayish loam.

A few hundred feet farther may be possible on SW end. To NE length of field could be doubled by crossing Route 3.

Flat cultivated land with scattered areas of short timber interspersed with coconut trees. Paralleling length of the strip some 200 yds N is Agno R. Mt Balungao (1237ft), 4 mls SE, is the nearest high ground.

Engineer Materials:

Water and sand are available from Agno R.

Installations:

Japanese planned barracks for 300. On 25 Jul 44 it was reported 26 barracks and 24 revetments were completed.

Communications:

Adjoining National Highways 3 and 8. Railroad at Rosales travels N to Dagupan and S to Manila.

27-VILLASIS, PANGASINAN-15°52′30″N., 120°35′E. Non-operational.

Location:

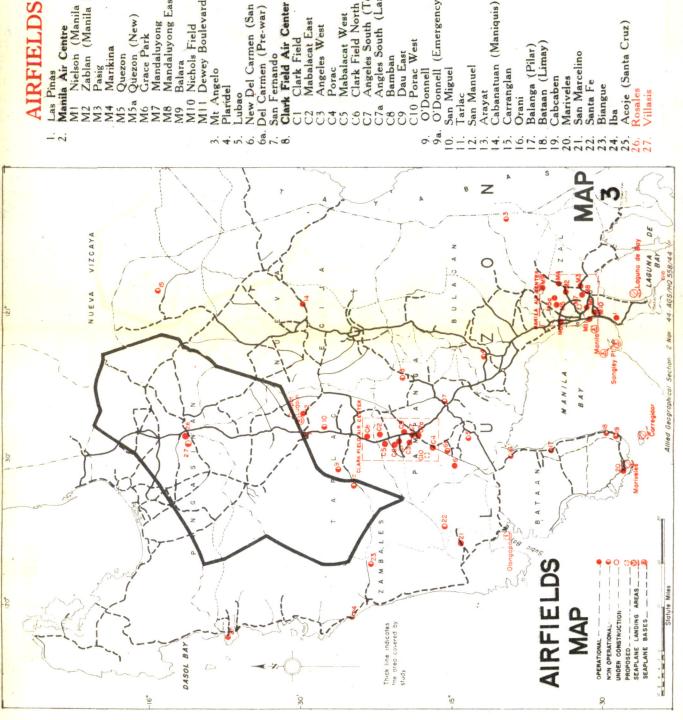
On S bank of Agno R, between barrios Carmen and Sto Tomas, only a few hundred yards west of Plaridel (Villasis) bridge, and approximately 1 ml W of Rosales A/F.

History and Status:

Emergency landing field. Has deteriorated since establishment of Rosales A/F.

Runways:

E/W 2100ft. x 186ft.



Manila Air Centre

Zablan (Manila North) Nielson (Manila East) Quezon (New) Marikina Quezon Pasig

Mandaluyong East Mandaluyong Balara

Mill Dewey Boulevard Nichols Field

New Del Carmen (San Jose) Del Carmen (Pre-war)

Clark Field Air Center Clark Field

Mabalacat East Angeles West

Mabalacat West

Angeles South (Telabastagan) Angles South (Lara) Clark Field North

Dau East Bamban

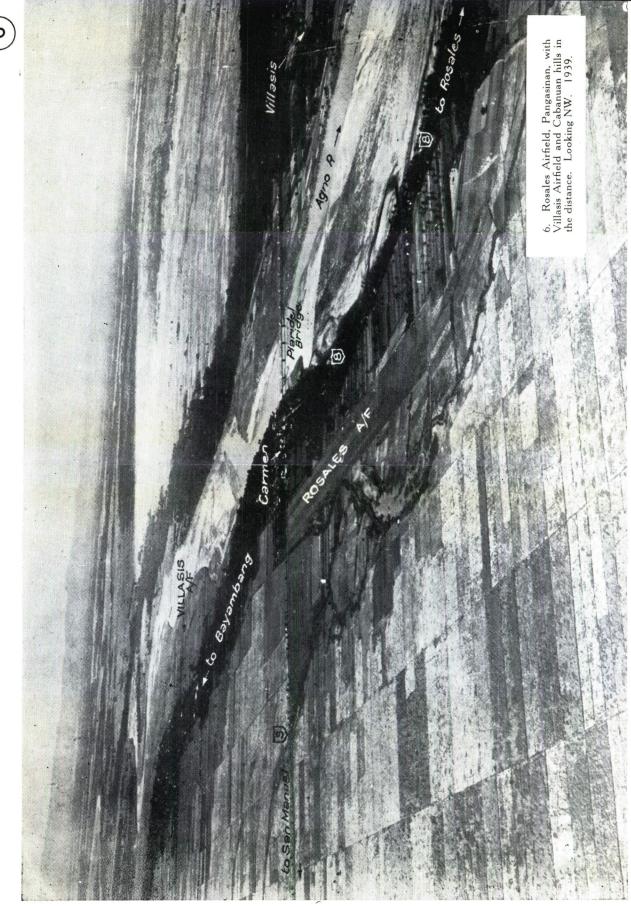
O'Donnell (Emergency)

San Manuel

Balanga (Pilar)

San Marcelino

Acoje (Santa Cruz)





Extensions:

Possible to the west.

Terrain:

Field runs lengthwise along southern bank of Agno R. Surrounding terrain is flat cultivated land with scattered areas of short timber interspersed with coconut trees.

Engineer Materials:

Water and sand are available from Agno R.

Communications:

Almost adjoining Route 252 and a few hundred yards W of Route 3. Railroad is at Rosales 5 mls E.

### B.—POSSIBLE AIRFIELD SITES:

### CENTRAL LUZON PLAIN:

Extends from Lingayen Gulf, on north, to Manila B, on south. Practically the whole plain is cultivated in rice, sugar, corn, etc. During dry season, movement of all kinds is easy, but during the wet or rice-growing season, much of the area is naturally or artificially irrigated, and it is then that ricefields would make movement of wheeled vehicles difficult.

Many large airfields could be developed in cane-covered areas and, with effective drainage, some of the rice-growing land could be rendered suitable for airfield construction.

# SECTION 4 GENERAL PHYSIOGRAPHY

(Rivers, Lakes, Swamps, Vegetation) (Maps, 4, 5; Photos 7, 8)

### 1. PHYSIOGRAPHY:

Main features are the southern extremities of the Cordillera Central (Caraballo Mts) to north, the Central Plain, and Zambales Range to west.

i.—Cordillera Central:

Rises abruptly from northern edge of Central Plain, attaining 1000-2000ft. along northern boundary of Pangasinan Prov, and more than 5000ft near Nueva Ecija Prov boundary. Terrain rough, and with exception of relatively broad valley of Agno R, rivers are deeply incised in steep-walled valleys and subject to flash floods after heavy rain.

Vegetation is a mixture of grassland and forest; movement for

MT and troops generally difficult.

ii.-Central Plain:

Comprises northern portion of great plain that extends 120 mls from Lingayen Gulf to Laguna de Bay. Plain is about 40 mls wide and low and level, with exception of low Cabaruan Hills north of Agno R, and nearly isolated outliers of Mt Balungao (1056ft) and Mt Bangcay (1312ft). Plain is intensively cultivated, mainly in rice, and supports heavy population.

Movement in general across plain is fairly free, especially in dry season. In wet season movement is difficult after heavy precipitation.

Main obstacles are wet rice paddies, and deep, broad Agno R.

iii.—Zambales Range:

Range flanks Central Plain on west, from which it rises fairly sharply to leave relatively narrow foothills belt. Range is rugged, attaining elevations of over 6000ft. Valleys are deep and V-shaped, with steep gradients which gradually flatten and expand as they enter Central Plain.

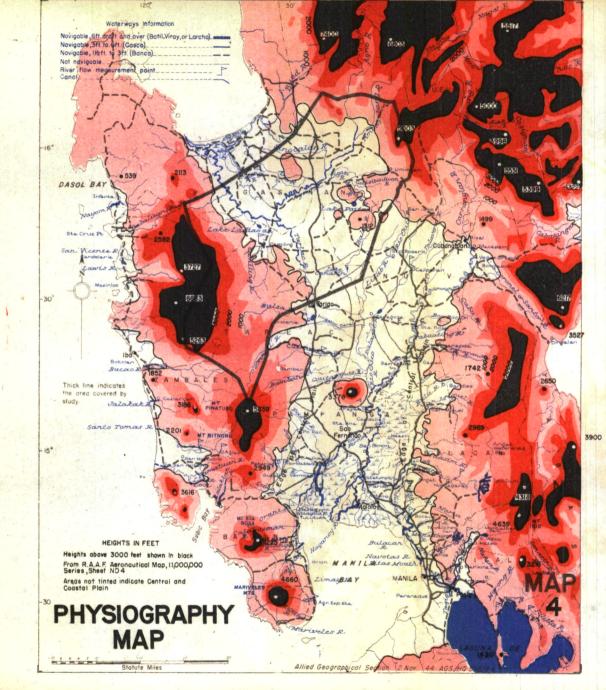
Range is heavily forested, with extensive grasslands along foothills. Movement in mountainous zone is very difficult, but less restricted in foothills, especially on river flats. Main obstacles are the larger streams, subject to floods during wet season from May to Oct, but fordable during dry season from Nov to May.

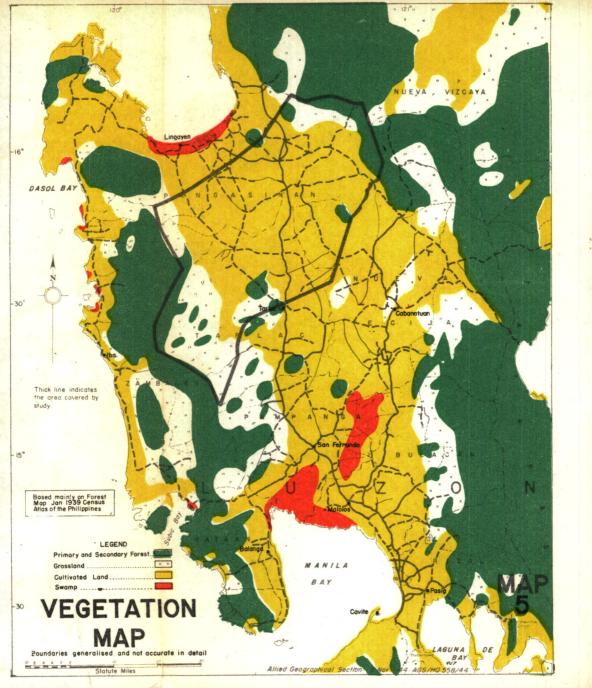
### 2. RIVERS:

i.-Agno R:

Rises in Cordillera Central, meanders SW across Central Plain toward foothills of Zambales Ra, then flows north into Lingayen Gulf. It thus cuts across all roads to the south with exception of Lingayen-Camiling Rd (National Highway 13) and forms formidable barrier across plain.

Subject to sudden rises and overflow, flooding vast areas. In lower reaches it flows through swampy delta but about 15 mls from





mouth flows through better drained terrain with banks about 10ft

high.

Mouth is obstructed by bar having minimum depth of 6ft at LW. If entrance channel were deepened vessels drawing 8ft can ascend 15 mls. Craft drawing 3ft can ascend about 50 mls to Bautista, and bancas about 75 mls.

ii.—Tarlac R:

Formed at confluence of Bulsa and O'Donnell Rs, draining eastern slopes of Zambales Ra, flows along foot of range to join Ango R. The Bulsa and O'Donnell with its tributary the Bangat (Bantag), are winding streams with sandy beds between steep grassy mountain spurs with patches of forest, and subject to flash floods in the rainy season.

Tarlac is wide and slow-flowing, with low banks covered in seattered bamboo clumps. In wet season it overflows and inundates a large area, stopping all traffic movement off built-up roads or railways.

There is a concrete dam on O'Donnell R near Armenia. From dam, an irrigation canal about 15ft wide and 4ft deep extends eastward for about 12 mls. This canal is an obstacle to MT, but could be easily bridged. Its destruction would flood small local areas.

iii.—Camiling R:

A small river in northern Tarlac flowing northwards to Agno R. Near confluence with Agno R is joined by Byantig R, which has parallel course to Camiling R. Both rivers are important obstacles. iv.—Smaller Streams:

Numerous small streams drain into Central Plain from Zambales Ra and Cordillera Central; none is large enough to constitute serious obstacle, but all are subject to flash floods after heavy rains.

### 3. LAKES:

None of any military importance in the area.

Lake Paitan (Nueva Ecija): A small lake about 1.71 sq. ml in low gap between Mt Bangcay and Mt Balungao.

Lake Canarin (Tarlac): Has area of about 0.5 sq. mls with a swampy fringe about half a mile wide.

### 4. SWAMPS:

No permanent swamps of any consequence in area. Large areas in vicinity of Agno and Tarlac Rivers are liable to flooding in wet season; during storms are associated with typhoons.

### 5. VEGETATION:

### i.-Forest:

Primary forest confined mainly to higher slopes and valleys of Zambales Ra and Cordillera Central, including patches of pine forest and moss forest. Along its edges primary forest replaced largely by secondary forest.

Forest provides good cover and concealment, but all movement severely impeded, especially in secondary forest.

ii. Grassland:

Mainly of cogon-type covering almost the entire foothills zone of Zambales Ra and Cordillera Central; grows thickly, is easily burned in dry season.

Affords partial cover for foot troops, but none from aerial obser-

vation. Where terrain permits, MT could operate fairly freely.

iii.—Cultivation:

Concentrated mainly on Central Plain, main crop being rice with fair amount of sugarcane: coconuts relatively scarce; bamboo clumps. and fruit and vegetable gardens widespread.

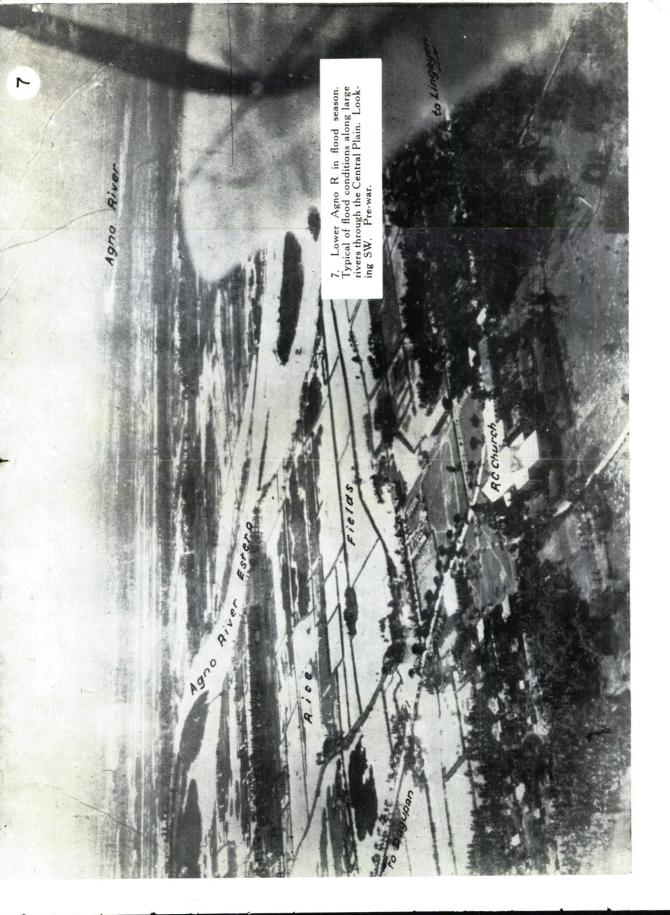
Rice paddies separated by small dikes to a few feet high. Paddies firm and dry from Nov to May, wet and impassable for MT from

May to Oct.

Sugarcane is cultivated mainly in Tarlac Prov; all stages of growth likely to be encountered at any time. Mature cane provides

good cover for troops, but is difficult to penetrate.

Bamboo clumps are common along river banks and near settlements; provide cover and concealment for troops and MT, but very difficult to penetrate.



8. Central Luzon Plain from vicinity Dalayap, Pangasinan. Looking NW. Pre-war.

# POPULATION, ADMINISTRATION, TOWNS AND BARRIOS

(Maps 6, 6A; Photos 9, 10)

### A. POPULATION.

### 1. GENERAL:

Within the boundaries of this area are 36 municipalities and part of three provinces. Distribution of population can best be seen by reference to C—Towns, this Section. Population figures are according to 1939 Census.

### 2. EUROPEAN (88):

European population—American, Spaniards, Germans and some few other nationalities—comprised only a small percentage of the people in this area before 1940. Most of them were interned after Japanese occupation.

### 3. ASIATIC (1428):

Chinese comprised majority of Asiatics in this area. They controlled retail food trade in most municipalities. An important Chinese center is Dagupan, 8 mls due north of San Carlos.

Other Asiatics were Japanese and British Indians. Prior to 1940, their number was small and influence negligible.

### 4. NATIVES (577,807):

Majority of the native population are Christian Filipinos. Principal division into groups is one of dialect. Predominant groups are Pangasinans, Ilocanos, and Negritos or Ilongots. Majority of the settlers in Tarlac comprise the industrious Ilocanos.

### 5. NEGRITOS:

Primitive and pagan Negritos are found in small numbers in western mountains of Pangasinan and high mountain forest of Tarlac.

### 6. LANGUAGE:

Tagalog, most important language in this area, has been adopted by Japanese as official tongue in conjunction with Japanese language. Second language of importance is Iloko (Ilocoino).

Next in importance are Spanish and English, which were the official

judicial and governmental languages.

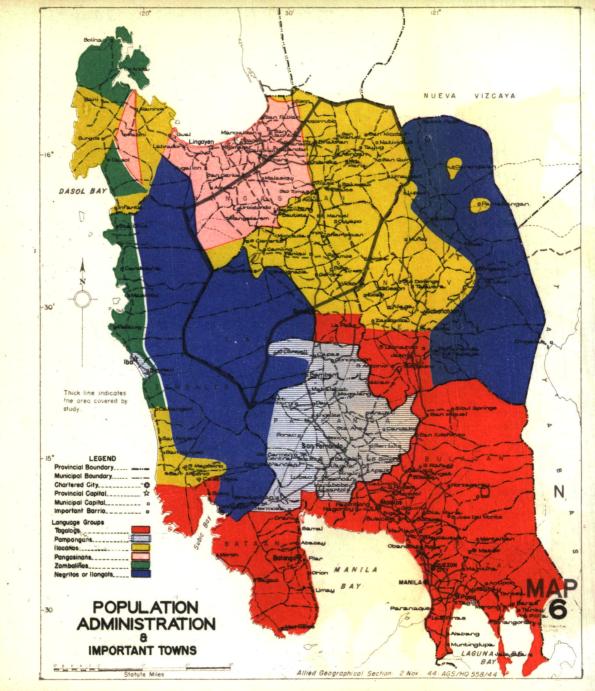
### 7. SYMPATHIES:

Most of native peoples are known to be pro-American but, due to the easy-going nature of the Filipinos, any organised revolt is unlikely under Japanese rule.

# POPULATION FIGURES

(See Map 6)

			(bee hap	0,1	Municipality.	Poblacion.
NUEVA ECIJA F	ROVI	NCE			A PER COLOR	
CUYAPO	17-1				24,570	5,122
GUIMBA			1000		27,681	3,655
PANGASINAN P	POVIN	CE				
		OL			8,178	2,130
AGUILAR	**				12,697	1,516
ALCALA	**				19,571	2,703
BALUNGAO					10,912	1,115
BAUTISTA					7,203	2,037
BAYAMBANG					25,578	2,960
BINALONAN					19,736	2,610
MALASIQUI					33,660	3,202
MANGATAREM		1			18,658	3,373
NATIVIDAD					9,946	1,104
ROSALES	P. C.				15,837	4,119
SAN CARLOS					47,334	5,835
SAN MANUEL			-		15,662	4,527
					16,088	3,469
SAN NICOLAS					12,833	3,594
SAN QUINTIN					10,295	1,172
SANTA MARIA		• • •			3,147	475
SANTO TOMAS					16,222	3,707
TAYUG				٠.	24,960	2,937
UMINGAN				٠.	11,159	1,424
URBIZTONDO					29,120	3,276
URDANETA				٠.	10 450	3,213
VILLASIS				١.,	10,402	0,210
TARLAC PROV	INCE					
ANAO						1,663
CAMILING					25,824	6,006
GERONA						2,004
MAYANTOC					7,196	1,298
MONCADA					12,518	2,372
PANIQUI					. 19,124	5,225
PURA					. 7,005	1,314
RAMOS					4,035	1,262
SAN CLEMEN					. 3,199	714
SAN MANUEL					. 5,919	345
SANTA IGNA					10.009	1,420
VICTORIA					. 19,575	5,610



### B. ADMINISTRATION.

### 1. PRE-WAR:

Before the Japanese occupation the government of the Philippines was republican in form. Official seat of government was Manila.

National Government was divided into executive, legislative and judicial powers.

Local government was effective over 48 provinces and 12 chartered cities.

Provinces were divided into municipalities comprising a poblacion (central village) and several barrios (secondary villages).

Each individual province had a Provincial Board—a provincial governor and two members elected by the people.

In the portions of three provinces dealt with in this Handbook there are 36 municipalities and no chartered cities.

### 2. SINCE ENEMY OCCUPATION :

Soon after occupation the Japanese High Command established a Philippines Executive Commission with Japanese "advisors" attached to each department. Commission carried on work of government for almost 2 years from 23 Jan 42 to 14 Oct 43.

In Dec 42 Japanese sponsored organisation known as Kalibapi, whose main concern was propaganda.

On 18 Jun 43 a Japanese-sponsored commission brought out a draft for the New Puppet Republic and the document was ratified without recourse to people by a Kalibapi convention. On 14 Oct 43 the New Republic came into being.

Under the New Republic the president is elected by National Assembly and not by public plebiscite, and greater powers are vested in him.

Pattern of local government is the same, but control is more nationalized; Provincial Governors are now presidential appointees and not elected by the people.

Japanese have appointed some mayors but there are no reports of organised municipal governments in this area.

# C. POPULATION, AND TOWN INFORMATION.

N 5]		The state of the s				
	General	Mountains NE. Low and marshy south and west.	Low, rice paddies.	Unimportant. Low plain.	Very important road junc. Rice land, rolling.	Low flat area, rice and sugar- cane land.
Grand	Communi- cations	Telephone and tele- graph.	Telephone Low, and tele- graph.	Telephone and tele- graph.	Telephone and tele- graph.	LD tele- phone and tele- graph.
	Supplies (	Electric plant, diesel 38 kw. Farming.	Electric plant, diesel 40 kw. Small rice mill.		Electric current from Dagupan. Rice mill, cap- acity 1,200 sacks palant aliv. Ice plant. Small cir- cular sawmill.	Electric current from Paniqui. Small rice mill.
	Water Supply	Mostly surface wells. A few art. wells.	Mostly shallow wells. A few art. wells. Hand pump.	Mostly surface wells.	Mostly surface wells. Some piped and some art, wells.	Mostly surface wells. Some art. wells and hand pumps.
	Important Buildings	1 stone, 10 wood	Big municipio church, convent, school about 150 good houses.		Big municipio, church, schools, about 100 good houses. 2 large warehouses for rice.	Good municipio, school, church, 5 big hardwood houses.
	Transport Facilities	87 and RR	15, 56F, 84 and RR.	87 and RR spur	13A, 13B, 251, 56H and 86.	3F, 84 and RR
(68)	Euro- pean	61	67	,	9	69
Population (1939)	Asia- tic	88	74	1	124	42
Popula	Town (Muni- cip)	5122 (24570)	3655 (27681)	1663 (3486)	6006 (25824)	2004 (20982)
	Town-Location	NUEVA ECIJA PROV CUYAPO 15° 47' N 120° 40' E	GUIMBA 15° 40' N 120° 46' E	TARLAC PROV ANAO 15° 44' N 120° 37' E	CAMILING 15° 41' N 120° 25' E	GERONA 15° 36' N 120° 36' E

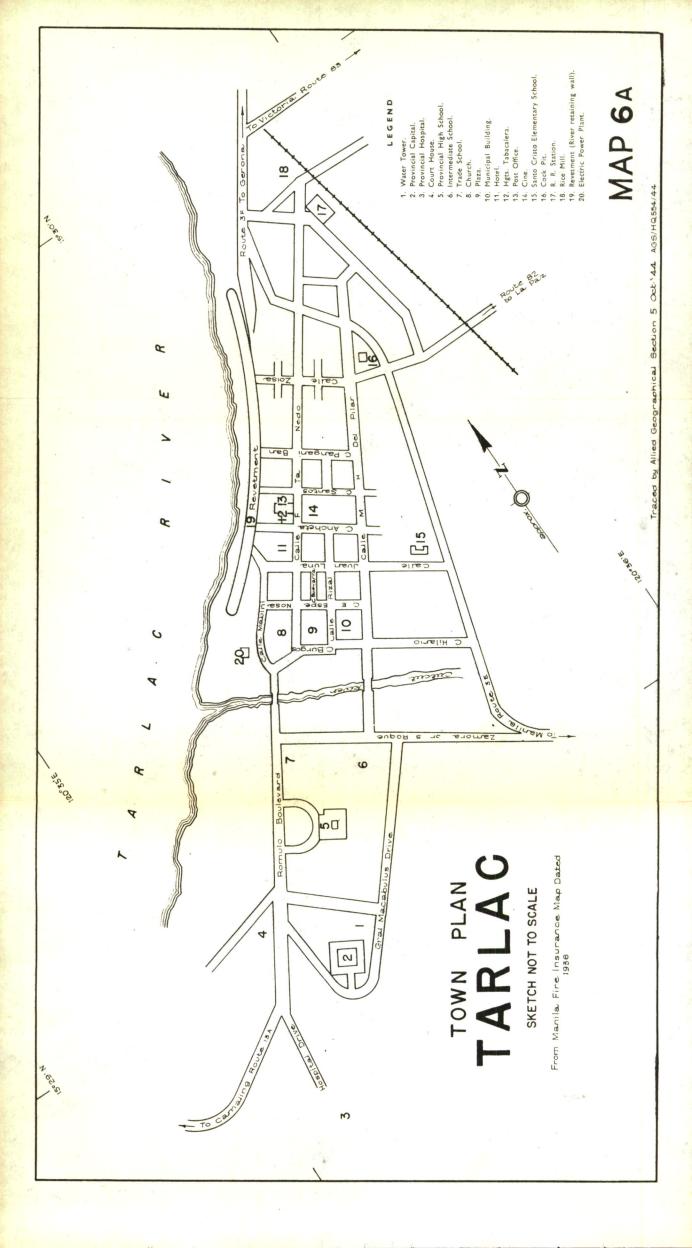
# C. POPULATION, AND TOWN INFORMATION—Continued

	Population (1939)	tion (19	(68)						
Town-Location	Town (Muni- cip)	Asia- tic	Euro- pean	Transport Facilities	Important Buildings	Water Supply	Industries and Supplies	Signal Communi- cations	General
MAYANTOC 15° 38' N 120° 23' E	1298 (7196)	2				All surface wells	Rice paddies	Telegraph	Normally unimportant but portant but considerable enemy activity this area reported. Flat rice paddies north. Rolling grassy hills south.
MONCADA 15° 44' N 120° 34' E	2372 (12518)	85	1	3F, RR	Small municipio	Art wells pumped to tower 87,000 gpd.	Electric current from Paniqui. Rice mill.	LD telephone and telegraph.	Low canefields. Some rice paddies.
PANIQUI 15° 40' N 120° 85' E	5225 (19124)	103	10	3F, 55G, 55H, RB Junc, NW, and NE.	old municipio, school, church, convent. 90 small houses. Just east of RR, is PC Barracks, 1 big brick and 1 big wood house. Rice mill.	Art and surface wells.	Electric plant, diesel 75 kw. Sugar Central 800 tons cane dally. Big rice mill. Distillery about 2000 US gallons 96% alcohol dally (uncohol d	LD telephone and telegraph.	Very important road and RR junc and Industrial eenter. Flat sugarcane land.
PURA 15°37' N 120°39' E	1314 (7005)	80		84, 55F, 55G	Small municipio	Small municipio Art and surface wells.	Rice	Telephone and tele- graph.	Not important. Low swampy area. Sugar-cane.
BAMOS 15° 40' N 120° 38' E	1262 (4035)	C. II	1	559	Small municipio	Art and surface wells.	Rice	Telephone and tele- graph.	Not important. Low swampy area.

SE	CT	ION	5]
SL	C.	IOI	27

C. POPULATION, AND TOWN INFORMATION—Continued

	ni- General	one Not important ele- Flat rice pad- dies.	one Not important Flat rice and canefields.	Normally not considerable considerable considerable enemy activity this area this ported. Gently ported. Gently politics, particle paddies, Patche of Second growth forest	one Not very import- ele-ant. Low rice and sugar.	and In center of large rice-producing district.
į	Signal Communi- cations	Telephone and tele- graph.	Telephone	Telephone and tele- graph.	Telephone and telegraph.	Post and tele-graph.
	Industries and Supplies	Rice	Rice	Rice	Electric current from Tarlac. Rice.	Lighting and power from Manila Electric Coy plant at Dagupan.
	Water Supply	Surface wells only.	Mostly art wells	Surface wells	Mostly surface wells. Some art wells with hand pumps.	Art wells. Estimated capacity of 108,000 gls. per day.
	Important Buildings				Municipio, church, school, some good houses.	Municipal high and elementary school bldgs, church, Two rice mills,
	Transport Facilities	13B	3.F	13.A	55E, 55F, 83, R.R. spur.	251 through town connects to Route 13 at Camiling, 252 to NE connects
939)	Euro- pean				Ø	က
Population (1939)	Asia- tic	10	61	80	88	65
Popul	Town (Municip)	714 (3199)	345 (5919)	1420 (10993)	5610 (19575)	2960 (25578)
	Town-Location	SAN CLEMENTE 15° 43' N 120° 22' E	SAN MANUEL 15° 48' N 120° 36' E	SANTA IGNACIA 15°87' N 120° 26' E	VICTORIA 15° 35' N 120° 41' E	PANGASINAN PROV BAYAMBANG 15°49' N 120°27' E







9. Aerial vertical of the road junction and town of Malasiqui, Pangasinan. Oct 40.



10. Town of Camiling, Tarlac. Typical layout of average Philippine town in this area. Looking west. Pre-war.

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	Popula	Population (1939)	(686						
Town-Location	Town (Muni-	Asia- tic	Euro- pean	Transport Facilities	Important Buildings	Water Supply	Industries and Supplies	Signal Communi- cations	General
BINALONAN 16° 03' N 120° 35' E	2610 (19736)	27	œ	3G through town. Also east and west roads link town to main road system.	Municipal building, post and telegraph office. Four rice mills.	Seven art wells. Capacityapprox 400,000 gpd.	Manila Electric Coy plant. Power from Dagupan.	Post and tele-graph.	Flat plain terrain. Hilly two miles north Rice district.
BOSALES 16° 38' N 120° 38' E	4119 (15837)	144	4	8 through town connects to 3 at Carmen and to 15 two miles to east. Branch RR south connects to Manila RR at Paniqui.	Municipal bidg. post and tel. office. Three rice mills, two sugar mills.	Begular supply system. Capacity 100,800 gls dally. Two art wells.	Power from Dagupan. Current 3-phase 220 v.	Post and tele-graph.	Terrain flat to undulating.Low hills 3.4 mls S.E. Rice, sugar and tobacco grown.
URDANETA 15° 58' N 120° 34' E	3276 (29120)	24	4	36 through town. 254 and 253 to NW and west and 264 to east connect to main road system.	Municipal bldg, church, post and tel. office. Five rice mills. Six stone and concrete bldgs.	Four art wells, capacity un- known. Quality good.	Power from Dagupan. 3-phase current 220v.	Post and tele- graph.	Center of agri- cultural dis- trict. Rice and corn principal crops. Flat- terrain.
VILLASIS 15° 54' N 120° 35' E	3213 (18452)	18	г	Main highway through town. 274 leads west to main road system, 274 not passable throughout to MT.	Municipal bidg, post and tel. office. Rice and sugar mill.	Regular supply system. Capacity 108,000 gls daily, also two art wells.	Power from Dagupan, 3- phase current 220v.	Post and telegraph.	On a wide plain Rice and corr principal crops
The state of the s		一般 八川 丁	100 M		No. of the state of the state of	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1			

### TRANSPORTATION AND SIGNAL COMMUNICATION

(Maps 7, 8).

### A.—TRANSPORTATION:

### 1. RAILROADS:

Main line of Manila Railroad extends from San Fernando, La Union, about 47 mls due north of San Carlos, Pangasinan, to the Pacific port of Legaspi, Albay, in southern Luzon. Several branches and spurs feed into the main line. A network of truck and bus routes supplement the rail services, linking Manila with many remote towns in the area. The main line runs parallel much of the way with Route 3.

### 2. BRANCHES:

i. Tarlac, Tarlac—NE to San Jose, Nueva Ecija (34.2 mls). From San Jose connection was made by Route 5 across Caraballo Mts to the north.

ii. Paniqui, Tarlac-NE to San Quintin, Pangasinan (30 mls) with

a short spur to Rosales, Pangasinan (2.3 mls).

### 3. RIVERS, ETC.:

Modern development of railroad and highways has caused river transport to become of secondary importance in recent years. However, destruction of bridges, etc., will necessitate using available water transport.

Traffic on waterways in this district was limited to shallow-draft native sail boats or rafts constructed from bamboo and coconut products. (For details of navigability of rivers, see Sec. 4, Sub-Sec.

2-Rivers.)

### 4. VEHICLES, ANIMALS AND PORTERS:

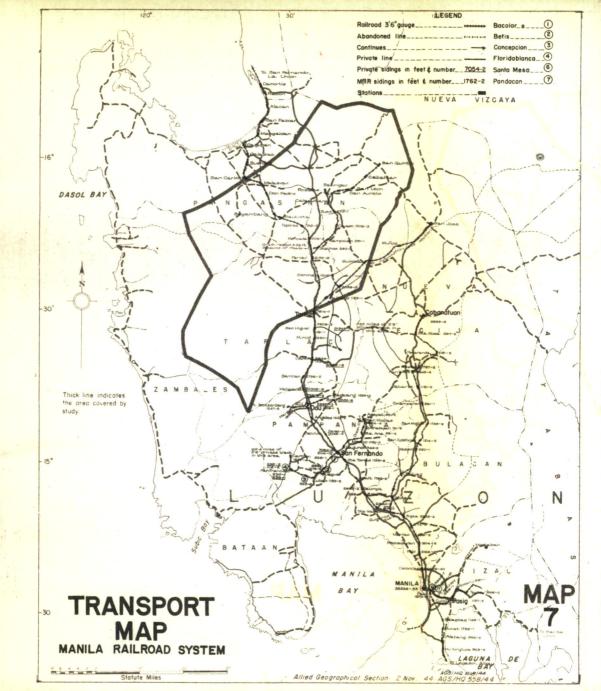
### a. Vehicles:

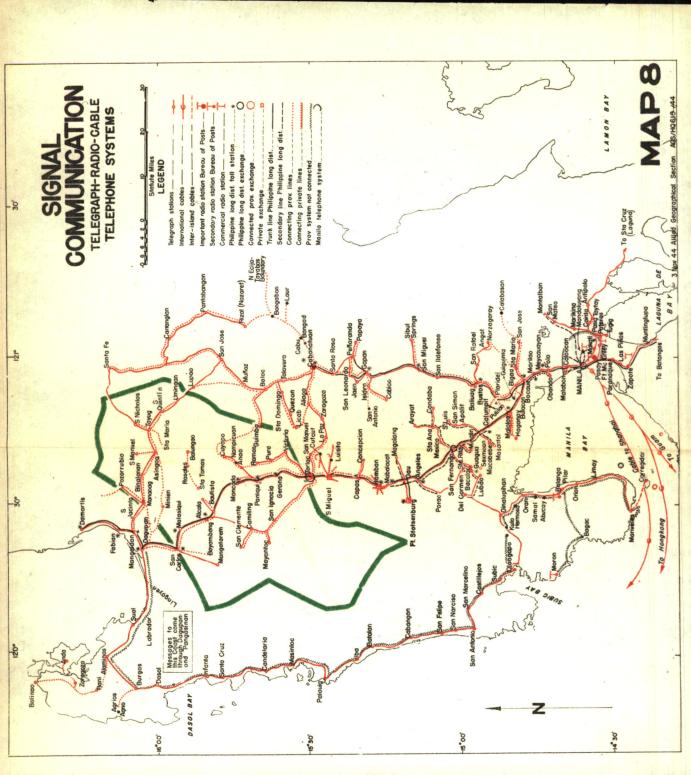
i. Cars and Trucks: Before war there were few private cars. There were public utility cars (taxis) in most towns. Alcohol for fuel is available from large distilleries (See Sec. 7—Resources). Distribution of vehicles by province:

	passenger cars	trucks
N. Ecija	486	518
Tarlac	359	266
Pangasinan	481	492

ii.—Buses: The Pampanga Bus Co—headquarters in San Fernando, Pampanga, and the Pangasinan Transportation Co—headquarters in Dagupan, Pangasinan, operated bus services. Buses usually were long wheelbase trucks with bejuco (split rattan) seats.

iii.—Carts and Sleds: Generally farm products were hauled on two-wheel carts or crude sleds drawn by carabao or oxen. Carts will haul about 1400lb at 1.2 mph, sleds 250lb at 0.6 mph. Twowheel buggies (carramattas) were also used.





iv.—Animals: These comprise:

Carabao (water buffalo)—main farm work animal. Cannot be used as pack animal, nor worked in heat of day.

Oxen—plough animals in upland fields, and as draught animals, mainly in Tarlac Prov. More endurance than carabao. Horses—small statured, wiry and strong. Little use as pack or

draught animal.

v.—Bicycles: The Japanese sold thousands of cheap bicycles to the Filipinos.

vi.—Porters: Rural population are good carriers. The lowlander carries 80lb. Mountain people can carry loads over bad trails at 2½ miles an hour for a 10-hour day—cannot work over two or three successive days without a break.

## B.—SIGNAL COMMUNICATION:

(See Sec. 5, C-Towns.)

Consisted of government telegraph, Philippine long distance telephone, private telephone, and the provincial telephone system. Main towns had available world contact through the PLD telephone. Manila Railroad has telephone facilities which are connected to the Bureau of Posts telegraph system and the Manila LD telephone exchange.

These facilities are available to nearby towns not served by telephone or telegraph.

### 1. TELEPHONE:

All municipalities in Nueva Ecija and Tarlac Provinces had telephone offices, except Mayantoc, Tarlac. Most of the larger towns in Pangasinan Province had telephone offices.

The following municipalities are known to have LD telephone

connection:-

Tarlac Prov: Gerona, Moncada, Paniqui and Tarlac.

Pangasinan Prov: Bayambang, Malasiqui, San Carlos and Dagupan.

### 2. TELEGRAPH:

The telegraph system is inter-provincial and inter-island, and most main towns are connected.

### 3. RADIO:

Nil.

### 4. POSTAL SYSTEM:

Government post offices were maintained only in the larger towns.

# SECTION 7 RESOURCES

(Maps 9, 10.)

### 1. GENERAL:

Principal industries of Central Luzon are production of sugar and sugar alcohol, coconut oil, copra cake and rope.

Principal food products include rice, fruit, and ordinary garden

vegetables.

Fuel for operating internal combustion engines has been limited to a great extent to sugar alcohol. There are no producing oilfields in the Philippines.

Good sub-surface water is available throughout the area, especially in the gravelly soil on the western side of the valley.

Skilled labor is more available on the Central Plain of Luzon than in other parts of the archipelago.

### 2. FOODSTUFFS:

Nueva Ecija Prov is the principal rice-producing area in Luzon. Rice is the main staple of the Filipino's diet, but must frequently be supplemented by corn or other garden produce to make it last throughout the year.

Cassava (tapioca) was widely grown, although more for its

starch content than as a food.

Certain varieties of bananas and the green papaya are used as vegetables or eaten as fruits when fully ripened.

Very few condiments and spices are available or grown in the

area.

Since the Central Plain is well irrigated and the soil rich, the possibilities for growing food products are good, and small gardens grown by troops will help supply necessary fresh vegetables and partially alleviate shipping problems.

a. Native Fruits and Vegetables:

Following is a list of principal native fruits and vegetables:

Ubi.—A red root vegetable, similar in many respects to sweet

potato. Used cooked as a vegetable and in making ice cream.

Cassava.—A root from which tapioca is made. Some forms are

poisonous if not properly prepared.

Gabe.—A small root vegetable similar to a potato.

Camote.—Sweet potato.

Ampalaya.—A bitter, cucumber-like vegetable. Is reputed to have anti-malarial medicinal value. Bitterness can be removed by proper cooking.

Upo.—A vegetable similar to squash.

Tugue.—Yam.

Jackfruit.—A type of breadfruit eaten green as a vegetable, ripe as a fruit.

Kalamansi.—A small citrus fruit used in making jam and drinks, Lanzones.—A small fruit. Grows in clusters like grapes,

Santolo.- A fruit eaten raw.

Siniguelas.—A tree-growing fruit similar to a yellow plum. Atis.—A custard apple.

Tamarinds.—A tree-growing fruit used in making drinks.

Kamias.-An edible root.

Caimitos.—An egg-shaped, tree-growing fruit eaten raw.

Sinkamas.—A plant resembling string bean, but with a turniplike root, which is eaten raw, as a fruit, or as a vegetable.

Makopa.—A pink, spongy, tree-growing fruit, eaten raw.

Pili.—An oily nut similar to almond.

Camatis.—Tomato.

Patola.—A long yellow squash.

Saguing.—Eating banana.

Saba.—Cooking banana.

### b. Meats:

The most numerous animals and fowls were carabao (native draught animal), chickens and other normal farmyard animals. Animals (other than carabao) and fowls are noticeably smaller than those of an American farmyard.

Carabao meat is dark and coarse and generally not palatable to

white men.

Numerous small canneries and fish-drying plants, operated along the coasts, and particularly in Manila. Canned or dried fish was then shipped inland to the more inaccessible municipalities.

### 3. FORAGE:

Imported horses and cattle cannot live on local forage. Cattle must have at least one-eighth Indian blood before they can thrive on local forage. A small amount of grass was planted and harvested, between seasons, in rice paddies. This grass was cut, bundled, and sold to carramatta (native oxen or carabao-drawn carts) owners.

Stubble in harvested rice paddies, corn fodder, young cogon and other native grasses are used as forage for carabao and cattle. No forage is stored.

### 4. FUEL:

All gasoline, kerosene and coal used in the area was imported.
Wood is the principal domestic fuel; most had to be hauled
overland from the mountains, or from off-lying islands by boat.
Mangrove produces a good grade of charcoal, and is widely used.

Coconut oil can be used as a fuel or for lighting purposes, but generally it is unsatisfactory. It will not burn well in restricted

places, and is useless in automobiles.

Alcohol is rather widely used, both as a motor fuel and for other purposes. As a motor fuel it is inefficient unless small amounts of lubricating oil and gasoline are added, and then is satisfactory only on level roads.

One of the more important alcohol distilling plants in Luzon is at Tarlac, Tarlac (just over the border of the area covered by this Handbook). The distillery at Paniqui, Tarlac, is reported to be currently producing 15,000 liters (3960 US gals) of alcohol a day.

### 5. CONSTRUCTION MATERIALS:

Lumber is the principal constructional material. Many of the woods, however, are not impervious to rot and the anay, or white ants.

Concrete or steel should be used in construction close to the ground, and lumber used for upper or living floors of quarters.

Most of the natives are good carpenters, although not versed in the use of nails and screws or military type construction.

Following is a list of the more abundant Philippine woods available to this general area:—

Almon.—Large diameter to 6½ft. Weight 35.5lb a cu ft. Durable for interior but not exterior. General construction, boxes, crates, and mining timber. Excellent boat planking.

White Lauan.-Weight 33.6lb a cu ft. Same as Almon.

Tangile.—Large diameter to 6½ft. Moderately hard and light, weight 35.2lb a cu ft. Durable for interior. Moderately durable for exteriors, veneer and boat planking.

Red Lauan.—Very large. Diameter to 7½ft. Weight 36.5lb a cu ft. Only moderately durable when exposed to weather or in contact with ground. Desirable for interiors and boat planking.

Tiaong.-Large. Diameter to 41/2ft. Weight 30.5lb a cu ft. Same

as tangile and red lauan.

Akle.—Diameter 4ft but commonly 1½-2ft. Resembles black walnut, hard and heavy. Weight 47lb a cu ft. Durable when exposed to weather. Resists termites and insects. Finest cabinet wood, gun-stocks.

Amugio.—Diameter 2ft-4ft. Weight 50lb a cu ft. Moderately durable for exteriors. House construction, posts, beams,

joists, rafters, flooring. High-grade furniture.

Apitong.—Warps and shrinks; needs seasoning. Weight 48lb a cu ft. Posts, beams, rafters, floorings, bridge and wharf construction, including piles (treated), barges and lighters, telegraph and telephone poles.

Guijo.—Diameter to 6ft. Brownish red. Weight 53lb a cu ft.
Very common. General construction beams, joists,
bridges, furniture, ship framing, wharves and vehicle

frames.

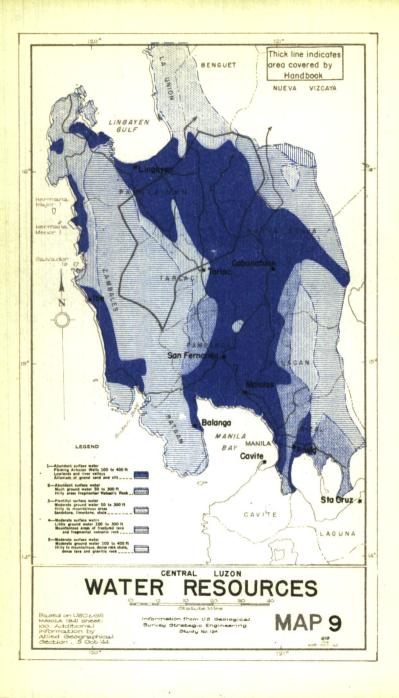
Ipil.—Diameter to 6ft. Weight 53lb a cu ft. Very strong. Highgrade construction, furniture, house posts, door and window frame.

Malugai.—Diameter to 31ft. Light to dark red. Weight 45lb a cu ft. Beam joists, rafters, flooring, masts and spars.

Yakal.—Diameter to 6ft. Yellowish gray wood. Weight 58lb a cu ft. Flooring, beams, joists, ties, bridge and wharf construction, ship framing and docking. Substitute for teak in ship building.

Pine is cut in Zambales and Mountain Provinces, but little was shipped to this area, being mainly consumed at the source. Coconut trees can be used for temporary structures, especially as posts; the older trees are the stronger.

Important sawmills in the area and pre-war capacities include:—
Mangatarem Sawmill at Pila, Pacalat, Mangatarem, Pangasinan—
6000 bd (super) ft a day.



Ramon Valles (Hard Lumber) at Macaanai, San Rogue, Lupao,

Neuva Ecija-5000 bd ft a day.

Native houses are usually made from bamboo, nipa thatching, and tied together with rattan lashings. Cogon grass makes a good thatch; flooring is usually of wood, split bamboo or woven matting. Sawalli (woven bamboo) is often used for siding. In emergencies, natives can quickly construct shelters of this type for temporary use.

Gravel and road metal are obtainable from stream and river beds

and shores. No rock quarries are in the area,

### 6. WATER:

Soil along western side of the valley bordering Zambales Range is of rather loose, gravelly nature, and wells for water supply can be easily drilled. Good water is usually available at depth of about 250ft. Rivers flowing down from high uninhabited areas can be used to supply water, but all water should bear the stamp of army approval before being drunk.

Water supply systems, aside from regular artesian wells, served

the following towns:-

	Gal per day
Bayambang, Pangasinan	108,000
Rosales, Pangasinan	100,800
Moncada, Tarlac	86,400
Paniqui, Tarlac	144,000

Water for most of the towns is from artesian wells, either pumped or flowing. These wells are usually centrally located—the people carry the water to their houses.

### 7. MINERALS:

The area is not rich in minerals; limited deposits of gold are the only important mineral found.

### 8. REPAIR FACILITIES:

Small machine shops were available at sugar centrals and the larger plantations.

Local filling stations and garages had hand tools.

### 9. NATIVE LABOR:

Labor is mostly unskilled. Some carpenters, plumbers and electricians were available. A man calling himself a skilled laborer should be watched until proved capable.

Laborers should be employed only through the native foreman

(capataz); one capataz to each 25 men.

Rates of pay (pre-war) are shown for various laborers (amounts are in US dollars):

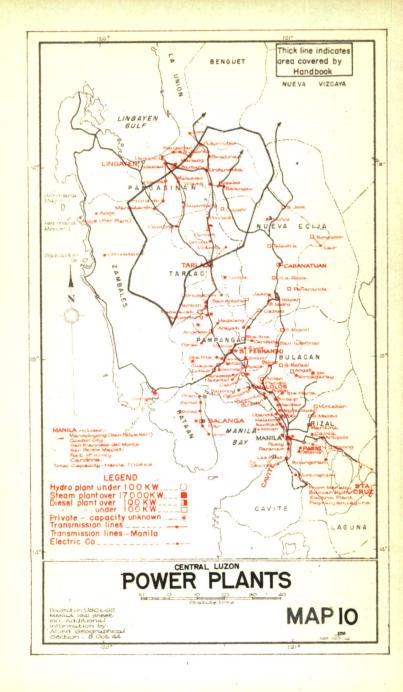
	\$ per day
Blacksmiths	0.54
Boat carpenters	1.28
Bus drivers	0 50
Carpenters	0.75
Chauffeurs	0 ==
Electricians	0.00

### SECTION 7]

: 100mm	
Miners	0.00
Painters	0.62
我没有我们的最后,我们就是一个人,我们就是一个人,我们就是一个人,我们就是一个人,我们就是一个人,我们就是一个人,我们就会一个人,我们就是一个人,我们就是一个人	0.64
TO TO 10	1.00
Anto Mechanica	0.86
Auto Mechanics	2.00
Sugar Centrals	0.72
Laborers	0.50
C.	\$ per month
Surveyors	22.50 to 30.00
Draitsman	20.00 to 22.50
Foreman	30.00 to 75.00
Accountant	50.00 to 100.00
Typists	17.50 to 35.00
	21.00 10 00.00
10. CURRENCY, WEIGHTS AND MEASURES:	
1 centavo	½ US cent
100 centavos	
1 peso	ON EN TIC
the metric system of measurement is used	through a
Philippines.	inroughout the

# 11. POWER:

Power throughout the area is limited mainly to small diesel and gasoline plants under 100 KW, and to power lines bringing in current from hydro-electric or larger diesel plants outside the area.



### MEDICAL PROBLEMS

### 1. GENERAL:

The climate is tropical with a well defined wet and dry season. Average temperature is about 80°F. Warmest temperature is about 100°F and coolest about 63°F. Diseases common to tropical countries are prevalent here.

### 2. DISEASES.

Malaria: Benign, sub-tertian and quartan malaria are found in the area, though the latter two are much less common. Mosquito vectors include:

Anopheline barbirostris, A filipinae, A maculatus, A minimus var flavirostris, A philippinersis, A pseudobarbirostris, A subpictus var indefinitus.

Anopheline minimus var flavirostris, which prefers shallow, shaded, foothill streams, is the most dangerous carrier.

Dengue: Prevalent carrier mosquitoes are: Aedes aegypti and Aedes albopictus.

Typhus: Mite borne or endemic typhus is known to occur. Mites are widespread, and care should be taken.

Filariasis: Uncommon mosquito borne disease.

### Dysentery:

- i. Bacillary dysentery is common though normally sporadic. Precautions should be taken by troops ensuring sterilisation of water, insect control and other contamination.
- ii. Amoebic dysentery is not so prevalent. Other forms of dysentery are also uncommon.
  - iii. Diarrhoea is of frequent occurrence.

Typhoid and Paratyphoid Fevers: Both are common, though normally less prevalent than dysentery. May have spread.

CHOLERA: None recorded some years before war. Reported epidemic in 1943. Necessary for all troops to maintain highest standards of hygiene to guard against this and other bowel diseases.

Yaws: Common, but responds to NAB injections.

Fungus Infections of Skin: Tinea, seborrhoea and pityriasis are very common, and cause much discomfort.

Scabies: Caused by a burrowing mite. Widespread and common. Tropical Ulcer: Scratches and abrasions, unless treated with antiseptic dressings, are liable to form rapidly-spreading ulcers. Food deficiencies increase likelihood of development.

Leprosy: Occurs; known cases were isolated, temporary detention for suspects.

Venereal Disease: Gonorrhoea is widespread. Syphilis is less common; chancroid uncommon.

### SECTION 8]

Tuberculosis: Greatest single cause of death in Philippines.
All necessary hygienic precautions should be taken.

Influenza: Common. It frequently leads to more dangerous res-

piratory diseases.

Respiratory Infections: Bronchitis, broncho-pneumonia and lobar pneumonia are common, and pre-war were a major cause of disability among American forces in the P.I.

Smallpox: Practically non-existent. Chicken Pox: Found occasionally.

Measles: Common.

Trachoma: A common eye disease.

Malnutrition and Beri Beri: Some encountered pre-war. War

has probably aggravated the situation.

Worm Infestations: Widespread. Most common are: round worms, hookworms, flat worms, and whip worms. Other rare types occasionally found.

Plague: None has occurred in recent years, but wartime con-

ditions make introduction of the disease a possibility.

### 3. HOSPITALS:

Before the war only one recorded hospital was in the area. J.P. Acosto Clinic, at Rosales, Pangasinan; General; 12 beds.

### 4. PESTS AND DANGEROUS ANIMALS:

a. Pest mosquitoes, flies, cockroaches and rats are common. Flies and rats constitute a medical hazard, and steps should be taken to control or eliminate them.

b. Itch mites occur and may cause skin irritation.

c. The Red Back spider, relative of the Black Widow spider, occurs, and can give a dangerous and painful bite.

d. Poisonous snakes are not common.

# SECTION 9 METEOROLOGICAL CONDITIONS

# 1. CLIMATE.

Two pronounced seasons—one dry in winter and spring, corresponding with the NE monsoon period from Nov to May, the other wet in summer and autumn, corresponding with SW monsoon period from Jun to Nov-occur. Temperature and humidity are uniformly high with little seasonal variation.

#### 2. RAINFALL.

Wettest months during SW monsoon are Jun-Aug; driest during NE monsoon are Jan-Mar. In wet season the mean monthly precipitation ranges from 7.7 to 17.1 in from Jun through Oct, with highest falls in Jul and Aug.

Yearly and monthly rainfall averages in inches at the principal

stations in or in near vicinity of area are :-

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Yearly Luisita, 2.0 8.2 12.0 19.2 18.6 12.6 7.6 3.3 1.2 87.0 Tarlac .. .23 1.2 Tarlac, 2.9 6.9 10.7 15.7 10.3 15.0 8.1 2.6 1.1 76.0 .. .15 1.3 Tarlac

Dagupan, Pangasinan . . .43 2.9 8.8 13.0 23.2 22.5 16.0 7.2 3.1 8.6 99.4 .59 .92

Rainy days are most frequent from Jul through Oct with 17 to 22 days a month, whilst from Jan to Apr only three to five days have precipitation.

Serious floods at times are caused by abnormally heavy rainfall associated with typhoons, Tarlac area in particular being most subject to floods. Flash floods delay traffic at most stream crossings in

Zambales Mts.

#### 3. WINDS.

NE (Winter) Monsoon: Nov-Mar or Apr; direction mainly north and NE tending easterly toward end of season. Wind steady especially

in Jan, averaging 15-20 mph.

SW (Summer) Monsoon: Jun-Sept or Oct generally from westerly quarter. Intermittent and less steady than NE monsoon. Follows transitional period of variable winds and calms. Steadiest in Jul and Aug with average speed at heights of 10-15 mph.

Squalls (collas): Accompanied by much rain—prevalent during SW

monsoon, especially near land.

Land and sea breezes well marked, especially where monsoon is

weak.

Typhoons (baguios): May occur in any month, but are more prevalent from Sept through Nov. Least probable from Jan through Mar. Cause great damage, especially in unprotected harbors; often accompanied by much rain persisting for days. Impossible for foot troops to march against force of wind.

# 4. CLOUD AND VISIBILITY.

Cloudiness is relatively high in all months with least in spring averaging from 3/10 to 5/10. Maximum in summer, averaging 7/10 from Jun to Sept. Cloud amount normally follows seasonal distribution

#### SECTION 91

of rainfall. Maximum cloudiness is in late afternoons, and minimum in mid-morning and evening.

When SW winds blow uninterruptedly for several days, overcast

skies with low cloud bases (1000-2000 ft) prevail.

Visibility is generally good. Fog rare. Early ground mist rapidly dissipates. Low clouds in Zambales Ra are often mistaken for fog.

#### 5. TEMPERATURE.

Consistently high and uniform, with minimum temperatures in winter (Dec-Feb).

Temperatures at sea level seldom exceed 95°F or fall below 65°F. Above 3000ft cooler conditions prevail.

#### 6. HUMIDITY.

High, with seasonal variation amounting to 15%. Lowest values in Apr, usually below 75%, highest in summer and autumn, usually between 80 and 85%.

#### 7. OTHER PHENOMENA.

Small land tremors frequent; severe earthquakes rare. Thunderstorms with squalls and heavy rains frequent from May to Oct.

# 8. EFFECTS OF CLIMATIC CONDITIONS.

i. Sea: Unloading operations hampered by typhoons and storms.

Ships endangered in most ports.

ii. Land: Operations are difficult during rainy season. Highways are blocked and rivers flooded during typhoons. Vitality of foot troops is lowered by hot dry season. Construction of new airfields in rice country is almost impossible when ground becomes saturated. Runways of most airfields, unless paved, are not usable during rainy season.

iii. Air: Cloud cover and low visibility are worst during rainy season. Typhoons and wet landing fields are main hazards.

Times shown are standard times for the Philippines. (0800 hrs. ahead of G.M.T.) LATITUDE 14° 35' N LONGITUDE 120° 59' E "APPENDIX A" TIMES OF SUNRISE AND SUNSET FOR NOV 1944-OCT 1945 (inclusive)-Manila

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# "APPENDIX A" TIMES OF MOONRISE FOR NOV 1944-OCT 1945 (inclusive)-Manila

Times shown are standard times for the Philippines. (0800 hrs. ahead of G.M.T.) LATITUDE 14° 35' N LONGITUDE 120° 59' E

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"APPENDIX A" TIMES OF MOONSET FOR NOV 1944-OCT 1945 (inclusive)-Manila

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# APPENDIX "B"

# GLOSSARY OF TAGALOG WORDS

Many Tagalog and Spanish words describing vehicles, methods, fruits, etc. that do not occur in America, Europe or Australia have been adopted by the white population, resulting in little use of the English equivalent. Such common words are :-

Adobe ... A consolidated volcanic ash, used for building stone

during the Spanish era.

A fresh or salt water fish maturing in three months, Bangas generally grown in artificial ponds.

Typhoon. Baquio . .

Bodega . . Warehouse.

Banca .. A canoe made by hollowing out a log.

Batil .. A small sailing boat with decking but no cabin-. .

10 to 50 tons.

A high two-wheel horse-drawn carriage for two Carramatta passengers. Generally with upholstered seat and

highly decorated.

Calesa . . A high two-wheel horse-drawn carriage for four passengers. About the same size as a carramatta,

but has two wooden seats along the side.

Colla .. Local squall.

Native grass similar to kunai grass. Cogon ..

Dango . . A unit of length, the span of the outstretched palm. . . Depa .. A unit of length the distance between the out-

stretched arms, about 6 feet.

Estero .. A navigable canal.

Kaingan Farmland prepared by burning off the grass or the forest.

Mestizo A Filipino of mixed blood, i.e., Spanish mestizo, American mestizo, Chinese mestizo.

Muscovado Crude raw sugar with a high molasses content, manufactured in old type sugar mills.

Palay .. Unhusked rice.

Poto A native sweetened rice cake.

Sawalli Mats woven from split and shaved bamboo, used for

drying palay, carpets, flooring, walls of houses and basmets.

Sitio A small group of houses within a barrio.

# APPENDIX "C"

# JAPANESE EQUIVALENTS OF PLACE NAMES

The following Japanese equivalents for place names in Central Luzon area are supplied by Allied Translator and Interpreter Section, SWPA, and are arranged alphabetically by provinces:

Name	Romaji	Character
TARLAC PROVINCE	TARURAKKU SHU	タルラツク州
ANAO	ANAO	アナオ
CAMILING	KAMARIN	カマリン
GERONA	HERONA	~ = +
MAYANTOC	MAYANTOKKU	マヤントツケ
MONCADO	MONKADO	モンカット
PANIQUI	PANIKI	)、 ニ キ
PURA	PURA	フ゜ラ
RAMOS	RAMOSU	ラモス
SAN CLEMENTE	SAN KARAMENTE	サンカラメンテ
SAN MANUEL	SAN MANUERU	サンマスエル
SANTA IGNACIA	SANTA IGUNASHIA	サンタイグナシア
TARLAC	TARURAKKU	タルラツク
VICTORIA	BUIKUTORIA (VIKUTORIA)	ウィクトリア
NUEVA ECIJA PROV	VINCE NEUBA ESHIYA SHU	ヌエバ エシャ か
CUYAPO	KUYAPO	カヤホ°
GUIMBA	GUINBA	かインパ
NAMPICUAN	NANPIKUAN 63	ナンピクマン

# JAPANESE EQUIVALENTS OF PLACE NAMES Continued. PANGASINAN PROV

Name	Romaji	Character
AGNO	AGUNO	771
	* * * * * * * * * * * * * * * * * * *	
AGUILLAR	AGIRARU	アギラル
ASINGAN	ASHINGAN	アシンガン
BAYAMBANG	BAYANBAN	バヤンバン
CARMEN	KARUMEN	カレメン
	KAREMEN	カル×ン
DAGUPAN	DAGUBAN	ダカバン
MANAOAG	MANAOAGU	マナオアグ
MANGATAREM	MANGATAREN	マンガタレン
NANCAYASAN	NAGANSAN	ナガンサン
POZORRUBIO	POSOROBIO	ポッロビオ
SAN CARLOS	SAN KARUROSU	サン カルロス
	KARAROSU	カラロス
ANTO TOMAS	SANTO TOMASU	サント トマス
AN QUINTIN	SAN KUINTA	サンクインタ

# JAPANESE EQUIVALENTS OF PLACE NAMES Continued. • PANGASINAN PROV—Continued

Name	Romaji	Characters
TAYUG	TAEGU	タエグ
	TAEUGU	タエウグ
	TAYOUGU	タョウグ
UMINGAN	UMINGAN	ウミンガン
URBIZTONDO	URUBISUTONDO	ウルビストンド
URDANETA	URUDANEITO	ウルダネイト

# APPENDIX "D"

# CONVERSION TABLES: MISCELLANEOUS

- i. One statute mile equals 5,280 feet or 1,760 yards.
- ii. Average earth, consisting of a mixture of loam and gravel, has a safe bearing pressure of from  $1\frac{1}{2}$  to  $2\frac{1}{2}$  tons/sq ft.

The above figures are for ground 6in below the surface. They can be increased by 25 per cent. for deep foundations.

iii. One horse power equals 2,545 British thermal units (BTU). One horse power equals 550 ft-lb per second or 746 watts.

#### iv. Measurement :-

OFF CHARGES !			
l inch			2.53968 centimeters.
1 centimeter			0.09370 inches.
1 yard			0.91440 meters.
1 meter			1.09361 yards.
1 mile			1.609341 kilometers.
1 kilometer		,	0.621382 miles.
l acre		'	0.40469 hectares.
1 hectare			2.47104 acres.
1 lb. (Avoirdu	ipois)		0.45369 kilograms.
1 kilogram			2.20462 lb (Avoirdupois)
1 US gallon			3.78533 liters.
* **.			0.26418 US gall.
1 US gallon	)		0.83 Imperial gall.
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ALLIED GEOGRAPHICAL SECTION
Allied forces Southwest Pacific Area

**TERRAIN HANDBOOK 40** 

# CABANATUAN

(Central Luzon)

PHILIPPINE SERIES

# UNCLASSIFIED

# IMPORTANT

- a. This document contains information of value to the enemy.
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ALLIED GEOGRAPHICAL SECTION

ORCEO. Southwest Pacific Area

TERRAIN HANDBOOK 40

# CABANATUAN

(Central Luzon)

PHILIPPINE SERIES

01240

3 NOVEMBER, 1944

General Headquarters, Southwest Pacific Area, 3 November, 1944.

This Handbook contains information on the Cabanatuan area (Central Luzon) as defined in the Orientation Map.

It is intended to provide basic topographical information of military interest for the use of officers in forward areas.

The maps included are intended as guides only, to be used in conjunction with operational maps.

By command of General MacARTHUR.

R. K. SUTHERLAND, Lieutenant-General, U.S.A., Chief of Staff.

Official:

C. A. WILLOUGHBY, Brigadier-General, G.S.C., Asst. Chief of Staff, G-2.

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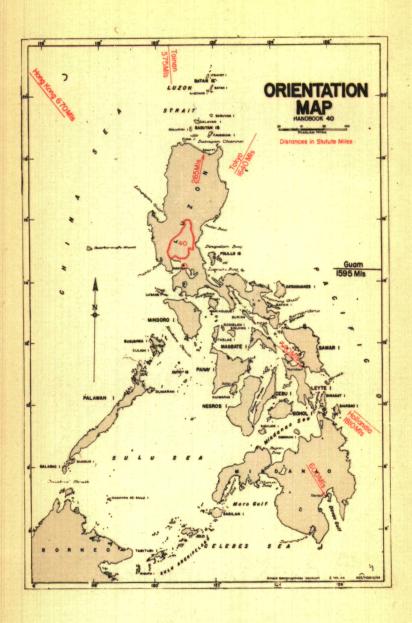
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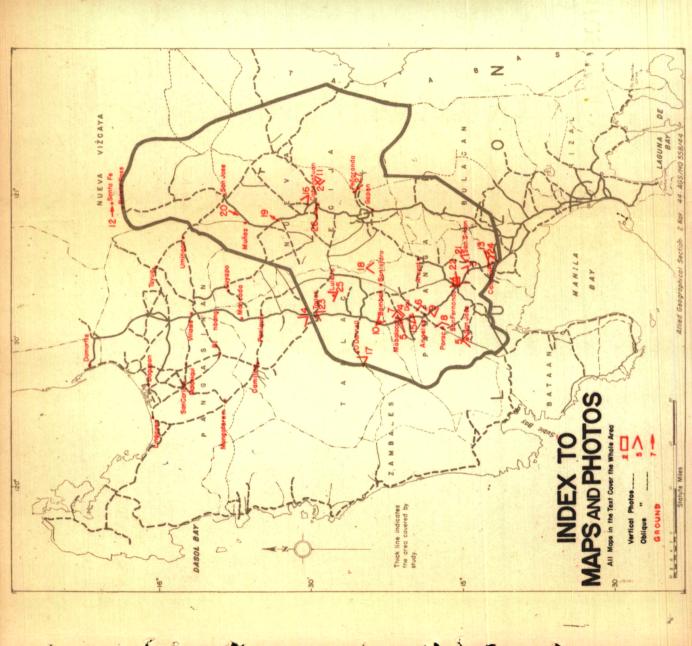
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Gazetteer of place names for Central Luzon Area will be issued with H.B. 41.





# CABANATUAN Central Luzon

# SECTION I.

# INTRODUCTION AND GENERAL DESCRIPTION.

(Map 1; Photos 1, 2.)

# 1. LOCATION AND AREA COVERED. See Orientation Map:

Area described in this Handbook consists of portions of Tarlac, Nueva Ecija, Bulacan and Pampanga Provinces and embraces about one half of the total area of Central Luzon Plain, as well as large areas of the Zambales and Sierra Madre mountains. It includes the extensive Candaba Swamp area of Rio Grande de Pampanga.

#### 2. GENERAL DESCRIPTION:

Central Luzon Plain is a level, alluvial plain extending NW/SE about 120 mls. Only break in the long, low, level plain is the prominent, extinct volcanic mass, Mt Arayat (3375ft).

Valley is readily accessible only from the NW and the SE end, high mountains with dangerous, narrow passes walling it on either

side.

Valley is mostly cultivated and is agriculturally rich. Rice, sugar cane, fruits, corn and root crops comprise the more important products. The mountains contain quantities of good timber, among which are pine forests in the foothills of Zambales Mts.

The road net is well developed and extensive. Main roads are either asphalt or concrete. Secondary roads are mainly all-weather

rock surfaced.

Principal towns in the area include Tarlac, Tarlac; San Fernando, Floridablanca, Arayat and Angeles in Pampanga; Calumpit, Baliuag and S Miguel in Bulacan; and Cabanatuan, Muñoz and S Jose in Nueva Ecija. These towns are all agricultural centers and are located on main roads.

Population throughout the Central Plain is the most dense of the

Philippines.

 SPELLING. Spelling is in accordance with Directions for Treatment of Geographical Names in the Philippines (issued 5 May, 1944 by U.S. Board on Geographical Names).

Different maps and charts may substitute certain letters for others in spelling place names. Most common of these are; the C to k; the qu to k; the j and k to j; j to j and the j to j. These changes will also be noticed in pronunciation by the inhabitants.

# 4. STANDARD TIME—METRIC SYSTEM—CURRENCY:

Standard time is eight hours ahead of Greenwich mean time.

The metric system is used throughout the Philippines.

The peso is the main item of coinage.

 $\begin{array}{ccc} 100 \ centavos &=& 1 \ peso. \\ 1 \ peso &=& \$.50 \ (US). \end{array}$ 

Copper, silver and paper money is used.

## 5. WATER:

There are many free-flowing and pumped artesian wells. Shallow wells and streams and rivers should not be trusted. Natives may drink this water without harmful effect whereas it might be dangerous for troops. Many towns have water distribution systems. All drinking water should be treated.

#### 6. MILITARY IMPORTANCE:

Philippine Islands generally are strategically placed across the important trade routes of the Far East.

Central Luzon Plain is the most developed area economically and militarily, in the Philippines. Through this plain passed all land transportation going north from Manila to North Luzon.

Although the Philippine Army, as organized by USAFFE in 1941, does not exist today, these partially trained men can still be used as a nucleus for reorganizing the army and constabulary (police) forces.

At Angeles, Pampanga, is the extensive army development, Ft Stotsenburg, which includes the many airfields comprising Clark Air Center. This is one of the most important air bases in the Philippines and has been further developed by the Japanese.

Japanese Army activity is limited mostly to garrison and administrative duties except in the immediate vicinity of air bases. Japanese defences are mainly foxholes and A/A positions.

The Japanese Air Force have only two airfields of limited consequence in the area.

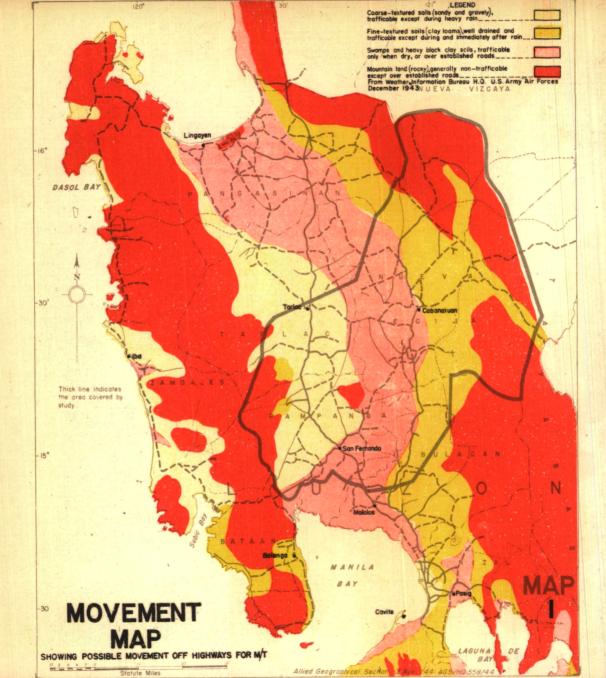
Potential development of the area is practically without limit. Additional airfield sites, warehousing and camp site areas can be located nearly everywhere on the level plain and in the savannah forest foothills of the Zambales mountain range.

#### 7. APPROACHES:

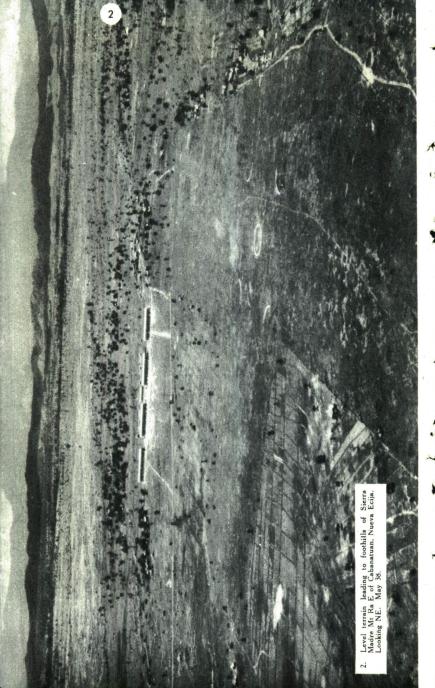
The two most accessible avenues of approach are from the Lingayen Gulf beaches of Pangasinan to the NW, and from the Manila Bay and Tayabas Province beaches to the south. Approaches from the east or west require traversing mountainous country, making use of narrow, easily defended mountain passes.

# 8. MOVEMENT:

Two types of terrain are encountered in the area. Mountainous country to the east and west and the level plain between. The plain also has two major divisions—the eastern portion consisting of heavy black clay soils liable to swampy conditions (now mostly rice paddy area); the western portion having coarse-textured gravelly soil which drains rapidly.







Movement by MT on the extentive road net is possible at any season except during severe floods. MT movement across-country is possible only during the dry seasons.

Tracked vehicles can move through the western portion of the valley in any season except during unusually heavy precipitation. They, like MT, would be limited to dry season use of the eastern portion of the valley. Cross country movement in the sandy western portion is facilitated by light rains.

Foot troops can move easily throughout the area during the dry season, but would have to use the road net in the eastern portion during the rainy season.

Days with wet soil rise sharply to a peak in Jul and descend gradually to Dec. The section of plain described in this Handbook is rather severely affected by rainy weather and the drainage pattern is intricate. Rice fields are normally dry in this area during Oct, Nov, Dec, Apr, May. They are flooded during Jun, Jul, Feb and Mar

# HANDBOOK No. 40.

# SECTION 2.

## ROADS AND TRAILS.

(See Map 2; Photos 3 and 4.)

#### 1. GENERAL:

Area covered by this Handbook is fairly thickly settled, and contains two main roads: Route 3 running southwards from Tarlac, Tarlac, down west side of Central Luzon Plain; and Route 5 from Balete Pass southward down east side of Central Luzon Plain. They join at the south end of the great Candaba Swamp, before reaching Manila.

Focal points for main road nets are Cabanatuan, Tarlac, and

San Fernando.

Map 2 shows most of the important roads; those in red are main

highways; remainder are of less importance.

The only mountain road sections lie in NE, and by far the majority run across lowlying farmland planted with rice or sugarcane, or lying

fallow in grass.

Driving off road is possible in some of sandy grassland areas to west even in wet weather, but as a rule this is restricted even in dry weather by deep ditches and streams, earthen banks, carabao wallows (muddy waterholes) and dwellings. In wet season (Jun-Oct) large

areas along roadways become completely submerged.

Cover is generally scarce. It can sometimes be found in form of large acacia and mango trees or bamboo clumps along roadside; some streams and ditches have narrow fringes of bushy vegetation and tall reed-like grass. Towns and barrios usually have many large trees, clumps of bamboo and banana, and nipa huts often line each side of roadway for some distance near each settlement.

All water should be treated in approved manner before use. Most towns have excellent artesian well water, but great care should be taken

to avoid contamination from containers used by natives.

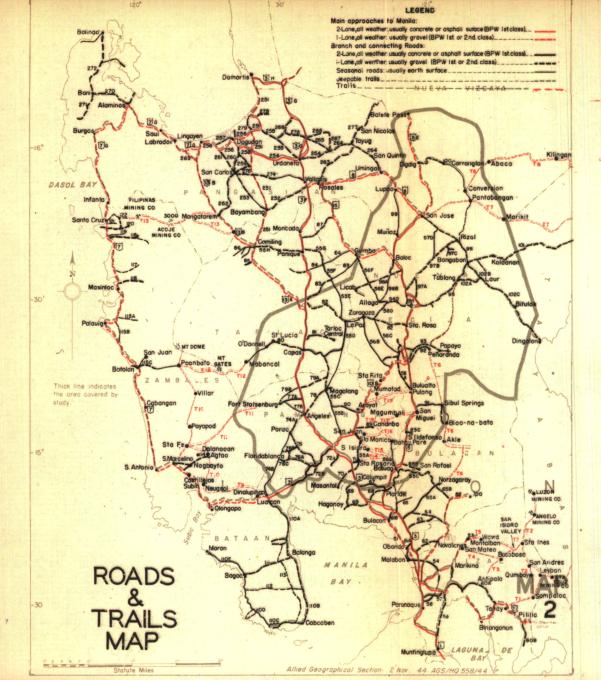
Drivers should be warned that loose river gravel is often scattered on otherwise well surfaced roads. This has caused many road accidents.

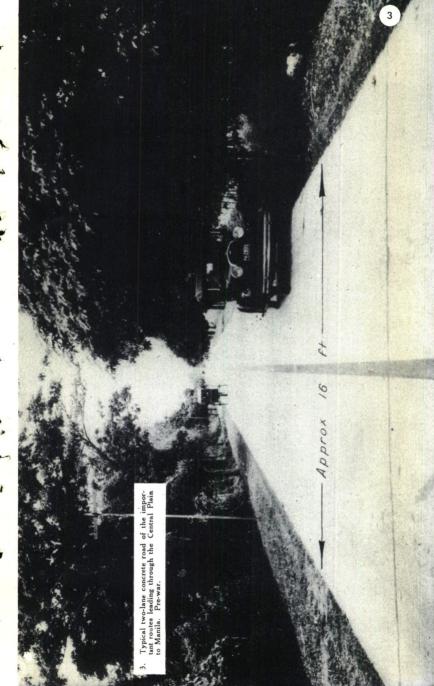
#### Road classification:

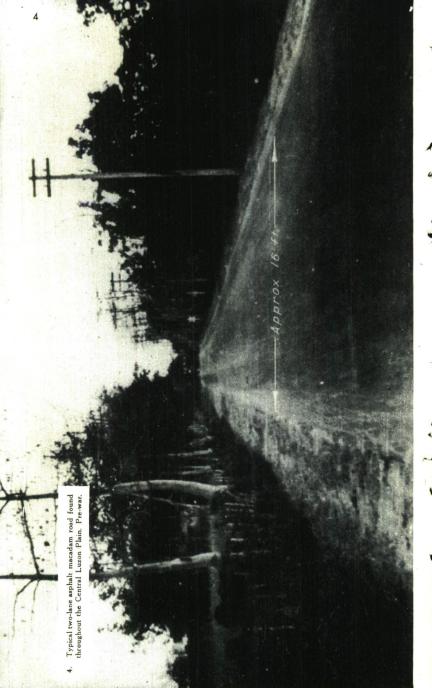
2-lane all-weather: At least 16ft base, and surface usually concrete or asphalt; 4ft shoulders; bridges and culverts at least 16ft wide. Maintained as a "First Class Road" by the Philippine Bureau of Public Works.

(Philippine BPW classification for the above road type is: "First Class Roads: Well graded and surfaced, thoroughly drained and constantly maintained. Bridges and culverts are usually complete and permanent and, when missing, their places are almost always supplied by ferries capable of carrying automobiles weighing two tons or more. Continuously passable at all times with possible exceptions during typhoon periods.")

1-lane all-weather: Usually 8ft base, and 12ft surface of gravel; 4ft shoulders; vehicles pass by driving on the thinly surfaced shoulders. Culverts usually 16ft and bridges 10ft wide. Maintained as a "First Class Road" by the Philippine Bureau of Public Works.







Seasonal: Usually graded for at least 20ft crown, in flat areas and 16ft or less in mountain areas. Usually unsurfaced and may become impassable during wet. Bridges and culverts usually 10ft wide. Maintained as a "Second Class Road" by the Philippine BPW.

Maintained as a "Second Class Road" by the Philippine BPW.

(Philippine BPW classification: "Second Class Roads" Fairly graded, partially or naturally surfaced and generally intermittently maintained. Bridges and culverts usually complete and partially temporary. Continuously passable for vehicle traffic during dry season but more or less impassable during rainy season.")

Most water obstacles in this area are wide, deep, but slow-moving except in flood; low soil banks. Bridges on many sections in this area, have been destroyed; details are given of some pre-war structures.

Several types of bridges were used, the most common being reinforced concrete slab and girder type over smaller streams, and steel truss types over larger rivers or where high clearance was required. The intended loadings of these bridges was usually 10 tons for main highways (marked in red on Map 2) and 5 tons or less for secondary roads.

Road distances in the text are given in both miles and kilometers. Concrete distance posts giving kilometers to various points were installed along most roads before war.

Good road metal has usually to be hauled long distances. Banks of adobe stone (a consolidated volcanic ash) can sometimes be found near the roadside, and gravel in most streams.

Timber suitable for making even temporary bridge repairs is seldom readily at hand.

## Abbreviations:

Prov Bdry—Provincial Boundary.

km -Kilometer (1000 meters or 1093 yards).

ml —Statute Mile (1760 yards).

RRX —Railroad Crossing.
Rd Junc —Road Junction.
Rd X —Road Crossing.
AW —All Weather.

BRIDGES: TW Temporary Wood.

WTs —Wood Truss.
STs —Steel Truss.
SG —Steel Girder.

CG -Reinforced Concrete slab and girder.

M —Masonry. A —Arch.

Dimensions: Length; width; height above normal water level or dry flood plain, in feet, in that order.

# 2. TRAILS:

Foot trails link almost every settlement and lead from the plain up into mountain areas to north, east, and SW. There are also several main trails across Candaba Swamp. (For details see at end of road section.)

In the vast areas of flat, lowlying farmland, foot trails will be found around edges of nearly every field. Many of these are wide, having been made by animal-drawn wagons and sleds. In dry weather MT can use these. After rain, particularly in southern and eastern sections, surface becomes soft and sticky. During wet season or in irrigated districts, large areas become completely ubmerged. The earthen dikes are built around rice paddies and foot troops can find good footing along tops of these even in flood time.

## 3. ROAD DETAILS:

#### ROUTE 3.

Summary: This is main NS highway of Central Luzon. From NW coast of Luzon and Lingayen Gulf road net it enters the area covered in this Handbook at Tarlac, Tarlac (15° 29' N; 120° 35' E).

It runs south between Cabusilan Mts ond Central Luzon plain to Angeles; thence SE between south end of Candaba Swamp and salt marsh delta area to a junction with Route 5 from the north, 36.4 km (22.6 ml) north of Manila.

Distance from Tarlac to this rd junc 87.7 km (54.5 ml) reduced 5.1 km (3.2 ml) due to Malolos Cut-off. (For roads north, south, and west of this area see Handbooks 39, 41 and 42 respectively.

Detail	Distance to Km	Manila Ml	Class and Terrain
TARLAC Rd X. Street west 0.8 km (0.5 ml) to business section. Branch east is Route 82 to Route 5B. Route 13A runs SW then NW to LIN-GAYEN GULF. Route 3F ends; 3E runs south.	124.1	77.1	Route 3F: 3E. 2-LANE AW BLACK. TOP. Gently rolling rice and sugarcane fields. Some grassland with small isolated trees. (Photos 14 and 23).
Rd Junc. Branch NW (right) 2-lane AW 1 km to Route 13A.	123.5	76.7	(110003 14 and 25).
River CG. 51 x 14 x 13	119.4	74.2	
SAN MIGUEL. Branch east (left) is Route 81 2-lane AW about 7 km (4.47 ml) to Tarlac Sugar Central.	118.0	73.3	
CANAL. CG 26 x 27 x 8	117.8	73.2	
Tramline Crossing.  BURUT Rd Junc. Branch SW (right)  1-lane AW old road loop for 7.7 km. With  2 CG bridges 34 x 26 x 12 and 36 x 25 x 12.  New road is 1.3 km (0.8 ml) longer, but better surface.	(110.7	73.0 $7.7$ $72.5$	Old road. New road.
MURCIA. Creek 31 x 14 x 14	New 116.3	72.3	
Rd Junc SE (left) seasonal 5.5 km (3.4 ml) to Route 55D at SANTIAGO.	New 112.1	69.7	
Creek. 39 x 14 x 7	New 111.7	69.4	
Creek. 30 x 15 x 7	New 109.6	68.1	
Rd Junc. Branch SE (left) Route 55D. 2-lane AW 7 km (4.4 ml) to CON CEPCION.	New 108.2	67.2	

Route 3-continued.

Detail	Distance to Km	Manila Ml	Class and Terrain		
RRX	107.9	67.0	New		
Rd June. Branch north (right) is old road loop.	107.7	66.9	Old road.		
CAPAS. Branch NW is Route 80 up O'DONNEL R Valley.	106.8	66.4			
CUTCUT R S.Ts. 158 x 16 x 35 (1 truss)	105.9	65.8	Flat, grassland or sugar- cane. Poor sandy soil.		
SUSUBA Cr. CG 36 x 16 x 10.	105.1	65.3			
SUSUBA Cr. CG 25 x 16 x 10.	102.1	63.4			
BAMBAN.	99.2	61.8	(Photo 10).		
BAMBAN R. S.Ts 396 x 16 x 32 (3 trusses) Prov Bdry Tarlac-Pampanga.	97.5	60.6	BLACKTOP ends, CONCRETE begins.		
Rd Junc. Branch west (right) 1-lane AW about 0.8 km (0.5 ml) to MABALACAT Hydro Electric plant.	95.2	59.2			
MABALACAT. Branch east (left) Route 79A, 1-lane AW 9 km to Route 55C at STA MARIA. Branch west, seasonal to FORT STOTSENBURG.	93.2	57.9	CONCRETE ends. BLACKTOP begins. (Photo 4 and 7).		
RRX. Good ballast pits west (right).	88.8	55.2	Ballast Pits.		
Rd Junc. Branch west (right) ½ km to DAU RR Sta.	88.4	54.9			
DAU Rd Junc. Branch west (right) is Route 77A 2-lane AW 7.4 km (4.6 ml) to FORT STOTSENBURG. Route 3E continues south.	88.1	54.7			
BALIBAGO.	85.6	53.2	2-LANE AW BLACK- TOP.		
River CG 628 x 20 x 13	84.6	52.6			
RRX	84.1	52.3	2-LANE AW CON- CRETE.		
Rd Junc. Branch ENE (left) 1-lane AW 1.5 km (0.9 ml) to Route 78.	84.0	52.2			
Creek CG 40ft.	83.2	51.7			
Creek CG 35 x 16 x 20.	82.8	51.4			
Rd Junc. Branch SW is Route 74 to PORAC and BATAAN.	82.7	51.3			
ANGELES. Municipio SW (right). Branch NE is Route 78 1-lane AW 12.2 km (7.6 ml) to MAGALANG.	82.2	51.1	(Photo 6).		
Rd Junc. Branch south 73 about 4 km (2.5 ml) to new airfields.	81.3	50.5	(Photo 9).		

# Route 3-continued.

Detail	Distance to Km	Manila Ml	Class and Terrain
STO DOMINGO Rd Junc. Branch SW 1-lane AW 1.5 km (0.9 ml) to an old sugar mill site.	80.7	50.1	
Rd Junc. Branch SW 1-lane AW 1½ km (0.9 ml) to Lara.	77.2	48.0	Many small branch roads.
S AGUSTIN. 20 houses.	69.9	43.4	RR on NE (left).
RRX.	69.0	42.9	
Rd Junc. Branch north seasonal to network of seasonal roads, running north and NW.	68.0	42.3	RR on SW (right).
RRX.	67.1	41.7	2-LANE AW, CON CRETE.
SAN FERNANDO. Branch NE (left) is Route 10 to Route 5. Branch SW (right) is Route 7 to BATAAN and the west coast of ZAMBALES.  Route 3E ends; 3D begins.	66.1	41.1	3E : 3D.
SAN FERNANDO R. CA 79 x 20 x 18. Not fordable.	65.9	40.9	
SAN MATIAS Rd Junc. Branch SW (right) Route 72A 1-lane AW 6.4 km (4.0 ml) to MINALIN.	63.2	39.3	2-LANE AW CONCRETE. (Photo 3).
SAPANG DAPDAP R. CG 157 x 16 x 11.	62.3	38.7	
River CG 111 x 16 x 8	60.8	37.8	
STO DOMINGO Rd Junc. Branch east (left) 1-lane seasonal 4 km (2.5 ml) to SAN SIMON.	59.3	36.9	
STA MONICA Rd Junc. Branch NE (left) Route 71 2-lane AW 3.0 km (1.9 ml) to SAN SIMON.	57.6	35.8	
SAN ROQUE cut-off starts, old road west (right).	56.3	35.0	
SAN ROQUE cut-off ends.	54.9	34.1	
Rd Junc. Branch ENE (left) 2-lane AW 1.7 km (1.1 ml) to APALIT on Route 55A.	54.1	33.6	
Rd X. Branch east (left) 1-lane AW 0.3 km (0.2 ml) to Route 55A. Branch SW (right) is Route 70, 1-lane AW 10 km (6.2 ml) to MASANTOL.	54.0	33.6	2-LANE AW CON- CRETE.
Prov Bdry PAMPANGA-BULACAN Rd Junct. Branch NE (left) 1-lane seasonal is start of Route 55A.	50.7	31.5	Concrete ends. Asphalt begins.
PAMPANGA R. S.Ts 330 x 20 (3 trusses).	50.5	31.4	(Photo 24).

Route 3-continued.

Detail	Distance to Km	Manila Ml	Class and Terrain
CALUMPIT. Branch east (left) street leads to old road south 1.8 km (1.1 ml) to Route 3C. Route 3D ends, 3C begins.	50.4	31.3	3D: 3C. (Photo 13).
Rd Junc. Branch SW (right) is Route 69, 1-lane AW 12.5 km (7.8 ml) to HAGONOY	50.0	31.1	
Rd Junc. Branch east (left) is Route 67 (old Route 3).	49.4	30.7	2-LANE AW. Newly completed grave surface begins. RR. SW, deep ditch NE Built-up road. Ricc paddies.
Route 3C runs SE (ahead).			2-LANE AW GRAVEL SURFACE. PARTS BLACKTOP OR CON- CRETE.
LABANGAN R CG 284ft.	48.5	30.1	
Rd X. Branch south (right) is Route 51C, start of the so called alternative "Low Road" to MANILA via MALOLOS, BULACAN and POLO. Total 46.2 km (28.7 ml).	47.2	29.3	
MALOLOS Rd X. Branch SW (right) is Route 68, 2-lane AW blacktop 1.1 km (0.7 ml) MALOLOS and NE 1-lane AW 7.8 km (4.8 ml) to Route 5A.	41.3	25.7	2-LANE AW PARTS BLACKTOP OR CON- CRETE,
An old 1-lane AW Blacktop. Branch runs parallel to Route 3C on south side of RR.			3C: 3B.
Rd Junc. Branch north (left) is Route 5 to CAGAYAN Valley. Route 3C ends; 3B begins turns south to MANILA.	36.4	22.6	NEW CUT-OFF ends. BLACKTOP begins.

Route 3 ends.

# ROUTE 5:

Summary: This is a national highway running southwards from Cagayan Valley in Northern Luzon, through Balete Pass (16° 07' N, 120° 56' E), down the eastern side of the Central Luzon plain to Route 3B, between Plaridel (Quingua) and Guiguinto.

From Balete Pass to the road junction on Route 3B at 36.4 km (22.6 ml) from Manila is 178.5 km (110.9 ml).

Before war the mountain section north of San Jose, total 53.6 km (33.3 ml), was a 1-lane AW road; the balance was 2-lane AW.

Main towns on the route are Cabanatuan, Gapan and Baliuag. Important branch roads and bridges are indicated on Map 2.

Distances have been adjusted on the assumption that a new section of road just north of Gapan (15° 19′ N, 120° 57′ E) has now been opened, involving a shortening of the road by 3.3 km (2.1 ml).

Route 5-continued.

ALVANO						
Detail	Distance Km	to Manila Ml	Class and Terrain			
BALETE PASS (about 2900ft). Rest house. Prov Bdry. NUEVA ECIJA- NUEVA VIZCAYA.	214.9	133.5	1-LANE AW. GRAVEL SURFACE southwards. Winds in heavily for- ested mountains.			
KAPINTALAN CG 144 x 20 (3 spans).	206.7	128.4	Forest thins out.			
MINULI (Camp 7).	204.5	127.1	Many small ravines.			
PUTLAN R.	201.6	125.3				
ANABAT—about 9 nipa huts.	199.0 195.5	123.7 $121.5$	Very winding.			
Route 5E turns SE.	189.0	117.4				
Stream crossing.	185.0	115.0				
DIGDIG Rd June (about 960ft). Branch east Route 100 50.5 km (31.4 ml) to RIZAL.	184.8	114.8				
TALAVERA R. STs and CG 218 x 16 x 29 (1 steel truss 160ft and 2-concrete spans	184.4	114.6				
29 ft each on north end). Two hairpin turns.	183.0	113.7				
River TW 56 x 10 x 8.	181.3	112.7	Runs southwards in a valley about 500 yds wide between mountains.			
River SG 115 x 16 x 9.	179.4	111.5	Wide Between and and			
River TW 37 x 10 x 7.	179.1	111.3				
River TW 60 x 10 x 7.	178.9	111.2				
PUNCAN, Barrio.	178.5	110.9	Patches of cultivation.			
Bottle-neck area. Many side-cuts. Turns SW elev about 450ft.	169.0 167.6	$105.0 \\ 104.1$				
SAN JOSE. Branch NW is Route 8. PANGASINAN Prov.	161.3	100.2	Open rice fields.			
Branch SE is Route 96 to BONGABON. (Both these branches reported to be under improvement to 25ft wide, 23 Aug 44.) Terminus of RR spur from TARLAC.	-		2-LANE AW GRAVEL. SOME BLACKTOP.			
Route 5E ends; 5D begins, runs SW RR on SE (left).	7		5E-5D.			
River TW 33 x 10 x 6.	158.2	98.3	2-LANE AW GRAVEL. Some BLACKTOP.			
RRX.	152.1	94.5	Level rice and grassland.			
MUNOZ Rd. Junc. Branch north is Route 99, 1-lane seasonal to LUPAO on Route 8 19.0 km (11.8 ml).	147.8	91.8				

# Route 5-continued.

Detail	Distance Km	to Manila Ml	Class and Terrain
BALOC Rd. Branch NW (right) is Route 15A to PANGASINAN Prov. Branch SW (right) is 98B to Route 98A at STO DOM- INGO. Route 5D ends; Route 5C begins, runs SE.	140.3	87.2	5D: 5C. MOSTLY BLACKTOP.
DIBABUYAN Cr CG 75 x 14 x 18 (3 spans). Bamboo along banks. Probably fordable. (8 concrete culverts 14ft wide).	138.8	86.2	Mostly riceland with nar row fringes bamboo alon some roads and water
SICSICAN Rd Junc. Branch SW (right) is Route 98A. 23.0 km (14.3 ml) to STA MARIA.	134.9	83.8	courses.
TALAVERA Rd. STs 490 x 16 x 22 (3 trusses).	134.8	83.7	
FALAVERA. Branch west 1-lane seasonal 4.5 km (2.8 ml) to STO DOMINGO.	132.0	82.0	
PINAGPANAAN Rd Junc. Branch NE (left) is Route 97B to RIZAL on Route 96.	127.6	79.3	
Rd Junc. Branch south (ahead) is Route 94Å, 1-lane AW about 6.5 km (4.0 ml) to CABANATUAN. Route 5D turns east (left).	124.2	77.2	2-LANE AW BLACK TOP.
Rd X. Route 97A 1-lane AW except at stream crossings SW (right) 1.4 km to Route 94A and NE (left) 8.6 km (5.3 ml) to Route 97B. Route 5C turns SE (right).	122.6	76.2	
AMPANGA R. North end of General Luna bridge. STs 1,989 x 16 x 26 (13 trusses). Not fordable.	122.0	75.8	2-LANE AW BLACK TOP. (Photo 16).
trusses). Not fordable. Route 5C turns south.	119.3	74.1	
ANGITAN (BANTUG) Rd X. Branch east (left) is Route 95, 1-lane AW 26.9 km (16.7 ml) to BONGABON. Branch west (right) 2-lane AW 1.3 km (0.8 ml) to CABANATUAN. Route 5C continues south and SW on south outskirts of CABANATUAN.	118.1	73.4	(Photo 26).
RRX.	116.5	72.4	
ABANATUAN Rd Junc. Important Railhead and road centre. Branch NW is Route 94A, 2-lane AW 1.2 km (0.7 ml) to CABANATUAN.	115.8	72.0	
Route 5C ends 5B begins. Runs SW. RR on east (left). Old road west (right) along river bank.			5C:5B.
IINATULA Cr. CA 108 x 18 x 40. dd Junc. Branch (right) is old seasonal road to CABANATUAN.	110.5 110.0	68.7 68.4	2-LANE AW BLACK TOP. Mostly rice paddies.

# Route 5-continued.

Detail	Distance to Km	Manila Ml	Class and Terrain
STA ROSA. Branch west (right) is Route 82 to TARLAC. Total 40.3 km (25.1 ml). Route 5B runs southwards.	109.0	67.7	2-LANE AW BLACK- TOP ends. GRAVEL SURFACE BEGINS.
Rd Junc. Branch NW (right) is old road to STA ROSA.	107.5	66.8	
TABUATING R. STs 195 x 18 x 30 (1 span).	105.8	65.7	
Rd Jun. Branch SW (right) is old road loop.	105.1	65.3	
TAMBO R.	104.0	62.4	
Rd X. (New). (Old).		$\begin{array}{c} 63.3 \\ 65.4 \end{array}$	2-LANE AW GRAVEL SURFACE.
Branch east (left) Route 93A along north bank of PENARANDA R 17.1 km (10.6 ml) to PIAS (CHICOR). Branch south (ahead) is new section of Route 5B, unfinished Junc 41. Old road loop turns west (right) 0.8 km (0.5 ml) to old road at 104.4 km (64.9 ml).			Note: Distances north of this point conform to new road.
Rd Junc. BranchNW (right) is old (Old) road loop over TAMBOR R. TW 120 x 10 x 24. Route 5B turns south (left) on old road. (Disregard existing km posts).		64.9	
Rd Junc. Branch west (right) is (Old) Route 56A (0.4 km) over a TW 280 x 8 or ferry across PAMPANGA R to JAEN.	101.4	63.0	
River TW 49ft. Route 5B turns east	(Old) 99.0	61.5	2-LANE AW GRAVEL SURFACE.
Rd Junc. Branch SW (right) seasonal road to old ferry crossing on PENA. RANDA R, thence to SAN ISIDRO total 2.3 km (1.4 ml).		61.3	Mostly Rice paddies. A few bamboo clumps.
Old road joins new section of Route 5B, turns SE (right).	(New) 97.3	60.6	
Rd Junc. Branch NE (left) is Route 93E to old ferry crossing and LEONARDO 6.2 km (3.9 ml).		59.5	
PENARANDA R. STs 915 x 18 x 24 In dry season water 75 x 2 t. Currents 3 knots, sandy bottom. North bank 9ft steep; south bank 11ft, gentle slope.	4	59.7	
GAPAN Rd X. Branch north (left) is Route 92. 1-lane AW up south bank of Penaranda R 9.5 km (5.9 ml) to PEN- ARANDA.		59.3	
Branch SW (right) is Route 10 48.1 km (29.9 ml) to SAN FERNANDO or Route 3D. Route 5B ends, 5A begins			2-LANE AW GRAVEL 5B-5A:

# Route 5-continued.

Detail	Distance to Km	Manila Ml	Class and Terrain
RRX.	95.1	59.1	Rice paddies and bambo
MALIMBA R. CG 137 x 9	88.9	55.2	
S ROQUE, RRX.	87.6	54.4	
Prov Bdry NUEVA ECIJA-BULACAN.	86.0	53.4	
BULUALTO Rd Junc. Branch NW (right) is Route 56A, 1-lane AW 11.3 km (7.0 ml) to Route 10 at S ISIDRO.	85.5	53.1	
BULU R. CG 92 x 16 x 3 (4-span).	81.3	50.5	2-LANE AW GRAVES
Rd Junc. Branch NE (left) is Route 91 to BIAC-NA-BATO.	78.4	48.7	Rice paddies and bambo clumps.
Rd Junc. Branch SE (ahead) 2-lane AW 0.7 km (0.4 ml) to S MIGUEL RR Sta. Route 5A swings SW (right).	76.9	47.8	
S MIGUEL. Branch west, 1-lane seasonal for about 8.5 km (5.3 ml) to BULU R.	76.2	47.5	Many shade trees.
S MIGUEL R STs 176. Dry season water 100ft wide 2-knot current. Unfordable. Route 5A swings south and west.	76.1	47.4	Surroundings low and subject to flooding CANDABA SWAMI west. Rice paddies nea
			road. Grassland east.
River STs 137.	74.3	46.2	
Rd Junc. Branch NE (right) is old road about 1 km to 4-span wood bridge site. Route 5A turns SW (left).	73.6	45.7	
GOLONG R. C abuts 50ft.	70.6	43.9	
ILDEFONSO. Branch east (left) 1-lane AW 2.6 km (1.6 ml) to PINAOD RR Sta.	66.0	41.0	
MAASIM R. CG 253 x 16 x 20 (11 spans). Water dry season 60 x 3ft. Hard sand bottom. Banks 15ft high, steep, and sandy.	61.5	38.2	2-lane AW, Grave surface.
RRX.	54.7	34.0	
Creek CG 60ft.	54.1	33.6	
Creek CG 34.5ft.	53.4	33.2	
Rd Junc. Branch east (left) is Route 88B 14.8 km 9.2 ml) to SANTA LUCIA.	53.3	33.1	
BALIUAG. Branch north (right) is Route 88A to RR Sta. Thence north to edge of Candaba Swamp total 6 km (3.7 ml) Route 5A turns SE (left).	51.1	31.8	2-LANE AW GRAVEI SURFACE.

Detail	Distance Km	to Manila Ml	Class and Terrain
On north bank of Angat R. Rd Junc. Branch SE to ferry crossing to Bustos. In dry season water is 300 x 4tf. current 3 knots. Route 5A turns SW (right).		31.7	Flat farmland. Patches bamboo, betelnut and mango.
RRX.	42.6	26.5	
Rd Junc. Branch north (right) is Route 67 (old Route 3). Route 5A turns south (left).	42.5	26.4	2-LANE AW. Gravel Ends, Blacktop begins.
Angat (Quingua) R STs 518 x 16 (4 trusses). Good sand and gravel pits along both banks. Unfordable.	42.4	26.3	Gravel Pits. Important Bottleneck.
Plaridel (Quingua) Rd X. Branch east (left) is Route 65C 1-lane AW 32.2 km (20.0 ml) to Norzagaray Rd Junc on 65A. Branch west (right) is Route 68, 1-lane AW 9 km (5.6 ml) Malolos. Route runs SW.		26.0	Mostly low rice paddies.
Irrigation ditch CG 26ft.	41.6	25.8	
Rd Junc. Branch north (right) 1-lane AW 1.3 km (0.8 ml) to Plaridel (Quingua).	40.2	25.0	
Rd Junc with Route 3B	36.4	22.6	3C-3B

Route 5 ends here.

### ROUTE 7:

Summary: From LINGAYEN via west coast of ZAMBALES and Northern BATAAN this national highway enters SW corner of area covered by this Handbook near DINALUPIHAN (14° 52′ N, 120° 28′ E), runs NE to SAN FERNANDO, PAMPANGA. 36.2 km (22.5 ml).

An important link from ZAMBALES coast and BATAAN to CENTRAL LUZON road net.

Road distances given below have not been corrected for the MALOLOS cut-off because kilometer posts on ground probably not yet altered. Deduct 5.1 km (3.2 ml) for true road distances to Manila.

Detail	Distance to Km	Manila Ml	Class and Terrain
DINALUPIHAN. Municipality Rd Junc.		66.7	1-LANE AW GRAVEL SURFACE.
Branch north is Route 74, 35.3 km (21.9 ml) to ANGELES on Route 3E.			
Route 7B ends; 7A begins. Runs south (right). Tramline X.	105.9	65.8	7B: 7A. 2-LANE AW BLACK- TOP.

Route 7-continued.

Detail	Distance to Km	Manila Ml	Class and Terrain
LAYAC Rd Junc. Branch SW (right) is Route 110 BATAAN coastal road about 143 km (88.9 ml). Route 7A turns NE (left).	105.5	65.6	Level, open cane and rice fields.
Creek TW 39 x 18 x 12.	105.3	65.4	Sandy soil.
Creek TW 58 x 18 x 11.	105.2	65.4	Many small wood beam bridges.
BALSIC R. CG 180 x 18 x 12.	104.4	64.9	
Tramline X.	101.2	62.9	
Tramline X.	100.1	62.2	
River TW 114 x 11 x 11.	97.8	60.8	2-LANE AW BLACK-
River TW 58 x 19 x 3.	94.0	58.4	
River TW 52 x 19 x 5.	92.7	57.6	
River TW 59 x 19 x 7.	92.3	57.4	
PORAC R CG 62 x 14 x 9.	89.2	55.4	
LUBAO.	88.9	55.2	
Branch east (right) is Route 72B alternative road loop through SEXMOAN to GUAGUA, 6.3 km (3.9 ml). Route 7A runs north.			Road link with Tidal Waterways SE.
RRX. SANTO TOMAS Station.	87.9	54.6	2-LANE AW BLACK- TOP. Rice and cane NW; fish ponds or swamps SE.
River CG 126 x 14 x 9.	86.1	53.5	
SAN ANTONIO Rd Junc. Branch NW (left) is Route 76 to DEL CARMEN area.	84.8	52.7	
GUAGUA. River port. Branch NW (left) is Route 75 to PORAC.	82.0	51.0	
BACALOR. Old road loop follows north bank of river. Route 7A runs NE.	77.7	48.3	
SAN JUAN. Route 7A turns east. Old army airport north.	73.6	45.7	
RRX SAN FERNANDO sta north.	71.9	44.7	
SAN FERNANDO on Route 3E.	ſ71.2	44.2	Old distance.

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## ROUTE 8:

Summary: From Carmen, Pangasinan (15° 53′ N, 120° 36′ E) on Route 3G: 3F, Route 8 runs east and SE for 51.4 km (32.8 ml) to Route 5D: 5E at San Jose, Nueva Ecija. First 4 mls 2-lane AW, thence 1-lane AW. All streams bridged, usually by wood structures 16-18ft wide.

An important E/W link between Routes 5, 15 and 3.

Detail	Distance Carmen, Km		Class and Terrain
CARMEN, Pang. on Route 3G: 3F 171.7 km (106.7 ml) to Manila. Just south of VILASSIS Bridge over AGNO R. Route 8 runs east.	00	00	2-LANE AW BLACK- TOP. Flat cultivation rice and sugarcane some trees close to road. ROSALES A/F 250 yds south of road.
C Bridge 85 x 18 x 19.	3.1	1.9	
ROSALES Rd Junc. Branch NE (left) is Route 263 to TAYUG.	4.0	2.5	Railroad spur on south.
C Bridge 121 x 15 x 18.	6.5	4.0	Undulating grassland and cultivation gradually rising to south and east.
Junc. Branch south (right) is Route 15 to GUIMBA and Route 5C: 5D at BALOC.	6.6	4.1	1-LANE AW BLACK- TOP ends, Gravel begins. RR parallel, south.
BALUNGAO.	9.0	5.6	Undulating grassland and cultivation rising south to Mt BALUNGAO.
SAN LEON. RRX. Line NE to SAN QUINTIN. Route 8 continues east.	14.5	9.0	
KARAYOGAN R. TW 90 x 10 x 16.	19.3	11.9	
UMINGAN Rd Junc north of the town. (Elev 340ft) Route 8 runs east and SE. Route 264 NW to TAYUG.	28.0	17.4	1-LANE AW. GRAVEL SURFACE. Gently rolling. Mountains NE.
ALOU R. TW 49ft Prov Bdry. PAN-	34.3	21.3	
GASINAN-NUEVA ECIJA. LUPAO. Branch south is Route 99, seasonal to Munoz on Route 5D, total 19.0 km (11.8 ml). Route 8 runs SE. 3 small wood bridges.	37.7	23.4	1-LANE AW GRAVEL SURFACE.
River TW 100 x 9 x 6.	38.6	24.0	
River TW 99 x 10 x 6. 4 small wood bridges.	38.8	24.1	
River TW 80 x 10 x 9.	40.4	25.1	
River TW 59 x 10 x 11.	41.5	25.8	
River TW 52.	42.1	26.2	
River TW 84 x 10 x 6.	43.2	26.8	

### Route 8-continued.

Detail	Distance to Carmen, Km		Class and Terrain
River TW 59 x 10 x 11	45.2	28.1	
River TW 55 x 10 x 10	49.0	30.5	
SAN JOSE on Route 5D: 5D 161.3 km (99.3 ml) to Manila.	51.9	32.2	

Route 8 ends.

### ROUTE 10:

Summary: This is an important National Highway running SW from Gapan (15° 19' N, 120° 57' E) on Route 5A for 48.1 km (29.9 ml) to San Fernando, Pampanga, on Route 3D.

In 1941 it was an excellent AW road throughout, capable of supporting 1-lane convoys for the first 28.9 km (18.0 ml) to Arayat, thence 2-lane to San Fernando, Pampanga.

Main towns include S Isidro, Arayat, and Mexico, with a large steel bridge over Pampanga R near Arayat.

It connects a network of roads in the lowlying riceland areas of Central Luzon Plain with the main highways on each side.

#### Route 10B:

Detail	Distance to via Gaj Route Km	oan on	Class and Terrain
GAPAN Rd Junc on Route 5A: 5B. Route 10B runs SW and west.	95.5	59.3	1-LANE AW GRAVEL SURFACE. Level.
SAN ISIDRO. Branch south (left) is Route 56A 1-lane AW 11.3 km (7.0 ml) to Route 5A at BULUALTO.	100.2	62.3	Rice paddies.
Branch north is Route 56A, crossing river by TW 618 x 8 x 6.	100.4	62.4	
Rd Junc. Branch west (ahead) is old road along river bank. Route 10B turns SW.	101.4	63.0	
S ROQUE. Branch north (right) is Route 56B to ferry crossing.	103.8	64.5	
Rd Junc. Branch north is old road along river bank.	106.2	66.0	
CABIAO.	109.4	68.0	Level rice paddies SE Pampanga River NW.
River TW 73 x 9 x 12.	115.9	72.0	
Prov Bdry NUEVA ECIJA-PAMPANGA via GAPAN.	${116.0}\atop{93.7}$	72.1 58.2	

Route 10B ends; 10A begins.

Route 10A:

Detail	via San	to Manila Fernando loute 3 Ml	Class and Terrain
Rd Junc. Branch south (ahead) to old ferry crossing 2.4 km (1.5 ml). Route 10A turns SW (right).	89.1	55.4	1-LANE AW. GRAVEI SURFACE.
PAMPANGA R. STs 570 x 20 x 32. Un- fordable. Original bridge reported des- troyed in 1942 and repaired by enemy.	87.6	54.4	Rice paddies.
Rd Junc. Branch NW is a jeep trail wind- ing for about 20 km (12.4 ml) to top of MOUNT ARAYAT.	87.1	54.1	
ARAYAT extends to SE of Rd Junc.	85.3	53.0	(Photo 1.)
Rd Junc. Branch west (right) is Route 90.  1-lane AW 9·2 km (5.7 ml) to Route 55B.  There was a large Government rock- crusher and quarry about 1 km (0.6 ml)  SW of here.  Route 10A turns south.  RR west (left).	84.6	52.6	2-LANE AW. GRAVEI ENDS; BLACKTOF OR CONCRETE BE GINS. Rock quarry.
Rd Junc. Branch east seasonal 1.6 km (1.0 ml) to SAN NICOLAS.	79.8	49.6	
STA ANA. Branch east (left) is Route 89 1-lane AW 7 km (4.4 ml) to CANDABA crossing PAMPANGA River by suspen- sion bridge 342 x 10 x 28.	78.3	48.7	
RRX.	77.7	48.3	
RRX.	76.3	47.4	
STO DOMINGO. Branch east (left) is Route 55A. Route 10A turns west (right) several small bridges.	75.7	47.0	
MEXICO. Branch north (right) is Route 55B. Route 10A continues south through town, several seasonal road branches. Several small MA bridges.	71.8	44.6	
SAN FERNANDO.	66.1	41.1	(Photo 22.)

### ROUTE 13:

Summary: This is a direct road-link from LINGAYEN (16°01'N 120°14'E) to TARLAC, TARLAC (Photo 23), on Route 3E, 124.1 km (76.1 ml) from MANILA. Its total length is 82.8 km (51.4 ml).

It is a good 1-lane AW road.

CAMILING and TARLAC are the main towns on this route in TARLAC Province. (For details, see Handbook No. 39, Tarlac-Dagupan.)

## ROUTE 15:

Summary: From Rd Junc just east of ROSALES (15° 54' N, 120° 38' E) on Route 8, runs south and SE for 34.1 km (21.2 ml) to GUIMBA; thence 14.2 km (8.8 ml) to BALOC Rd X on Route 5C: 5D.

In 1941 it was 1-lane AW throughout, mostly blacktop.

It forms part of a direct route from Lingayen Gulf to Cabanatuan in central Nueva Ecija.

Detail	Distance Km	to Manila Ml	Class and Terrain
Rd Junc on Route 8, 6.4 km (4.0 ml). East of CARMEN on Route 3F. Route 15A runs south.	188.6	117.2	1-LANE AW. BLACK- TOP.
River. Rf CI—beam 26 x 15 x 9.	185.5	115.3	RR east. Rice paddies occasional patches light timber.
RŘX.	184.6	114.7	
S ANTONIO. Route 15A turns east.	179.0	111.2	RR west, mountains east
Prov Bdry. PANGASINAN-NUEVA ECIJA.	178.0	110.6	
River. CG 36 x 18 x 10.	177.5	110.3	
Rd X. Seasonal roads run east and west. Route 15A runs south.	176.4	109.6	
River. TW 60 x 19 x 19.  MALANING small barrio on south bank.	173.4	107.8	
Rd Junc. Branch west (right) is Route 87, 1-lane AW 2.7 km (1.7 ml) to CUYAPO; thence 5.4 km (3.4 ml) to NAMPICUAN; thence 7.4 km (4.6 ml) to Route 3F. Total 15.5 km (9.6 ml).	1	106.5	
BURGOS Rd Junc. Seasonal roads west and NW to CUYAPO.	170.0	105.6	Blacktop ends; grave surface starts.
			1-LANE AW. Grave
SAN ANTONIO (15° 43′ N., 120° 42′ E), centre of many seasonal branch roads.	164.6	102.3	surface. Level; rice paddies.
SAN FRANCISCO Rd Junc. Branch west to 87.	161.0	100.0	Gravel ends; blacktog starts.
Rd June. Branch SW (right) is Route 84 seasonal to Route 3F at GERONA. 17.3 km (10.8 ml).	157.0	97.6	
BALOY R STs 164 x 16 x 23.	156.9	97.5	
GUIMBA. Route 15A turns east.	154.5	96.0	
Rd Junc. Branch south (ahead) is Route 56F. Route 15A turns east (left).	154.2	95.8	
River TW 74 x 11 x 9.	146.8	91.2	
River TW 37 x 10 x 10.	146.5	91.0	

Route 15-continued.

Detail	Distance to Km	Manila Ml	Class and Terrain
RIO CHICO R STs 360 x 16 x 18.	144.5	89.8	
STO ROSARIO Rd June. Branch SW (right) 1 km (0.6 ml) to town.	142.2	88.4	
BALOC Rd X on Route 5.	140.3	87.2	

Route 15A ends here.

## ROUTE 55:

**Summary:** A series of road sections generally parallel to and to the east of Route 3; some sections 2-lane AW, others seasonal. Many good lateral connections make it possible to use this route to relieve traffic on the main highways.

Important towns include Victoria, Concepcion, Magalang, and Mexico.

All streams were bridged, but it should be regarded as a light duty route.

(For detail of sections north of Victoria, see Handbook 39.)

Detail	Distance Km	to Manila Ml	Class and Terrain
VICTORIA Rd X on Route 83, SW to TARLAC, TARLAC. NE to GUIMBA. Route 55E runs south.	146.0	90.7	1-LANE METALLED but said to be seasonal Rice paddies.
RRX.	145.6	90.5	
River TW 99 x 10 x 10.	142.6	88.6	
LOMBOY Rd Junc. Branch west jeepable 4.1 km (2.6 ml) on Route 82.	136.0	84.5	
CUTCUT R TW 61 x 12 x 8.	132.0	82.0	
Rd Junc on Route 82. Route 55E ends. Turn east (left) along Route 82 for 1.5 km (0.9 ml).	131.0	81.4	55E: 55D.
LA PAZ Rd Junc East of ZARAGOZA and Route 5 west to TARLAC, TARLAC. Route 55D begins, runs south. 3 TW bridges total 98ft. Low level.	129.5	80.5	SEASONAL ROAD ends, 1-LANE AW begins, Flat. Rice paddies.
CAUT barrio. Trail west to S JUAN.	124.9	77.6	
River TW 62 x 9 x 4.	124.7	77.5	
BANDOC. 4 low level TW total 128ft.	123.3	76.5	
STA MONICA. Jeep trail west. Route 55D turns SW. 2 low-level TW total 83ft.	120.5	74.9	
STA CRUZ.	116.5	72.4	

# Route 55-continued.

Detail	Distance to Km	Manila Ml	Class and Terrain
CUTCUT R TW 212 x 11 x 15.	114.1	70.9	Gravel.
CONCEPCION. Branch south (left) is an old seasonal road about 11 km (6.8 ml) to MAGALANG. Route 55D runs west (ahead).	7 6	70.2	Rice paddies.
SANTIAGO. Branch west (ahead) is 1-lane AW 4.2 km (2.6 ml) to Route 3E. Route 55D ends; Route 55C begins, runs south (left).		68.1	55D: 55C. 1-LANE AW GRAVEL.
Rd X. Jeepable trails run NE and SW	107.1	66.6	
River TW 23 x 10 x 5. Many small streams.	106.0	65.9	
STA MARIA. Branch SW (right) is Route 79A 1-lane AW 8.9 km (5.5 ml) to Route 3E at MABALACAT.	100.8	62.6	
Rd Junc. Branch north (left) is old seasonal road about 11 km (6.8 ml) to CONCEPCION.	97.8	60.8	al aruon
MAGALANG. Branch NE (left) 1-lane AW 3.5 km (2.2 ml) to SAN AGUSTIN School Farm. Branch SW (right) is Route 78, 1-lane AW 12.2 km (7.6 ml) to Route 3E at ANGELES.		60.0	and daily
PANDULANG Creek TW 55 x 10 x 4.	94.8	58.9	1-LANE AW. Open Cultivation.
Rd Junc. Branch east (left) is Route 90 1-lane AW 9 km (5.6 ml) to Route 10A at ARAYAT.	90.0	55.9	
Route 55C ends; 55B begins. Runs south.			55C: 55B.
Route 55B runs south. Many small streams and seasonal branch roads.			1-LANE AW. Rice paddies.
River TW 120 x 9 x 6.	85.0	52.8	Rice paddies,
MEXICO on Route 10A. Route 55B ends. Turn east (left) for 4 km (2.5 ml) along Route 10A.	78.9	49.0	
Rd Junc on Route 10A Route 55A begins, runs east. Rd Junc. Branch NE (ahead) is old road to Sta Ana. Route 55A turns SE (right).	74.9 64.3	46.5 46.2	55B: 55A. 1-LANE AW. Rice paddies.
River TW 37 x 9 x 13.	74.2	46.1	
SAN LUIS on north (right) bank of PAM PANGA R.	69.4	43.1	Winds along NW (right) bank of Pampanga. Rice paddies west; CAN- DABA SWAMP east.

### Route 55-continued.

Detail	Distance to	Manila	Class and Terrain
	Km	M1	-
SAN SIMON. (Photo 21). Branch west (right) is 1-lane seasonal for about 4 km (2.5 ml) to Route 3D at STO DOMINGO.		38.8	
Branch SW (right) is Route 71, 1-lane AW, 3.1 km (1.9 ml) to Route 3D at STA MONICA.	62.2	38.7	
APALIT. Branch NW (right) then west is 2-lane AW 1.7 km (1.1 ml) to Route 3D. Route 55A continues to wind along river bank.		35.2	1-LANE AW ends, SEASONAL begins,
Rd Junc Branch west (right) is Route 70, 1-lane AW 0.3 km (0.2 ml) to Route 3D, thence about 10 km (6.2 ml) to MASANOL Route 55A continues southwards along river bank.	1	34.3	
Rd Junc with Route 3D just north of CALUMPIT bridge.	50.7	31.5	
Route	55 A end		

### ROUTE 56:

Summary: This is another long N/S alternative route to the west of Route 5.

Commencing at Guimba (15° 40' N, 120° 46' E) on Route 15 it runs southwards by a series of short connecting road sections on Route 5A at Bulualto 85.5 km (53.1 ml) from Manila, total length of 60.9 km (37.8 ml).

Parts of section 56E and 56C were seasonal roads, totalling 20.8 km (12.9 ml), the remainder being 1-lane, AW.

Important towns include Quezon, Jaen, and S Isidro, and important bridges over the Licab R on 56F and Pampanga R on 56A.

Detail	Distance to Km	Manila Ml	Class and Terrain
GUIMBA on Route 15. Route 56F runs SE.	146.4	91.0	56F. 1-lane AW.
LICAB or CHICO R TW 156.	137.4	85.4	
QUEZON Rd X on Route 98A. Route 56F ends; 56E begins, runs SE.	134.0	83.3	56F: 56E. 1-LANE SEASONAL.
ALIAGA. Branch NE is 98B to BALOC on Route 5C 17 km (10.6 ml). Route 56E turns east (left).	127.2	79.0	1-LANE AW.
BUCOT Rd Junc. Branch east (ahead) is Route 94B about 14 km (8.7 ml) to CAB ANATUAN. Route 56E ends; 56D begins, runs SW.	123.9	77.0	56E: 56D. 1-LANE AW.
CARMEN Rd X on Route 82. Route 56D ends; 56C begins, runs south.	115.8	72.0	56D: 56C. 1-LANE SEASONAL.
SANGALANG Cr. TW 48.	109.5	68.0	1-LANE AW.

# Route 56-continued.

Detail stan	Distance t	Manila Ml	Class and Terrain
Rd Junc. Branch NE (right) is 1-lane AW to SAN PABLO about 5 km (3.1 ml).	101.8	63.3	
JAEN. Branch east over PAMPANGA R. TW 280 x 8. Total 0.7 km (0.4 ml) to Route 5B. Route 56C ends; 56A begins, runs south.	101.1	62.8	56C: 56A.
Rd Junc. Branch west (left) 1-lane AW 6.5 km (4.0 ml) to S. ANTONIO, alternative Route 56B.	98.6	61.3	
PAMPANGA R. TW 618 x 8 x 6.	97.4	60.5	
S. ISIDRO on Route 10B running E/W. Route 56A continues south.	96.8	60.1	
TABUN Creek. TW 60 x 12 x 8.	92.7	57.6	
BULUALTO. Rd Junc on Route 5A.  Route	85.5 56 ends.	53.1	

# ROUTE 65C:

Summary: This branch commences at Plaridel (Quingua) on Route 5A and runs up the south (left) bank of the Angat River 32·2 km (20·0 ml) to Norzagaray road junction Route 56A.

41.8 42.0 46.0	26.1 28.6	I-LANE AW. GRAVEL SURFACE winds along south (left) bank of Angat R, low rice paddies.
46.0	28.6	
46.0	28.6	
53.2	33.1	
53.2	33.1	
	0012	
67.2	41.8	
68.5	42.6	Narrow defile between hills and river.
70.5	43.8	1-LANE AW. GRAVEL SURFACE.
74.0	46.0	
5.	68.5	68.5 42.6 70.5 43.8 74.0 46.0

### ROUTE 67:

Summary: This is a section of old Route 3 before the new "Malolos cut-off" was completed.

It now forms an important lateral between Route 3C and 5A on the north (right) bank of the Angat (Quingua) River, total 12.0 km (7.5 ml).

Detail	Distance to Km	Manila Ml	Class and Terrain
Rd June on Route 5A, just north of the PLARIDEL (QUINGUA) bridge. Route 67 runs north. (Photo 56.)	42.5	26.4	2-LANE AW. BLACK- TOP. Thickly settled farming area.
Curves west (left) over irrigation canal, about 35ft wide, 4 ft deep.	43.5	27.0	
PULILAN. Branch north (right) seasonal 3 km (1.9 ml) to BALATONG.	45.5	28.3	
BAGBAG R CG 412 x 16 (9 spans). Unfordable.	53.4	33.2	
Rd Junc. Branch north (right) is an old 1-lane AW road to CALUMPIT 1.8 km (1.1 ml).	53.7	33.4	
Rd Junc. At 49.4 km (30.7 ml) on Route 3C, just south of CALUMPIT.	54.5	33.9	

Route 67 ends.

### ROUTE 68:

Summary: This is a lateral road from Plarodil (Quingua) to Ma'olos crossing Routes 5C, 3C and 51B. Total 8.7 km (5.4 ml).

Detail	Distance to Km	Manila Ml	Class and Terrain
Rd Junc on Route 5A at 41.9 Km (26.0 ml). Just south of the PLARIDEL (QUIN- GUA) bridge. Route 68 runs west.	48.1	29.9	1-LANE AW. GRAVEL SURFACE. Low rice paddies.
PLARIDEL (QUINGUA). Branch south (left) 1.4 km (0.9 ml) to Route 5A. An old seasonal road winds north and west along the south (left) bank of the ANGAT (QUINGUA) R to Route 3C at the commencement of Route 51C.  Route 68 continues west and SW.	47.3	29.4	No important bridges, but many built-up sec- tions.
Rd X on Route 3C at 41.3 km (25.7 ml), also crosses RR.	40.5	25.2	1-LANE AW. GRAVEL SURFACE.
MALOLOS. Where it joins Route 51B.	39.4	24.5	

## ROUTE 69:

Summary: This is a loop road running west from Malolas on Route 51B to Hagonoy, thence north to Route 3C near Calumpit, total 18·3 km (11·4 ml).

Detail	Distance 1	to Manila Ml	Class and Terrain
MALOLOS on Route 51B. Route 69 runs west.	39.4	24.5	1-LANE AW.
CALANATA. CG 116ft.	41.2	25.6	Rice paddies. Many built up sections and small bridges.
PAOMBONG. CG 49ft.	42.0	26.1	
River. CG 46ft.	44.0	27.3	
River. STs 208ft.	44.8	27.8	
HAGONOY Rd Junc. Branch south (left) 1-lane AW 1 km (0.6 ml) to the town of HAGONOY, thence south and east, seasonal road for about 5 km (3.7 ml) along left bank of MARULAO R, a seasonal branch also follows west (right) bank of the HAGONOY R, thickly settled area. Route 69 turns north (right) up east (left) bank of HAGONOY R. Many small creeks with wood bridges.		28.6	Very thickly settled area along river banks.
Rd Junc. Branch east seasonal road into rice paddies.	50.0	31.1	
CALUMPIT Rd Junc on Route 3C, 50.0 km (31.1 ml) from MANILA.	57.7	35.9	1-LANE AW.

## ROUTE 70:

Summary: Commencing at a road crossing 3.6 km (2.2 ml) north of Calumpit. Route 70 run SW to Masantol 9.4 km (5.8 ml).

Detail	Distance to Km	o Manila Ml	Class and Terrain
Rd X on Route 3D, Route 70 runs SW.	54.0	33.6	1-LANE AW. GRAVEL SURFACE.
RRX.	55.2	34.3	
FRANCISCO R STs 141 x 14 x 16.	56.7	35.2	Rice paddies.
DOMINGO R STs 102 x 15 x 14.	57.6	35.8	
River STs 82 x 14 x 11.	58.1	36.1	
MACABEBE. Seasonal branch roads follow banks of river. TW bridge 37 x 11 x 8 in town.	61.4	38.2	Thickly settled area along river banks.
MASANTOL.	63.4	39.4	

### ROUTE 71:

Summary: Commencing at Sta Monica Rd Junc on Route 3D, 57.6 km (35.8 ml) from Manila, Route 71 runs NE, 2-lane AW blacktop to San Simon (Photo 21) on Route 55A, total 3 km (1.9 ml).

## ROUTE 72A:

Summary: Commencing at San Matias Rd Junc on Route 3D, Route 72 runs SW, 1-lane AW to Minalin, total 6.8 km (4.2 ml).

Detail	Distance Km	to Manila Ml	Class and Terrain
SAN MATIAS Rd June on Route 3D.	63.2	39.3	1-LANE AW.
RRX.	63.7	39.6	Low riceland.
Rd Junc. Branch east about ½ km (0.3 ml) to STO TOMAS. 3 small wood bridges.	66.1	41.1	
MINALIN. Seasonal roads extend SW along both banks of a waterway for 2 km (1.2 ml) SW.	70.0	43.5	

### ROUTE 72B:

Summary: From LUBAO (15° 56′ N, 120° 36′ E) on Route 7A, Route 72B runs east 2.3 km (1.4 ml) to SEXMOAN, an important river port on the ORANI and GUAGUA River channels. Crosses two unfordable tidal rivers, TW 331 x 9 x 9 and 255 x 9 x 8 respectively.

It turns north along west (right) bank of GUAGUA R for 4.0 km

(2.5 ml) to GUAGUA; total 6.3 km (3.9 ml).

Said to be 1-LANE AW throughout, but parts may be under water in high flood. Surroundings very low, mostly fish ponds, salt marsh or rice paddies. Many built-up sections.

Connects tidal waterways with Route 7A.

### ROUTE 73:

Summary: A branch road from Angeles on Route 3E to Bacolor on Route 7A, total 16.5 km (9.6 ml). The northern sections of this route appear to be under recent improvement in connection with airfields in the vicinity of Angeles and Lara.

Detail	Distance t via An Km		Class and Terrain
Rd Junc on Route 74A just south of ANGELES, Route 73 runs SE, parallel to Route 3E.	83.0	51.6	CONDITION UN- KNOWN. It was a poor private road (seasonal). Appeared to be under development in May 44. Open farmland. Rice, sugar cane and pasture.
Rd Junc. Branch NE about 200 yds to Route 3E near TELABASTAGAN. Route 73 turns southwards.	85.9	53.4	

Route 73-continued.

Detail	Distance to Manila via Angeles Km Ml	Class and Terrain
Rd Junc. Branch SW about 1 km (0.6 ml) past the south end of airfield to an old sugar mill site.	86.6 53.8	
LARA Rd Junc. Branch eastwards through the barrio, thence for about 3 km (1.2 ml) to Route 3E just north of SAN ROQUE. Airfield west. Route 73 continues south.		(РНОТО 9.)
SAPANG GUGO. TW bridge with 12ft beams (size unknown). There was an old TW 40 x 12 x 15 about 300yds down stream.  Route 73 continues SSE.  Many branch roads to nearby farms.	*	ROAD UNDER DEVELOPMENT ENDS, AND A POOR PRIVATE ROAD (PROBABLY SEASONAL) BEGINS.
BACOLOR, on Route 7A.	99.5 61.8 e 73 ends.	

## ROUTE 74:

Summary: This is an important strategic branch road from Angeles on Route 3E, SW to Dinalupihan on Route 7A. Total 35.3 km (21.9 ml).

The SW end of this road has only recently been developed, unconfirmed reports indicate that the enemy moved tanks and MT along this road early in 1942.

	-		
Detail	Distance to via Ang Km		Class and Terrain
ANGELES Rd Junc on Route 3E, Route 74A runs SW.	82.7	51.4	1-LANE AW. GRAVEL SURFACE. (PHOTO 6).
CUTCUT. Cemetery north (right).	83.2	51.7	
PASIG R. STs 132 x 14 x 12.	88.4	54.9	Open grass, rice and sugarcane. Sandy soil.
Pramline X.	90.3	56.1	Many seasonal branches and small bridges.
Rd Junc. Branch NW (right) 1-lane AW, for about 6 km (3.7 ml) to BANABA.	91.0	56.6	
Porac Rd Junc. Branch NW (right) over PORAC R, CG 87 x 16 x 21.	91.8	57.0	
PORAC. Branch SE is Route 75, to Route 7A at Guagua 15.2 km (9.4 ml). Branch east is an alternative seasonal road to Route 7A at Bacolor, about 15 km (9.3 ml). Route 74A ends; 74B begins, turns SW.		57.3	74A: 74B. (PHOTO 8). Open canefields; river and mountains to NW.

Detail		to Manila ngeles Ml	Class and Terrain
PORAC R at Lucsuan. CG 30 x 14 x 8. Route 74B turns south.	96.9	60.2	
PLANAS R. MA 50 x 13 x 10.	97.8	60.8	1-LANE AW. NEWLY COMPLETED.
Tramline X.	100.3	62.3	
Rd Junc. Branch east (left) is Route 76B, 1-lane AW to DEL CARMEN sugar central.	100.9	62.7	
Tramline X.	101.0	62.8	
SANTOL Rd Junc. Branch SE to DEL CARMEN 2.8 km (1.7 ml).	102.3	63.6	
SAN JOSE Rd Junc. Branch SE is Route 76C to FLORIDABLANCA 2.5 km (1.6 ml).	103.4	64.3	(РНОТО 5.)
Gumain R. Temporary bridge about 400ft. (unconfirmed).	108.2	67.2	
Tramline X. GAUTEMAN R. Temporary bridge (unconfirmed).	108.7 110.8	67.5 68.8	
Tramline X.	114.3	71.0	
PAGALANGANG R. Temporary bridge (unconfirmed).	114.6	71.2	
SAN JOSE. Route 74B turns SE on an old 1-lane AW road.	116.1	72.1	
DINALUPIHAN on Route 7A.	118.0	73.3	

### ROUTE 75:

Summary: A link between Guagua, at 82.0 km (51.0 ml) on Route 7A NW to Porac (Photo 8) on Route 74A, total distance 15.2 km (9.4 ml).

It is l-lane AW, gravel surface, and may support heavy 2-lane

traffic in dry weather.

No important towns or bridges. Terrain is generally open, level

farmland in rice or sugarcane.

About  $2\frac{1}{2}$  km (1.6 ml) SE of Porac a branch road, l-lane AW, runs SW to Route 76B, total about 6 km.

### ROUTE 76:

Summary: This road system links the highly developed Del Carmen Sugar Central and Floridablanca area with routes 7A near Guagua and Route 74B. Total distance 18.8 km (11.7 ml).

Route 76-continued.

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Detail	Distance to Km	Manila Ml	Class and Terrain
SAN ANTONIO Rd Junc. On Route 7A, Route 76A runs NW and WNW.	84.8	52.7	1-LANE AW BLACK- TOP.
Rd Junc. Branch NW (right) is old road, Route 76A continues straight ahead.	86.9	54.0	
Tramline X.	89.5	55.6	Rice and sugarcane.
DEL CARMEN Rd June and Tramline X. Route 76A ends; Route 76C turns SW (left).	92.9	57.7	ROUTE 76C.
PORAC R. TW 180 x 8 x 3.	93.3	58.0	1-LANE AW BLACK-
Route 76C turns NW (right).	94.5	58.7	Mostly rice and sugarcan land. Gently rolling.
FLORIDABLANCA.	95.1	59.1	
River. TW 27 x 9 x 6.	95.4	59.3	
Tramline X.	97.0	60.3	
SAN JOSE. Rd Junc on Route 74B. Route 76C ends.	97.4	60.5	ROUTE 76B.
DEL CARMEN. Rd Junc at NW end of Route 76A. Route 76B runs west (ahead).	f 92.9	57.7	1-LANE AW BLACK- TOP.
Rd Junc. Branch west (ahead) is old road and ford. Route 76B turns north.	93.2	57.9	
CARMEN. Rd June SE (right) old road to Guagua.	94.5	58.7	Level grass or caneland, sandy soil.
Rd Junc. Branch NE (right), 1-lane AW about 6 km (3.7 ml) to SAN ROQUE of Route 75. Route 76C continues NW.	95.9	59.6	
Tramline X. Route 76C turns SW.	96.1	59.7	
PORAC R. TW approx 170 x 10 x 28 Branch NW (right) and SW (ahead) ar good private roads to Del Carmen suga central buildings. Route 76C turns south (left).	96.2 e	59.8	
Rd Junc. Branch south (ahead) is ol seasonal road to FLORIDABLANCA about 3.5 km (2.2 ml). Route 76C turns west.	d 96.9	60.2	(Photo 5.)
Rd June on Route 74B.	99.1	61.6	1
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Route 76B ends.

## ROUTE 77A:

Summary: Links Route 3E with Clark Field and Fort Stotsenburg. Total 7.4 km (4.6 ml).

Detail	Distance to Km	Manila Ml	Class and Terrain
DAU Rd Junc on Route 3E. Route 77A runs west.	88.1	54.7	2-LANE AW GRAVEI SURFACE.
RRX. Station north (right) in a road triangle. Branch SW (left) leads 100 yards to eight large buildings around a grove of trees.	88.6	55.1	SURPACE.
RRX on branch line to FORT STOTSENBURG.	88.8	55.2	Open, gently rolling grass- land with a few scattered shade trees.
Rd X. Branch south (left) to three large buildings near railroad. Branch north appears to be a well-used, winding country road.	89.5	55.6	
CLARK A/F on north (right).	92.2	57.3	(Photos 6, 7, and 15.)
Rd Junc. Branch north (right) to dispersal area, 2 km (1.2 ml).	93.7	58.2	
Rd Junc. Branch north (right) to dispersal area, 1.5 km (0.9 ml).	94.5	58.7	
FORT STOTSENBURG. Good sand pit here. Trail No. 11 continues westwards to the ZAMBALES coast.	95.5	59.3	Sand pit. (Photo 15.)

## ROUTE 77B:

Summary: This is a l-lane unsurfaced road from a road junction on Route 3E near Angeles, just north of the bridge, at 84.6 km (52.6 ml) NW to Fort Stotsenburg, total about 8 km (5.0 ml).

Terrain is open and very sandy. Vehicles can drive off the road

better in wet than in dry weather due to loose sand.

#### ROUTE 78:

Summary: Runs NE from Angeles on Route 3E to Pampanga Agricultural School, crossing Route 55C at Magalang, total 15.5 km (9.6 ml).

Detail	Distance to Km	Manila Ml	Class and Terrain
ANGELES on Route 3E. Take first street NE (right) after passing MUNICIPIO.	82.2	51.3	1-LANE AW BLACK- TOP. (Photo 6.)
RRx. Motor pool on left.	82.2	51.6	Open grass and riceland.
Rd X. Branch west (left) to Route 3E, completing a road triangle.	84.4	52.5	
River. TW 315 x 10 x 9.	85.3	53.0	

Route 78-continued.

Detail	Distance to Km	Manila Ml	Class and Terrain
River. TW 37 x 9 x 8.	86.7	53.9	
River. TW 46 x 10 x 7.	88.0	54.7	
River. TW 36 x 9 x 11.	89.1	55.4	
MAGALANG Rd Junc on Route 55C. Route 78 continues NE.	94.1	58.5	
PAMPANGA Agric School.	97.7	60.7	
Re	ute 78 ends.		

## ROUTE 79A:

Summary: From Mabalacat on Route 3E at 93.3 km (57.9 ml) from Manila, Route 79A runs east and ENE to Route 55C at Sta Maria. Total 9 km (5.6 ml) l-lane AW gravel surface.

No important towns or bridges.

## ROUTE 79B:

Summary: From Mabalacat on Route 3E, Route 79B runs SW to Fort Stotsenburg, seasonal for about 8 km (5.0 ml). Open sandy terrain.

## ROUTE 80:

Summary: Runs NW from Capas on Route 3E up the O'Donnell R. Valley (Photo 17), total 26.2 km (22.5 ml).

Detail	Distance to Km	Manila Ml	Class and Terrain
CAPAS. Rd Junc. Branch east 1-lane AW to Route 3, 1.2 km (0.7 ml).	106.8 108.0	66.4 67.1	1-LANE AW GRAVEL SURFACE.
Rd Junc. Branch NW to LAWY, 3.7 km (2.3 ml). Route 80 turns west.	109.3	67.9	Rolling grassy hills. Patches of forest.
Camp O'DONNELL on north (right). Many side-cuts with good adobe stone.	117.0	72.7	Adobe stone quarries.
BANGAT R. TW 140ft. Good gravel banks. Route 80 turns SW.	119.4	74.2	Gravel pits.
O'DONNELL barrio.	123.0	76.4	
MABANGCAL. Route 80 ends here. Many foot trails continue upstream and the O'DONNELL-BOTOLAN Trail (No. 12) crosses CABUSILAN Mts west to ZAMBALES coast.	133.0	82.7	1-LANE SEASONAL. Follows O'Donnell River valley.

Route 80 ends.

# ROUTE 81 :

Summary: From San Miguel at 118.0 km (73.3 ml) on Route 3E, Route 81 runs NE and east about 7.5 km (4.7 ml) to Tarlac sugar central (Photo 25), 1-lane AW blacktop, thence seasonal plantation roads.

Runs through level sugarcane fields, with Tabacalera Co. tramway and a large irrigation canal on the south (right).

## ROUTE 82:

Summary: This is an important lateral running east from Tarlac (15° 29' N, 120° 35' E) on Route 3E to Sta Rosa on Route 5B, total 40.3 km (25.1 ml).

Detail		to Manila Tarlac Ml	Class and Terrain
TARLAC Rd X on Route 3E runs east.	124.1	77.1	1-LANE AW GRAVEL SURFACE.
RRX.	124.4	77.3	
Rd Junc. Branch NW (left) is 1-lane AW to Route 3F near RR Sta.	125.7	78.1	Numerous seasonal branch roads.
BALINGCANAWAY. Route 82 turns SE.	133.4	82.9	Lowlying rice paddies.
CUTCUT R. TW 40 x 11 x 7.	135.5	84.2	
River. TW 40 x 11 x 8.	136.5	84.8	
Rd Junc. Branch north (left) is Route 55E.	139.8	86.9	
LA PAZ. Branch south (right) is Route 55D.	141.3	87.8	
River. TW 41 x 10 x 11.	143.0	88.9	
CHICO DE LA PAMPANGA R. TW 181 x 8 x 28. This section probably impassable in flood.	143.5	89.2	1-LANE AW ENDS SEASONAL BEGINS.
ZARAGOZA. Two low-level bridges TW total 110ft.	147.8	91.8	1-LANE SEASONAL ENDS. 1-LANE AW GRAVEI SURFACE BEGINS.
Rd X. Branch south (right) is Route 56B. Branch NE (left) old road loop to CARMEN.	148.8	92.5	
Rd X. Branch south (right) is Route 56C. Branch NE (left) is Route 56D.	151.8	94.3	Lowlying open grass or rice paddies.
MANGUNI R. TW 87 x 11 x 13.	152.3	95.3	
CINCO CINCO R. TW 60 x 9 x 6. STO ROSARIO.	158.7	98.6	
PAMPANGA R. TW 260 x 10 x 5.	164.0	101.9	
STA ROSA Rd Junc on Route 5B, 109.0 km (67.7 ml) from MANILA.		102.2	
Rout	e 82 ends.		

#### ROUTE 88A:

Summary: Commencing at Baliuag (14° 57 N, 120° 54′ E) on Route 5A, Route 88A runs north for about 9.0 km (5.6 ml) through rice paddies.

Ît is I-lane, AW, for the first 6 km (3.7 ml), thence seasonal to Maasim R at Bahay Pare. There is no record of a bridge over this river.

Seasonal trails continue across Candaba Swamp to Candaba. (See Trails 14, 15 and 16.)

### ROUTE 88B:

**Summary:** Extends eastward from Baliuag (14° 57′ N, 120° 54′ E) on Route 5 up the north bank of Angat R for 14.8 km (9.2 ml).

Detail	Distance to Km	Manila Ml	Class and Terrain
Rd Junc on Route 5. Route 88B runs east along north (right) bank of ANGAT R.	53.3	33.1	1-LANE AW. Flat farmland.
River. CG 92ft. Several small bridges.	53.7	33.4	1 414 41 4 4 4
SAN RAFAEL.	59.0	36.7	1-lane AW ends; sea- sonal begins.
PULO Rd Junc. Branch south 1.5 km (0.9 ml) to Route 65C, over a dry-season ford on the ANGAT R.		40.3	
SANTA LUCIA. Trails extend north and east to the mountains.	68.1	42.3	

Route 88B ends.

#### ROUTE 88C:

Summary: Runs east from S Idlefonso on Route 5A, 66.0 km (41.0 ml) from Manila, to the RR station, total 2.2 km (1.4 ml); 1-lane, AW.

### ROUTE 89:

Summary: Runs east from Sta Ana (15° 06' N, 120° 46' E) on Route 10A to Candaba on the edge of the great inland swamp, total 7.0 km (4.4 ml).

It is 1-lane, AW, crossing Pampanga R by a suspension bridge 342 x 10 x 28.

Note.—The construction of an AW road across Candaba Swamp to Route 88A was considered in 1941, but was abandoned because of the great amount of work needed.

## ROUTE 90:

Summary: Commencing at Arayat (15° 09′ N, 120° 46′ E) on Route 10A, Route 90 runs westwards to Route 55B, total 9.2 km (5.7 ml).

It is 1-lane, AW through very lowlying rice and open grassland. No important towns.

There is a TW 42 x 11 x 6 about mid-way.

### ROUTE 91:

Summary: Commencing at a road junction on Route 5A just north of S Miguel (15° 09' N, 120° 58' E), Route 91 runs eastward to S Miguel River Valley to Sibul Springs and Biak-Na-Bato. Total 19.6 km (12.2 ml).

Detail	Distance to Km	Manila Ml	Class and Terrain
Rd Junc on Route 5A. Route 91 runs NE.	748.	487	2-LANE AW. GRAVEL.
RRX.	78.9	49.0	Gently rolling, patches, second growth forest.
SAN MIGUEL or MADLUM R. 210 x 9 x 22.	CG 88.4	54.9	
SIBUL SPRINGS.	89.2	55.4	
Route 91 turns south.			2-LANE ENDS; 1-LANE AW BEGINS. GRAVEL.
BALICULING R. Route 91 turns S.E.	93.7	58.2	1-LANE AW ENDS SEASONAL BEGINS.
BIAK-NA-BATO National Park.	98.0	60.9	

Route 91 ends.

### ROUTE 92:

Summary: From Gapan (15° 19′ N, 120° 57′ E) on Route 5A Route 92 runs NE to Penaranda, total 9.5 km (5.9 ml).

Detail	Distance to Km	Manila Ml	Class and Terrain
GAPAN Rd Cr on Route 5A, Route 92 runs NE, through GAPAN.	95.5	59.3	1-LANE AW between PENERANDA R and RR.
GAPAN Municipio.	96.4	59.9	
Street south (right) to RR sta (about 200 yds), thence across RR 1-lane, seasonal to SANTA-CRUZ, total 7 km (4.4 ml).		60.3	Rice paddies.
Rd Junc. Branch NE (left) leads to old dry-season ford across PENARANDA R to Route 93A. Total about 2 km (1.2 ml), below irrigation dam.		64.7	
PENARANDA. RR bridge across river. Several seasonal branch roads and trails extend south and east.		65.3	(РНОТО 27).

Route 92 ends.

### ROUTE 93B:

Summary: Runs from Route 5B just north of Gapan (15° 19′ N, 120° 57′ E) NE and east along the north (right) bank of Penaranda R to San Leonardo Rd Junc, total 6.2 km (3.9 ml).

It is 1-lane, AW through a thickly settled farm area. No important towns. One TW 54 x 19 x 11.

### Route 93A:

Summary: From Route 5B between Gapan and Sta Rosa eastwards up Penaranda River Valley. Total 17.1 km (10.6 ml).

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Detail	Distance to Km	Manila Ml	Class and Terrain
Rd X on Route 5B (15° 22′ N., 120° 56′ E). Route 93A runs east.	101.9	63.3	New road. 1-LANE
Rd Junc. Branch south (right) is Route 93B to GAPAN. Route 93A turns N.E. (left).	103.1	64.1	
SAN LEONARDO.	103.9	64.6	Rolling farmland.
RRX. Route 93A turns SE.	108.9	67.7	
River. TW 42 x 12 x 4.	111.2	69.1	
Rd Junc. Branch west (right) 0.8 km (0.5 ml) to site of proposed bridge across PENARANDA R to PENARANDA beside RR bridge.		69.5	Rice paddies.
PAPAYA.	116.0	72.1	
CHICO R. No bridge recorded. Three seasonal branch roads extend from here about 1 km each NW, NE and SE to mountain trails.		74.0	1-LANE AW ENDS. 1-LANE SEASONAL BEGINS.

Route 93A ends.

### ROUTE 94A:

Summary: This is the old road loop from Route 5B to Route 5C to the west of Cabanatuan (15° 29′ N, 120° 58′ E). Total 6.2 km (3.9 ml).

Detail	Distance Km	to	Manila Ml	Class and Terrain
CABANATUAN Rd Junc on Route 5B. Route 94A runs NW.	115.8		72.0	1-LANE AW BLACK TOP.
Rd Junc. Street NE (right) is main stree in CABANATUAN. Route 94A turns SW (left).	t 116.4		72.3	Lowlying. Rice paddies.
Rd Junc. Branch SW (ahead) is old road loop southwards for about 6.7 km (4.2 ml) to Route 5B near STA ROSA. Originally 1-lane AW. Route 94A turns NW.			72.7	
PAMPANGA R. Old ferry crossing and site of collapsible deck bridge, 320 x 8 x 6\frac{1}{2} (16.5pan). Washed out. Route 94A runs NW and west.			72.8	
Rd Junc. Branch west (ahead) is Route 94B to ALIAGA. Route 94A turns north.	119.0		74.0	
Rd Junc with Route 5C at its 124.2 km (77.2 ml) mark.	122.0		75.8	

Route 94A ends.

### ROUTE 94B:

Summary: Runs west from Route 94A to Route 56D at Bucot. Total 8.0 km (5.0 ml).

Detail	Distance to Km	Manila Ml	Class and Terrain
Rd Junc on Route 94A. Route 94B runs west.	119.0	74.0	1-LANE AW GRAVEL SURFACE
Rd Junc. Branch SE (left) is a seasonal road to an old ferry crossing on PAM-PANGA R. 3.5 km (2.2 ml).	120.9	75.1	
CINCO CINCO R. CA 72 x 14 x 8.	121.0	75.2	Open farmland.
BALALES R. CA 52 x 14 x 12.	121.7	75.6	
Route 94B turns west.	123.9	77.0	
BUCOT. Branch SW (left) is Route 56D to CARMEN on Route 82, 8.1 km (5.0 ml). Branch west (ahead) is Route 56E to ALIAGA, 3.3 km (2.1 ml).	127.0	78.9	Rice paddies.

Route 94B ends.

## ROUTE 95:

Summary: Commencing at Sangitan (Bantug), just east of Cabanatuan (15° 29′ N, 120° 58′ E) on Route 5C, Route 95 runs NE to Bongabon, total 26.9 km (16.7 ml).

It forms an important link between Routes 101 and 102 from the east coast and the Central Luzon Rd network.

Detail	Distance to Km	Manila Ml	Class and Terrain
SANGITAN Rd. X on Route 5C. Route 95 runs east and NE.	118.1	73.3	1-LANE AW BLACK- TOP.
Rd Junc. Branch SE (right) 1-lane AW to KALIKID A/F 2.3 km (1.4 ml).	123.4	76.7	Gently rolling farmland. (Photos 2 and 11.)
River. TW 80 x 10 x 11.	123.6	76.8	
River. TW 61 x 10 x 7.	126.5	78.6	
CABU Creek STs 163 x 20 x 21.	128.3	79.7	
River. TW 60 x 12 x 13.	134.3	83.5	
River. TW 60 x 19 x 14.	136.6	84.9	
TABLANG. Branch east is Route 102A to Laur thence to DINGALAN Bay. Total 45.5 km (28.3 ml).Branch NW 1-lane AW 1 km (0.6 ml) to PAMPANGA R. TW 600ft thence to PICO LEON about 2 km (1.2 ml).		85.1	1-LANE AW. BLACK- TOP ENDED IN 1941. GRAVEL SURFACE BEGINS.
River. TW 39 x 18 x 16.	137.9	85.7	
River. TW 56 x 11 x 15.	139.2	86.5	
CORONEL or SANTOR R. TW 341 x 8 x 6.	139.9	86.9	Lowlying level farmland.
River. TW 157 x 8 x 6. In the next 1.2 km (0.7 ml) there are 3 bridges, total 125ft.	140.1	87.1	
Rd Junc. Branch SE is Route 102B to LAUR thence 102C to DINGALAN on east coast, total 44.1 km (27.4 ml). Route 95 turns NW (left).	144.0	89.5	
BONGABON. Branch NE is Route 101 to BALER 90.5 km (56.2 ml). Branch north is Route 96 to S Jose 26.5 km (16.5 ml).	145.0	90.1	

Route 95 ends .

#### ROUTE 96:

Summary: Commencing at San Jose (15° 48' N, 120° 59' E) on Route 5D, it runs south and SE to Bongabon on Route 95. Total 26.5 km (16.5 ml).

In 1941 it was a 1-lane seasonal, rough gravel surface road, but unconfirmed reports in Aug 44, indicate that the enemy was widening this section to 25ft, apparently with the object of completing a 3-lane highway from Dingalan Bay on the east coast to Lingayen in the west, via Routes 102, 96 and 8.

Rizal is the only large town on this route.

Pampanga River is crossed by ferry, and other stream crossings were by ford only, impassable in flood time.

Detail		to Manila ngabon Ml	Class and Terrain
SAN JOSE at 161.3 km (100.2 ml) on Route 5D and terminus of RR spur from Cabanatuan. Branch NW is Route 8 to PANGASINAN Prov. Route 96 runs south and SE.		106.6	1-LANE SEASONAL. REPORTED UNDER DEVELOPMENT TO 3-LANE AW.
TALAVERA R. No bridge recorded.  Probably fordable in dry weather.	167.2	103.9	Gently rolling grassland. Patches forest.
RIZAL. Branch SW (right) is Route 97B. 1-lane AW 25.8 km (16.0 ml) to Route 5 at PINAGPANAAN.	155.3	96.5	Steep grassy mountains north. Low plain with rice paddies to the south. Patches of forest.
Rd Junc. Branch north (left) is Route 100. Mostly a jeepable trail to CARRANGLAN.		96.1	
PAMPANGA R. No bridge recorded. Not fordable.	154.8	96.2	
BANTUG barrio. Route 96 turns south (right).	151.7	94.3	
River. No record of bridge. Probably fordable.	149.5	92.9	
BONGABON. Branch NE is Route 101 to BALER on east coast 90.5 km (56.2 ml). Branch SE is Routes 102B and 102C to DINGALAN on east coast 44.1 km (27.4 ml). Branch SW is Route 95 to Route 5C at SANGITAN near CABANATUAN 26.9 km (16.7 ml).		90.1	

Route 96 ends.

### ROUTE 97A:

Summary: Commencing at 122.6 km (76.2 ml) Rd X on Route 5C, Route 97A runs SW 1.4 km (0.9 ml) to Route 94A; and NE and north for 8.6 km (5.3 ml) to Route 97B.

It is said to be l-lane AW except at stream crossings.

No record of bridges and no large towns. It runs through rice paddies and level farmland.

### ROUTE 97B:

Summary: Commencing at Pinagpanaan Rd Junc (15° 32' N, 120° 56' E) on Route 5C, Route 97B runs NE to Rizal on Route 96 Total 25.8 km (16.0 ml).

Detail	Distance to Km	Manila Ml	Class and Terrain
PINAGPANAAN Rd Junc on Route 5C. Route 97B runs NE.	127.6	79.3	1-LANE AW. GRAVEL SURFACE. Rice paddies.
Rd Junc. Branch south is Route 97A to Route 5C, 8.6 km (5.3 ml).	132.6	82.4	
CASILI R. TW 144 x 10 x 18.	134.7	83.7	
Rd June. Branch SE 1-lane AW to Morcon R. Total 2.2 km (1.4 ml).	139.7	86.8	Gently rolling.
Rd Junc. Branch north seasonal to Route 97D to Route 96.	143.8	89.4	
Rd Junc. Branch east (right) is Route 97C, 1-lane AW to CABUCBUCAN, 3 km (1.9 ml).		92.6	
RIZAL Municipality on west (right) bank of PAMPANGA R on NE edge of great CENTRAL LUZON Plain. Route 96 runs SE to BONGABON, 10.3 km (6.4 ml) and NW to SAN JOSE on Route 5D, 16.2 km (10.1 ml).		95.3	

Route 97B ends.

### ROUTE 97C:

Summary: A branch SE from Route 97B to Cabucbucan (15° 41' N, 121° 06' E), 1-lane AW, total 3 km (1.9 ml).

Many seasonal roads traverse this area, which is flat farmland.

### ROUTE 97D:

Summary: A seasonal branch road running northwards from Route 97C to 96, total 12.5 km (7.8 ml).

It runs east of a small hill near Capisuan (15° 44′ N, 121° 02′ E) in a small rice-growing area.

### ROUTE 98A:

Summary: Commencing at Siksikan on Route 5C just west of the Talavera R bridge, Route 98A runs SW to Sta Maria, total 23.1 km (14.4 ml).

Detail	Distance to via Siks Km		Class and Terrain
SIKSIKAN on Route 5C. Route 98A runs SW.	134.9	83.8	1-LANE AW. Rice paddies broken by many creeks.
S FRANCISCO Rd Junc. Branch SW (left) seasonal, and without bridges to TALAVERA about 3 km and to Sto Domingo about 3.5 km (2.2 ml). Route 98A turns west over four wood bridges, total 210ft.		85.0	
Rd X. Branch north is Route 98B to Route 5C at BALOC 5.8 km (3.6 ml) and south to STO DOMINGO and Route 56E at ALIAGA.	139.6	86.7	
ILOG BALIWAG. Two wood bridges, total 114ft.	145.3	90.3	
QUEZON Rd X. Branch south (left) is Route 56E through QUEZON and ALIAGA to BUCOT, total 10.1 km (6.3 ml). Branch north (right) is Route 56F to GUIMBA, 12.4 km (7.7 ml).	148.3	92.2	
Route 98A continues SW over five small wood bridges total 189ft.			
LICAB. Route 98A turns SE.	154.2	95.8	1-LANE AW ends; SEASONAL begins.
River TW 89 x 10 x 6.	155.1		
STA MARIA. Completely surrounded by rice paddies with seasonal roads and trails running in several directions.	158.0	98.2	

Route 98A ends.

#### ROUTE 98B:

Summary: Commencing at Baloc (15° 38 N, 120° 53′ E) on Route 5C, Route 98B runs SW to Aliaga on Route 56E, crossing Route 98A at Sto Domingo, total 17.0 km (10.6 ml).

Detail	Distance to Manila via Route 56 Km Ml	Class and Terrain
BALOC Rd Junc at 140.3 km (87.2 ml) on Route 5C; Route 98B runs south.	144.2 89.6	1-LANE AW GRAVEL. Rice paddies.
STO DOMINGO Rd X on Route 98A.	138.4 86.0	
STO DOMINGO. Route 98B runs SW.	137.5 85.4	1-LANE AW ends; SEASONAL begins.
VISORIA Rd Junc. Branch west (right) is seasonal road to QUEZON about 6 km.	135.1 84.0	Rice paddies.
TALAVERA R. Dry-weather ford.	132.4 82.3	
ALIAGA on Route 56E.	127.2 79.0	

Route 98B ends.

### ROUTE 99:

Summary: A seasonal shortcut from Lupao (15° 53′ N, 120° 54′ E) on Route 8A southwards to Route 5D at Munoz. Total 19.0 km (11.8 ml).

### ROUTE 100:

**Summary:** This is a mountainous road loop starting at Digdig (15° 58′ N, 120° 58′ E) on Route 5E, running east and south to Route 96 near Rizal, total 50.5 km (31.4 ml).

The first 12.7 km (7.9 ml) was 1-lane AW. The remainder was little better than a jeepable mountain trail with very few bridges or culverts recorded.

Chief towns are Carranglan and Pantabangan.

Distance and elevations recorded below are approximate only.

Detail	Distanc Manila vi Km	e from a Digdig Ml	Class and Terrain
DIGDIG on Route 5E (elev 960ft).	184.8	114.8	1-LANE AW.
Route 100 runs east along the north (left) bank of TALAVERA R.			Down narrow grassy mountain gorge; patches of forest.
Turns NE (left) leaving the river valley.	187.0	116.2	Winds sharply in broken country.
MARINGALU R. STs 100 (1-span).	191.8	119.2	

Detail	Distance to Manila via Km		Class and Terrain
CARRANGLAN R. STs 200 (2-span).	196.8	122.3	
CARRANGLAN (elev about 800ft) Municipality.	197.5	122.7	Valley about $1\frac{1}{2} \times 3$ ml Rice paddies.
Route 100 continues SÉ.			1-LANE AW ends. JEEPABLE TRAIL BEGINS.
DIPAN Cr. Fordable in dry weather. Route 100 starts to climb.	199.7	124.1	Heavy forest on peaks. Mostly grassy spurs.
STA CRUZ. Crest of saddle (about 900ft).	201.2	125.0	
AMOT Cr. (elev about 700ft).	204.7	127.2	Broken country.
DIAMMAN R. (elev about 540ft).	210.0	130.5	
BADIO barrio (elev about 560ft). Hot springs.	210.8	131.0	JEEPABLE TRAIL ENDS; 1-LANE AW BEGINS.
PANTABANGAN Municipality (elev about 500ft). Route 100 winds southwards,	215.4	133.9	Winds down a steep- sided gorge about ½-ml wide.
(Elev about 950ft).	220.1	136.8	Winds and climbs in mountains. CHANGES TO 1-LANE SEASONAL ROAD.
Crest of saddle. Starts to descend down ANTUNAN Cr.	222.4	138.2	Winds in a narrow gorge.
AWITAN R (elev about 500ft), no record of bridge.	229.6	142.7	Rolling broken country. Patches of forest.
PAMPANG barrio (elev about 450ft).	233.9	145.3	
Route 100 winds and descends.			
Rd Junc. Route 96, 154.6 km (158.2 ml) from MANILA via BONGABON.	235.3	146.2	

Route 100 ends.

### ROUTE 101:

Summary: An important 1-lane AW road from Bongabon (15° 38′ N, 121° 09′ E) eastwards to Baler on the east coast. Total 90.5 km (56.2 ml).

It was mostly a winding mountain road, subject to landslides and washouts in wet weather, and in 1941 there were still several sections where vehicles could not pass, and one-way traffic was regulated by a gate system.

Grades were reported to average 7 per cent. Road surfacing was reported by several informants to be of crushed rock most of the way, but it may be expected to break up under sustained traffic.

## Route 101-continued.

Before war, passenger buses and trucks travelled regularly over this road. The only information concerning maintenance under Japanese control is an unconfirmed report that in May 44 landslides had delayed traffic, but trucks were able to get through to Baler.

Detail	Distance Km	to Manila Ml	Class and Terrain
BONGABON. Branch SW is Route 95 to CABANATUAN 28.2 km (17.5 ml) and by Routes 102B and 102C to DINGALAN Bay on east coast 39.0 km (24.2 ml). Branch north is Route 96 to Route 5D at SAN JOSE 26.5 km (16.5 ml).		90.1	1-LANE AW GRAVEL. Climbs very gently in open grass and farmland. Patches second growth.
Route 101 runs NE.			
MACABACLAY Rd Junc. Branch SE right is Route 102D, 1-lane seasonal to PINTO on Route 102C, 12.4 km (7.7 ml).	149.5	92.9	
KALAANAN (elev about 480ft) Rd Junc. Branch north over DIGMALA R to two lumber mills thence by winding seasonal jeepable trail east and SE to YMCA boys' camp at LABI, total about 8 km (5 ml).	155.0	96.3	Steep forested hills on south.
Route 101 turns SE. River TW 65.	155.7	96.8	1-LANE AW BUT MOSTLY DIRT SUR- FACE.
River TW 24 x 9 x 7.	158.4	98.4	Winds sharply and climbs in a narrow forested mountain gorge.
River TW 63 x 10 x 9.	158.5	98.5	
DIGMALA R TW 53 x 10 x 20 Labi. Sawmill in an open valley. YMCA boys' camp. Jeepable trail runs north and west to KALAANAN.	$\begin{cases} 162.8 \\ 162.9 \end{cases}$	101.2 101.2	Many side-cuts and hair- pin turns.
River TW 29 x 10 x 17.	165.6	102.9	
High spot on Route 101, approx 2,000ft elev.	172.0	106.9	
CABATAGON rest house at Prov Bdry NUEVA ECIJA-TAYABAS.	172.7	107.3	Prov Bdry.
	180.0	111.9	Very narrow gorge. Steep side-cuts.
SALUPAGUI R STs 150ft. Fordable downstream (north) about 70 yards.	180.6	112.2	1-WAY AW. Partly gravel. Heavy forest.
"DONA AURORA" Suspension bridge 210ft (unconfirmed).	182.0	113.1	
Narrow pass ends. Grades gentle. Route 101 leaves river and turns east.	183.0	113.7	Winds in mountainous heavy forest. Grade usually downwards, OC- CASIONAL SHORT 1-WAY SECTIONS.

Route 101-continued.

Detail	Distance to Km	Manila Ml	Class	and Terrain
DIMANIBONG. (Aguang) R. Temporary wood bridge. Flood plain about 300 yards wide. Fordable in dry weather rocky bed. River subject to sudden severe floods. Route 101 turns north down valley.	214.5	133.3		
Route 101 reaches coastal plain, turns SE.	218.0	135.5	1-LANE	AW.
SAN LUIS. A few nipa huts only	227.7	141.5	Patches	gently sloping rice, grass clear- onuts and second
BALER Airfield (pre-war).	229.0	142.3		
Creek. Temporary wood bridge.	234.7	145.8	Sec. 1	
BALER on east coast. Good landing beaches during SW season.	235.5	146.4		

Route 101 ends.

# ROUTE 102A:

Summary: Commencing at Tablang Rd Junc (15° 35′ N, 121° 07′ E) on Route 95, Route 102A runs east to Route 102C at Laur, 9.0 km (5.6 ml).

Detail	Distance to Km	Manila Ml	Class and Terrain
TABLANG Rd Junc on Route 95. Route 102A runs east.	137.0	84.1	1-LANE AW. Rolling farmland.
Starts to wind and climb over a saddle 300ft elev.	138.0	84.8	
Straight and level.	140.5	87.3	Heavily forested mountains on south.
River STs 98ft.	143.2	89.0	Open lowlying grassland and rice paddies.
Rd Junc. Branch north (left) seasonal to Route 102B, 1.5 km (0.9 ml).	144.3	89.7	
LAUR. Branch NW is Route 102B to BONGABON, 7.6 km (4.7 ml). Branch east is Route 102C to DINGALAN on east coast 36,5 km (22.7 ml).		90.7	

Route 102A ends.

### ROUTE 102B:

Summary: This is a small cut-off between Bongabon (15° 38' N, 121° 09' E) Route 95 to Laur on Route 102A, 7.6 km (4.7 ml).

Reported to be under improvement by the enemy to 25ft wide, AW.

Detail	Distance to Km	Manila Ml	Class and Terrain
Rd June on Route 95 just east of BON-GABON. Route 102B runs SE.	144.0	89.5	1-LANE AW in gently rolling farm land.
SANTOR.	146.5	91.0	
Route 102B turns south at NABAO R. (No details of crossing).	147.3	91.5	
Santor R.	149.5	92.9	
Rd Junc. Branch south (right) seasonal to Route 102A 1.5 km (0.9 ml).	149.6	93.0	
LAUR. Branch west is Route 102A to TABLANG 9.0 km. Branch east is Route 102C to DINGALAN on east coast 36.5 km 22.7 ml).	151.6	94.2	

Route 102B ends.

#### ROUTE 102C:

Summary: From Laur (15° 35′ N, 121° 11′ E) Route 102C runs SE to Dingalan on east coast 36.5 km (22.7 ml).

This road was reported (23 Aug 44) to be repaired and widened by the enemy to 25ft (unconfirmed).

Considered to follow most accessible of all routes from east coast to Central Luzon plain. Beachhead area at Dingalan is, however, limited

Detail	Distance to Km	Manila Ml	Class and Terrain
LAUR on Route 102A. Route 102C runs S.E.	146.0	90.7	1-LANE AW. Grassy or cultivated plain. Patches of second growth.
Route 102C turns south, then east between low hills.	149.0	92.6	1-LANE AW. GRAVEL Grassy hills.
SANTOR (or Coronel) R. Probably fordable dry weather.	151.7	94.3	Gently rolling grass and farmland.
PINTO Rd Junc. Branch NW (left) is Route 102D seasonal branch to Route 101 near MACABACLAY, 12.4 km (7.7 ml), Route 102 turns SE (right).	154.7	96.1	Defile 200 yds wide between heavily forested mountains.

Route 102C-continued.

Detail	Distance Km	to Manila Ml	Class and Terrain
DUPINGA R. TW 100ft. Fordable dry weather, but subject to quick flood making bridge maintenance very difficult.	158.5	98.5	Cultivated valley opens out to 3 miles wide. Grassy plain partly under cultivation.
BAGONG SIKAT. Route 102C turns south.	163.0	101.3	Patches of forest near NW end.
BITULOK. Barrio SW (right). BITULOK sawmill NE (left). Old road ended here. BANTUG barrio was 1½ miles SW.	167.2	103,9	
Creek. No bridge, but fordable. Route 102C climbs in heavily forested gorge.	174.7	108.6	1-LANE AW surfaced with crushed rock in 1941.
Route 102C enters a narrow but open valley. Climbs steeply.	175.0	108.7	Narrow grassy gorge; heavily forested moun- tains each side.
Crest of divide (elev about 700ft) Prov Bdry between NUEVA ECIJA-TAY- ABAS. Route 102C descends steeply.		109.7	
Narrow coastal flat both sides of DING- ALAN River; logging concession of Ding- alan Lumber Coy.		110.9	Low alluvial delta. For est and second growth and small patches o cultivation.
DINGALAN R. No details of crossing Ends on shores of north part of DING- ALAN Bay (east coast LUZON) fronting administrative buildings Dingalan Lum- ber Coy. Safe anchorage and good landing beach.	182.5	112.0 113.4	

Route 102C ends.

#### ROUTE 102D:

Summary: This is a direct road link between Routes 101 and 102C to the east of Bongabon.

Commencing at Macabaclay Rd Junc on Route 101 at 149.5 km (92.9 ml) it runs SE to Pinto on Route 102C. Total 12.4 km (7.7 ml).

It was l-lane AW for the first 4.5 km (2.8 ml) to Bantug, thence seasonal.

There were no large towns nor important bridges.

Terrain is generally open grass or riceland on the NW end, to open gently rolling near Pinto.

#### 4. TRAIL DETAILS:

#### TRAIL No. 6: Norzagaray to Tablang:

Commencing at Norzagaray (14° 55' N, 121° 03' E) on Route 65A. Trail No. 6 runs northwards to Tablang on Route No. 95. It represents the easterly edge of a large network of trails which run through foothills between Route 5 and Sierra Madre Mountains to the east, usually along crests of ridges in open rolling country with frequent patches of high forest.

Main towns connected by this trail include Akle, Sibul Springs and Penaranda.

Numerous foot trails follow heavily forested mountain gorges eastwards for varying distances, but no record has been found of any of these crossing the mountains to east coast.

Habitation in the watershed reservations is very limited and trails

in this area are not at all well established.

#### TRAIL No. 7: San Jose to Baler (about 11 days):

Commencing at San Jose (15° 48' N, 120° 59' E) on Route 5D, Trail No. 7 runs eastwards to Baler on the east coast.

It is a well-established foot trail with fairly easy grades, except

for one steep climb to a mountain pass at 15° 47′ N, 121° 18′ E.

West of this pass is mostly through open grassland with patches of second growth forest; from the pass to Baler the trail runs mostly along heavily forested river banks.

It crosses Route 100 at Pantabangan, a barrio, and runs through San Juan, Marikit and Lublub, just west of the pass. These are small groups of nipa or grass huts of very little importance.

Drinking water is said to be plentiful. The area was thinly settled with occasional patches of rice, camotes, cassava and bananas.

No very difficult stream crosses have been reported.

#### TRAIL No. 8: Conversion to Ditali:

Very little information has been obtained about this trail beyond the fact that it did exist before war approximately as indicated. traversed rough forested mountains. It ran NE from Conversion on Route 100 (15° 53' N, 121° 07' E) to Abaca River, thence eastwards to Ditali on the east coast.

# TRAIL No. 14: Sto Rosario East to Trail 14, near Baliuag (8 mls):

Commencing at Sto Rosario (Cansinala) (14° 59′ N, 120° 47′ E) on the east (left) bank of Pampanga R, Trail No. 14 runs ENE for about 31 mls through Candaba Swamp, thence eastwards through rice paddies for about 4½ miles to a junction with Trail No. 15 about 2 mls NW of Baliuag.

The swamp section of this trail is said to be impassable for even foot traffic during flood, but after floods subside foot traffic can use this trail and, during the dry season, it is said to be jeepable, although very rough going over large stones placed in earlier attempts at road construction.

The rice and farmland section is said to be trafficable on foot at all seasons and jeepable during the dry season.

#### TRAIL No. 15: Santa Monica to Baliuag (91 miles):

Commencing at Santa Monica (15° 02′ N, 120° 47′ E) on the east (left) bank of Pampanga R, opposite San Luis on Route 55A, Trail No. 15 runs SE for about 2 mls to San Isidro, across Candaba Swamp, thence through rice paddies and farmland for about 7½ mls to Route 88A, about 1 ml north of Baliuag.

The swamp and farmland sections are respectively similar to Trail No. 14.

## TRAIL No. 16: Candaba to Bahay Pare (64 mls):

Commencing at Candaba at the terminus of Route 89, Trail No. 16 runs SE across Candaba Swamp for about 4½ mls, thence through rice paddies for about 1½ mls to Maasim R at Bahay Pare, at the terminus of Route 88A, 8 mls north of Baliuag on Route 5A, the northernmost 1½ mls of which was unsurfaced seasonal road, the balance being 1-lane AW.

The swamp section of this trail actually consists of two parallel foot trails. There is no indication that either of them is even jeepable during the dry season, but foot troops could, no doubt, cross the swamp at this point, except during high floods, when the entire area becomes flooded.

About midway across the swamp section, two branch trails leave Trail No. 15. The northern branch loops around in the swamp; the southern branch runs south to a crossing on Maasim River, thence westwards along its south bank to the Pampanga River-bank trails.

## TRAIL No. 17: Candaba to San Miguel ( $10\frac{1}{2}$ mls):

Commencing at Candaba, this trail runs NE for about 6 mls through Candaba Swamp to Magumbalio. It continues eastwards for another  $4\frac{1}{2}$  mls to San Miguel on Route 5A through rice paddies.

The swamp section of this trail is said to be jeepable most of the year, except in high flood.

# TRAIL No. 18: Candaba to Santa Rita (11 mls):

This is a N/S trail of no value so far as crossing Candaba Swamp is concerned, but may form a useful alternative foot trail in the dry season, parallel to portion of Route 10.

Commencing at Candaba, it runs northwards along the east (left) bank of Pampanga R for about  $2\frac{1}{2}$  mls, then continues northwards through Candaba Swamp for about 6 mls to Mamatad; thence through rice paddies for  $2\frac{1}{2}$  mls to Route 10B at Santa Rita barrio.

## TRAIL No. 19: Arayat to Pulang Buli:

Commencing from the old road loop on Route 10 about 1 ml east of the new steel truss bridge over Pampanga R at Arayat, Trail No. 19 runs NE across Candaba Swamp for about 5 mls. It then skirts the north end of the swamp in rice paddies for  $2\frac{1}{2}$  mls, again crossing a swampy section eastwards for about  $\frac{3}{4}$  ml; thence on firmer ground between rice paddies for  $4\frac{1}{2}$  mls to Pulang Buli on Route 5A.

No record of wheeled vehicles using this trail has been found.

# 5. HIGHWAY MILEAGES BETWEEN MAIN POINTS ON LUZON:

	MANILA (Manila).	APARRI (Cagayan).	BAGUIO (Benguet).	BATANGAS (Batangas).	CABANATUAN (Nueva Ecija).	LEGASPI (Albay).	LINGAYEN (Pangasinan).	SAN FERNANDO (Pampanga).	TARLAC (Tarlac).
MANILA (Manila)		368	157	72	73	320	128	41	77
APARRI (Cagayan)	368		339	440	293	688	329	338	309
BAGUIO (Benguet)	157	339		229	107	477	60	116	80
BATANGAS (Batangas)	72	440	229		145	282	200	113	150
CABANATUAN (Nueva	73	293	107	145		394	91	46	30
Ecija). LEGASPI (Albay)	320	688	477	282	394		448	361	397
LINGAYEN (Pangasi-	128	329	60	200	91	448		88	52
nan). SAN FERNANDO	41	338	116	113	46	361	88		37
(Pampanga). TARLAC (Tarlac)	77	309	80	150	30	397	52	37	

# 6. APPROXIMATE ROAD DISTANCES FROM CABANATUAN:

(Province and main route number shown in brackets.)
(Bul = Bulacan; Nv Ec = Nueva Ecija; Pam = Pampanga; Pang = Pangasinan; Tar = Tarlac; Tbs = Tayabas).

То	Cabar Km	Cabanatuan Km Ml		
ALIAGA (Nv Ec 56E).	13.3	8.3		
ANGELES (Pam 3E) (via La Paz).	81.2	50.5		
APALIT (Pam 55A).	77.6	48.2		
ARAYAT (Pam 10A).	50.4	31.3		

# 6. Approximate Road Distances from Cabanatuan—continued.

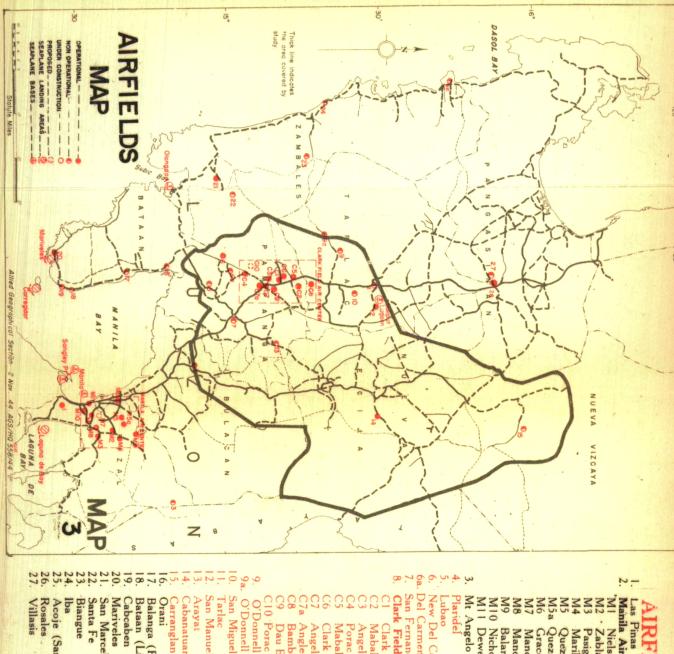
То	Cabanatuan Km Ml		
BACOLOR (Pam 7A).	76.1	47.3	
BALER (Tbs 101).	118.5	73.6	
BALETE PASS (Nv Ec 5E).	97.9	60.8	
BALIUAG (Bul 5A).	65.9	40.9	
BALOC (Nv Ec 5C).	23.3	14.5	
BAMBAN (Tar 3E).	64.2	39.9	
BONGABON (Nv. Ec 95).	28.0	17.4	
BUSTOS (Bul 65C).	86.5	53.8	
CABIAO (Nv Ec 10B).	35.4	22.0	
CALUMPIT (Bul 3C).	85.3	52.8	
CANDABA (Pam 89).	64.4	40.0	
CAPAS (Tar 3E).	56.6	35.2	
CARRANGLAN (Nv Ec 100).	80.5	50.0	
CONCEPCION (Tar 55D).	47.7	29.6	
DAU (Tar 3E).	75.3	46.8	
DIGDIG (Nu Ec 5E).	67.8	42.1	
DINALUPIHAN (Bataan 7A).	105.8	65.7	
DINGALAN (Tbs 102C).	65.5	40.7	
FLORIDABLANCA (Pam 76C).	93.5	58.0	
FORT STOTSENBURG (Pam 77A).	82.7	51.4	
GAPAN (Nv Ec 5A).	22.5	14.0	
GUAGUA (Pam 7A).	80.4	50.0	
GUIMBA (Nv Ec 15).	37.5	23.3	

# 6. Approximate Road Distances from Cabanatuan—continued.

То	Caban	atuan Ml
HAGONOY (Bul 69).	90.4	56.2
JAEN (Nv Ec 56A).	19.0	11.8
LA PAZ (Tar 82).	31.1	19.3
LAUR (Nv Ec 102C).	29.0	18.0
LICAB (Nv Ec 98A).	24.0	14.9
LUBAO (Pam 7A).	87.3	54.3
LUPAO (Nv Ec 8).	49.8	30.9
MABALACAT (Pam 3E).	70.2	43.6
MACABEBE (Pam 70).	89.7	55.7
MAGALANG (Pam 55C) (via Arayat).	67.0	41.6
MALOLOS (Bul 51B).	83.8	52.1
MASANTOL (Pam 70) (via Calumpit).	91.7	57.0
MEXICO (Pam 10A).	63.9	39.7
MINALIN (Pam 72) (via San Fernando).	* 79.3	49.3
MUNOZ (Nv Ec 5D).	30.8	19.1
NORZAGARAY (Bul 65A).	108.8	67.6
O'DONNELL (Tar 80).	72.8	45.2
PANTABANGAN (Nv Ec 100) (via Digdig).	98.4	61.2
PAOMBONG(Bul 69)	86.4	53.7
PAPAYA (Nv Ec 93A).	29.2	18.1
PENARANDA (Nv Ec 92).	31.1	19.3
PLARIDEL (QUINGA) (Bul 5A).	75.1	46.7
PORAC (Pam 74A) (via La Paz).	90.7	56.4

# 6. Approximate Road Distances from Cabanatuan—continued.

То	Cabanatuan Km Ml		
PULILAN (Bul 67).	77.3	48.0	
QUEZON (Nv Ec via 98A).	31.3	19.5	
RIZAL (Nv Ec 96).	36.4	22.6	
SAN ANTONIO (Nv Ec 56B).	34.0	21.1	
SANTO DOMINGO (Nv Ec via 98A).	22.5	14.0	
SAN FERNANDO (Pam 3D).	69.6	43.3	
SAN ILDEFONSO (Bul 5A).	51.0	31.7	
SAN ISIDRO (Nv Ec 20B).	26.2	16.3	
SAN JOSE (Nv Ec 5D).	44.3	27.5	
SAN LEONARDO (Nv Ec 93A).	17.1	10.6	
SAN LUIS (Nv Ec 55A).	64.9	40.3	
SAN MIGUEL (Bul 5A).	40.8	25.4	
SAN MIGUEL (Tar 3E).	55.9	34.7	
SAN SIMON (Pam 55A).	71.9	44.7	
STA ANA (Pam 10A).	57.4	35.7	
STA RITA (Pam 75).	84.4	52.5	
STA ROSA (Nv Ec 5B).	8.0	5.0	
SEXMOAN (Pam 72B).	84.1	52.3	
SIBUL SPRINGS (Bul 91).	49.4	30.7	
TALAVERA (Nv Ec 5C).	15.0	9.3	
TARLAC (Tar 3E).	49.0	30.5	
ZARAGOZA (Nv Ec 82).	24.6	15.3	



Las Pinas

Manila Air Centre

Nielson (Manila East)

Pasig Zablan (Manila North)

Marikina

Quezon

Quezon (New Grace Park

Mandaluyong

Balara Mandaluyong East

M10 Nichols Field M11 Dewey Boulevard Mt Angelo

Plaridel

New Del Carmen (San Jose)

Carmen (Pre-war) Fernando

Clark Field Air Center

Clark Field

Angeles West Mabalacat East

Porac Clark Field North Mabalacat West

Angeles South (Telabastagan)

Angles South (Lara)

Dau East Bamban

C10 Porac West O'Donnell

San Migue O'Donnell (Emergency)

San Manuel

Cabanatuan (Maniquis)

Balanga (Pilar) Orani

Bataan (Limay

Cabcaben

San Marcelino Mariveles

Biangue Santa Fe

Acoje (Santa Cruz)

Rosales

#### SECTION 3.

# AIRFIELDS, POSSIBLE AIRFIELD SITES AND SEAPLANE LANDING PLACES.

(MAP 3.)

A.—AIRFIELDS.

#### 1. GENERAL:

Japanese have developed this area into one of most important air centers in Philippines. Extensive construction work has been carried out along western edge of the wide Central Luzon Plain, where open, sandy, well-drained terrain permits easy preparation of fields, usable practically in all weather. Here Clark Field is center of a network of operational bases.

Airfields in area covered by this Handbook number: 13 operational, 10 non-operational and 1 proposed. They are numbered to correspond

with AGS/Terrain Study 94—Central Luzon.

Communications and Meteorological Conditions are dealt with

more fully in their respective sections.

Where defence figures are stated thus "Heavy A/A 10/7", the former figure signifies emplacements prepared; the latter positions

occupied.

The following abbreviations apply: AW—all weather; seas—seasonal; DW—dry weather; RR—railroad; CNA—Commercial National Airport; PA—private airfield; MNA—Military National Airport; LD—long distance; ASL—above sea level. Cardinal points have been abbreviated to N, S, E, and W.

#### 2. AIRFIELDS IN DETAIL:

4. Plaridel—14° 53′ N, 121° 51′ E. 20ft ASL. Non-operational. Location:

A pre-war CNA 1 ml W of Plaridel, Bulacan Prov.

Runways, Etc.:

One, grassy clay loam, N/S, 2,640ft x 330ft; DW only. Extension impossible without extensive canal diversion.

Level riceland with tree-lined streams.

Communications:

Routes 5 and 67, also Manila RR, at Plaridel.

5. Lubao—14° 56′ N, 120° 36′ E. Non-operational. General:

USAAF built a fighter strip at Lubao in 1941.

Location:

Not known, and no details are available.

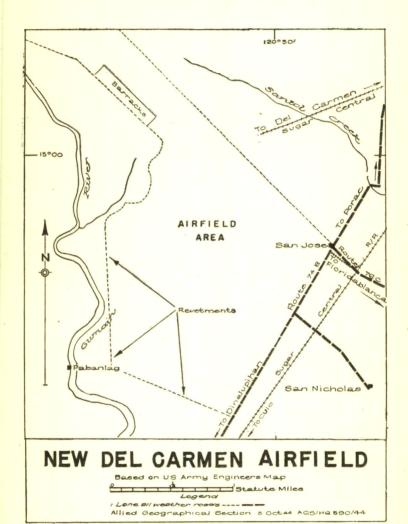
Terrain:

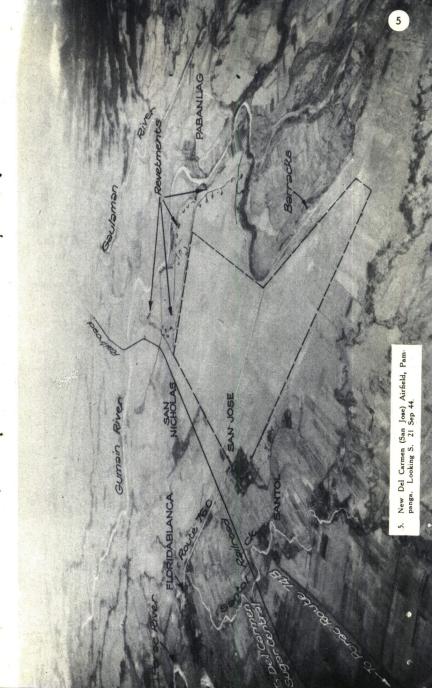
In vicinity of Lubao is flat. Cane and rice cultivation SW through W to N; NE, E and SE extensive salt marsh and tidal swamp area.

6. New Del Carmen (San Jose)—14° 59′ N, 120° 30′ E. 160ft ASL. Operational (Photo 5):

Location:

A recently-constructed Japanese field 2 mls W of Floridablanca between Gumain R and Route 74B, near barries San Jose and San Nicholas.





Runways, Etc.:

Photos show no defined runways. Cleared level area 11,000ft. x 6,000ft. Could possibly be extended along its N/S axis. Revetments W and S.

Terrain:

Very gently rolling caneland with occasional rice paddies. Gumain R forms W boundary and foothills of Zambales Ra are 11 mls W. Route 74B is E perimeter.

Defences: A/A reported 130yds N. See current Intell Summaries.

Engineer Materials:

Water and gravel from river; stone and timber from hills W.

Installations:

NW corner of field.

Communications:

Route 74B (1-lane AW) N to Porac, S to Dinalupihan. From San Jose 76C (1-lane AW) to Floridablanca. Sugar Central RR north to Del Carmen and S to Culo.

6a. Del Carmen (Old)—15° 00' N, 120° 32' E. 100ft ASL. Nonoperational.

Location:

Immediately E across river from Del Carmen Sugar Central between river and Route 76B. Originally a PA of Pampanga Sugar Mills; later a US fighter field. Runways, Etc.:

One, NNW/SSE 2,640 x 330ft. Level grassy surface, AW. A minor extension is possible to S end. Ground in vicinity of Del Carmen

is suitable for construction of large fields.

Flat, sandy, sugarcane land. Zambales Ra 5 mls W is nearest high ground. Porac R flows through the town and parallels W edge of field.

Communications: 1-lane AW roads to Floridablanca, Porac, San Jose, and main Route 5 near Guagua. Sugar Central RR spurs to New Del Carmen and Porac airfields; also to join Manila RR at San Fernando, via Floridablanca.

7. San Fernando—15° 02′ N, 120° 42′ E. 13ft ASL. Non-operational: Location:

Half a mile SE of San Fernando adjoining Route 3. A MNA of

the Philippine Army.

Runways, Etc.: One NE/SW, 2,175 x 390ft. Grassy; sandy, alluvial soil. Field soft after heavy rains and subject to floods from San Fernando R. creek and drainage system prevent extension, but a N/S strip could be built by removing cadre barracks. Terrain:

Level cane and riceland, laced with several bamboo-lined streams.

E and SE is a large tidal swamp area.

Communications:

Route 3 (2-lane AW) which adjoins SW end connects Route 10 at San Fernando and 5 at Plaridel. Manila RR runs parallel with Route 3.

#### 8. Clark Air Center:

General:

This important center includes ten fields, all of which are reported operational, and one proposed field. These airfields have been numerically listed to correspond with Terrain Study 94—Central Luzon. The letter "C" prefixed to the number denotes Clark.

Engineer Materials:

As these fields are within a 10-ml radius of Clark Field, engineer materials available to Clark Field are also accessible to the other bases of the centre. Timber is available in Zambales Mts but, because of transportation, this source is impracticable. Best source would be from other islands through Manila Port.

Sand and gravel can be secured from streams, and stone from

quarry at Margot near Stotsenburg.

Artesian wells can be readily developed in this area, as well as utilizing the water systems of Clark Field, Camp Dau and Angeles.

Paratroop Areas:

Airborne and glider operations could be carried out in the vicinity of all fields in this centre.

C1. Clark Field—15° 11′ N, 120° 32′ E. 500ft ASL. Operational. (Photos 6 and 7):

Location:

2.4/5 mls W of Dau and  $\frac{1}{2}$  ml E of Ft Stotsenburg. Former US Army field greatly enlarged by Japanese.

Runways, Etc.:

Four, named for reference purposes, IA, IB, IC, and ID. Dimensions are approximate.

1A: level grassy NE/SW 13,000 x 600ft. 1B: E/W concrete 4,200 x 400ft.

1B: E/W concrete 4,200 x 400ft. 1C: level grassy E/W 6,000 x 800ft. 1D: level grassy E/W 4,000 x 500ft.

Considerable extensions possible to 1B, 1C and 1D. Large revetted dispersal areas N and S of 1A.

Terrain:

Ground west rises gradually to Ft Stotsenburg then abruptly to Zambales Ra (3,000ft). Low hills N and S. NE to SE terrain falls slowly to cane and rice fields.

Defences:

Clark Field is heavily garrisoned. Intell Summary 245 reports heavy A/A 10/4; medium 44/22; light 13/13; S/L 2/2.

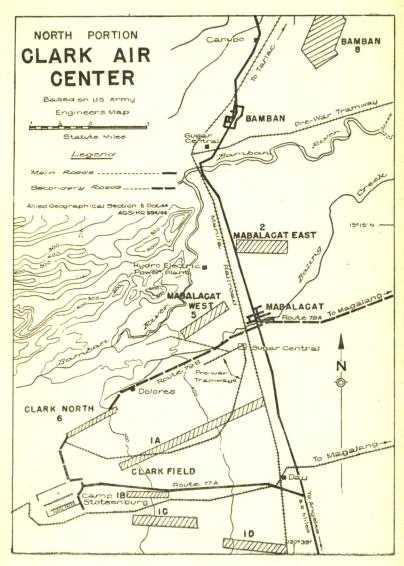
Installations:

Most extensive; including repair workshops, supply dumps, barracks and several large hangars.

Communications:

2-lane AW road to Route 3 at Dau. 1-lane seas road passing Clark North Field connects Route 3 at Mabalacat. RR from Ft Stotsenburg links Manila RR at Dau. A pre-war 24-in tramway ran from field to Mabalacat Sugar Central. Was connected to LD telephone.

Clark North Stotschburg Zumboles Range Mabalacat West, Mabalacat East, Clark North and Clark Airfields, Pampanga, Looking W... 21 Sep 44.



**C2.** Mabalacat East—150° 14′ N, 120° 35′ E. 300ft ASL. Operational. (Photo 7):

One ml N of Mabalacat and 4<sup>3</sup>/<sub>4</sub> mls NE of Clark Field. Newly built by Japanese.

Runways, Etc.:

One, E/W approx 4,593ft x 984ft. Reported 20in rock base, sand, clay and shell surface. Probably AW with no appreciable extension.

Taxiways and revetments S extend W across Manila RR and also serves Mabalacat West Field.

Terrain:

Flat cane land; occasional patches sparse bamboo. Bamban R is  $\frac{3}{4}$  ml W backed by foothills of Zambales Ra (3,000ft).

See Current Intell Summaries.

Installations:

N and S in bamboo clumps.

Communications:

Route 3 at west edge of field. From Mabalacat Route 79B (1-lane seasonal) to Clark North and Clark Field.

Manila RR adjacent to Route 3 and 24in tramway from Mabalacat

Sugar Central to Clark Field.

Mabalacat had LD telephone and telegraph.

C3. Angeles West—15° 08′ N, 120° 34′ E. 360ft ASL. Operational. (Photo 6):

Location:

Japanese constructed airfield 1 ml W of Angeles and 3 mls S of Clark Field.

Runways, Etc.:

One, WNW/ESE approx 2,528 x 550ft. Reported 20in rock base, topped with sand, clay and shell. Believed AW. Can be lengthened W 2,000ft over slight uphill grade. Taxiways to disposal bays N and S.

Terrain:

Flat cane land sloping gently W to E. Zambales Ra (3,000ft) is 4 mls W.

Defences:

Nil. See Current Intell Summaries.

Installations:

Approx twenty-five buildings, probably barracks in bamboo cover S. Also numerous installations in bamboo N.

Communications:

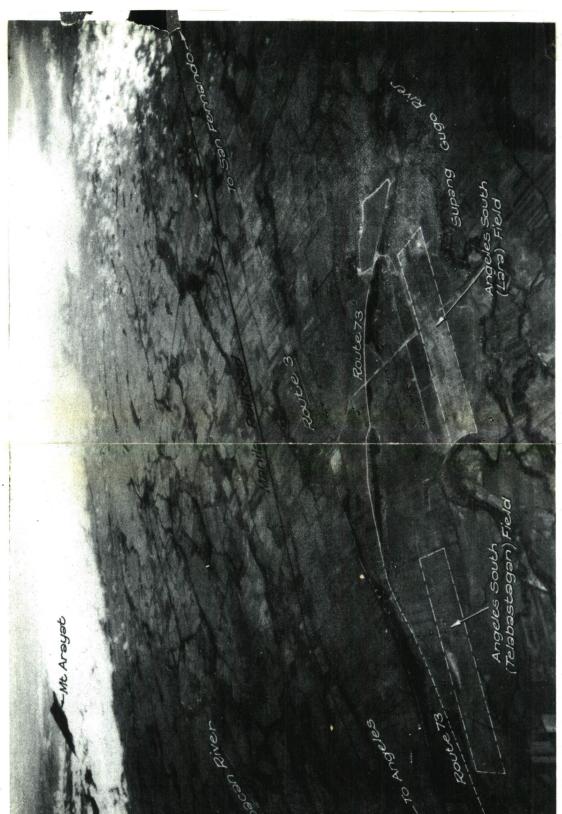
Route 74A (1-lane AW) which passes E end of field travels S to Dinalupihan via Porac and San Jose and N 1 ml to Route 3 at Angeles. Manila RR at Angeles. Angeles was connected to LD telephone and telegraph, also Prov telephone.

C4. Porac—15° 04′ N, 120° 33′ E. 210ft ASL. Operational. (Photo 8):

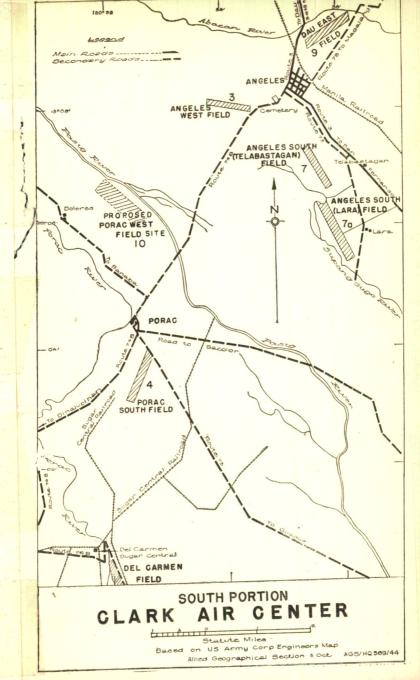
Location:

A recently completed field immediately S of Porac between Routes 74B and 75.

8. Porac field, Pampanga. Looking W. 21 Sep 44.



9. Angeles South (Lara) and Angeles South (Telebastagan) Airhelds, Pampanga, Looking E. 21 Sep 44.



Runways:

One NNE/SSW probably to Japanese specification 7,560ft x

1,184ft. Graded, but not surfaced.

Could be extended S to 9,000ft. Large strips travelling any directions could be prepared in vicinity.

Dispersal revetments W near Porac R.

Terrain:

Flat cane fields NW through E to SW. SW through W to NW beyond Porac R steadily rising terrain to Zambales Ra (3,000ft). Porac R lies ½ ml W. Approx 800yds N is Porac R.

Defences:

See Current Intell Summaries.

Installations:

None visible Sep 44 photos. Quarters for 600 men were reported 30 per cent. complete in Feb 44, scheduled for completion Jun 44. Communications:

1-lane AW roads from Porac to Routes 3 and 7—74A joins Route 3 at Angeles; 75 with Route 7 at Guagua. Also 74B (1-lane AW) S

to Del Carmen fields.

Spurs of Del Carmen Sugar Central RR are close S and E of field.

Manila RR at Angeles.

**C5. Mabalacat West**—15° 13′ N, 120° 34′ E. 380ft ASL. Operational. (Photo 7):

Location:

Half a mile W of Mabalacat, 1 ml SW of Mabalacat East field and 1½ mls NE of Clark North field. Recently constructed by Japanese. Runways:

No defined runways, but fairly level cleared area approx 4,920ft x

984ft ENE/WSW.

Area could be lengthened E 3,000ft to Manila RR.

Revetments 1 ml N serve this field and Mabalacat East field.

Revenients also SW along Bamban R.

NW 300yds is Bamban R backed by E/W aligned spurs (600ft) with swift streams in their valleys. N through E to S level cane land. Foothills of Zambales Ra commence 5 mls W and SW. Defences:

See Current Intell Summaries.

Installations:

Several buildings probable barracks in small bamboo patch 400vds S.

Communications:

A ½-ml road S to Route 79B (1-lane seas), which leads SW to Clark North and Clark Field and NE to Route 3 at Mabalacat.

Manila RR ½ ml E. Mabalacat was connected with LD telephone and telegraph.

**C6.** Clark North—15° 12′ N, 120° 32′ E. 520ft ASL. Operational. (Photos 6 and 7):

Location:

Japanese built field 1 ml N of Clark Field and 31 mls NW of Dau.

Runways:

One, NE/SW, graded sand approx 5,148ft x 492ft. Another NE/SW strip approx 3,900ft is reported ½ ml N near Bamban R.

Can easily be expanded NE to 7,800ft.

Dispersal areas serving Clark Field are also available to this field. Additional revetments N extending NE along Bamban R.

Terrain:

NW  $\frac{1}{2}$  ml is a low ridge 300yds wide, backed by the shallow valley of the Bamban R, then E/W aligned spurs (500/600ft) with deep creek beds in their valleys. 1 ml W and SW terrain rises sharply to Zambales Ra (3,000ft). N through E to S slowly falling ground to cane and rice fields.

Defences:

Defences of Clark Field probably cover this field. See Current Intell Summaries.

Installations:

None planned. Evidently extensive installations of Clark are sufficient to meet requirements.

Communications:

From field a 2-lane AW road to Route 3 at Dau, also a 1-lane seas to Route 3 at Mabalacat.

Fort Stotensburg RR connects Manila RR at Dau.

There was LD telephone at Ft Stotensburg.

C7. Angeles South (Telebastagan)—15° 07′ N, 120° 36′ E. 260ft ASL. Operational. (Photos 6 and 9):

Location:

Near barrio Telebastagan, 2 mls SE of Angeles, and ½ ml NE of Angeles South (Lara) Field. Newly constructed Japanese field, believed in use.

Runways:

One, level grassy NW/SE approx 4,600ft x 770ft. Probably AW. A 1,000ft extension is possible SE. Taxiways to revetments all round field.

Terrain:

Level sandy cane land. Nearest high ground is Zambales Ra 5 mls W.

Defences:

None reported. See Current Intell Summaries.

Installations:

None visible in photos of Sep 44.

Communications:

Route 73 from Angeles South (Lara) Field passes W boundary and joins Route 74A, 300yds S of Angeles. A short feeder road W to Route 3.

Manila RR at Angeles. Angeles was connected to LD telephone and telegraph, also Prov telephone.

C7a. Angeles South (Lara)—15° 06′ N, 120° 36′ E. 200ft ASL. Operational. (Photo 9):

Location:

At barrio Lara  $2\frac{1}{2}$  mls SE of Angeles and  $\frac{1}{2}$  ml S of Angeles South (Telebastagan) Field. A highly developed Japanese field.

Runways, Etc.:

One graded grassy NW/SE approx 5,400ft x 950ft. Considered serviceable AW. Supang Gugo R limits runway to present size. Revetments W and E close to strip, also W near Route 3.

Terrain:

Level sandy cane land. Supang Gugo R, a seasonal stream with rather steep banks borders N end of strip and continues S parallel with runway. A small creek cuts across S end.

Defences:

Intell Summary 245 reports 14/7 medium A/A. See Current Intell Summaries.

Installations:

No large buildings visible in Sep 44 photos; numerous small huts in bamboo growth along river.

Communications:

Good ml long road E to Route 3. From field Route 73 runs past Angeles South (Telabastagan) Field to connect 74A near Angeles. Manila RR ½ ml E of Route 3 passes through Angeles. Angeles was connected to LD telephone, telegraph, also Prov telephone.

**C8.** Bamban—15° 18′ N, 120° 35′ E. 180ft ASL. Operational. (Photo 10):

Location:

About 1½ mls NE of Bamban; 7½ mls NE of Clark Field. A recently completed Japanese field.

Runways, Etc.:

Photos of Sep 44 show large approx rectangular cleared area, oriented NE/SW. No runways discernible; possibly entire area is used. Area is favourable for a field up to 4 mls. Revetments all round field.

Terrain:

Surrounding terrain is level cultivated fields.

SW of Bamban are foothills of Zambales Ra.

NW across Manila RR. Bamban R is 1½ mls S.

Capas R 1 ml N.

Defences:

See Current Intell Summaries.

Installations:

No Japanese constructed buildings observed.

Communications:

Enemy built road from field to Bamban. Main highway (Route 3) and Manila RR pass through Bamban.

Prov telephone and telegraph at town.

**C9.** Dau East—15° 09′ N, 120° 36′ E. 300ft ASL. Operational. (Photo 6):

Location:

Japanese built airfield 1 ml NE of Angeles between Abacan R and Route 78; 4 mls SE of Clark Field.

Runways:

One, ENE/WSW grassy, approx 4,400ft x 910ft. Strip is of maximum length. Revetment area N, E and S.

Terrain:

Level sandy cane and rice land with few scattered patches of bamboo. Field is bordered W by Route 3 and E by Route 78. Some 200yds N Abacan R parallels length of strip. River is shallow, braided and probably dry in dry season.

Defences:

See Current Intell Summaries.

Installations:

Fifteen large buildings, probably barracks about 11 mls N.

Communications:

Route 3 (2-lane AW) passes W edge of field. Route 78 (1-lane AW) immediately E travels NE to Magalang and SW to Dinalupihan via Porac. Manila RR 400yds W.

Angeles was connected to LD telephone and telegraph, also Prov

telephone.

C10. Porac West—15° 06′ N, 120° 32′ E. 480ft ASL. Proposed:
According to reports Japanese proposed constructing a field in vicinity of barrio Dolores, about 2 mls NNW of Porac. Proposed runway, NW/SE, 3,280ft long.

9. O'Donnell—15° 21' N, 120° 27' E. 400ft ASL. Non-operational:

Location:

Immediately N of O'Donnell. US Army Engineers were constructing this field at outbreak of war. It has not been improved and not in use.

Runways, Etc.:

Two, a NW/SE approx 3,000ft x 300ft was well graded and partially sand surfaced. A NE/SW strip of unknown dimensions was laid out and cleared. Both runways can be extended to about 4,800ft.

Situated on 2 ml wide river plain bounded N and W by O'Donnell R and E by Bangat R. Plain is flat except for three knolls (200/300ft).

Engineer Materials:

Sand and gravel from O'Donnell R flats; stone could be quarried from nearby hills.

Communications:

Route 80 (1-lane AW) is only communication. It joins Route 3 and Manila RR at Capas.

9a. O'Donnell Emergency Field—15° 19′ N, 120° 24′ E. 450ft ASL. Non-operational:

Location:

Approx 4 mls SW of O'Donnell on S bank of O'Donnell R. A pre-war natural emergency landing field suitable only for crash landings for fighters.

Runways, Etc.:

Pre-war grass-covered clearing ENE/WSW approx 1,800ft x 135ft.

Now probably overgrown with long grass. Possible extension to 2.500ft.

Terrain:

Field is on a \(\frac{3}{4}\)-ml wide river plain surrounded except NE, by semi-mountainous terrain.

Communications:

1-lane seas road to O'Donnell.

10. San Miguel—15° 27′ N, 120° 37′ E. 160ft ASL. Non-operational: Location:

A pre-war PA 1 ml NE of San Miguel, adjoining road to Tarlac Sugar Central. An unconfirmed report states field being improved.

Runways, Etc.:

One, E/W sodded clay, AW, 2,145ft x 720ft. Could be extended equally to 6,000ft and parallel strip possible by filling irrigation channels. Unlimited dispersal area, but no concealment.

Terrain

Surrounded by flat, open, sandy cane cultivation. Immediately N of San Miguel, between O'Donnell R and Manila RR is small swampy area.

Engineer Materials:

Sand and gravel from nearby rivers.

Communications:

Good AW road to Route 3 at San Miguel. RR (standard gauge) 100yds E connects Manila RR at San Miguel. LD telephone and telegraph, also Prov telephone at town.

11. Tarlac—15° 29′ N, 120° 35′ E. 181ft ASL. Non-operational.

Half a ml S of Tarlac. A CNA abandoned by Japanese.

Runnays Ftc .

One NE/SW sodded clay loam, 2,640ft x 231ft. Possible minor extension S. Field and dispersal area soft in wet season.

Terrain:

Flat open country NW through E to S. Mildly undulating developing into 400/500ft hills SW and W. Tarlac R skirts W edge of town.

Engineer Materials:

Water from town; surfacing material from Tarlac R.

Installations

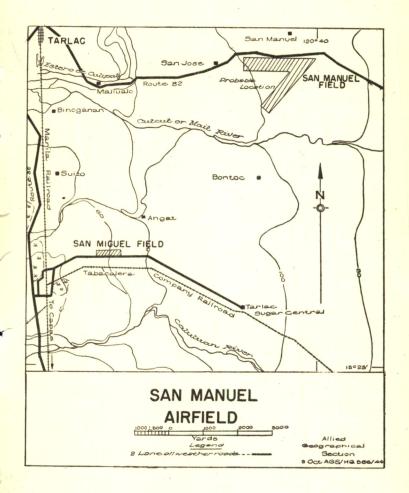
Trainee barracks were near SW end. (See photo 23.)

Communications:

Connected by Route 13, which joins Route 3 at Tarlac. Manila RR 1,000yds E. There were LD telephone and telegraph, also Prov telephone at Tarlac.

12. San Manuel—15° 30′ N, 120° 39′ E. 100ft ASL. Operational:

Exact location not known. Reported on S edge of barrio San Manuel adjacent to Tarlac-De La Paz road, 4 mls E of Tarlac. Important new Japanese field.



Runways, Etc.:

Reported strips; one E/W 6,560ft x 1,312ft joined at E end by NE/SW strip 6,560ft x 984ft. Construction, 20in rock base surfaced with sand clay and shell. Available AW.

Extension probable any direction. No concealment, but unlimited

dispersal area.

Terrain:

Country for 4 ml radius is very flat, sandy cane land. Cutcut (Mait) R, a tributary of Tarlac R lies to S. 2 mls W of San Manuel is a small lagoon reported as a seaplane base. (See Seaplane Landing Places.)

Defences:

See Current Intell Summaries.

Installations:

Barracks for 600 are reported at W edge of field.

Communications:

Road 82 (2-lane AW) connects field with Route 3 at Tarlac.

Manila RR telephone and telegraph at Tarlac.

13. Arayat—15° 10′ N, 120° 48′ E. 30ft ASL. Non-operational: Location:

1½ mls E of Arayat, immediately E of Pampanga R bridge. A Government emergency landing field improved for the Philippine Army.

Runways, Etc.:

One, E/W, grassy sandy loam, 3,300ft x 110ft. Thought serviceable DW only. Strip cannot be extended, however a 6,000ft N/S strip may be possible.

Terrain:

Mt Arayat (3,367ft) 1 ml NW is the only high ground within a 9 ml radius. Cultivated land S through W to N. NE to SE is Candaba Swamp. A loop of Pampanga R borders field area S and W.

Engineer Materials:

Stone from Government quarry about 1 ml SW of Arayat; sand and gravel from river. Construction timber from Mt Arayat.

Communications:

Route 10A (2-lane AW) connects field to Routes 3, 5 and 7. RR from Arayat joins Manila RR at San Fernando. Telegraph at Arayat.

**14. Cabanatuan** (Maniquis)—15° 29′ N, 121° 02′ E. 150ft ASL. Operational. (Photo 11):

Location:

4.8 mls E of Cabanatuan, S of Route 95. Formerly a CNA taken over by Philippine AAF. Enlarged by enemy and reported important training base.

Runways:

E/W pre-war runway enlarged to 5,000ft x 600ft. N/S pre-war strip abandoned. By adding to both ends E/W strip could be lengthened to 6,000ft. A 5,000ft N/S cross-strip is feasible. Field is AW.

Terrain:

Flat grass and cultivated land with scattered patches of trees and few seasonal creeks. Pampanga R is 4 mls E and 5 mls N.

11. Cabanatuan Airfield, Nueva Ecija. Looking N. 21 Sep 44.

Engineer Materials:

Gravel from river, stone from mountains 5 mls E. There were several large lumber yards in Cabanatuan.

Installations:

Ten Jap-constructed barracks NE of E end of strip; hangar N near W end; several supply dumps E and S of field. Pre-war cadre barracks have been destroyed. Cabanatuan POW camp is 1 ml NE. Communications:

Good road from field to Route 95, which joins Route 5 at Cabanatuan. Manila branch RR at town. Field had LD telephone

in 1941.

15. Carranglan—15° 59′ N, 121° 03′ E. 850ft ASL. Non-operational. Location:

A pre-war emergency landing field  $1\frac{1}{2}$  mls NW of Carranglan across Carranglan R.

Runways:

No regular runway. Clear level grass-covered area approx 4,500ft x 3,000ft.

Terrain:

Located on fairly level 1 ml wide valley which runs NW of Carranglan. Is practically encircled by mountains varying from 1,500ft to 4,000ft.

Engineer Materials:

Water, sand and gravel from river; timber and stone from nearby mountains.

Communications:

Route 100 (1-lane AW) connects field to Route 5:

## B.—POSSIBLE AIRFIELD SITES.

Possible field sites are not treated in detail as there is already a great number of fields within the area, and the wide Central Plain offers innumerable sites for airfields.

## C.—SEAPLANE LANDING PLACES.

Current Intell reports that the Japanese have created a seaplane base in a small lagoon just E of Tarlac, between Tarlac and San Manuel. This is the only seaplane landing place in this area.

1. San Manuel, Tarlac—15° 30′ N, 120° 37′ E. Elevation 100ft: Location:

1½ mls E of Tarlac.

History:

A small lagoon reported dammed to form a lake. Six four-engine seaplanes were reported based here in Jun 44.

Alighting Area:

The map indicates that a straight away running N/S for 1,200yds and 150yds wide is available.

Obstruction:

Clear in all directions.

Anchorage:

A bulge near N end could be used for an anchorage.

Base Facilities:

The San Manuel air base is nearby. Size of lagoon would prevent development of a large base.

#### SECTION 4.

# GENERAL PHYSIOGRAPHY.

(Maps 4, 5; Photos 12-21)

#### 1. PHYSIOGRAPHY:

# i. Central Sierra Madre Range:

Trends N/S with longitudinal drainage system developed. Range about 10 mls wide broadening southwards. Cut off northwards from Northern Sierra Madre and Cordillera Central by Santor and Dingalan Rs. Attains elevation of over 4,000ft. Slopes steeply toward Pacific coast, but more gently toward central plain to leave narrow belt of foothills.

Terrain rough with deep V-shaped valleys which gradually diminish in gradient, and expand to merge into central plain. Heavily forested on summits and western slopes, with grassland on the foothills. All movement very difficult in mountainous zone, becoming less restricted on foothills. MT roads connect central plain with Baler B and Dingalan B over relatively low passes through range.

#### ii. Southern Cordillera Central:

Range rises fairly abruptly from northern edge of plain, attaining elevation of over 5,000ft. Terrain rough, and deeply dissected by river system of upper Pampanga and Talavera Rs, draining southwards to central plain. Vegetation consists of dense forest and grassland. All movement difficult and restricted. National Highway 5 follows Talavera Valley to Balete Pass, to connect up with Cagayan Valley in Northern Luzon.

#### iii. Central Plain:

Comprises the central part of the great plain that extends 120 mls from Lingayen Gulf to Laguna de Bay. Varies 30-40 mls in width and is level, with exception of conspicuous volcanic mass of Mt Arayat (3,379ft) about middle of plain.

Highly cultivated, mainly in rice and sugarcane, and supports

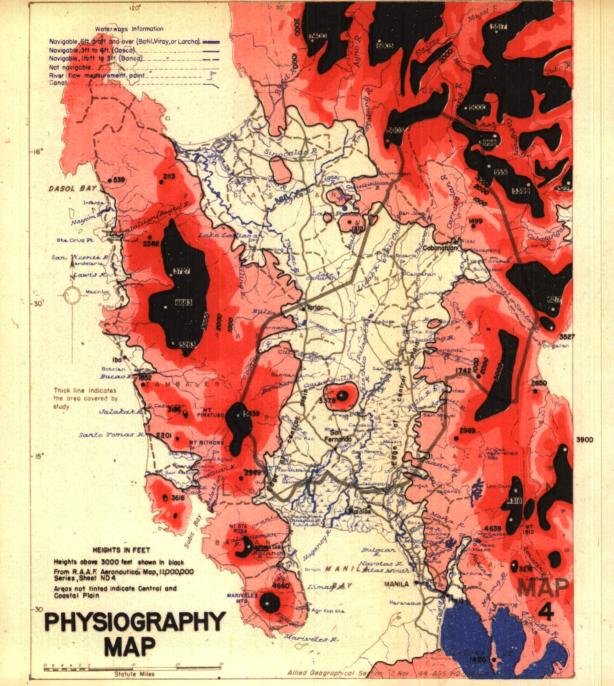
heavy population.

Plain watered by numerous rivers dominated by Pampanga R with major tributaries Talavera and Chico flowing southwards to Manila B. Candaba Swamp covers large area on east bank of lower Pampanga R.

Movement across plain fairly free during the dry season, but restricted after heavy precipitation to built-up roads and railways. Main obstacles are the deep and broad Pampanga R, the wet rice paddies, and Candaba Swamp.

#### iv. Zambales Ra:

Flanks central plain on its western side rising fairly abruptly to leave narrow foothills belt; attains elevation of 5,843ft at Mt Pinatubo from which drainage radiates to central plain and China Sea. Range is rough and deeply dissected; heavily forested in higher slopes and grass-covered along foothills. Movement in higher parts of range very difficult, but less restricted on foothills. One good pass at southern end of main range is followed by National Highway 7 connecting central plain with Subic B. Old cavalry pack trail, with much rough going, leads into mountains from Fort Stotsenburg.







14. Typical terrain and vegetation vicinity of Tarlac, Tarlac. Looking NW. Pre-war.



 Central Plain from vicinity of Ft Stotsenburg, Pampanga, Looking NW. Pre-war.

Another pack trail (Capas Trail) leading up O'Donnell R crosses range by pass 2,000ft high. Main obstacles are the larger streams, which are impassable after heavy rains in wet season from May to Oct, but easily forded during dry season from Nov to Apr.

### 2. RIVERS:

Rivers play an important part in local transport of supplies and, with probable future damage to existing roads and railways, their value will be greatly increased. Following types of native water craft are used:—

Larcha... Large wooden vessel 60-100 tons; requires 6ft of

water.

Batil ... Generally similar to a larcha; up to 50 tons; requires
4ft of water.

Viray ... Hollow log keel and built-up sides with outriggers;

20 tons; requires 4 to 6ft of water.

Casco ... Flat bottom barge; seldom used outside Manila area; 30 tons; water 3 to 6ft.

Banca ... Small craft hollowed out from single log; water 1½ to 3ft.

Chief rivers are:

### i. Pampanga:

Second largest river in Luzon (largest is Cagayan); rises in Cordillera Central and flows southwards through eastern side of central

plain for about 160 mls to Manila B.

From source to Rizal, Nueva Ecija, where it enters central plain, river is fast-flowing mountain stream with many gorges. Can be forded in many places during dry season but becomes raging torrent after heavy rains.

Rizal—Santor R Section (18 mls direct line): River broadens out, and during dry season in Mar-May is about 50 yds wide and knee-deep, with swift current and loose gravelly bottom. Banks usually high. Possible MT fords during dry season reported on trails leading west from Bongabong, Vega Grande, and Macapsing.

Santor R—Cabanatuan Section (14 mls direct line): Flows through wide, shifting flood plain. Reported impassable for MT at any season. Ricelands on west bank up to Cabu Ck and rolling hills on east bank;

below Cabu Ck ricelands on both banks.

Cabanatuan—Cabiao Section (17 mls direct line): River about 80–100 yds wide. Many sandbanks in dry season hindering navigability for small craft. Banks low and sloping with numerous rice paddies. Joined by Penaranda R east of San Isidro.

Cabiao—San Simon Section (19 mls direct line): About 100 yds wide, slow current, low banks with scrubby growth of bamboo and timber and open rice or canefields. Joined by Chico east of Mt Arayat. Forms western boundary of great Candaba Swamp which extends south from east of Mt Arayat to Angat R.

San Simon—River mouth Section (18 mls direct line): Lower portion about 100 yds wide, higher portion 100-150 yds wide. Banks low, muddy and fringed with nipa palm and mangrove below junction with Hagonoy R. Slow current through lowlying swampy trea above confluence with Hagonoy R.

ii. Angat, Bulacan:

Upper part flows south through mountain gorges to Ipo dam, then westwards along gradually expanding flood plain to Calumpit, then south to Manila B. Extensive rice lands along banks. Irrigation dam west of Angat. Navigable for bancas at all seasons from Calumpit to Baliuag, a river distance of 16 mls. River forms major obstacle between Baliuag and Calumpit. Banks steep and fringed with bamboo and palm trees, with rice paddies beyond. Can be forded above Baliuag in dry season.

iii. Maasim, Bulacan:

Rises in foothills of Sierra Madre and flows west across central plain through Candaba Swamp to join Pampanga R. Banks steep and sandy with ricefields and swamps downstream. A serious obstacle at all times west of railroad, but fordable in dry season east of this point.

iv. S Miguel, Bulacan:

Rises in foothills of Sierra Madre and flows west to Candaba Swamp ending in series of indefinite channels. Lower reaches navigable by bancas in wet season only. At town of San Miguel about 30 yds wide and 3ft deep; banks steep and bamboo-fringed with rice paddies beyond. Serious obstacle when flooded. In dry season easily forded east of railroad.

v. Bulu, Bulacan:

Follows a parallel course 3 mls to north of S Miguel R. A serious obstacle in flood time.

vi. Penaranda, Nueva Ecija:

Rises in the high Sierra Madre and flows west to join Pampanga north of S isidro. Upper reaches comprise two main streams flowing through deep forested gorges. Irrigation dam near town of Penaranda serving large rice area around Gapan. Stream at Gapan about 25 yds wide and 2½ft deep. Banks steep and high. Navigable by bancas between Gapan and confluence with Pampanga. Has large permanent flow and is serious obstacle along most of its course. Can be forded in dry season between Gapan and Pampanga R.

vii. Tabuating, Nueva Ecija:

Rises 15 mls east of Sta Rosa and flows west to Pampanga R. Has steep banks and is serious obstacle in flood.

viii. Bocboc or Minatula Ck, Nueva Ecija:

Similar to Tabuating. Reaches Pampanga north of Sta Rosa.

ix. Cabu Cr, Nueva Ecija:

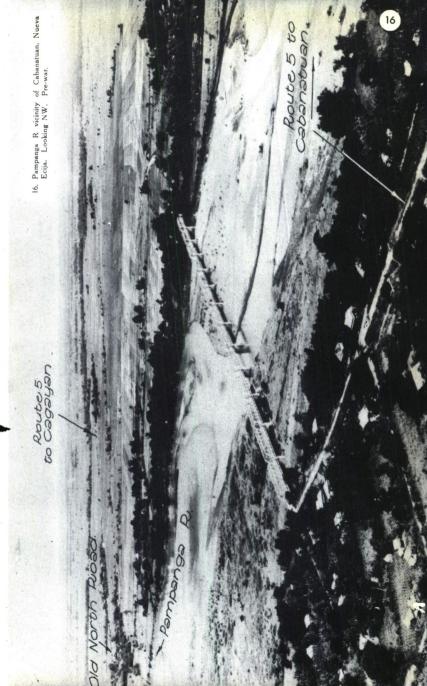
Rises in ranges east of Cabanatuan. Flows through open rolling grassland. Fairly steep banks and reported as an important obstacle.

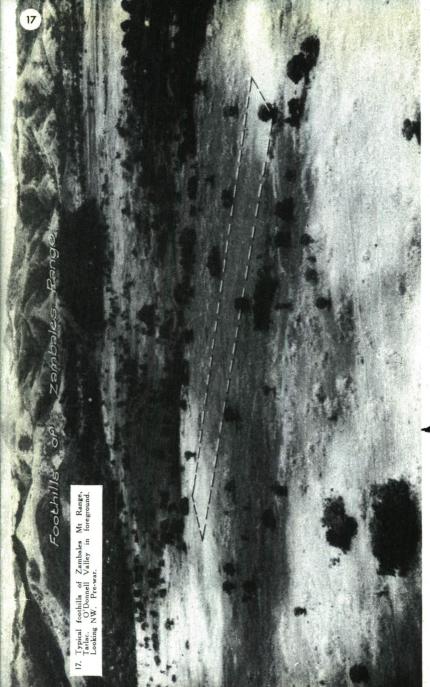
x. Coronel or Santor, Nueva Ecija:

Rises in low divide about 4 mls NW of Dingalan B and flows NW to join Pampanga. Easily forded during dry season but subject to severe floods in wet season.

xi. Talavera, Nueva Ecija:

Rises near Balete Pass and flows south, first through forested mountainous gorges and then through central plain to join Rio Chico about 12 mls north of Arayat. Along central plain banks fringed with bamboo clumps with rice paddies beyond. A serious obstacle in wet season but easily forded in dry season.



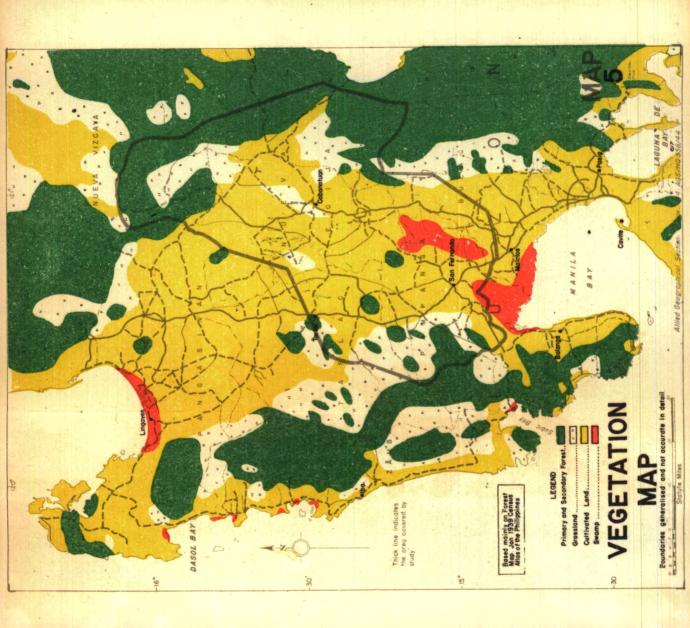


Cordillera Central (Caraballo Mts.)

19. Dry rice fields, Nueva Ecija. Looking N. Pre-war.



21 oute 55, ebuedue Bamboo Bamboo Typical vegetation, lower Pampanga R, vicinity San Simon, Pampanga. Looking SSW, Pre-war.



xii. Rio Chico, Nueva Ecija:

Rises in southern Cordillera Central and flows generally southerly across central plain to join Pampanga about 6 mls north of Arayat. Navigable to bancas in lower reaches during wet season only. Has many tributaries including Cutcut, Bamban and Quitanguil from west and Baloy from north. Banks of all these rivers are low with bamboo clumps, open rice paddies, sugarcane or grasslands. All fordable in dry season but major obstacles in rainy season.

xiii. San Fernando, Pampanga:

A low-level river rising in poorly drained areas near Sta Ana, Pampanga, and flowing SW for about 13 mls to join Guagua R. Slowmoving and fairly deep. Banks fringed with bamboo with rice paddies or canefields beyond. Generally over 15 yds wide and 3ft deep, and is serious obstacle at any time.

3. LAKES:

None of any importance. A small unnamed lake shown on maps NE of Zaragoza, Nueva Ecija, has swampy approaches.

4. SWAMPS:

Candaba Swamp, Pampanga: A large freshwater swampy area extending along east bank of Pampanga between Arayat and Calumpit for about 22 mls. Varies in width from 2 to 8 mls. Covered from a few inches to a few feet of water during rainy season. At end of dry season it consists of stagnant lagoons and sluggish water channels with relatively firm areas between. Vegetation mainly tall reeds (talahip) with nipa and bamboo clumps. Served by a few poorly surfaced trails during dry season. Quite impassable in the wet season and movement generally restricted to trails during dry season. Mosquitoes very bad at all seasons.

### 5. VEGETATION:

i. Forest: Confined to summits and higher slopes of mountain ranges and usually fringed by secondary forest. Pine and moss forest in highest parts of ranges. All movement impeded especially in secondary forest.

ii. Grasslands: Confined mainly to the foothills of the mountain ranges. Grass grows thickly and can be easily burned in dry season. Provides partial cover for foot troops and, where terrain permits, MT

could operate freely.

iii. Cultivation: Concentrated on the central plain consisting mainly of rice and sugarcane with some coconuts. Bamboo clumps and fruit and vegetable gardens widespread.

Rice paddies irrigated and separated by narrow dikes up to a few feet high. Paddies impassable for MT and difficult for troops

during wet season May-Oct; firm during dry season.

Sugarcane grown chiefly in Pampanga Prov. All stages of crops likely to be encountered. Mature cane provides fair cover for troops but none for MT; movement through mature cane difficult for foot troops. Cane fields dangerous during dry season as they easily set afire.

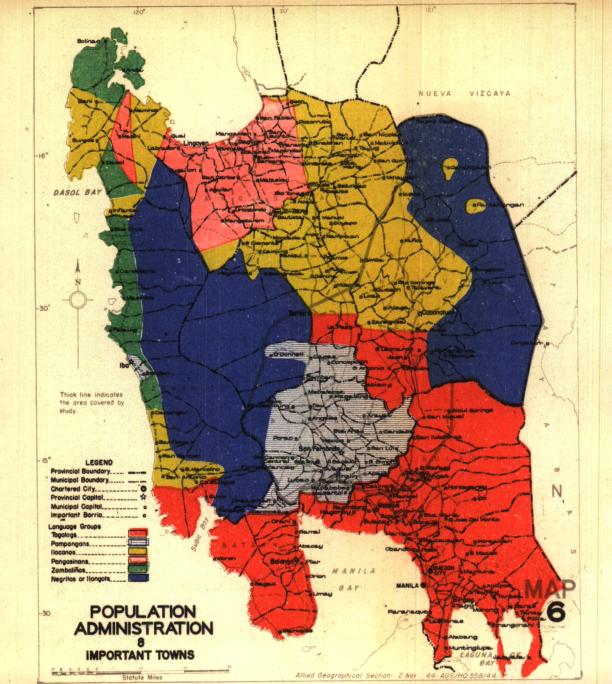
Impenetrable bamboo thickets common along river banks and near settlements. Provide good cover and concealment for troops

and MT.

# POPULATION FIGURES.

(See Map 6.)

T			
Town.		Municipality.	Poblacion
BULACAN PROVINCE:			
BALIUAG		22,972	1,478
BUSTOS		8,692	1,450
CALUMPIT		17,047	1,051
PULILAN			1,614
SAN ILDEFONSO			1,442
SAN MIGUEL		26,759	1,637
NUEVA ECIJA PROVINCE	E :		
ALIAGA		15,149	1,911
BONGABON		11,885	3,259
CABANATUAN		46,626	8,834
			2,760
CARRANGLAN		6,339	1,460
GAPAN		23,324	6,107
JAEN		14,408	2,211
LAUR		13,634	2,187
LICAB		8,348	1,676
MUNOZ	• • •	11,783	1,724
MUNUZ		21,814	4,149
DANTADANGAN		5,023	2,319
PANIABANGAN		5,655	1,799
DENA DANDA		7,517	4,506
OUEZON		9,423	3,873
PIZAT		8,780	1,550
SAN ANTONIO		15,936	2,769
SAN ISIDBO		18,084	1,310
SAN JOSE		12,078	2,192
SAN LEONAPDO		28,666	5,904
SANTA ROSA	***	10,716	2,761
SANTA DOMINGO		12,809	2,151
TALAVERA		12,163	3,506
CARRANGLAN GAPAN JAEN LAUR LICAB LUPAO MUNOZ NAMPICUAN PANTABANGAN PENARANDA QUEZON RIZAL SAN ANTONIO SAN ISIDRO SAN ISIDRO SAN ISOSE SAN LEONARDO SANTA ROSA SANTA DOMINGO TALAVERA ZARAGOSA		20,442 9,292	$\frac{2,738}{1,391}$
AMPANGA PROVINCE:			,
ADALIT	• • • •	26,027	3,377
ARAYAT		14,330	2,286
ARAYAT BACALOR CANDABA FLORIDABLANCA GUAGUA LUBAO MABALACAT MAGALANG MEXICO MINALIN	• • • •	22,510	1,269
CANDARA		19,129	1,015
FLORIDARIANCA		19,956	3,019
GUAGUA	•••	17,521	2,071
LUBAO		22,331	4,497
MABALACAT		29,154 20,560	2,557
MAGALANG	•••	16,634	884
MEXICO		22,341	3,614
MINALIN		9,805	1,675
PORAC	•••		2,125
SAN FERNANDO		16,169 35,662	807
SAN LUIS		10,966	3,981
CART GENERAL			1,503
SAN SIMON			
SANTA ANA		8,940	1,628
SANTA ANA SANTA RITA	:::	8,183	990
SANTA ANA SANTA RITA SEXMOAN		8,940 8,183 10,801 10,018	
		8,183 10,801	990 1,451
ARLAC PROVINCE:		8,183 10,801 10,018	990 1,451 1,421
ARLAC PROVINCE:		8,183 10,801 10,018 9,663	990 1,451 1,421 6,584
ARLAC PROVINCE:		8,183 10,801 10,018	990 1,451 1,421 6,584 2,741
ARLAC PROVINCE:		8,183 10,801 10,018 9,663 13,178 32,702	990 1,451 1,421 6,584 2,741 3,141
ARLAC PROVINCE: BAMBAN		8,183 10,801 10,018	990 1,451 1,421 6,584 2,741



### SECTION 5.

## POPULATION, ADMINISTRATION, TOWNS AND BARRIOS.

(Map 6; Photos 22, 23)

## A.—POPULATION.

### 1. GENERAL:

Within this area there are 55 municipalities, and portions of four provinces. For distribution, see Sub-sec C, this Section. Following population figures are according to 1939 Census:

## 2. EUROPEAN (400):

European population, comprising Americans, Spaniards, Germans and some few other nationalities, comprised only a small percentage of the population in this area prior to 1940. Most of them were interned after Japanese occupation.

### 3. ASIATIC (3,767):

Mostly Chinese. They controlled retail food trade in most municipalities. Cabanatuan was an important Chinese center.

Other Asiatics were Japanese and British Indians. Before 1940 their number was small and influence negligible.

## 4. NATIVES (930,501):

Majority of native population are Christian Filipinos. Principal division into groups is one of dialect. Predominant groups are Tagalogs, Pampangans, Visayans, Ilocanos and Bicolanis. Ilocanos are found mainly in northern Nueva Ecija and Tarlac Provinces.

#### 5. NEGRITOS:

Small-statured black people, primitive and pagan in culture. Found in small numbers in the high mountain forests of Tarlac.

## 6. NON-CHRISTIAN OR MOUNTAIN TRIBES:

Primitive and few in number. Found in the northern and eastern mountains of Nueva Ecija. Reported friendly to Americans.

### 7. LANGUAGE:

Tagalog, the most important language in this area, has been adopted as official tongue in conjunction with Japanese language. Second language of importance is Iloko (Ilocano); next, Spanish and English, which were the official judicial and governmental languages.

### 8. SYMPATHIES:

Most of the Filipinos are known to be pro-American, however the large number of enemy troops in this area would prevent attempts at organized resistance.

## B.—ADMINISTRATION.

### 1. PRE-WAR:

Before Japanese occupation the government of the Philippines was republican in form. Official seat of Government was Manila.

The National Government was divided into executive, legislative and judicial powers.

Local government consisted of 48 provinces and 12 chartered cities.

Provinces were divided into municipalities consisting of a *poblacion* (central village) and several *barrios* (secondary villages).

Each individual province has a Provincial Board—a provincial governor and two members elected by the people.

In the portions of four provinces dealt with in this Handbook there are 55 municipalities and no chartered cities.

### 2. SINCE ENEMY OCCUPATION:

Japanese High Command established a Philippines Executive Commission, with Japanese "advisers." The Commission carried on the work of government from 23 Jan 42 to 14 Oct 43. In Dec 42 Japanese sponsored an organisation known as *Kalibapi*, whose main function was to conduct propaganda.

On 18 Jun 43 the Japanese sponsored a preparatory commission which drafted a report on the new puppet republic. This was ratified without recourse to the people by a *Kalibapi* convention and on 14 Oct 43 the New Republic came into being.

The President is now elected by National Assembly and not by public plebiscite; powers vested in him are far greater than previously.

Although the pattern of local government is the same, control is more nationalized, and provincial governors are now presidential appointees, and not elected by the people.

Japanese have appointed mayors but there are no reports of organised municipal governments in this area.



22. Town of San Fernando, Pampanga. Vertical. June, 40.



# C-POPULATION AND

Town,	POPULATION (1939			TRANSPORT	T
LOCATION	Town (Munici- pality)	Asi- atic	Euro- pean.	FACILITIES	IMPORTANT BUILDINGS
BULACAN PROV.					
BALIUAG. 14° 57′ N. 120° 54′ E.	1,478 (22,972)	38	1	5A; 88A; ferry SE to Route 65C RR. Angat R navigable for barges down- stream but current swift.	schools; about 300 good houses.
BUSTOS. 14° 57′ N. 120° 54′ E.	1,450 (8,692)	16	1	65C (see Baliuag).	
CALUMPIT. 14° 55′ N. 120° 46′ E.	1,051 (17,047)	47	2	3C; 3D; 55A; 69 and 67; RR; water- ways navigable for big barges and launches.	stone church and convent; 3 schools;
PULILAN. 14° 54′ N. 120° 51′ E.	1,614 (12,693)	3	2	67. Angat (Ouingua) R south is navigable for barges.	Very big church and convent, part stone; municipio; school; about 50 good houses.
SAN ILDE- FONSO. 15° 05′ N. 120° 56′ E.	1,442 (16,395)		4	5A and 88C to RR.	Old municipio of adobe; church; convent; school; about 70 good houses (iron roofs).
5AN MIGUEL. 15° 09′ N. 120° 58′ E.	1,637 (26,759)	68	6	5A and RR.	Old municipio; church; convent; school; about 12 big wood houses. Cadre barracks.
PROV. ALIAGA. 14° 30′ N. 120° 50′ E.	1,911 (15,149)	11	4	56F, 98B.	
3ONGABON. 15° 38′ N. 121° 08′ E.	3,259 (11,885)	42	2	95, 96, 101 and 102.	Small church; school; old muni- cipio; barracks just outside of town.

C-POPULATION AND TOWNS INFORMATION.

# TOWNS INFORMATION.

	The second secon		
WATER SUPPLY	Industries and Supplies	SIGNAL COMMUNICATIONS	GENERAL
Art wells pumped to tower.	Electric current from Manila. Ice plant. Rice, hat- weaving. Bamboo plentiful.	LD telephone and telegraph.	Important strategically; located on high ground commanding river, roads and RR.
 Art wells, hand pump.	Electric extension from S Rafael.	Telephone and telegraph.	Unimportant.
Art wells pumped to tower.	Electric current from Manila. Sugar central capacity 600 tons cane daily. Ice plant capacity 10 tons daily. Big market. Rice and sugar. Ice plant. Distillery about 6,000 US gall 96% alcohol daily.	LD telephone and telegraph.	Very important strategically. Road, rail, river and Can- daba Swamp bottle- neck. Low flooded area.
Art wells, hand pumps.	Electric plant diesel 50 kw. Rice and fruit.		Important road link. High sandy river bank. Big acacia and fruit trees. Some rice paddies.
Art and surface wells. Hand pumps.		Telephone and telegraph.	Open rolling grass or riceland east. Can- daba Swamp west.
Art wells pumped to tower. 144,000 gpd.		and telegraph.	Difficult river crossing. Rice paddies. Candaba Swamp west.
Mostly art wells.		Telephone and telegraph.	
	Electric plant diesel 30 kw. Lumber. Some gold mining in the hills.		Important road junction. Low, open rice paddies and grassland.

Town,	POPULAT	ION (19	939)	TRANSPORT	IMPORTANT
LOCATION	Town (Munici- pality)	Asi- atic	Euro- pean	FACILITIES	Buildings
CABANATUAN. 15° 29' N. 120° 58' E.	8,834 (46,626)	700	31	5C at edge of town running north and south. 95 runs east to 101 and 102; 94 runs west connects to road network of Central Luzon val- ley. Spur of Manila RR terminus here.	municipio; hospi- tal; 4 large schools; police barracks; cinema; club house; several hotels.
CABIAO. 15° 15′ N. 120° 51′ E.	2,760 (14,617)	10		10B. Pampanga R not navigable.	Small municipio; small church and convent. Big house and small sugar central \(\frac{1}{2}\) mile north.
GAPAN. 15° 19′ N. 120° 57′ E.	6,107 (23,324)	97	1	5A, 5B, 10B, 92 RR.	Municipio; school; rice warehouses; and about 200 good houses.
JAEN. 15° 21′ N. 120° 55′ E.	2,211 (14,408)	2		56C, and bridge over Pampanga R to Route 5B.	
LAUR. 15° 35′ N. 121° 11′ E.	2,183 (13,634)	14		102.	
LICAB. 15° 33′ N. 120° 46′ E.	1,676 (8,348)	19		98A.	
LUPAO. 15° 53′ N. 120° 53′ E.	1,724 (11,783)	7		8,99.	
MUNOZ. 15° 43′ N. 120° 54′ E.	4,149 (21,814)	45	7	50, 99 RR.	Municipio; 2 schools; fair; large agr high school on Route 5D, 1½ mls east. Many good buildings.
MAMPICUAN. 15° 44′ N. 120° 38′ E.	2,319 (5,023)			87 RR.	
PANTABANGAN 15° 50′ N. 120° 09′ E.	1,709 (5,655)	5		100.	
PAPAYA. 15° 21′ N. 121° 03′ E.	4,506 (7,517)	2	1	93A.	

# Information—continued.

	WATER SUPPLY	WATER SUPPLY INDUSTRIES AND SUPPLIES		GENERAL
	Tower storage tank. Pampanga R north of town is a large permanent stream.	Diesel power plant capacity 495 kw; 4 rice mills; bus depot and repair shop; lumber yards; rice ware- houses. Ice plant— 20 tons daily.	LD telephone and telegraph; provin- cial telephone.	Capital of Nueva Ecija Prov. Impor- tant railhead and marketing center for large rice area.
	Art wells, hand pumps.	Electric plant diesel 202 kw. Sugar Central about 200 tons cane idaily. 4 mile NW. Sugar and rice.	Telephone and telegraph.	Low, flat sugarcane and ricefields.
	Art wells pumped to tower.	Electric plant diesel 90 and 48 kw. 2 rice mills 1,500 bags palay daily each. Ice plant capacity 10 tons daily. Marketing centre.	telegraph.	Important road and RR centre. Low rice paddies.
	Art wells.	Electric current from Gapan.	Telephone and telegraph.	Low rice paddies.
	Mostly surface wells	Electric current from Bongabon.	Telephone.	Not important. Grassy valley. Mountains south and east.
_	Mostly art wells, hand pumps.		Telephone and tele- graph.	Not important. Rice paddies.
_	Mostly surface wells		Telephone and telegraph.	Mountains NE. Rolling grassland and rice paddies S and W.
	Art wells pumped to tower, also sur- face wells.	Electric power plant. Many farm crops raised, agr school. Rice.	graph.	Open farmland with small grassy hills.
_	Mostly art wells, hand pump.		Telephone.	Low. Rice paddies.
	Surface wells. Rain and springs.		Telephone and tele- graph.	Not important, Surrounded by hills.
_	Mostly art wells, hand pumps.		Telephone and tele- graph.	Not important. Or north bank of Pen- aranda R. Hilly.

## C-Population and Towns

				1	arrow arra 1 owns	
Town,	POPULAT	ion (19	939)	TRANSPORT	IMPORTANT	
Location	Town (Munici- pality)	Asi- atic	Euro- pean	FACILITIES	Buildings	
PENARANDA. 15° 21′ N. 121° 00′ E.	3,873 (9,423)	3		92.		
QUEZON. 15° 34′ N. 120° 49′ E.	1,550 (8,780)	. 3		56E, 56F, 98A.	Small municipio; big residence of Gabaldon; 2 big warehouses.	
RIZAL. 15° 43′ N. 121° 06′ E.	2,769 (15,936)	28		96, 97B, 100.	Small municipio.	
SAN ANTONIO. 15° 18′ N. 120° 51′ E.	1,310 (18,084)	14	4	56A, 56B.		_
SAN ISIDRO. 15° 19′ N. 120° 54′ E.	2,192 (12,078)	3		10B, 56A.		
SAN JOSE. 15° 48′ N. 120° 59′ E.	5,904 (28,666)	180		5D, 5E, 8 and 96 RR Terminus.	Small municipio.	
SAN LEONARD. 15° 22′ N. 120° 58′ E.	2,761 (10,716)	2				
SANTA ROSA. 15° 25′ N. 120° 56′ E.	2,151 (12,809)	27		5B, 82 RR.	Municipio; school; convent; ware-houses.	
SANTO DOMINGO. 15° 35′ N. 120° 53′ E.	3,506 (12,163)	6		98A, 98B.		
TALAVERA. 15° 35′ N. 120° 55′ E.	2,738 (20,442)	16		5C.	New municipio; 60 good houses.	
ZARAGOZA. 15° 27′ N. 120° 47′ E.	1,391 (9,292)	9		82, 56B.		
PAMPANGA PROV ANGELES. 15° 09' N. 120° 35' E.	3,377 (26,027)	384	42	3E, 78, 73, 74A, 77B and RR. 3 airfields nearby.	New municipio; big church; 3 big schools; private hospital; cabarets; about 6 big wood houses and many good smaller build- ings.	

## Information—continued.

WATER SUPPLY	INDUSTRIES AND SUPPLIES	SIGNAL COMMUNICATIONS	GENERAL
Mostly art wells.	Electric plant diesel 25 kw. Irrigation dam.		On south bank Penaranda R.
Mostly surface wells	Rice mill. Rice.	Telephone and telegraph.	Low, rice paddies.
Surface wells	Rice.	Telephone and telegraph.	Important road june, tion, On west bank of Pampanga R, Mountains NE. Rice paddies and low grassland SW.
Mostly art wells.	Electric plant diesel 50 kw. Rice.	Telephone.	Not important. Low Rice paddies.
Mostly art wells.	Electric current from Gapan.	Telephone and telegraph.	Not important. Low rice paddies.
Surface and art wells.	Electric plant diesel 72 kw. Ice plant capacity 5 tons daily. Rice.		Very important road junction and rail- head. Mountains NE. Low rice and grassland south and west.
Art wells, hand pump.		Telegraph and telegraph.	Not important. Rice paddies.
Art wells, hand pump.	Electric plant diesel 31 kw.	Telephone and telegraph.	Low rice paddies.
Surface wells.		Telephone and telegraph.	Not important. Low. Rice paddies.
Surface wells.	Electric plant diesel 24 kw. Large rice mill.	Telephone and telegraph.	Low. Rice paddies.
Art and surface wells.		Telephone and tele- graph.	Low. Rice paddies.
Art wells pumped to tower and surface wells.		LD telephone and telegraph.	Very important road junction.

# C-Population and Towns

Town,	POPULAT	ion (1	939)	Transport Facilities	Important
Location	Town (Munici- pality)	Asi- atic	Euro- pean		Buildings
APALIT. 14° 57′ N. 120° 46′ E.	2,286 (14,330)	4		55A; Pampanga R navigable for barges.	Municipio; church; large school; about 30 wood houses.
ARAYAT. 15° 09' N. 120° 46' E.	1,269 (22,510)	23	9	10A, 10B, 90. Pampanga R navigable for barges in wet season.	Municipio; church; convent; school; warehouses and 2 big wood houses on outskirts.
BACALOR. 15° 00' N. 120° 39' E.	1,015 (19,129)	31	5	7A and RR.	Big 3-storey trade school; 2-storey municipio; church; convent; school; 10 modern concrete 20 old adobe and hardwood; 200 small houses; old Spanish fort.
CANDABA. 15° 06′ N. 120° 50′ E.	3,019 (19,956)	12	5	89.	Big adobe church; many big houses of strong material.
FLORIDA- BLANCA. 14° 59′ N. 120° 32′ E.	2,071 (17,521)	93	31	76C and RR spur	
GUAGUA. 14° 58′ N 120° 38′ E.	4,497 (22,331)	101	11	7A, 75, 72B; RR; Guagua R navi- gable for 60-ton vessels.	municipio; big
LUBAO. 14° 56′ N. 120° 36′ E.	2,557 (29,154)	26	5	7A, 72B; RR; Sta Monica R navigable for barges.	Modern municipio; church; convent; school; about 100 good buildings.

	Water Supply	Industries and Supplies	SIGNAL COMMUNICATIONS	GENERAL
	Art wells.	Electric plant diesel 124 kw.	Telephone and telegraph.	Pampanga R and Candaba Swamp east. Rice paddies west.
	Piped by gravity from a spring 1½ mls away. Minimum flow 70 gpm. Some art wells.	from sugar central.	Telegraph.	Strategically impor- tant, between Mt. Arayat (over 3,000ft) 4 mls NW and Can- daba Swamp east.
	Art wells, hand pump, and rain water.		Telephone and telegraph.	Ancient capital of province. Low rice and sugarcane fields.
_	Art and surface wells.	Electric current from Sta Ana. Ice plant capacity 10 tons daily. Rice, fish, watermelons.	Telephone and telegraph.	On west edge of Candaba Swamp.
	Mostly art wells.	Electric current from Lubao. Sugar central Del Carmen 2 mls N. Capacity 2,400 tons daily sugarcane; extensive tramline system 36° gauge, also a big alcohol distillery, unconfirmed.	Telephone.	Gently rolling sandy sugarcane land. Patches light timber.
	Art wells pumped to tower.	Electric plant diesel 135 kw. 3 big rice mills; ice plant capacity 15 tons daily; several auto repair shops, lumber yards, wharf and warehouses on river. Big market. Fish, rice, vegetables and fruit.		Very important town strategically and commercially. Flat rice and sugarcane land.
7	Art wells, hand pump, and rain water.		Telephone and telegraph.	Rice paddies and sugar canefields NW; fish ponds and tidal swamps SE.

## C-Population and Towns

Town,	POPULAT	rion (1	939)	Transport	Important Buildings	
LOCATION	Town (Munici- pality)	Asi- atic	Euro- pean	FACILITIES		
MABALACAT. 15° 14′ N. 120° 34′ E.	884 (20,560)	139	12	3E, 79A, 79B; RR; 24" gauge tram- line.	Concrete municipio; church; convent; school; about 150 good houses.	
MAGALANG. 15° 13′ N. 120° 39′ E.	3,614 (16,634)	82		55C, 78; RR spur.	Municipio; church; convent; school; some good houses.	
MEXICO. 15° 04′ N. 120° 43′ E.	1,675 (22,341)	1	7	10A, 55B; RR.	Several good buildings and old Spanish homes.	
MINALIN. 14° 58′ N. 120° 41′ E.	2,125 (9,805)	2		72.		
PORAC. 15° 04′ N. 120° 32′ E.	807 (16,169)	1	10	74A, 74B, 75; 2 airfields.		
SAN FER- NANDO. 15° 02′ N. 120° 41′ E.	3,981 (35,662)	466	51	3 runs NW through town; 7 runs west to Bataan and Zam- bales coast; 10 runs NE to Gapan on 5; Manila RR north of town; branch RR runs SW to Bataan and NE to Arayat.	30 modern concrete buildings; 2 cine- mas; 100 buildings of strong material.	
SAN LUIS. 15° 03′ N. 120° 47′ E.	1,503 (10,966)	8		55A; Pampanga R takes barges in wet weather only.		
SAN SIMON. 15° 00' N.	1,628 (8,940)			55A, 71; Pampanga R takes barges all seasons.		
SANTA ANA. 15° 06′ N. 120° 46′ E.	900 (8,183)	3	5	10A, 89; RR spur.	Several old Spanish houses.	
SANTA RITA. 15° 00′ N. 120° 37′ E.	1,451 (10,801)	16	5	75.		

## Information—continued.

1			1
WATER SUPPLY	INDUSTRIES AND SUPPLIES	SIGNAL COMMUNICATIONS	GENERAL
Mostly surface wells, 2 art wells,	Hydro-electric plant and dam 1½ mls NW. Sugar central 300 tons cane daily.	LD telephone and telegraph.	Important centre Gently sloping sandy cultivation and grassland.
Art wells, hand pump.	Electric current from Angeles.	Telephone and telegraph.	Useful road junction and railhead. In val ley between Mt. Ara yat and Clark Field area.
Art wells, hand pump.	Electric current from San Fernan- do. Small rice mill. Small machine shop at agr. school 2 mls east.	Telephone and telegraph.	Low rice paddies and sugarcane.
Art wells, hand pump.	Electric current from San Fernando.	Telephone and tele- graph.	Surrounded by tida swamps.
Art wells and some surface wells.	Electric current from Angeles.	Telegraph.	Important road junction and airfield center. Gently rolling cultivation east grassy slopes west.
Art wells from a central water tower to all main buildings. All good art wells for drinking water.	Pasudeco Sugar Central ½ ml NW of town, 2,400 tons cane daily and machine shop for heavy equipment. Electric light plant 368 kw. 2 ice plants 20 and 2 tons daily. Bus depot. 2 small machine-shops. MT repair.	LD telephone and telegraph; provin- cial telephone.	Capital of Pampanga Prov; considered strategically impor- tant. Important road and rail junc- tion. Extends 14 mls along north bank of San Fernando R material mater
Mostly art wells, hand pump.	Electric current from Apalit.	Telephone and telegraph.	Low rice paddies west. Pampanga R and Candaba Swamp east.
Mostly art wells, hand pump.	Electric current from Apalit.	Telephone and telegraph.	Important river port and road junction. Rice paddies west, Pampanga R and Candaba Swanip east. Sugarcane.
Art wells, hand pump and rain water.	Electric plant diesel 75 kw.	Telephone and telegraph.	Low, rice and cane- fields.
Mostly art wells, hand pump.	Electric current from San Fernando.	Telephone and telegraph.	Not important. Low rice paddies.

## C-Population and Towns

Town,	Population (1939)			TRANSPORT	IMPORTANT
LOCATION	Town (Munici- pality)	Asi- atic	Euro- pean	Facilities	Buildings
EXMOAN. 14° 56′ N. 120° 37′ E.	1,421 (10,018)		2	72B. Some concrete streets. Waterways suitable for barges.	About 25 good houses.
TARLAC PROV.					
BAMBAN. 15° 17′ N. 120° 34′ E.	6,584 (9,663)	92	1	3E; RR spur runs east about 4 mls in canefields.	Municipio; church; convent; school.
CAPAS. 15° 20′ N. 120° 35′ E.	2,741 (13,178)	33	1	3E, 55D, 80; RR.	Small municipio.
CONCEPCION. 15° 19′ N. 120° 39′ E.	3,14 <b>1</b> (32,702)	97	6	55D.	
LA PAZ. 15° 27′ N. 120° 44′ E.	3,294 (13,298)	15	10	82, 55D, 55E.	
TARLAC. 15° 29' N. 120° 35' E.	16,350 (55,682)	711	111	3 runs NS between town and RR. 82 runs east across central plain. Manila RR station and assembly yard ¼ ml NE with a branch NE to San Jose. Tarlac R flows north along NE side, no transport value.	hospital; 4 large schools; 3 hotels, total 100 rooms; large warehouse and commercia houses; municipic buildings; church.

# Information—continued.

WATER SUPPLY	Industries and Supplies	SIGNAL COMMUNICATIONS	GENERAL		
Art wells, hand pump.	Electric current from Guagua, Fish,	Telephone and telegraph.	Low, marshy area.		
Mostly art wells, some surface wells.	Electric current from Mabalacat hydro - electric plant. Sugar central capacity 1,200 tons cane daily about ½ ml SW. Distillery about 2,600 US gall 96% alcohol daily.	telegraph.	Rolling hills west, canefields east, wide sandy river 1 ml south.		
Mostly art wells, hand pumps.	Rice mill.	LD telephone and telegraph.	Important road junction lowlying rice and caneland.		
	Electric current diesel 79 kw. Ice plant capacity 5 tons daily.	Telephone and telegraph.	Low flat area rice- land. Subject to flooding.		
Mostly art wells, hand pump.	Tarlac sugar central and distillery. About 4 mls west. (See sub-para. 9.)	graph.	Flat sugarcane land.		
Art well from central tower to main buildings; also art and open surface wells.	power plant 284 kw; several small	telegraph; prov	Capital of Tarlac Prov; important road and rail junc- tion on west of Cen- tral Luzon plain. Sugarcane and rice. Soil sandy. Grassy hills slope west to Zambales Ra. Town- ship 800 x 500 yds, 6 mls of blacktop streets.		

### SECTION 6.

## TRANSPORTATION AND COMMUNICATION.

(Maps 7, 8)

A.—TRANSPORTATION.

### 1. RAILROADS:

Main line of Manila Railroad extends from San Fernando, La Union, about 47 mls due north of San Carlos, Pangasinan, to the Pacific port of Legaspi, Albay, in southern Luzon. Several branches and spurs feed into the main line. A network of truck and bus routes supplements the rail services, linking Manila with many remote towns in the area. The main line runs parallel much of the way with Route 3.

## 2. BRANCHES:

i. Cabanatuan, Nueva Ecija, south to Biagaa, Bulacan (56.7 mls).

Route 5 connects Cabanatuan to San Jose.

ii. San Fernando, Pampanga, SW to Floridablanca, Pampanga (17.7 mls), with a NE spur to Del Carmen Sugar Central and a west spur to Gumain R (3 mls) through canefields.

iii. San Fernando, Pampanga, NE to Arayat, Pampanga (12.4 mls). iv. Short spurs from main line at Dau, Pampanga, west to Fort

Stotsenburg (4.2 mls) and east to Magalang (5.5 mls).

### 3. RIVERS, ETC.:

Modern development of railroad and highways has caused river transport to become of secondary importance in recent years. However, destruction of bridges, etc, would necessitate using available water transport.

Traffic on the waterways in this district was limited to shallow-draft native sail boats or rafts constructed from bamboo and coconut products (for details of navigability and types of craft, see Sec 4, Rivers).

### 4. VEHICLES, ANIMALS AND PORTERS:

### a. Vehicles:

i. Cars and Trucks: Before war there were few private cars. There were public utility cars (taxis) in most towns. Alcohol for fuel is available from large distilleries (see Sec. 7, Sub-sec 5).

Distribution of vehicles by province:

Bulacan ... 510 passenger cars, 825 trucks. N Ecija ... 486 ., , , 518 ,, Pampanga ... 1,193 ,, , , 449 ,, Tarlac ... 359 ... , 266 ,,

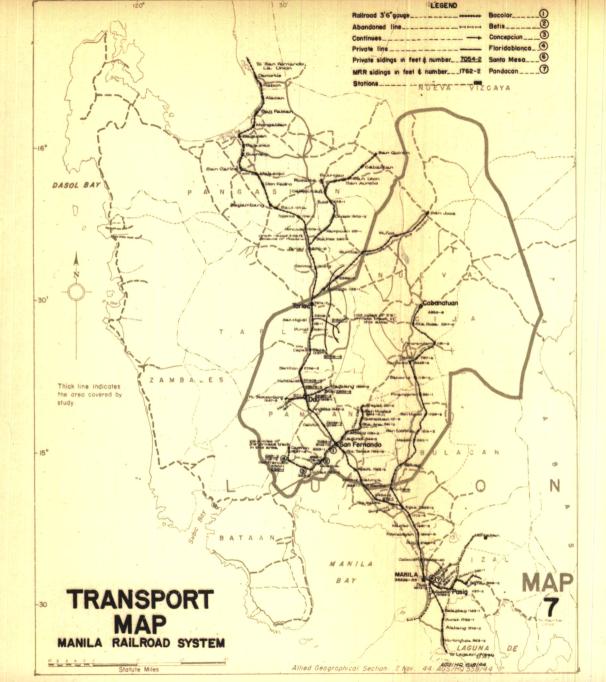
ii. Buses: Pampanga Bus Co (HQ in San Fernando, Pampanga) and Pangasinan Transportation Co (HQ in Dagupan, Pangasinan) operated bus services. Buses usually were long wheelbase trucks

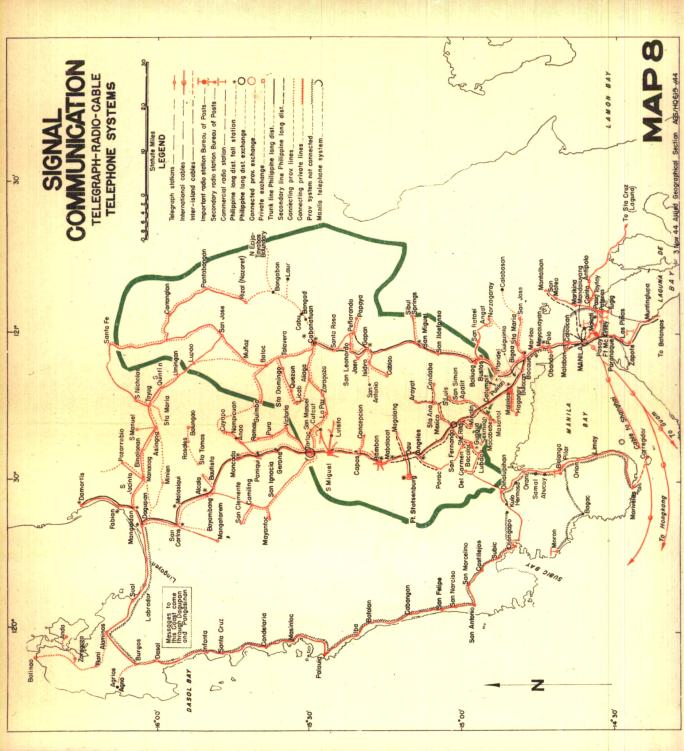
with bejuco (split rattan) seats.

iii. Carts and Sleds: Generally farm products were hauled on two-wheel carts or crude sleds drawn by carabao. Carts will haul about 1,400lb at 1.2 mph, sleds 250lb at .6 mph. Two-wheel buggies (carramattas) were used mostly for passengers.

### b. Animals:

Carabao (water buffalo)... Main farm work animal. Cannot be used as pack animal nor worked in heat of day.





### b. Animals—continued.

Oxen ... ... Plough animals in upland fields and as draft animals mainly in Tarlac Prov. More endurance than carabao.

Horses ... ... Small-statured, wiry and strong.

Little use as pack or draft animal.

## c. Bicycles:

Japanese sold thousands of cheap bicycles to Filipinos.

### d. Porters:

Rural population are good carriers. The lowlander carries 80lb. Mountain people can carry 100lb loads over bad trails at  $2\frac{1}{2}$  mls an hour for a 10-hour day, but cannot work over two or three successive days without a break.

## B.—COMMUNICATIONS.

(See Sec 5—Table of Towns)

### GENERAL:

Communications consisted of government telegraph, Philippine Long Distance Telephone, private telephone, and the provincial telephone system. Main towns had world contact through PLDTC, Manila Railroad had telephone facilities connected to Bureau of Posts telegraph system and PLDTC.

### 1. TELEPHONE:

There are 4 independent provincial telephone systems in this area, one in each province. All 55 municipalities have a telephone office.

The 4 provincial systems are connected to the PLDTC. There are 13 municipalities with LD telephone facilities, as follows:—

Bulacan Prov—Baliuag, Calumpit, San Miguel.

Neuva Ecija—Gapan, Cabanatuan.

Pampanga Prov—Angeles, Guagua, Mabalacat, San Fernando, Ft Stotsenburg.

Tarlac Prov—Bamban, Capas.

#### 2. TELEGRAPH:

The telegraph system is inter-provincial and inter-island. The only 6 municipalities not connected are—

Bulacan—Pulilan.

Neuva Ecija—Bongabon, Laur, Nampicuan, San Antonio.

Pampanga Prov—Floridablanca.

#### 3. RADIO:

There are no BP radio communication facilities. An enemy radio staion is reported in Tarlac, Tarlac (150 meters SW of Prov Cap Bldg South of road junc).

#### 4. POSTAL SYSTEM:

Pre-war postal system was well developed. There is a post office in every municipality. Combined train and bus service were the principal means of carrying mail.

After the Japanese occupation, extensive disorganisation developed.

In Jun 44 Japanese claimed about 50 per cent of post offices in

Philippines had been reopened.

## SECTION 7.

## RESOURCES.

(Maps 9, 10; Photos 24-27)

### 1. GENERAL:

This section of Central Luzon is near the industrial and manufacturing center of Manila; this factor is noticeable in the improved farming and agricultural conditions throughout Pampanga, Bulacan, Tarlac and Nueva Ecija.

Most important industries are the production of sugar, sugar alcohol, rope, coconut oil and light manufacturing.

Principle food products are rice, fruit, and ordinary garden produce. Canned and dried fish are imported from coastal regions and other islands.

Fuel for operating internal combustion engines has been restricted mostly to sugar alcohol. There are no producing oilfields in Philippines.

Good sub-surface water is available throught area, especially in gravelly soil on western side of valley.

Skilled labor is more available in central plain of Luzon than in other parts of archipelago.

### 2. FOODSTUFFS:

European-American influence on native diet is more noticeable as one approaches Manila. Soldiers should not be surprised to hear natives mention familiar brands of canned foods, coffee, etc.

Staple food of all Filipinos is still rice; most important rice producing province is Nueva Ecija. Fresh vegetables and especially corn also supplement the average Filipino diet.

Cassava (tapioca) was widely grown, though more for its starch content than as a food.

Certain varieties of bananas and the green papaya are used as vegetables.

Since the central plain is well irrigated and the soil rich, possibilities for growing food products are good and small gardens made by troops will help supply fresh vegetables and ease strain on shipping.

## Native Fruits, Vegetables:

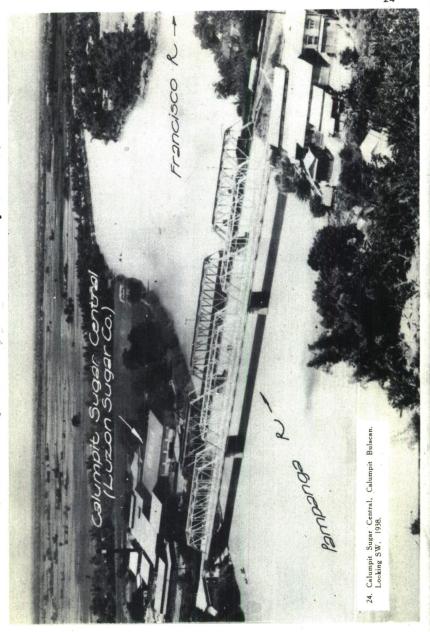
Ubi	 A red root vegetable, similar in many respects to
	sweet potato. Used cooked as a vegetable
	and in making ice cream.

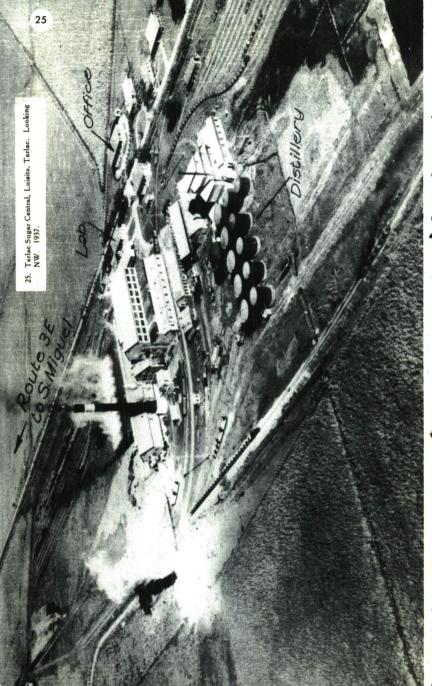
	and	III IIIar	ring ice	Cicam.			
Cassava	 A root	from	which	tapioca	is	made.	Some
	form	s are p	oisonous	if not	prop	erly pre	epared.

Gabe	 A	small	root	vegetable	similar	to	a pot	tato.
0 1		4						

Camote	Sweet potato.
Ampalaya	 A bitter, cucumber-like vegetable. Is reputed
1	to have anti-malarial medicinal value. Bitter-
	ness can be removed by proper cooking

Upo	 A	vegetable	similar	to	squash.









# Native Fruits, Vegetables—continued.

Jackfruit ... A type of breadfruit eaten green as a vegetable, ripe as a fruit.

Kalamansi ... A small citrus fruit used in making jam and

Lanzones ... A small fruit. Grows in clusters like grapes.

Santolo ... A fruit eaten raw.

Siniguelas ... A tree-growing fruit similar to a yellow plum.

Atis ... A custard apple.

Tamarinds ... A tree-growing fruit used in making drinks.

Kamias ... An edible root.

Caimitos ... An egg-shaped tree-growing fruit eaten raw.

Sinkamas ... A plant resembling string bean, but with a turnip-like root, which is eaten raw, as a fruit, or as a vegetable.

Makopa ... A pink spongy tree-growing fruit eaten raw.

Pili ... An oily nut similar to almond.

Camatis ... Tomato.

Patola ... A long yellow squash. Saguing ... Eating banana.

Saguing ... Eating banana.
Saba ... Cooking banana.

Muscavado (dark brown, un-refined) sugar is preferred by the Filipino to white, refined sugar. Sugar was a principal export. Important sugar centrals were—

Luzon Sugar Co Inc ... Calumpit, Pampanga. ... Arayat, Pampanga. Mt Arayat Sugar Co ... ... Del Carmen, Pampanga. Pampanga Sugar Mills ... San Fernando, Pampanga. Pampanga Sugar Dev Co San Miguel, Tarlac. Tarlac Sugar Central ... Bamban, Tarlac. Central Luzon Milling Co ...

These mills produced an estimated 2,397 tons of sugar every 24 hrs. As trade restrictions prohibited export to USA of white, refined sugar, these mills refined their sugar to about 96 per cent (very light brown) and left further refining to US mills.

### Meats:

Carabao (water buffalo), chickens and other farmyard animals were plentiful. Apart from the carabao, animals and fowl are noticeably smaller than those in an American farmyard.

Carabao meat is dark and coarse, generally not palatable to white

men.

Fish, generally dried, was brought in from coastal areas to supplement the *mud fish* of the marshes and rice paddies.

# 3. FORAGE:

Imported horses and cattle cannot live on Philippine grasses. Cattle must have at least one-eighth Indian blood before they can thrive on local forage. A small amount of grass was planted and harvested, between seasons, in rice paddies.

Stubble in harvested rice paddies, corn fodder, young cogon and other native grasses are used as forage for carabao and cattle. No

forage is stored.

# 4. FUEL:

Quantity and variety of fuels were greater in lower half of Central Luzon Plain due to large oil storage tanks and shipping facilities at Manila. All gasoline, kerosene and coal were imported.

Wood is principal domestic fuel; most had to be hauled overland from mountains, or brought from offlying islands. Mangrove produces

a good grade of charcoal and is widely used.

Coconut oil can be used as a fuel or for lighting purposes, but it will not burn well in restricted places and is useless in automobiles. Alcohol is widely used as motor fuel and for other purposes. As motor fuel it requires small amounts of lubricating oil and gasoline added, and this is satisfactory only on level roads.

Two large alcohol distilling plants (96 per cent alcohol) are— Tarlac Sugar Central, Tarlac, Tarlac. Capacity, 6,300 US gals per

24 hrs.

Pampanga Sugar Mills, Del Carmen, Pampanga. Capacity, 7,550 US gals per 24 hrs.

Tarlac Sugar Central also produced daily about 4,750 US gals of 100 per cent (absolute) alcohol. (Absolute alcohol has no advantage over 96 per cent alcohol as motor fuel.)

Japanese-operated distilleries at Bamban, Tarlac, and Calumpit, Bulacan, are said to be producing 18,500 US gals of alcohol per 24 hrs.

# 5. CONSTRUCTION MATERIALS:

41ft. Weight 30.5lb a cu ft.

Lumber is the chief. Many woods, however, are not impervious to rot and anay (white ants). Concrete or steel should be used in construction close to the ground, lumber for upper stories and floors.

Most natives are good carpenters, but not accustomed to use of nails, or military-type construction.

Following are the more abundant Philippine woods in this area:

Type and Characteristics.	Use.
ALMON: Large diameter to 6½ft. Weight 35.5lb a cu ft.	Durable for interior only. General construction, boxes, crates, mining timber, boat planking.
WHITE LAUAN: Weight 33.6 lb a cu ft.	Same as almon.
TANGILE: Large. Diameter to 6½tt. Moderately hard and light. Weight 35.2lb a cu ft.	
RED LAUAN: Very large. Diameter to 7½ft. Weight 36.5 lb a cu ft.	Only moderately durable when exposed to weather or in contact with ground. Interiors and boat planking.
TIAONG: Large. Diameter to	As for tangile and red lauan.

Type and Characteristics.

black walnut; hard and heavy. Weight 47lb a cu ft.	
AMUGIO: Diameter 2ft-4ft. Weight 50lb a cu ft.	Moderately durable for exteriors, house construction, posts, beams, joists, rafters, flooring. High-grade furniture.
APITONG: Warps and shrinks; needs seasoning. Weight 48 lb a cu ft.	Posts, beams, rafters, flooring, bridge and wharf construction, including piles (treated), barges and lighters, telegraph and telephone poles.
GUIJO: Diameter to 6ft. Brownish red. Weight 53lb a cu ft. Very common.	General construction beams, joists, bridges, furniture, ship framing, wharves, vehicle frames.
IPIL: Diameter to 6ft. Weight 53lb a cu ft. Very strong.	High-grade construction, furniture, house posts, door and window-frame.
MALUGAI: Diameter to 3½ft.  Light to dark red. Weight  45lb a cu ft	Beam joists, rafters, flooring, masts and spars.

Use.

and docking. Substitute for teak

Pine is cut in Zambales and Mountain Prov, but little was shipped to this area, being mainly consumed at the source. Coconut trees can be used for temporary structures, especially as posts; older trees are stronger.

YAKAL: Diameter to 6ft. Yellowish gray wood. Weight and wharf construction, ship framing

in ship building.

Important sawmills include:

58lb a cu ft.

Name	Loc	cation			BD Ft per 24 hrs.
David: San I	Miguel, B	ılacan		 	2,000
Digmala: Bo	ngabon, 1	Nueva Ec	ija	 	8,000
Garcia:	,,	,,		 	4,000
Gordon:		,,		 	2,000
Valles: Lupa	o, Nueva	Ecija		 	5,000

Native houses are usually made from bamboo, nipa thatching and tied with rattan lashings. *Cogon* grass makes good thatch; flooring is usually of wood, split bamboo or woven matting. *Sawalli* (woven bamboo) is often used for siding. Natives can quickly construct shelters of this type for temporary use.

A large rock quarry is at Mt Arayat; generally, good gravel and sand can be obtained from stream beds. No gravel or sand will be found in swampy regions of Pampanga R.

# 6. WATER:

Water table is high, and free-flowing artesian wells can be brought in at 250 ft in Pampanga, Bulacan and Tarlac. Only exception is in vicinity of Tarlac town where wells have to be drilled 600–800ft, and require pumping after a few days of flowing.

Soil along western side of valley bordering Zambales Range in Tarlac and Pampanga is of a rather loose, gravelly nature and wells for water supply can be easily drilled. Good water is usually available at a depth of 250ft. Water flowing down from high uninhabited areas can be used for drinking but all water should first bear the stamp of army approval.

Water supply systems served the following towns:

vater supply systems s	served th	e iono	wing to	WIID .
vater suppry systems t	or voca our			Gals per day.
Baliuag, Bulacan				Unknown
Calumpit, Bulacan				Unknown
San Miguel, Bulacan				144,000
Cabanatuan, Nueva	Ecija			100,000
Gapan, Nueva Ecija				220,000
Muñoz, Nueva Ecija				86,400
Angeles, Pampanga				205,900
Guagua, Pampanga				100,000
San Fernando, Pamj	panga			302,400
Arayat, Pampanga				144,000
Tarlac, Tarlac				200,000
Luisita, Tarlac				Unknown

Water for most towns is from artesian or pumped wells, usually centrally located.

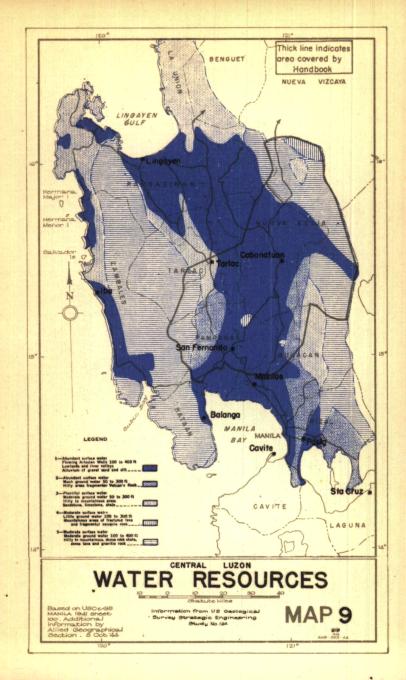
# 7. MINERALS:

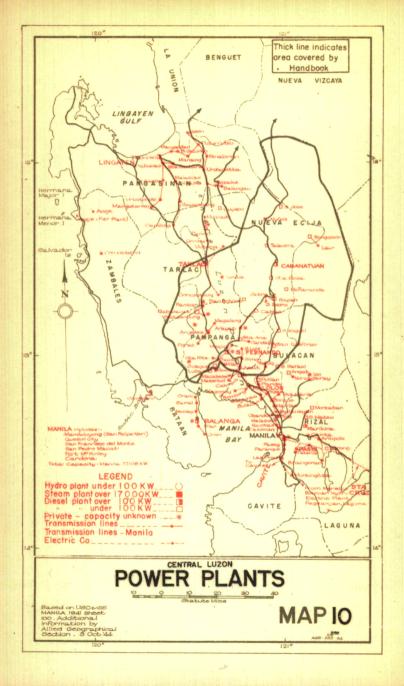
Only important minerals mined were gold (Ipo Gold Mining Co, Ipo, Bulacan), and iron (Bulacan Mines, 9 mls east of Angat, Bulacan).

# 8. REPAIR FACILITIES:

Small machine shops were available at sugar centrals and larger plantations.

Local filling stations and garages had hand tools.





# 9. NATIVE LABOR:

Labor is mostly unskilled. Some carpenters, plumbers and electricians were available. (Natives claiming to be skilled laborers should be watched until proved capable.)

Laborers should be employed through the native foreman (Capataz)
—one Capataz to each 25 men.

Rates of pay (pre-war) were—

tates of pay (	pre-wa	I) Were	_					
1 2 (	1	,		US d	olla	rs.		
Blacksmiths				 0.54	per	day.		
Boat carpent	ters			 1.28	,,	,,		
Bus drivers				 0.56	,,	,,		
Carpenters				 0.75	,,	,,,		
Chauffeurs				 0.57	,,	,,		
Electricians				 0.92	,,	,,		
Miners				 0.62	,,	,,		
Painters				 0.64	,,	,,		
Plumbers				 1.00	,,	,,		
R. R. Engin	eers			 0.86	,,	,,		
Auto Mechan	nics			 2.00	,,	,,		
Sugar Centra	als			 0.72	,,	,,		
Laborers				 0.50	,,	,,		
Surveyors				 22.50	to	30.00	a	mth.
Draftsman				 20.00	to	22.50		,,
Foreman				 30.00	to	75.00		,,
Accountant				 50.00	to	100.00		,,
Typists				 17.50	to	35.00		,,

# 10. CURRENCY, WEIGHTS AND MEASURES:

1 centavo		 	 	1 US cent.
100 centavo	s	 	 	1 peso. \$ 0.50 US.
1 peso		 	 	\$ 0.50 US.

Metric system of measurement is used throughout Philippines.

### 11. POWER:

Manila Electric Co furnished majority of power throughout Bulacan.

Small privately-owned diesel plants under 300 KW capacity supplied all of the power used in Pampanga.

Power requirements in Nueva Ecija were divided between small privately-owned diesel plants and transmission lines from the Manila Electric Co.

Largest requirement was that of 495 KW supplied to Cabanatuan by private interests.

Tarlac was supplied by small subsidiary companies of Manila Electric Co and private diesel plants. Manila Electric Co supplied 284 KW to Tarlac town and a few small surrounding barrios.

# SECTION 8.

# MEDICAL PROBLEMS.

# 1. GENERAL:

Climate is tropical with a well defined wet and dry season. Average temperature is about 80° F. Warmest temperature is about 100° F, coolest about 63° F. Diseases common to tropical countries are prevalent here.

# 2. DISEASES:

### Malaria:

Benign, sub-tertian and quartan malaria are found in the area,

though the latter two are much less common.

Mosquito vectors include: Anopheline barbirostris, A filipinae, A maculatus, A minimus var flavirostris, A philippinersis, A pseudobarbirostris, A subpictus var indefinitus.

Anopheline minimus var flavirostris which prefers shallow, shaded,

foothill streams is the most dangerous carrier.

# Dengue:

Prevalent carrier mosquitoes are: Aedes aegypti and A albopictus.

Typhus:

Mite-born or endemic typhus is known to occur. Mites are widespread and care should be taken.

Uncommon mosquito-born disease.

Dysentery:

i. Bacillary dysentery is common though normally sporadic. Precautions should be taken by troops insuring sterilization of water, insect control and other contamination.

ii. Amoebic dysentery is not so prevalent. Other forms of dysentery

are also uncommon.

iii. Diarrhoea is of frequent occurrence.

Typhoid and Paratyphoid Fevers:

Both are common though normally less prevalent than dysentery.

May have spread.

# Cholera:

None was recorded some years before war. Reported epidemic in 1943. Necessary for all troops to maintain highest standards of hygiene to guard against this and other bowel diseases.

Yaws:

Common but responds to NAB injections.

Fungus Infections of Skin:

Tinea, seborrhoea and pityriasis are very common and cause much discomfort.

#### Scabies:

Caused by a burrowing mite. Widespread and common.

Tropical Ulcer:

Scratches and abrasions, unless treated with antiseptic dressings, are liable to form rapidly spreading ulcers. Food deficiencies increase the liability for their development.

Leprosy:

Occurs; known cases were isolated and suspects detained.

Venereal Disease:

Gonorrhoea is widespread. Syphilis is less common; chancroid uncommon.

Tuberculosis:

Greatest single cause of death in Philippines. All necessary hygienic precautions should be taken.

Influenza:

Common. It frequently leads to more dangerous respiratory diseases.

Respiratory Infections:

Bronchitis, broncho-pneumonia and lobar pneumonia are common and pre-war were a major cause of disability among American forces in the PI.

Smallpox:

Practically non-existent.

Chicken Pox:

Found occasionally.

Measles:

Common.

Trachoma:

A common eve disease.

Malnutrition and Beri Beri:

Some encountered pre-war. War has probably aggravated the situation.

Worm Infestations:

Widespread. Most common are round worms, hookworms, flat worms, and whip worms. Other rare types occasionally found.

Plague:

None has occured in recent years but wartime conditions make outbreak a possibility.

#### 3. HOSPITALS:

Following is a list of pre-war hospitals in the area:

	Hospital—Location.	Beds.
(1)	Eladia Memorial—San Miguel, Bulacan	12
(2	Nueva Ecija Provincial—Cabanatuan, N. Ecija	75
(3)	Pampanga Provincial—San Fernando, Pampanga	50
(4)	Tarlac Provincial—Tarlac, Tarlac	30-
(5)	San Miguel Maternity—San Miguel, Bulacan	2
(6)	Camp Stotsenburg—Angeles, Pampanga	72
(7)	Guagua Hospital—Guagua, Pampanga	14
(8)	Sta. Catalina Hospital—Arayat, Pampanga	12
(9)	Del Carmen—Del Carmen, Pampanga	37
(10)	Tarlac Sugar Central Hospital—San Miguel, Tarlac	26

# 4. PESTS AND DANGEROUS ANIMALS:

a Pest mosquitoes, flies, cockroaches and rats are common. Flies and rats constitute a medical hazard and steps should be taken to control or eliminate them.

b. Itch mites occur and may cause skin irritation.

c. The Red Back spider, relative of the Black Widow, occurs and can give a dangerous and painful bite.

d. Poisonous snakes are infrequent.

# SECTION 9.

# METEOROLOGICAL CONDITIONS.

### 1. CLIMATE:

Two pronounced seasons—one dry in winter and spring, corresponding with period of NE monsoon from Nov to May; the other wet in summer and autumn corresponding with period of SW monsoon from Jun to Nov. Temperature and humidity uniformly high with little seasonal variation.

### 2. RAINFALL:

Wettest months during SW monsoon are Jun-Aug; driest months during NE monsoon Jan-Mar. In wet season mean monthly precipitation ranges from 7.7 to 17.1 in from Jun through Oct, with highest falls in Jul and Aug.

Yearly and monthly rainfall averages in inches are—

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Yearly.
Malolos (Bulacan) S. Fernando	.70	.42	.54	-66	7.0	13.7	18.7	19.1	11.5	7.2	8.0	2.0	91.00
(Pampanga)	·62	•30	.66	1.5	9.0	11.2	18.4	17.0	9.3	5.6	5.2	1.1	81.2
S. Isidro (N. Ecija)	.70	·14	.30	1.6	7.1	8.8	14.6	11.4	12.6	7.6	3.2	1.4	70.4

Rainy days are most frequent from Jul through Oct with 17 to 22 days a month, while in Jan-Apr only three to five days have precipitation.

Serious floods at times are caused by abnormally heavy rainfall associated with typhoons; Tarlac area in particular is subject to floods. Flash floods delay traffic at most stream crossings in Zambales Mts.

#### 3. WINDS:

NE (Winter) Monsoon: Nov-Mar or Apr. Direction mainly from north and NE, tending easterly towards end of season. Wind steady especially in Jan averaging 15-20mph.

SW (Summer) Monsoon: Jun-Sept or Oct generally from westerly quarter. Intermittent and less steady than NE monsoon. Follows transitional period of variable winds and calms. Steadiest in Jul and Aug with average speed at heights of 10-15mph.

Squalls (Collas): Accompanied by much rain—prevalent during SW monsoon, especially near land.

Land and sea breezes well marked, especially where monsoon is weak.

Typhoons (baguios): May occur in any month, but more prevalent from Sep through Nov. Least probable from Jan through Mar. Cause great damage, especially in unprotected harbors; often accompanied by much rain persisting for days. Impossible for foot troops to march against force of wind.

# 4. CLOUD AND VISIBILITY:

Cloudiness relatively high in all months with least in spring averaging from  $\frac{1}{10}$  to  $\frac{5}{10}$ ; maximum in summer, averaging  $\frac{7}{10}$  from Jun to Sep. Cloud amount normally follows seasonal distribution of rainfall. Maximum cloudiness is in late afternoons, and minimum in mid-morning and evening.

When SW winds blow uninterruptedly for several days, overcast skies with low cloud bases (1,000-2,000ft) prevail.

Visibility generally good; fog rare; early ground mist rapidly dissipated. Low clouds in Zambales often mistaken for fog.

# 5. TEMPERATURE:

Consistently high and uniform, with minimum temperatures in winter (Dec-Feb).

Temperatures at sea level seldom exceed 95° F or fall below 65°F. Above 3,000ft cooler conditions prevail.

### 6. HUMIDITY:

High, with seasonal variation amounting to 15 per cent. Lowest values in Apr, usually below 75 per cent; highest in summer and autumn, usually between 80 and 85 per cent.

# 7. OTHER PHENOMENA:

Small land tremors frequent; severe earthquakes rare. Thunderstorms with squalls and heavy rains frequent from May to Oct.

# 8. EFFECTS OF CLIMATIC CONDITIONS:

- i. Sea: Unloading operations hampered by typhoons and storms Ships endangered in most ports.
- ii. Land: Operations difficult during rainy season. Highways blocked and rivers flooded during typhoons. Vitality of foot troops lowered in hot dry season. Marchers should take advantage of the early morning and late afternoon coolness. Rate of march is generally .6 less than in temperate climate: i.e., 4 mph will be reduced to 4 kmph. Construction of new airfields in rice country is almost impossible when ground becomes saturated. Runways of most airfields, unless paved, are not usuable during rainy season.
- iii. Air: Cloud cover and low visibility are highest during rainy season. Typhoons and wet landing fields main hazards.

# **APPENDICES**

# "APPENDIX A"

# TIMES OF SUNRISE AND SUNSET FOR NOV 1944-OCT 1945 MANILA

Latitude 14° 35′ N Longitude 120° 59′ E

Times shown are standard times for the Philippines. (0800 hrs. ahead of G.M.T.)

			Sunrise	Sunset			Sunrise	Sunset
Nov	1		0552	1728	May	2	 0532	1813
	8		0555	1725		9	 0529	1815
	15		0558	1724		16	 0527	1817
	22		0602	1723		23	 0525	1819
	29		0605	1724	1.	30	 0525	1822
Dec	6		0609	1725	June	6	 0525	1824
	13		0613	1728		13	 0526	1826
	20		0617	1731		20	 0527	1828
	27 .		0619	1735		27	 0529	1829
an	3		0623	1739	July	4	 0531	1830
cui	10		0625	1743		11	 0533	1830
	17		0626	1746		18	 0535	1829
	24		0626	1751		25	 0537	1828
	31		0625	1754	Aug	1	 0539	1826
7-1-	7		0623	1757		8	 0540	1823
Feb		•••				15	 0542	1819
	14	•••	0621	1800		22	 0543	1815
	21	•••	0617	1802		29	 0544	1810
	28	•••	0613	1804	Sept	5	 0544	1806
Mar	7	•••	0609	1805		12	 0545	1801
	14	•••	0604	1806		19	 0545	1755
	21	•••	0559	1807		26	 0545	1750
	28	•••	0554	1808	Oct	3	 0546	1745
pr	4		0550	1808		10	 0546	1740
	11		0545	1809		17	 0548	1735
	18		0540	1810		24	 0549	1731
	25		0536	1812		31	 0551	1728

# "APPENDIX A "

# TIMES OF MOONRISE FOR NOV 1944-OCT 1945 (inclusive).

Longitude 120° 59' E Times shown are standard times for the Philippines. (0800 hrs. ahead of G.M.T.) MANILA Latitude 14° 35' N

	Oct	0127	0221	0314	0403	0451	0538	0624	0710	0757	0845	0934	1026	11117	1209	1301	1351	1441	1529	1615	1702	1749	1839	1932	2027	2125	2223	2322	1	0018	0110	0500
	Sep	0044	0139	0235	0331	0425	0519	2090	0655	0741	0827	0914	1002	1050	1140	1232	1325	1419	1512	1603	1653	1742	1829	1916	2003	2052	2144	2239	2335	1	0031	1
	Aug	1	0013	0101	0153	0248	0345	0442	0538	0632	0724	0813	0901	0947	1033	1120	1208	1257	1349	1443	1538	1632	1825	1816	1905	1952	2037	2123	2210	2259	2350	1
	Jul	2314	2359	١	0043	0127	0215	0307	0401	0458	0556	0654	0749	0842	0933	1021	1107	1154	1240	1327	1416	1508	1602	1657	1751	1845	1936	2027	2112	2147	2241	2326
010	Jun	2255	2344	1	0031	0115	0159	0246	0333	0424	0518	0614	0712	0811	8060	1002	1052	1141	1228	1314	1400	1447	1535	1625	1717	1812	1907	2000	2052	2142	2229	1
T	May	2129	2222	2314	1	9000	0057	0146	0233	0320	0407	0456	0545	0638	0734	0831	0929	1035	1119	1211	1300	1347	1433	1519	1605	1652	1741	1833	1925	2019	2112	2205
	Apr	2059	2148	2240	2333	1	0027	0120	0213	0304	0354	0443	0531	0620	6020	0801	0854	0949	1045	1141	1234	1326	1416	1504	1550	1635	1722	1809	1856	1945	2037	1
	Mar	1956	2042	2128	2215	2303	2354	1	0046	0141	0237	0332	0426	0519	6090	0659	0745	0833	0922	1013	1105	1159	1253	1346	1439	1529	1619	1707	1753	1839	1924	2011
	Feb	2115	2200	2246	2333	١	0021	0111	0204	0259	0356	0453	0549	0642	0733	0822	6060	0955	1042	1129	1219	1311	1403	1457	1550	1643	1733	1822	1910	١	1	1
	Jan	2005	2048	2147	2235	2322	١	2000	0054	0141	0230	0323	0418	0516	0612	8040	0802	0854	0943	1029	1113	1158	1245	1332	1421	1514	1608	1703	1756	1849	1939	2028
11	Dec	1842	1937	2032	2128	2218	2308	2356	1	0043	0128	0202	0302	0350	0442	0536	0632	0728	0824	0918	1009	1058	1145	1230	1314	1359	1446	1536	1628	1723	1818	1914
01	Nov	1818	1908	2003	2057	2152	2245	2336	1	0056	0115	0202	0248	0335	0421	0200	0090	0652	0744	0839	0935	1019	1122	1212	1300	1345	1431	1518	1605	1655	1747	1
	Date	1	2		4	2	9	2	00	6	10	11	12	13	14	91	16	17	18	19	20	21	25	23	24	25	56	27	28	50	30	31

# "APPENDIX A"

# 1944—OCT 1945 (inclusive) MOONSET FOR NOV MANILA OF LIMES Latitude 14° 35' N

田 Longitude 120° 59' ahead of G.M.T. (0800 hrs. Times shown are standard times for the Philippines. 1944

# JAPANESE EQUIVALENTS OF PLACE NAMES

The following Japanese equivalents for place names in Cabanatuan area are supplied by Allied Translator and Interpreter Section, SWPA, and are arranged alphabetically by provinces:

NAME	ROMAJI	CHARACTER
NUEVA ECIJA PROVINCE	NEUBA ESHIYA SHU	スエパ エシヤ 州
ALIAGA	ARIAGA	アリアカ
BONGABON	BONGABON	ホ"ンカ"ホ"ン
CABANATUAN	KABANATSUAN	カバナツアン
CABIAO	KABIAO	カピアオ
CARRANGLAN	KARANGARAN	カランカ"ラン
CUYAPO	KUYAPO	クヤホ
GAPAN	GAPAN	カッペン
GUIMBA	GUINBA	グインリー
JAEN	IEN	イエン
LAUR	RAURU	ラウル
LICAB	RIKABU	リ・カフツ
LUPAO	RUPAO	ルバオ
MUNOZ	MUNOSU	412
NAMPICUAN	NANPIKUAN	ナンヒクトン
PANTABANGAN	PANTABANGAN	ファンタハンカン
PAPAYA	PAPAYA	21 21 4
PENARANDA	PENARANDA	ペナランタ
QUEZON	KUIZON	クイソン
RIZAL	RIZARU	ال الله الله
SAN ANTONIO	SAN ANTONIO	サンアントニオ
SAN ISIDRO	SAN ISHIDORO	サソイシトロ
SAN JOSE	SAN HOSE	サンホセ
SAN LEONARDO	SAN REONARUDO	サンレオナルト
SANTA ROSA	SANTA ROSA	サンダロサ
SANTO DOMINGO	SANTO DOMINGO	サント トミソコ"
TALAVERA	TARABERA	タラベラ
ZARAGOZA	ZARAGOZA	サ"ラコ"サ"

Appendix "C"	-continued.	
NAME	ROMAJI	CHARACTER
PAMPANGA PROVINCE	PANPAMGA SHU	パンパンカー州
ANGELES	ANHERESU	アンヘレス
APALIT	APARITTO	アッパリツト
ARAYAT	ARAYATTO	アラヤット
BACALOR	BAKARORU	バカロル
CANDABA	KANDABA	カンダンベ
CLARK AIRFIELD	KURAAKU FUIRUDO	クラーク フィルト
DAU EAST AIRFIELD	HIGASHI DAU HIKOJO	東外心行場
DEL CARMEN AIRFIELD	DERU KARUMEN HIKOJO	デルカルメン配行場
FLORIDABLANCA	FURORIDA- BURANKA	フロリダ"フ"ランカ
FORT STOTSENBURG	SUTOTSUEN- BURUGU	ストツエンブ"ルク"
GUAGUA	GUAGUA	グ"アク"ア
LUBAO	RUBAO	ルバオ
MABALACAT	MABARAKATTO	マバラカツト
MACABEBE	MAKABEBE	マカベレ
MAYALANG	MAYARANGU	マヤラング
MASANTOL	MASANTORU	マサントル
MEXICO	меніко	7 2 7
MINABIN	MINABIN	ミナビン
PORAC	PARAKKU	ボラック
SAN FERNANDO	SAN FUERUNANDO	サンフエルナント
SAN LUIS	SAN RUISU	サンルイス
SAN SIMON	SAN SHIMON	サンシモン
SANTA ANA	SANTA ANA	サンタアナ
SANTA RITA	SANTA RITA	サンタリタ
SEXMOAN	SEHIMOAN	サ.ヒモアン

Appendix "C"-continued.

CHARACTER NAME ROMJI TARURAKKU SHU 4 1V. 5

TARLAC PROVINCE

アナオ ANAO ANAO

BAMBAN BANBAN

マリン CAMILING KAMARIN

カップス CAPAS KAPASU

シェブシオン CONCEPCION KONSHIEPU-SHION

D HERONA GERONA

LA PAZ RA PAZU

MAYANTOC MAYANTOKKU

モンカット MONCADO MONKADO

O'DONNEL O DONERU ト"ネル飛行場 AIRFIELD нікојо

= + PANIQUI PANIKI

PURA PURA

RAMOS RAMOSU ラモ.ス

SAN CLEMENTE SAN KARAMENTE カラメンテ

SAN MANUERU SAN MANUEL サンマスエル

サンミクエル飛行場 SAN MIGUEL SAN MIGUERU AIRFIELD нікојо

SANTA IGNACIA SANTA サンタイグナシア **IGUNASHIA** 105

NO.41

UNGLASSIFIED

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ALLIED GEOGRAPHICAL SECTION

Allied forces, Southwest Pacific Area

TERRAIN HANDBOOK 41

MANILA

(Philippine Series)

# MINISTED

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ALLIED GEOGRAPHICAL SECTION

Allied Jorces, Southwest Pacific Area

TERRAIN HANDBOOK 41

MANILA

(Philippine Series)

11 41

General Headquarters,
Southwest Pacific Area,
21 November 1944.

This Handbook contains information on an area in Central Luzon, Philippine Islands, as defined on the Orientation Map.

It is intended to provide basic topographical information of military interest for the use of officers in forward areas.

The maps included are intended as guides only, to be used in conjunction with operational maps.

By command of General MacARTHUR.

R. K. SUTHERLAND, Lieutenant General, U.S.A., Chief of Staff.

# Official:

C. A. WILLOUGHBY, Brigadier General, G.S.C. Asst. Chief of Staff, G-2.

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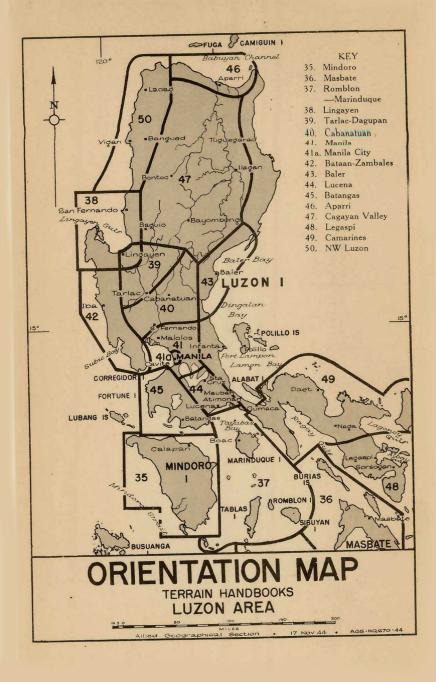
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# **MANILA**

# (CENTRAL LUZON, PI)

# **SECTION 1**

# INTRODUCTION AND GENERAL DESCRIPTION OF AREA

(Map 1, Photos 1, 2)

# 1. LOCATION AND AREA COVERED. (See Orientation Map):

Area described in this Handbook is in Central Luzon and consists of the greater part of Bulacan Province, all of Rizal Province except the City of Manila, and a small section of the swamp land of southern Pampanga Province. (Manila City is covered in a separate Handbook—No 41-A).

Manila, the focal point of the area, is located at 14°36′ N, 120°59′ E.

# 2. GENERAL DESCRIPTION:

Area concerned involves the industrial and trading center of the Philippine Archipelago. The western world's influence regarding agriculture, industry, habits and customs is found to a considerable extent.

The terrain is divided about equally between low, flat and rolling country to the west and high mountains along the eastern halves of Bulacan and Rizal Provinces. Extensive swamp land is found at the head of Manila Bay and its complex river net presents a definite military obstacle.

The only landing beaches in the area are two short sections, one immediately north and one immediately south of Manila City.

The large lake, Laguna de Bay, is relatively shallow and its water is stagnant and dirty.

Shipping facilities in the area are limited to Port of Manila.

Manila Bay is a large, deep, protected harbor that offers excellent anchorage for a large fleet.

The roads that radiate out from Manila are among the best in the Philippines and include many good concrete and asphaltmacadam, two-lane highways.

# [SECTION 1]

The mountainous terrain along the east side of the area is an effective natural barrier and no movement other than foot patrols could approach the area from the east. The approach from the north is down the level Central Luzon Plain and aside from numerous stream crossings is free of any natural topographical barriers.

Approach from the west is mainly a water approach through Manila Bay. Approach from the south is limited to narrow land corridors because of the large lake, Laguna de Bay.

# 3. MILITARY IMPORTANCE. (Map 1):

The area is militarily significant in that it is the most developed, economically and militarily, in the Philippines.

Pre-war development included many large airfields, important naval installations, extensive army posts and camps and other fixed and mobile defence installations.

Manila Bay offers the finest natural protected harbor in the Philippines. This area was also the nucleus for the organization and development of the Philippine Army,

Japanese development of the area has been limited largely to garrison and administrative duties around Manila. Airfields are the most heavily defended. Schools and municipal buildings are used for headquarters and barracks.

Only significant airfield development in the area has been the expansion and improvement of the Manila Air Center, which extends beyond the corporate limits of Manila and includes 11 airfields. All operational fields are probably well defended.

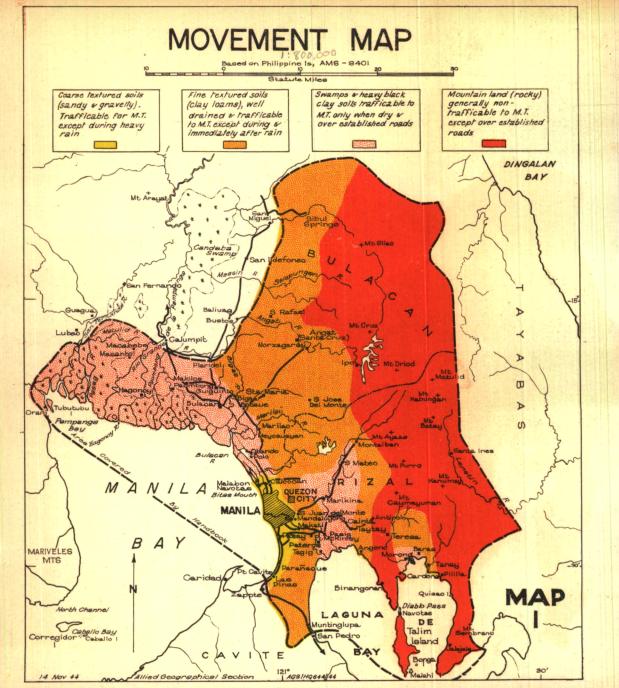
# 4. POTENTIAL DEVELOPMENT:

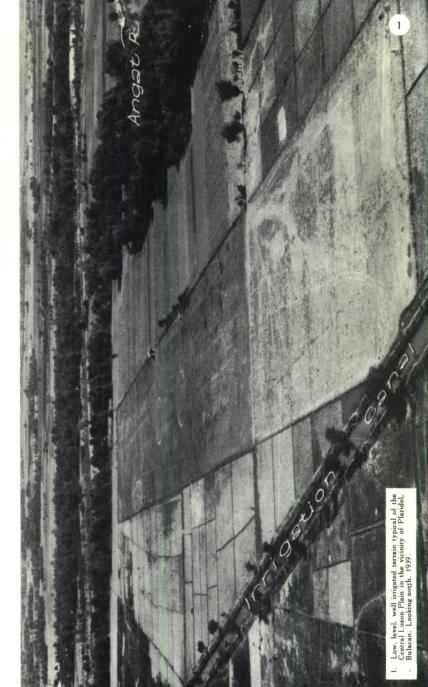
Potential development is limited to the area between Sierra Madre ranges along the eastern border of the area, and the extensive delta swamp lands of Pampanga River along the western border. This area has about 650 sq miles of level terrain and gently sloping footbills.

Use of Manila port facilities, and good rail and road networks, further enhance the potentialities of this area. Power, water-supply and ample storage facilities are in the area.

# 5. DISTANCES FROM MANILA:

To	Enemy Base	s:	Statute	9	Standard Geo
			Mls		Mls
	Aparri		265		. 230
	Cebu		350		. 305
	Davao		600		. 520
	Hongkong		670		. 585
	Tokyo		1640		. 1420
	Tainan		575		. 500
To	Allied Bases	:			
	Tacloban		340		
	Morotai		985		. 855
	Guam		1595		. 1380
	Hollandia		1810		. 1580







# 6. SPELLING:

Spelling of geographical names in this Handbook is in accordance with Directions for the Treatment of Geographical Names in the PI issued by US Board on Geographical Names. (See Terrain Study 80 Mindanao I, Vol I for details).

Different maps and charts may substitute certain letters for others in spelling place names. Most common among these are: the c to k; the qu to k; the j and h to y; and the v and f to b. These changes will also be noticed in pronunciation by local inhabitants. Generally, pronunciation of names follows the Spanish, as the Philippines were under Spanish influence for more than 350 years.

# 7. STANDARD TIME: MEASUREMENTS: CURRENCY:

Standard time is 8 hours ahead of GMT.

Following measurements are used in this Handbook:—Standard nautical miles and fathoms when referring to sea measurements; statute miles and yards for distances. Road distances are in miles and kilometers; elevations in feet above sea level.

Metric system is used throughout the Philippines. The peso is the main item of coinage.

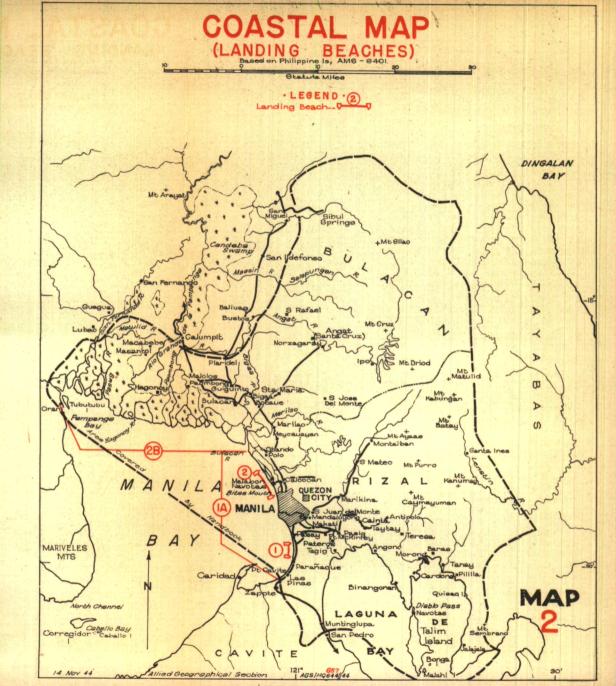
100 centavos = 1 peso 1 peso = \$.50 (US)

Copper, silver and paper money are used.

# 8. WATER:

The water supply system for Manila involves water drawn from mountain rivers and backed up by three dams, the Ipo, Novaliches and Montalban.

All of these dams are in the area, one in Bulacan and two in Rizal. Numerous other mountain rivers, and artesian and pumped wells augment the water supplied by these dams. Ample water is available by drilling in the alluvial soil for depths of from 50 to 400 ft.



#### **SECTION 2**

#### DESCRIPTION OF COASTLINE

(Map 2; Photos 3, 4)

#### 1. ZAPOTE R TO BULACAN R:

#### a. Anchorages:

Extensive fleet anchorage in Manila B (covered in Handbook 41-A).

#### b. Shoreline:

Shoreline is low and faced with mud and silt-bottomed shoal water for several hundred yards offshore. From Zapote R mouth to 1400 yds north of Paranaque R mouth, is a narrow sand beach extending out to 1fm line 600 yds offshore. Behind beach is narrow strip of firm ground backed by lagoons and fish ponds. A seawall extends north from near Baclaran to the large ship docks of Manila City outside of which there is no beach.

From north end of Manila docks to mouth of Bitas R is a fairly wide beach with 1fm line 300-600 yds offshore. A large stone breakwater prevents landing craft (LC) from using beach,

Between Bitas and Navotas R the shore may be suitable for small LC. From Navotas to Bulacan R are muddy shallows less than 3ft deep as far as 1000 yds offshore.

#### c. Landing Beaches:

#### BEACH No. 1:

Extends from end of seawall near Baclaran south for approx 14 mls. At LW it is 10-20 yds wide and broken by numerous small streams. One fm line is 230-300 yds offshore, gradual slope, muddy bottom. Small LC can reach beach at HW. MT movement inland easy.

#### BEACH No. 2:

Extends between Bitas and Navotas R. Suitable for small LC at HW only. Bottom slopes gradually. Hinterland is actually an island formed by Navotas R and tidal estuaries to south. Good road to Manila south passing over 2 good bridges. Town of Navotas covers most of island.

#### d. Hinterland:

Generally unsuited to movement off established roads. Beside built-up areas of Manila City the terrain is lowlying, cut by many streams and largely devoted to fish ponds, rice paddies and swamp. Rice paddies are flooded 7 months of the year but will support MT when dry.

#### e. Vegetation:

Area is well cultivated. Principal crop is rice. Since Japanese occupation many former firm areas now are rice paddies.

#### [SECTION 2]

#### f. Rivers:

Principal rivers are: Zapote, Paranaque, Pasig, Marakina, Bitas, Navotas and Bulacan. (See Sec 5, Physiography.)

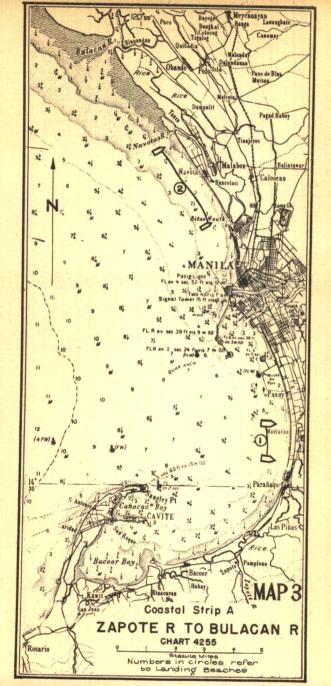
#### g. Roads:

Manila highway runs within several hundred yards of the shore south of the city and about 13 mls inland north of the city. There is a good network of secondary roads providing numerous approaches to Manila (See Sec 3, Roads and Trails).

#### h. Towns:

America and Comment

Aside from Manila, principal coastal towns are Las Pinas (pop 3493), Paranaque (21,125), Pasay (55,161), Navotas (2765), and Malabon (3125) (See Sec 6).



#### 2. BULACAN R TO ORANI:

#### a. Anchorages:

Small boat anchorage on river bank of Orani R in NW corner of Pampanga B. Large vessel anchorage in Manila B from 2 to 5 mls offshore. No large vessel anchorage in Pampanga B.

#### b. Offlying Islands:

Several small, mud-flat islands are formed by the delta of Pasag and Orani Rs. None is militarily important. They are mostly mangrove swamp and cultivated fish ponds. Tubutubo and Dilayuping are two most prominent.

#### c. Shoreline:

Head of Manila B is faced by mud flats and shoal water. Expanses of mud 1 ml wide are exposed at LW. Approaches to the many streams along this coast are through shallow, narrow channels suitable only for shallow draft barges and native craft.

Pampanga B is shoal with mud, has a low shoreline broken by many streams. Approaches to these streams are through restricted channels. On east side of bay a channel with average depth of 2fms at LW leads to mouth of Pasag (Guagua) R. Bar across channel mouth has least depth of 1fm.

Malubag R may be entered through channel with least depth of liftms at LW. Barrio Orani may be approached through channel with least depth of ifm at LW.

#### d. Landing Beaches:

Nil.

#### e. Hinterland:

From Bulacan R westward a widening swamp plain extends around the head of Manila B stretching inland for many miles. Fish ponds, mangrove and nipa swamps, and rice paddies farther inland constitute general nature of swamp areas.

The swamp north of Pampanga B is an important fish-producing area. Principal cannery is located at Guagua,

West and south of Orani the terrain commences to rise to mountains forming Bataan Pen.

#### f. Vegetation:

Most of the area is mangrove and nipa swamp which forms important sources of these native construction materials. Back of this swamp land, rice paddies comprise the principal vegetation.

Only timber in area besides mangrove, is that on the hills SW of Orani.

#### g. Rivers:

Main rivers are Bulacan. Pampanga, Pasag (Guagua) and Orani. All may be navigated by any barges or boats which can clear the mud-flats at their mouths. The other numerous streams lacing the swamps provide navigable waterways for native craft. (See Sec 5—Physiography).

#### [SECTION 2]

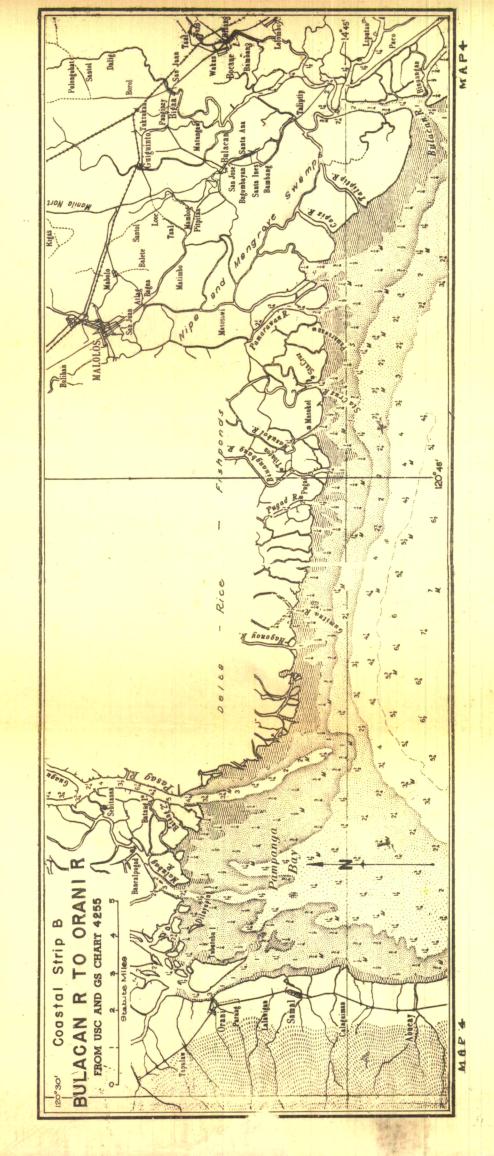
h. Roads and Trails: (See Sec 3).

Nearest good roads are 3 to 5 mls in from shore at Bulacan R end of area. Road at Orani runs along west coast of Manila B and skirts edge of swamp lands before going north through Central Luzon Plain.

Movement through swamp is by native craft rather than trails.

i. Towns:

Principal towns in coastal area are: Bulacan (pop 833), Malolos (33,384), Hagonoy (2118), Lubao (2557), Hermosa (2668), Orani (7628), Guagua (4497) (See Sec 6).



3. Only possible landing beach south of Manila. Looking north. 1933.



		_	LEGEND:
fm	:	:	Fathom
MH	:	:	High Water
CW	:	:	Low Water
LLW	:	:	Lower Low Water
CC	:	:	Landing Craft

# LANDING BEACH SUMMARY

WITH HANDBOOK 41 — MANILA.

This summary covers beaches considered, to be tactically important.

For detailed description see Sec 2.

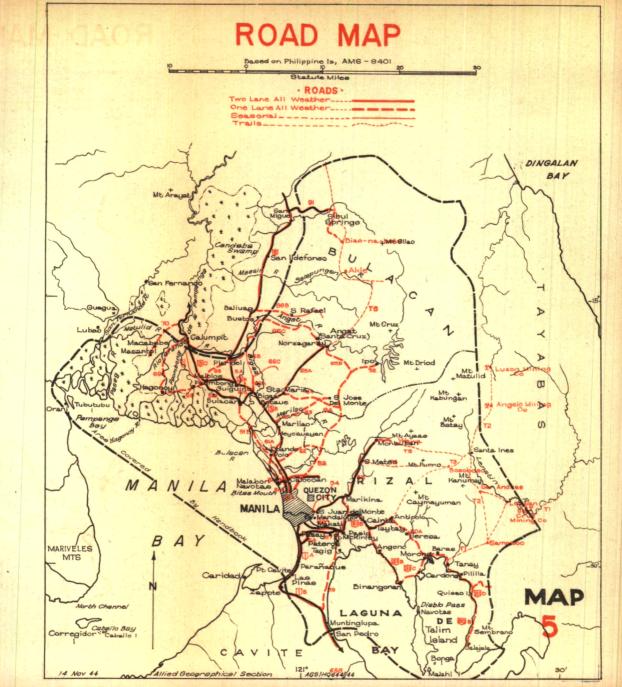
(Beaches are numbered to correspond with coastal sub-divisions in Sec 2)

For locations see Map 2.

# INFORMATION COMMON TO BOTH BEACHES

Mean higher HW 3.3ft.
Chart datum (Mean LLW) 0.0ft.
Lowest tide —1.5ft.

BEACH No 2 Coastal Strip "A" Photo 4	Manila	Clear	ds. 2 1 fm 400-600 yds offshore. South to north ends 2 fms 1000-1500 yds offshore. South to north ends	3 mls Not known Not known	Very shallow Very shallow	phoons Little surf except during storms in SW season	Numerous fish traps. Shallow sand bars at north end	Firm sand suitable for MT	inland Numerous roads inland from beach	popu- Firm ground on island partially covered with popu- lated sections. Navotas R serious obstacle for move- ment to Manila	depths Highway to Manila crosses 2 bridges near south end of island (USC&GS Chart 4255)	would Suitable for small LC at HW only
BEACH No 1 Coastal Strip "A" Photo 3	Manila and Nichols A/F	Clear channels at entrance to Manila B	1 fm 230-300 yds offshore. North to south ends. 2 fms 400-600 yds offshore. North to south ends. 3 fms 900-1300 yds offshore. North to south ends	1 ½ mls 10-20 yds 5-10 yds	Very shallow. Less than 1%. Reported somewhat steeper at HW	Very little surf except during squalls and typhoons in SW season	A few fish traps	Firm sand suitable for MT	Numerous MT roads from Beach to roadnet just inland	Firm sandy soil with little vegetation. Thickly populated at north end. Numerous MT roads through military camp areas with large drill fields	Bottom offshore reported to be soft silt with depths changeable (USC&GS Charts 4243, 4355)	Suitable for small LC only at HW. Large LC would ground over 100 vds offshore in soft silt
BEACH ORIENTATION Map and Photo Ref	OBJECTIVE	APPROACH FROM SEA	DEPTHS OFFSHORE (At mean lower LW)	DIMENSIONS: Length Width LW Width HW	SLOPE AT: LW Line HW Line	SURF CONDITIONS	BEACH OBSTRUCTIONS: For Landing Craft	CHARACTER OF BEACH SOIL Suitability for MT	ACCESS TO ROAD SYSTEM	HINTERLAND: Type of soil, terrain and vegetation with relation to movement and dispersal	MISC INFORMATION	LANDING SUITABILITY AND REMARKS



#### **SECTION 3**

#### ROADS AND TRAILS

(Map 5; Photos 5, 6.)

#### 1. GENERAL:

The roads radiating from Manila through the surrounding level terrain are among the best in Luzon. Two-lane concrete and macadam roads lead north and south, for short distances east, and west around the head of Manila B.

Other good, surfaced roads of varying widths connect towns and barrios not on the main routes with the important N/S highways and Manila.

Road construction materials are not available in the vicinity of main roads and have to be hauled for some distance. Most bridges were of reinforced concrete and steel, and timber, for even temporary repairs, is seldom at hand.

Many seasonal roads are excellent in the dry season, impassable in the wet season.

Many roads are surfaced with loose river gravel which has caused numerous accidents. Vehicles drive on left hand side of road.

Road drainage presents a major problem because of clayey nature of soil.

Cover is limited to shade trees along routes and bamboo clusters along streams. Most of the good roads pass through areas of cultivated land.

Drinking water is plentiful. Water from open streams and shallow wells should be treated.

#### Road Classification:

2-lane, all-weather.

At least 16ft base, 4ft shoulders. Surface usually concrete or asphalt. Bridges and culverts at least 16ft wide.

Usually 9ft base, 12ft surface; 4ft shoulders. Gravel surface.
Culverts 16ft; bridges 10ft wide.

Usually graded for 20ft in flat areas; 16ft in mountainous areas. Unsurfaced and impassable in wet season. Bridges and culverts 10ft wide.

#### Abbreviations used in Text:

Prov Bdry = Provincial Boundary
Km = Kilometer (1093 yds)
M1 = Statute Mile
RRX = Railroad Crossing
Rd Junc
Rd Cr = Road Junction
Rd Cr = River
AW = All Weather

#### [SECTION 3]

A

Bridges.

TW = Temporary Wood
WTs = Wood Truss
STs = Steel Truss
SG = Steel Girder
CG = Reinforced Concrete Slab and Girder
M = Masonry

Bridge dimensions are given in feet in the following order:
Length; width; height above normal water level or dry flood plain.

Route numbers below 50 are Philipping Burgan of Public Works

Route numbers below 50 are Philippine Bureau of Public Works designation of National highways. Numbers 51 and up are so numbered for purposes of this Handbook only.

#### 2. DETAILED DESCRIPTION OF ROADS:

### ROUTES 1B, A—S Pedro to Manila (19.5 mls): Two-lane, AW, blacktop.

= Arch

Distance to Manila Detail Class and Terrain Km MI S PEDRO (14° 22' N, 121° 03' E) on 19.5 ROUTE 1B 2-LANE AW 31.3 west shore of Laguna de Bay. BLACKTOP. Many NE is old trail to Route 59. built-up sections. Many runs NW. RR west (left). small creeks. TUNASAN R. CG 64ft. 31.2 19.4 RRX. 30.8 10.1 Rice paddies, fish ponds, clumps of bamboo. TUNASANCILLO R. CA 31ft Prov Bdry Rolling grassland west. 19.0 Laguna-Rizal. Rock Quarry west (left) MUNTINGLUPA. 2-LANE AW BLACK-Branch west (left) 27.8 17.3 one-lane AW 1.1 km to Insular Prison in TOP. rolling hills. ALABANG Rd June. Branch east (right) 15.3 1-lane AW is Route 59. River CG 30%. 24.5 15.3 Civil Government Stock Experimental rolling 24.4 15.2 Low grassy pasture land. Farm. Route 1B turns NW. 21.9 Spanish monument. 13.6 Road June Branch SW (left) is Route 25 14.8 9.2 Rice fields west. Navy airfield east. Route 1B ends; 1A starts and runs NE (right) along Manila B. 1B-1A Salt Ponds. River CA 43ft. 13.4 8.3 LAS PINAS. 12.6 7.8 PARANAQUE. Bridge in town. CG 259 9.7 6.0 x 211 and two sidewalks 4ft each (8spans). BACLARAN. Branch east (right) is Route 58 over a creek TW 50 x 16 x 15 BACLARAN. 6.6 4.1 to Nichols Field.

#### Routes 1B, A-continued.

Detail	Distance to Km	Manila Ml	Class	and Terrain
Rd Cr Route 54 runs NE (right). Route 1A turns west (left).	5.9	3.7		
DEWEY BOULEVARD (Photo 15) on Manila B. Route 1A turns NW (right) along Manila B, two 16ft wide concrete highways.	5.5	3.4	4-LANE	AW (starts).
Polo Club east (right) and Route 57 to Fort McKinley 9.2 km (5.7 ml).	4.6	2.9		
LUNETA. Turn NE (right) on Burgos Street.	1.6	1.0		
MANILA GPO.	.0	.0		

(Route 1 ends.)

# ROUTES 3C, B, A—Labangan R to Manila (30.1 mls): Two-lane, AW

211021	A110, 11 11		
Detail	Distance to I	Manila Ml	Class and Terrain
Route 3C runs SE (ahead).			2-LANE AW GRAVEL
LABANGAN R. CG 284ft (unconfirmed).	48.5	30.1	SURFACE.
Rd Cr Branch south (right) is Route 51C, start of the so-called alternative "Low Road" to MANILA via MALOLOS, BULACAN and POLO. Total 46.2 km (28.7 ml).	47.2	29.3	1100000
MALOLOS Rd Cr Branch SW (right) is Route 68 2-lane AW blacktop 1.1 km (0.7 ml) MALOLOS and NE 1-lane AW 7.8 km (4.8 ml) to Route 5A.	41.3	25.7	
Old 1-lane AW blacktop. Branch runs parallel to Route 3C on south side of RR.			
Rd Junc. Branch north (left) is Route 5 to CAGAYAN VALLEY. Route 3C ends; 3B begins and turns south.	36.4	22.6	3C: 3B New gravel sur- face ends. Blacktop begins.
RRX. Bridge CG 108ft (3 spans). Branch south (right) is old road loop. Route 3B runs SE.	36.1	22.4	begins.
GUIGUINTO R CG 185 x 20 x 13ft (8 spans) unfordable, mud bottom. Rd June Branch SW (right) is old road loop.	34.3	21.3	A CALL TO SEA
Rd June Branch south (right) is 1-lane AW 1.7 km (1.1 ml) to Route 61B. Route 3C swings gradually SE.	33.5	20.8	2-LANE AW BLACK- TOP. Low rice paddies. Bamboo clump.

Routes 3C, B, A-continued.

			1
Detail	Distance to Km	Manila Ml	Class and Terrain
Rd Cr 1-lane AW north (left) 0.6 km to BIGAA RR Sta south (right) 0.2 km (0.1 ml) to Route 61B.	31.1	19.3	
BIGAA. Branch west (right) is Route 61B, 2-lane AW 4.4 km (2.7 ml) to BULACAN on Route 51B. Branch north (left) is Route 66A to	30.7	19.1	
Route 65 and to PANDI on Route 66C.  BIGAA R. STs 157ft (2 spans). Not fordable. Tidal. Banks soft mud 5ft.	30.5	19.0	2-LANE AW BLACK
Rd June Branch NE 1-lane AW 5.7 km (3.5 ml) to STA MARIA.	28.0	17.4	
BOCAUE R. CG 236 x 18ft (6 spans). Unfordable. Tidal. Mud bottom.	27.3	17.0	Bamboo clumps.
BOCAUE Branch NE (left) is Route 65A. 1-lane AW to NORZAGARAY 18.8 km (11.7 ml).	27.2	16.9	
BUNLO R. CG 40 x 18ft Horse ford west side. Tidal.	26.3	16.4	
Rd June Branch NE (left) is Route 63. 1-lane AW to SAN JOSE DEL MONTE 12.8 km (8.0 ml).	22.2	13.8	
MARILAO	21.5	13.4	
MARILAO R. CG 318 x 18 x 13ft (6 spans). Not fordable. Tidal. Banks 10ft gravel.	21.4	13.3	
MEYCAUAYAN. RR Sta east (left). Old road west (right) 0.3 km (0.2 ml) to bridge 162 x 15 x 8ft over river.	19.1	11.9	
MEYCAUAYAN R. STs. 244 x 16ft (2 trusses). Unfordable. Tidal. Muddy.	18.4	11.4	Bamboo clumps and fish
Rd June Branch NW (right) old road 1-lane AW 1 km (0.6 ml) to MEY- CAUAYAN.	17.9	11.1	
Rd June Branch SW (right) unconfirmed branch 1.7 km (1.1 ml) to Route 61A near POLO.	16.9	10.5	
POLO Sta Rd Junc. Branch west (right) is Route 61A 2-lane AW 1.9 km (1.2 ml) to POLO on 51B. Branch NE 3 km (1.9 ml) to a stone quarry near LAW-ANGBATO.	15.8	9.8	Stone quarry.
MALINTA.	14.0	8.7	
RRX.	13.8	8.6	

Routes 3C, B, A-continued.

Detail	Distance to Km	Manila Ml	Class and Terrain
Rd June. Branch NE (left) is Route 62 1-lane AW 9.0 km (5.6 ml) to NOVA- LICHES.	13.7	8.5	
Water pipeline.	12.7	7.9	2-LANE AW BLACK. TOP.
Prov Bdry. BULACAN-RIZAL. (Approx location).	11.0	6.8	
TULLAHAN R. CG 99 x 18st (3 spans on concrete piers, one on wood piles).	10.4	6.5	
BONIFACIO monument. Rd Cr is Route 54 "Circumferential Road" east (left) to QUEZON CITY area. West (right) to Route 51 and MANILA Bay.	7.1	5.5 4.4	Recorded. Scaled.
Note: Distance discrepancy 1.7 km (1.1 ml).			
Route 3B ends; Route 3A begins.			3B: 3A
Distances scaled to MANILA GPO.			2-LANE AW BLACK TOP.
BONIFACIO Monument. Route 3A runs south through GRACE PARK.	7.1	4.4	
Philippine Air Taxi Co hangars east (left).	5.1	3.2	
Rd June NE (left) is Route 52 to IPO Dam.	4.3	2.7	
Turn SE (half left) and follow RIZAL	3.9	2.4	
RRX.	3.2	2.0	
BILIBID Prison east (left).	1.3	0.7	
PASIG R STA CRUZ bridge (3 double steel trusses). Total about 315 x 40ft.	0.2	0.1	
GPO Manila.			

(Route 3A ends.)

#### ROUTE 5A—Plaridel to Junc Route 3B (3.4 mls): Two-lane, AW, blacktop.

Detail	Distance to Km	Manila Ml	Class	and ?	l'errain .
PLARIDEL (QUINGUA) Rd Cr. Branch east (left) is Route 65C 1-lane AW 32.2 km (20.0 ml) to NORZAGARAY.			2-LANE TOP.	AW	BLACK-

#### Route 5A-continued.

Distance to Km	Manila	Class and Terrain
***		
41.6	25.8	
40.2	25.0	
36.4	22.6	
	41.6 40.2	41.6 25.8 40.2 25.0

# ROUTES 21D, C, B, A—Boundary Rizal-Laguna Provinces to Manila (41.6 mls):

One-lane, AW, for first 27.7 mls, then 2-lane, AW.

CTROUTE TOWN			
Detail	Distance to Km	Manila Ml	Class and Terrain
Route 21D starts at approx elev 1000ft, approx position of Prov Bdry RIZAL-LAGUNA.	67.0	41.6	I-LANE AW. WELL GRADED BUT ROUGH. GRAVEL SURFACE. Winds and descends in low hills. Patches of forest.
Rd June. Branch south is Route 60B about 13 km (8.1 ml) to JALAJALA.	60.5	37.6	
Route 21D ends; 21C begins. Runs north.			21D: 21C.
Crest of a low saddle. Approx el 100ft.	59.6	37.0	Patches rice paddies. Mountains east. Laguna de Bay west.
PILILLA	57.5	35.7	
Rd Junc. Branch NE (right) trail suitable for jeeps about 10 km (6.2 ml) to SAMPALOC.	54.8	34.0	
TANAY R. C Arch 89ft.	54.4	33.8	Along north shore of Laguna de Bay.
TANAY.  Branch NE (right) is 1-lane AW gravel surfaced to SAMPALOC. Approx elev 1100ft, about 9.0 km (5.6 ml) thence graded but no bridges or surfacing for 13 km (8.1 ml) to STA CRUZ goldmine. A trail suitable for jeeps also runs NE from TANAY to SAMPALOC about 10 km (6.2 ml) thence by pack and foot trails to LEYBAN and to ANGELO goldmines. (Trails 1 and 2)	54.2	33.7	1-LANE AW GRAVEL SURFACE.
BARAS. C. Arch 33ft in center of town.	50.1	31.1	

#### Route 21C-continued.

Detail	Distance to Manila Km Ml	Class and Terrain
MAYBANCAL Rd Junc. Branch NW (right) is Route 60A. 1-lane AW 12.5 km (7.8 ml) to ANTIPOLO. Route 21C turns south.	47.0 29.2,	7 10 %
MORONG. Masonry arch bridge 76ft in center of town.	45.7 28.4	
Route 21C climbs over a rocky spur 100ft high. Steep cuts.	43.0 26.7	Roadblock area.
CARDONA.	41.4 25.7	
Route 21C turns west on shore of LAGUNA DE BAY.	40.4 25.1	gre saretu
BINANGONAN.	36.0 22.4	Winds in hills.
Cement factory west (left) with overhead cables from quarries on east and west of road.	35.3 21.9	Gravel ends, blacktop begins.
Route 21C ends; 21B begins. North along shore of lake.		21C: 21B.
DARANGAN RC Arch 92ft.	32.9 20.4	
River C Arch 92ft.	31.4 19.5	
ANGONO. Turn east (right) then west (left).	28.0 17.4	
ANGONO RC Arch 66ft. Many small bridges.	27.5 17.1	
Rd Junc. Branch SW (left) 1-lane seasonal 1.6 km (1.0 ml) to shore of lake.	24.3 15.1	Rice paddies.
TAYTAY.	22.3 13.9	1-lane ends, 2-lane begins.
Branch NE (right) is Route 60A 2-lane AW 6 km (3.7 ml) to ANTIPOLO.		2-LANE AW BLACK- TOP.
RRX. Station and private road of Luzon Bus Co NE (right) about 10 km (6.2 ml) to ANTIPOLO.	20.8 12.9	Rice paddies and flat grassland.
SAPANG BAHO RC Arch 53ft.	20.0 12.4	2-LANE AW BLACK- TOP.
CAINTA. Route 21B runs west.	19.7 12.2	Not well
ROSARIO. Branch north (right) 2-lane AW 5.4 km (3.4 ml) to Route 53 at MARIKINA. Route 21B turns south (left).	15.6 9.7	and and any
PASIG.	11.8 7.3	the district parallel
PASIG R. STs. 439ft with suburban electric tramline on south (left) side.	10.5 6.5	11.8

#### Route 21B-continued.

Detail	Distance to Km	Manila Ml	Class and Terrain
Rd June. Branch east (right) and south under end of Pasig R bridge is Route 59 1-lane AW.	10.3	6.4	
FORT McKINLEY, north gate, branch south (left) is Route 57 to Pasay on MANILA B 9.2 km (5.7 ml).	9.0	5.6	
GUADALUPE. Proposed bridge and	8.0	5.0	Recorded.
intersection of Route 54. "Circumferential road." No evidence of bridge con-	8.9	5.5	Scaled.
Note: Distance discrepancy 0.9 km. 21B ends; 21A starts.			
MAKATI on south (left) bank of PASIG R. Route 21A continues west.	7.4	4.6	21B: 21A Good adobe stone quarry.
Rd June. Branch street SW (left) to NIELSON Airport. STA ANA Cabaret NE (right).	5.3	4.3	
Turn west (left) in Calle HERRAN.	4.1	2.6	2-LANE AW BLACK- TOP.
RRX. PACO station north (right).	3.1	1.9	
Concrete bridge, bear NW (right) in Calle GEN LUNA.	2.6	1.6	
TAFT Avenue, continue NW.	1.5	0.9	
Calle P BURGOS.	0.7	0.4	
GPO MANILA.			

(Route 21 ends.)

# ROUTES 51C, B, A—San Marcos to Manila (28.7 mls): One-lane seasonal for first 4.2 mls, then 2 and 1-lane to Manila.

Detail	Distance to Mani Km Ml	
Commencing at an old road crossing at 47.2 km (29.3 ml) on Route 3C, near SAN MARCOS.  Route 51C runs south and SE.	46.2 28.	7 1-LANE SEASONAL old road SW of RR. Rice paddies.
CALUMPANG Rd Junc. Branch south seasonal.	45.0 28.	0
River CG 99ft.	44.9 27.	9
MALOLOS. Two small masonry arch bridges. Branch NE and east to Route 3C and 3B. Route 51C ends; Route 51B begins, SE	39.4 24.	5 1-LANE SEASONAL ENDS. 2-LANE AW BLACKTOP BEGINS. Rice paddies swamp and fish ponds. 51C: 51B.

#### ROUTE 51B:

Detail	Distance to Km	Manila Ml	Class and Terrain
River CG 33 x 15 x 16ft.	37.2	23.1	
Estero de MATIMBO CG 29ft.	33.9	21.1	
SAN NICOLAS R. Ms Arch 21ft.	30.8	19.1	
BULACAN.	29.6	18.4	2-LANE ENDS, 1-LANE BEGINS.
Branch NE is Route 61B to Route 3B. Route 51B runs south.			1-LANE AW BLACK- TOP.
BAMBANG. Route 51B turns SE.	27.7	17.2	Rice paddies and fish ponds. Occasional clumps bamboo.
TALIPTIP R-TW 356ft.	25.2	15.7	
BULACAN R. South bank TW approx 750ft.	22.4	13.9	
MEYCAUAYAN R. South bank TW approx 900ft.	22.0	13.7	
OBANDO.	17.0	10.6	
Rd Junc Branch south (ahead) 1-lane seasonal cutoff for 3 km. Route 51B turns NE (left).	16.3	10.1	
POLO. Branch NE (ahead) is Route 61A to POLO Sta and Route 3B. Route 51B turns SE (right).	15.7	9.8	
Rd June Branch SW (left) 1-lane AW about 4 km to MALABON. Two important bridges, are about 180ft and one 210 x 12 x 10ft (6 spans).	14.5	9.0	1-LANE AW BLACK- TOP.
Stone Arch Prov Bdry BULACAN-RIZAL.	14.2	8.8	
Rd June Branch west (right) and NW seasonal cut-off for 3 km (1.8 mls).	12.7	7.9	
TINAJEROS R MA 240 x 16ft (7 arches)	11.4	7.1	
Rd Cr Route 54 "Circumferential road" runs east (left) 1.4 km to Bonifacio Monument on Route 3A. West (right)	7.4	5.5 4.6	Recorded. Scaled. 1-LANE ENDS. 2-LANE BEGINS.
5.2 km (3.2 ml) to Navotas.  Note: Distance discrepancy of 1.4 km (0.9 ml).			BEGINS.
Route 51B ends; 51A begins.			51B: 51A.
CALOOCAN. RR workshops.	6.7	4.2	
MAYPAJO, cockpit east (left).	5.0	3.1	2-LANE AW BLACK-
Estero de VITAS CB. School east (left) Continue south on Calle JUAN LUNA.	3.0	1.9	TOP.

#### Route 51A-continued.

Detạil	Distance to Km	o Manila Ml	Class and Terrain
At Calle S FERNANDO turn east (left) into Calle ROSARIO, then SE (right).	0.9	0.6	
PASIG R, JONES Bridge 5 RC arches.  Spans total about 325 x 54ft.	0.4	0.3	
GPO MANILA.	0	0	

#### ROUTE 52-Ipo Dam to Manila (29.5 mls):

One-lane AW for approx. 25 mls, then 2-lane

One-tane Aw for app	IOA. 20 III	us, un	2-lane
Detail	Distance to Km	Manila Ml	Class and Terrain
IPO Dam. Trail leads to tunnel.	47.5	29.5	1-LANE AW BLACK- TOP.
Route 52 climbs steeply SW. End of steep climb.	46.5	28.9	101.
Crest-elev approx 500ft.	43.0	26.7	
Rd June Branch NW (right) is Route 65B. 1-lane AW about 8 km (5.0 ml) to NORZAGARAY.	41.2	25.6	
Route 52 levels out in rolling hills.	38.5	23.9	
ARANETA.	29.5	18.3	
Rd June Branch west (right) is Route 64, 1-lane AW 4.5 km (2.8 ml) to Route 63.	29.0	18.0	BLACKTOP ENDS: GRAVEL BEGINS. Many big farm houses.
SAPANG ATAT R. PROV BDRY RIZAL-BULACAN.	27.2	16.9	
Rd June Branch west (right) about 0.5 km (.3 ml) to large 3-storey brick seminary.		14.5	
Rd June Branch south (left) 3.3 km to NOVALICHES dam.	22.2	13.3	Rolling hills, mango groves and grassland.
NOVALICHES. Branch west (right) is Route 62, 1-lane	17.7	11.0	
AW 9 km (5.6 ml) to Route 3B near MALINTA.  Route 52 runs south.			
TULIAHAN R CG about 80 x 16 x 20ft. Unfordable steep banks.	17.5	10.9	1-LANE AW GRAVEL SURFACE.
Rd Cr BANLAT Rd.	12.5	7.8	
Rd Cr Calle DARAPA.	10.8	6.7	
BALINTAWAK. Rd Cr on Route 54. "Circumferential road." East (left) to QUEZON CITY. West (right) 1.7 km to Route 3A at BONIFACIO Monument. Note: Distance discrepancy 1.6 km (1.0 ml).	9.2 7.6	5.7 4.7	Recorded. Scaled. Gravel ends, blacktop begins. 2-LANE AW.

#### Route 52-continued.

Detail	Distance to Km	Manila Ml	Class	and Terrain
Rd Junc Branch west (right) to Philippine Air Taxi hangars. Continue southwards.	5.5	3.4		
RRX. SAN LAZARO race track west (right).	3.3	2.1		
Turn SW (right) into QUEZON AVENUE.	2.6	1.6		E CT
BILIBID prison west (right). Continue south.	1.3	0.8		
PASIG R. Quezon Bridge. Steel arch 336 x 65ft. Vertical clearance 24.8ft above mean level; river opening 336ft.	0.4	0.3		
GPO MANILA.	0	0		

#### ROUTE 53-Montalban Dam to Manila (20.9 mls):

AW road; 1-lane for 16.6 mls, then 2-lane

Detail	Distance to Manil Km Ml	Class and Terrain
Caretaker's house 0.7 km (0.4 ml) from gate-house of MONTALBAN Dam (near Wawa barrio).	33.6 20.9	1-LANE AW. Gravel; winding in mountain gorge.
River. CG 88.5 x 14ft (3 spans).	33.1 20.0	5
MONTALBAN. Route 53 turns south (left).	28.6 17.8	1-LANE gravel ends. 2- LANE AW BLACKTOP begins.
MONGO R CG 144 (2-72ft arches).	27.4 17.0	Down Montalban Valley.
SAN MATEO.	23.0 14.3	
NANCA R CG (flow 4830cu ft per sec max).	20.6 12.8	
MARIKINA. Rd Junc Branch south (ahead) 1-lane AW asphalt 5.5 km (3.4 ml) to Route 21B at ROSARIO.	15.9 9.9	Rice paddies in valley 1-2 mls wide. Patches of low forest.
Route 53 turns west (right).		
MARIKINA R Sts 422ft (3 trusses).	15.7 9.0	3
Rd June Branch north (right) 1-lane AW to BALARE filters 3.6 km (2.2 ml) and NW BANLAT Rd, 1-lane AW about 10 km (6.2 ml) to Route 52.	13.7 8.5	

ROUTE 53-continued.

.0	5.7	Recorded Scaled. 2-LANE TOP.		BLACK
.9	4.3		AW	BLACK
.9	4.3		AW	BLACK
	1			
.9	3.7			
.2	2.0			
.4	0.9	Through	San	Miguel.
.3	0.8			
.1	0.7			
.5	0:3			
	0			
	1 )5	0.5	0.5	0.5 0:3

#### ROUTE 54-Manila circumferential road (17.3 mls):

#### Two-lane AW road

Detail	Distance to Km	Manila Ml	Class and Terrain
Starting at 6.8 km (4.2 ml) Rd June on Route 1 near south end of DEWEY Boulevard.			2-LANE AW. Gravel surface.
Rd Junc with TAFT Ave extension, thence eastwards.	0.8	0.5	
RRX. Thence NE.	2.6	1.6	
Rd crossing on Route 57, Pasay to FORT McKINLEY Rd. NIELSON Airport on west (left).	4.2	2.6	
Tramline X of Manila Electric street car line to PASIG.	5.5	3.4	
			SURFACED ROAD ENDS ABOUT HERE. PARTLY GRADED OR SURVEYED ONLY.

#### ROUTE 54-continued.

Detail	Distance to Km	Manila Ml	Class and Terrain
GUADALUPE on Route 21. Proposed road turns north.	6.8	4.2	
Proposed bridge over PASIG R. No evidence of work started.	6.9	4.3	
RRX.	7.0	4.4	" " " " " " " " " " " " " " " " " " "
Rd Cr on PASIG Boulevard. WACK WACK golf club left.	8.6	5.3	2-LANE AW. GRAVEL BEGINS.
Curves NNW. ZABLAN A/F on east (right) Camp CRAME west (left).	10.7	6.6	
Rd Cr on Route 53 at CUBAO. ROSARIO HEIGHTS hospital east (right).	13.2	8.2	
SE corner of QUEZON CITY square.	14.4	9.0	
Center of QUEZON CITY square.	15.9	9.9	and the second
NW corner of QUEZON CITY square.	17.4	10.8	GRAVEL ENDS. BLACKTOP BEGINS.
Rd Cr Route 52 at BALINTAWAK.	20.8	12.9	- 10 000
Rd Cr on Route 3A BONIFACIO Monu-	22.5	14.0	
RRX.	23.6	14.7	
Rd Cr on Route 51A.	23.9	14.8	
MALABON R CG 183 x 26ft (4 spans).	25.6	15.9	
MALABON. Branch NW (right) 1-lane AW 2.5 km (1.6 ml) to MALABON Sugar Refinery, thence to Route 51B.	26.1	16.2	
NAVOTAS R CG 266ft (9 spans).	26.5	16.5	
NAVOTAS on MANILA Bay.	27.8	17.3	

(Route 54 ends.)

#### ROUTE 57:

Detail	Distance to	Manila Ml	Class	and	Terrain
Route 57 commences at 9 km (5.6 ml) Rd Junc on Route 21 at north gate of FORT McKINLEY. Runs south through FORT McKINLEY.		8.6	2-LANE TOP.	AW	BLACK-
RRX Manila electric tramline.	13.5	8.4			
Post Headquarters.	12.3	7.7			

Route 57-continued.

Detail	Distance to Km	Manila Ml	Class an	d Terrain
South gate. Route 57 runs west. Cemetery south (left).	11.1	6.9		
Rd Cr on Route 54.	8.8	5.5	Rolling grante	
Rd Cr. Branch NE (right) 1-lane AW 2 km (1.2 ml) through NEILSON Airport to Route 21A. Branch SW (left) 1.2 km (0.7 ml) to Route 54.	8.1	5.0		
RRX at CULICULI.	7.0	4.4	2-LANE A	W BLACK
Rd Cr on TAFT Ave-extension.	5.5	3.4		
Rd June of Calle LIBERTAD and DEWEY Boulevard (Route 1A). Polo Club south (left).	4.6	2.9		

(Route 57 ends.)

#### ROUTE 58:

#### Summary:

This is a small but important branch running east from Baclaran at 6.6 km (4.1 ml) on Route 1 to Nichols Field—about 0.5 km (0.3 ml) of 1-lane, AW road.

Bridge over Paranaque R is TW 50x16x18ft approx. Unfordable.

Demolition of houses in this area reported recently, indicates widening of this branch road and bridge to 2-lane (confirmed by photos).

(Route 58 ends.)

#### ROUTE 59—Alabang to June Route 21B (11.1 mls):

A 1-lane AW road

Detail	Distance to Km	Manila Ml	Class and Terrain
ALABANG Rd June at 24.6 km (15.3 ml) on Route 1B. Route 59 runs east.	28.1	17.5	1-LANE AW GRAVEL, Rough surface.
RRX. ALABANG Station.	27.7	17:2	
Rd June Branch south (right) is old lake shore trail—bridges in disrepair and of little military value. Route 59 turns north (left) along lake shore.	27.5	17.1	
River TW 99ft.	27.2	16.9	Runs between Laguna de Bay and Manila RR.

Route 59-continued.

Detail	Distance to Km	Manit. Ml	Class and Terrain
River TW 100ft.	27.0	16.3	
River TW 50ft. Route 59 crosses a RR spur.	24.0	14.9	
River TW 48ft.	22.0	13.7	Flat rice paddies.
River TW 54ft.	19.8	12.3	Rolling grassland west.
HAGONOY. Route 59 leaves lake shore.	16.5	10.3	
Tagig R TW 217ft. Unfordable. Town of TAGIG both sides.	15.0	9.3	1-LANE AW GRAVEL ENDS.
			BLACKTOP BEGINS.
PATEROS. Route 59 turns west (left).	12.5	7.8	
TAGIG R CG 142 x 20ft (4 spans).	12.3	7.7	
Route 59 runs north under the west end of PASIG R Bridge to a Rd Junc on Route 21B at 10.3 km (6.4 ml).	10.3	6.4	

(Route 59 ends.)

#### ROUTE 60A-Maybancal to Taytay (11 mls):

#### One-lane AW for 7.2 mls, then 2-lane

Detail	Distance to Km	Manila Ml	Class and Terrain
MAYBANCAL. Route 60A starts at 47 km (29.2 ml) on Route 21C. Runs NW.	40.0	24.9	1-LANE AW GRAVEL. Climbing in hills. Patches heavy forest.
Crest of saddle (elev about 300ft). Descends with many side-cuts.	37.9	23.5	
MORONG R, TW 100ft.	36.0	22.4	
TERESA. Route 60A turns north, climbs steeply.	34.5	21.4	
High point (elev about 800ft).	30.5	19.0	
ANTIPOLO Mun (elev about 600ft).  Branch road NW is Luzon Bus Coy private road about 10 km (6.2 mls) to Route 21B. Route 60A runs west.	28.5	17.7	1-LANE ENDS, 2-LANE AW BEGINS. BLACK- TOP. Many steep hills. Several good hard rock quarries.
TAYTAY on Route 21B.	22.3	13.9	

(Route 60A ends.)

#### [SECTION 3]

#### ROUTE 60B (7.9 mls)

#### Summary:

From Rd June 60.5 km (37.6 ml) on Route 21C, on the eastern shore of Leguna de Bay, Route 60B runs southwards. It is 1-lane, AW. 3.2 km (2.0 ml) to Quisao, thence 9.5 km (5.9 ml) to Jalajala. Total rength 12.7 km (7.9 ml).

(Route 60B ends.)

#### ROUTE 61A (1.2 mls):

#### Summary:

A short but important 2-lane, AW, blacktop road link between Polo RR station at 15.8 km (9.8 ml) on Route 3B westwards to Route 51B at Polo, total 1.9 km (1.2 ml).

It crosses Polo R by a CG bridge about 70x18ft (unfordable, tidal, mud banks and bottom).

An unconfirmed branch runs NE from Polo R bridge to Route 3B at 16.9 km (10.5 ml); total about 1.7 km (1.1 ml).

(Route 614 ends.)

#### ROUTE 61B-Bigaa to Bulacan (2.7 mls):

Two-lane AW road

Detail	Distance to Km	Manila Ml	Class	and To	errain
BIGAA on Route 3B. Route 61B runs west.	30.7	19.1	2-LANE TOP.	AW	BLACK
Rd Junc. Branch north 1-lane AW 1 km (0.6 ml) to BIGAA RR stn, crossing Route 3B.	31.1	19.3			
Rd Junc. Branch north 1-lane AW 1.7 km (1.1 ml) to Route 3B.	33.0	20.5	Low rice	land.	
GUIGUINTO R, STs 179ft.	34.1	21.2			
BULACAN, on Route 51B.	35.1	21.8			
(Route	61B ends.)				

ROUTE 62-Malinta to Novaliches (5.6 mls):

#### Summary:

This is 1-lane AW. Runs NE from Route 3B at 13.7 km (8.5 ml) near Malinta, in gently rolling grassland 9.0 km (5.6 ml), to Novaliches on Route 52.

No important bridges nor towns.

(Route 62 ends.)

#### ROUTE 63-Marilao to San Jose del Monte (8 mls):

Detail	Distance to Km	Manila Ml	Class and Terrain
MARILAO Rd June on Route 3B. Route 63 runs NE.	22.2	13.8	1-LANE AW.
RR stn, crossing, road continues up north (right) bank of MARILAO R.	22.7	14.1	Gently rolling grassland.
Creek CG 23ft.	28.0	17.4	
Rd Cr Route 64.	33.2	20.6	
SAN JOSE DEL MONTE.	35.0	21.8	
(Route	63 ends.)		

#### ,

#### ROUTE 64 (8.1 mls):

#### Summary:

A branch running east from Sta Maria on Route 65A for about 13 km (8.1 ml) to Route 52.

It is said to be 1-lane, AW, gravel surface for about the first 3 km (1.9 ml), thence blacktop.

It crosses Route 63 about 1.8 km (1.1 ml) SW from San Jose del Monte.

Terrain rolling farm land, rising by easy grades to about 300 ft at Route 52.

(Route 64 ends.)

## ROUTE 65A—Bocaue to Norzagaray (11.7 mls): A 2-lane AW road

Detail	Distance to Km	Manila Ml	Class and Terrain
BOCAUE Rd June on east side of Bocaue R, Route 65A runs NE.	. 27.2	16.9	2-LANE AW GRAVEL SURFACE.
RRX at BOCAUE Station.	27.8	17.3	Level cultivation.
STA MARIA R. (Note: JANIS Report 1944 refers to one STa 160ft and 6 x 33ft CG Spans. Tot.l bridge 358ft long. Not confirmed.)	31.5	.19.6	
STA MARIA. Branch east is Route 64, 13 km (8.1 ml) to Route 52. Route 65A turns north (left) through town.	32.0	19.9	
Rd Junc. Branch west is 1-lane AW 5.6 km (3.5 ml) to Route 3B. Route 65A turns NE (right).	33.5	20.8	

#### Route 65A-continued.

Detail	Distance to Km	Manila Ml	Class and Terrain
CATNON R, TW.	36.3	22.6	
Climbs gently in rolling hills.	39.0	24.2	Rolling hills.
High point about 300ft. Road descends.	42.0	26.1	
Rd June. Branch NW is Route 65C.	45.0	28.0	
Route 65A continues NE. Rd Junc. Branch south is Route 65B.	45.6	28.4	
NORZAGARAY on ANGAT R.	46.0	28.6	

(Route 65A ends.)

#### ROUTE 65B (5 mls):

#### Summary:

This is 1-lane AW connecting Routes 65A and 52. Route 65B runs south then SE from Route 65A. It climbs between steep forested hills over a saddle of about 400ft elevation. No details of upkeep.

(Route 65B ends.)

#### ROUTE 65C-Plaridel to Norzagaray (20 mls):

This is 1-lane AW

Detail	Distance to Km	Manila Ml	Class and Terrain
PLARIDEL (QUINGUA) on Route 5A. Route 65C runs NE.	41.8	26.0	1-LANE AW GRAVEL SURFACE. Winds along south (left) bank of Angat R, low rice paddies.
RRX.	42.0	26.1	
Rd June. Branch south (right) is Route 66B 10.0 km (6.2 ml) to BIGAA on Route 3B. Route 65C turns north (left) 4 small concrete or masonry bridges.	46.0	28.6	
BUSTOS. Branch west (left) about 1 km (0.6 ml) to ferry crossing of ANGAT R to Route 5 at BALIUAG. Route 56C turns east. Many small concrete bridges.	53.2	33.1	
Rd Junc. Branch north to a dry season ford over ANGAT R to PULO on Route	67.2	41.8	
88B, total 1.5 km (0.9 ml).	68.5	42.6	Narrow defile between hills and river.

#### Route 65C-continued.

Detail	Distance to Km	Manila Ml	Class and Terrain
ANGAT. Irrigation Dam to NW.	70.5	43.8	1-LANE AW GRAVEL SURFACE.
Rd June on Route 65A at its 45.0 km (28.0 ml) post, 1 km (0.6 ml) west of NORZAGARAY.		46.0	

(Route 65C ends.)

#### ROUTE 66A (6.3 mls):

Detail	Distance to Km	Manila Ml	Class	and Terrain
BIGAA on Route 3B, Route 66A runs	30.7	19.1	1-LANE	AW.
BIGAA RR station. Branch SW (left) 1-lane AW 0.6 km (0.4 ml) to Route 3B.	31.8	19.8		
Rd June Branch east (right) is Route 66C.	34.3	21.3	1-LANE through	SEASONAL rice paddies.
Route 66A ends; and 66B begins and continues north subject to flooding in wet season.				
Rd June with Route 65C.	40.8	25.4		

#### ROUTE 66C (3.8 mls):

Detail	Distance to Km	Manila Ml	Class and Terrain
Route 66C runs NE from Rd Junc on Route 66A.	34.3	21.3	1-LANE SEASONAL through rice paddies.
BIGAA R. Wood and masonry 70ft.	36.4	22.6	
PANDI. From here trails suitable for jeeps run south and NE to Route 65A.	40.4	25.1	

(Route 66C ends.)

# [SECTION 3] ROUTE 68 (5.4 mls):

Detail	Distance to Km	Manila Ml	Class and Terrain
Rd Junc on Route 5A at 41.9 km (26.0 ml). Just south of PLARIDE!. (QUINGUA) bridge. Route 68 runs west.	48.1	29.9	1-LANE AW GRAVEI SURFACE. Low rice paddies.
PLARIDEL (QUINGUA). Branch south (left) 1.4 km (0.9 ml) to Route 5A. An old seasonal road winds north and west along the south (left) bank of ANGAT (QUINGUA) R to Route 3C at start of Route 51C.	47.3	29.4	No important bridges but many built-up sections.
Route 68 continues west and SW. Rd Cron Route 3C at 41.3 km (25.7 mls), also crosses RR.	40.5	25.2	1-LANE AW GRAVEL SURFACE.
MALOLOS. Where it joins Route 51B.	39.4	24.5	

(Route 68 ends.)

ROUTE 69—Malolos to Calumpit Road Junction (11.4 mls):
1-lane AW Road

Detail	Distance to Km	Manila Ml	Class and Terrain
MALOLOS on Route 51B. Route 69 runs west.	39.4	24.5	1-LANE AW.
CALANATA. CG-116ft.	41.2	25.6	Rice paddies. Many built-up sections and small bridges.
PAOMBONG. CG-49ft.	42.0	26.1	
River CG-46ft.	44.0	27.3	
River STs 208ft.	44.8	27.8	
HAGONOY Rd June Branch south (left) 1-lane AW 1 km (0.6 ml) to town of HAGONOY, thence south and east, seasonal road for about 5 km (3.7 ml) along left bank of MARULAO R, a seasonal branch also follows west (right) bank of HAGONOY R; thickly settled area. Route 69 turns north (right) up east (left) bank of HAGONOY R. Many small creeks with wood bridges.	46.0	28.6	Very thickly settled area along river banks.
Rd June Branch east seasonal road into rice paddies.	50.0	31.1	
CALUMPIT Rd June on Route 3C, 50.0 km (31.1 ml) from MANILA.	57.7	35.9	1-LANE AW.

(Route 69 ends)

#### ROUTE 70 (5.8 mls):

Detail	Distance to Km	Manila Ml	Class and Terrain
Rd Cr on Route 3D, Route 70 runs SW	54.0	33.6	1-LANE AW GRAVEL SURFACE.
RRX.	55.2_	34.3	
FRANCISCO R, STs 141 x 14 x 16ft	56.7	35.2	Rice paddies.
DOMINGO R, STs 102 x 15 x 14ft.	57.6	35.8	A-
River, STs 82 x 14 x 11ft.	58.1	36.1	
MACABEBE Seasonal branch roads follow banks of river, TW bridge 37 x 11 x 8ft in turn.	61.4	38.2	Thickly settled area along river banks.
MASANTOL	63.4	39.4	

(Route 70 ends.)

#### ROUTE 88B (9.2 mls):

Detail	Distance to Km	Manila Ml	Class	and Terrain
Rd June on Route 5A. Route 88B runs east along north (right) bank of ANGAT R.	53.3	33.1	1-LANE land.	AW'. Flat farm
River. CG 92ft. Several small bridges.	53.7	33.4		
SAN RAFAEL.	59.0	36.7	1-LANE seasonal	AW ends; begins.
PULO Rd Junc. Branch south 1.5 km (0.9 ml) to Route 65C, over a dry season ford on ANGAT R.	64.8	40.3		
SANTA LUCIA. Trails extend north and east to mountains.	68.1	42.3		

(Route 88B ends.)

#### ROUTE 91 (12.2 mls):

Detail	Distance to Km	Manila Ml	Class and Terrain	
Rd June on Route 5A. Route 91 runs NE.	78.4	48.7	2-LANE AW GRAVEL	
RRX.	78.9	49.0	Gently rolling, patches second growth forest.	
SAN MIGUEL or MADLUM R. CG 210 x 9 x 22ft.	88.4	54.9		

Route 91-continued.

Detail	Distance to Km	Manila Ml	Class and Terrain
SIBUL SPRINGS.	89.2	55.4	
Route 91 turns south.			2-LANE ENDS; 1-LANE AW BEGINS; GRAVEL.
BALICULING R. Route 91 turns SE.	93.7	58.2	1-LANE AW ENDS; SEASONAL BEGINS.
BIAK-NA-BATO NATIONAL PARK.	98.0	60.9	

(Route 91 ends.)

#### 3. DETAILED DESCRIPTION OF TRAILS:

#### TRAIL NO 1: Tanay to Infanta (about 4 days):

Commencing at Tanay (14°30'N, 121°17'E) on Route 21C, a foot trail runs eastwards to Infanta on the east coast of Luzon.

First section to Sampaloc can be covered in about 9 hours. In 1941 there were two separate new mining roads under construction, both roughly graded, with some surfacing and would probably need very little work to make them at least suitable for jeeps. Terrain is mountainous, grades generally upwards to about 1200 ft at Sampaloc. Patches of forest and grassland.

From Sampaloc to Santa Cruz goldmine (about 1 day) trail was rougher and with steeper grades. In 1941 some roadwork had been done on this section, but no surfacing had been applied; present condition is not known. Grades are very steep for about the first 2 mls, climbing to about 1600 ft. Rio Grande De Binanoonan, or Kiliva, R is crossed just before reaching Santa Cruz mine.

#### TRAIL NO 2: Sampaloc to Angelo Mine (about 3 days):

Well-beaten but extremely rough and difficult trail northwards to Angelo Goldmine and airfield.

First day's section to San Andres is fairly easy going to Qumbay, with only one difficult stream crossing; thence grades are very steep. Branch trail runs NE to Leyban, a small farming and goldmining barrio.

From San Andres to Santa Ines is estimated to take about 8 hours, fairly hard going up Lenatin R, mostly in forest. Pack animals could be used as far as Santa Ines.

From Santa Ines to Angelo Mine takes about 14 hours of extremely steep and rough going, mostly in heavy forest, climbing most of the way. Pack animals cannot be used on this section.

Place names mentioned on this trail had a few nipa or grass huts only. Ample drinking water was available at numerous streams.

An unconfirmed report indicates that this trail extends northwards to Luzon Mining Coy, about 4 hours. Unconfirmed trails,

suitable for patrol activities, are reported to run eastwards from both these mining camps to the east coast.

#### TRAIL NO 3: Antipolo to Santa Ines (about 12½ hours):

Commencing at Antipolo (14°35'N, 121°10'E) on Route 60A, Trail No 3 runs NE.

First section to Bosoboso takes about  $3\frac{1}{2}$  hours. It is well-beaten foot and animal sled trail, following crest of a ridge most of way, with easy grades, and only one stream crossing which may become difficult in flood. It runs mostly through grassland, with patches of second growth. From a junction with Trail No 4, about 1 ml west of Bosoboso, Trail No 3 descends to fertile valley, thickly populated and producing important supplies of rice around Bosoboso barrio.

From Bosoboso to Santa Ines takes about 9 hours hard going. It is well-beaten trail, but there are at least 3 stream crossings which are difficult in flood time. Steep climb through heavy forest to wide, rolling grassy area along San Ysidro (pronounced locally San Shiro) Valley; thence up another steep winding section in forest to Santa Ines on Trail No. 2.

There was originally some farming and cattle-ranching along this trail, but since Japanese occupation most of the farming population has been concentrated in Bosoboso area, and very little food can be obtained beyond this center.

#### TRAIL NO 4: Bosoboso to San Mateo (about 4½ hours):

From a junction on Trail No 3 about 1 ml west of Bosoboso, Trail No 4 runs NW along the crest of mountain spurs at average elevation of about 1200 ft.

With exception of one steep gorge, this trail runs fairly level to east side of Marikina Valley, where it descends steeply to wide fertile farming area at San Mateo.

Most of mountain section of this trail is through open cogon country with good view of entire Manila area most of way. In Jul 44 trail was in good condition, but due to sparse population it may quickly become overgrown with cogon grass. It was stated that this area was normally burnt off in Dec.

In dry weather there was no drinking water along this trail.

Many trails branch from and cross this trail, chief of which lead to Wawa and Montalban on Route 53.

#### TRAIL NO 5: San Ysidro Valley to Wawa (3 days):

Commencing at the open grassy area at San Ysidro Valley, referred to on Trail No 3, just west of Santa Ines, Trail No 5 follows down Tayabasan, Montalban and Marikina in turn to Montalban dam (Photo 25) near Wawa.

It winds down steep-sided gorges in heavy forest, and is extremely rough going, probably impassable in flood.

A branch trail runs north from Bosoboso across Payaguan R to Trail No 5 just east of Mt Purro, about 4 hours hard going. Other trails follow streams which lead down to Trail No 5.

These trails have been of great value in guerilla warfare.

#### [SECTION 3]

TRAIL NO 6: Norzagaray to Tablang:

Commencing at Norzagaray (14°55′N, 121°03′E) on Route 65A, Trail No 6 runs northwards to Tablang on Route No 95. It represents the easterly edge of large network of trails which run through foothills, between Route 5 and the Sierra Madre (Mts) to the east, usually along crests of ridges in open rolling country with frequent patches of high forest.

Main towns connected by this trail are Akle, Sibul Springs and

Penaranda.

Numerous foot trails follow heavily forested mountain gorges eastwards for varying distances, but no record has been found of any of these crossing the mountains to east coast.

Habitation in the watershed reservations is very limited and

trails in this area are not at all well established.

#### 4. BRIDGE INFORMATION:

#### Abbreviations used:

Size in ft (Length, Width, Height)			Construction	Co	Coordinates		
	99			TW	14°25½′N	121°3′E	59
1	00			TW	14°26′N	121°3′E	59
	50			TW	14°27′N	121°3′E	59
	18			TW	14°28′N	121°3′E	59
9	99			CA	14°28′N	120°58'E	1A
	36			SA	14°29'N	121°18½'E	210
	31	16		CA (98' arch)	14°29′N	120°58½′E	1A
	54			TW	14°29′N	120°3½'E	59
-	2			CA	14°29½'N	121°10½'E	21B
8	19			CA	14°30′N	121°17′E	21C
25		21.5	_	(8 span)	14°30′N	120°59½′E	1A
	6			MA	14°31′N	121°14′E	21C
70		54		(5 arches)	14°35½′N	120°58½′E	1A
31		4 way		STs (3 double truss)	14°35½′N	120°58½'E	1A
140	O	03	.	SA River span one 336' as	14°35½′N	120°59'E	1A
44	7	60		ST (2 double truss)	14°35½'N	120°59'E	1 <b>A</b>
31		20	[	STs (1 truss 240')	14°35′N	121°1′E	21A
7		26?		CG	14°36½'N	121°1½′E	53
8		14?		SG	14°36′N	121°2′E	53
21				TW'	14°31½'N	121°4½'E	59
6			-	CA	14°31½'N	121°9′E	21B
5		18	18	$\mathbf{TW}$	14°31½'N	121°0′E	1A
3	3			CA	14°31½'N	121°16′E	21C
14		20		CG (4 span)	14°33′N	121°4′E	59
10				TW	14°33′N	121°13′E	60A
43				STs	14°33′N	121°4′E	21A
64		20		STs (4 truss)	14°34′N	121°4′E	21A
9		26		(1 span 52)	14°34½′N	121°8′E	60A
423				STs (8 truss)	14°38′N	121°5½′E	53
266		96		(9 span)	14°39′N	120°17′E	54
183		, 26		(4 span)	14°39½′N	120°17′E	54
24(		10		(10 arches)	14°41′N	120°18′E	3A

#### [SECTION 3]

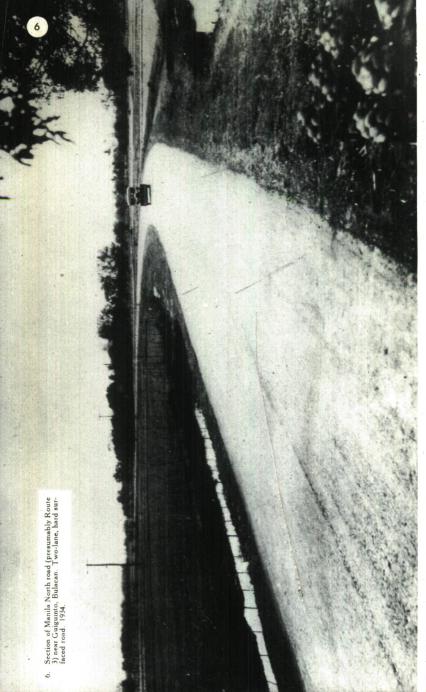
Bridge Information-continued.

Size in ft (Length, Width, Height)		eight)	Construction	Coordinates .		Route
99	18		CG (3 span)	14°40½′N	120°19′E	3B
210	12	10	CG	14°41′N	120°56½'E	54
200	(approx)		CG	14°41½'N	120°56½'E	54
53			CG	14°42′N	120°58′E	3B
144			CG (2 span)	14°42½'N	121°8′E	53
69 ?			CG	14°42½'N	120°57′E	61.
88	14		CG (3 span)	14°44′N	121°10′E	53
244	16		STs (2 truss)	14°44′N	120°58′E	3B
162	15	8	(old)	14°44′N	120°57½'E	3B
900	(approx)		$\mathbf{T}\mathbf{W}$	14°44½′N	120°54½'E	51
750	(approx)		TW	14°45′N	120°54½'E	511
218	18		CG	14°46′N	120°57′E	3B
115.0			(6 span)			51
356		yı 📗	TW	14°46′N	120°54′E	3B
236	18	-	(6 span)	14°48′N	120°55½'E	3B
179			STs	14°48′N	120°52½'E	511
33			STs	14°50′N	120 522 E 120°58′E	65
157			STs	14°49′N	120°53½'E	3B
131			(2 truss)	14 47 11	120 332 13	
185	20		CG (8 span)	14°50′N	120°52½'E	3B
118			CG	14°50'N	120°48'E	69
46			CG	14°50'N	120°46′E	69
208			STs	14°50'N	120°45'E	69
53			SG	14°57′N	121°2′E	- 65
210	9	22	CG	15°10'N	121°3½'E	91

#### 5. ROAD DISTANCES FROM MANILA:

These are shown in the table on the next page.





APPROXIMATE ROAD DISTANCES FROM MANILA (Province and main route number shown in brackets)

- Bulacan; Lag - Laguna; Pam - Pampanga; Riz - Rizal) (Bul

To	M	MANILA	To	MANII.A	I A
	km	lm u		km	ml
ALABANG (Riz 1B)	24.6		Z	17.4	10.8
(Bul 650	46	8 29.1	AN (I		16.8
	28.		MORONG (Riz 21C)		28.9
=	29.		UPA	27.8	17.3
	51.				7.1
1 3B)	29.	0 18.0	7		27.5
NAN	36.9	_	HES (Riz 5		10.0
Bul 3B)	25.	5 15.8	TI I		7.9
0	7.	4	PAOMBONG (Bul 69)		26.9
	28.		PARANAQUE (Riz 1A)		0.9
2	20.6	6 12.7	PASAY (Riz Taft)	5.8	3.6
Z	6		PASIG (Riz 21A)		7.8
(Riz 21C)	42.3	3 26.2	PATEROS (Riz 59)	13.4	8
Z	12.			58.4	36.2
GUIGUINTO (Bul 3B)	32.	6 20.2	PLARIDEL (QUINGUA) (Bul 65C)	40.1	24.9
	48.		POLO (Bul 51B)	14.3	8.9
(T	45.		QUEZON CITY	8.7	5.4
	74.4		-	33.4	20.7
$\overline{}$	12.		-	6.9	4.3
MACABEBE (Pam 70)	59.			21.4	13.3
R	7		PEDRO (	31.3	19.5
Rig	9.6	0.9 9	SAN RAFAEL (Bul 88B)	57.3	35.6
MALOLOS (Bul 51B)	40.7		STA MARIA (Bul 65A)	30.3	18.8
YONG	6.		TAGIG (Riz 59)	13.2	8.2
A (Riz	14.3		TANAY (Riz 21C)	55.1	34.2
	19.	8 12.3	TAYTAY (Riz 21B)	23.2	14.4
MASANTOL (Pam 70)	61.	7 38.3			
	1 . 1				

Note: Distances adjusted for slight discrepancy shown in text at junctions with Route 54, the Manila "Circumferential Road."

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## **SECTION 4**

## AIRFIELDS, POSSIBLE SITES AND SEAPLANE ANCHORAGES

(Map 6; Photos 7-15)

## A.—AIRFIELDS.

#### General:

Japanese have been active in airfield construction work in this area, particularly in vicinity of Manila. In this region, known as Manila Air Center, there are 9 operational fields, 1 proposed or under construction and Dewey Boulevard, which has been converted to a take-off strip for newly assembled planes.

All pre-war bases in this area have been materially improved and all the newly-constructed airfields are believed complete with full installations.

## Meteorological:

Winds and climatic conditions are similar throughout area. (See Sec 10).

#### Paratroop Areas:

Airborne operations could be carried out in the vicinity of all fields, except Mt Angelo.

#### Abbreviations:

In this section the following abbreviations apply:

AW—all weather; DW—dry weather; ASL—above sea level; LD—long distance; RR—railroad. Compass points have been abbreviated to N, S, E and W.

## 1. LAS PINAS — 14°28'N, 121°01'E. 40ft ASL.

Operational. (Photo 7).

## Location and History:

1½ mls SE of Las Pinas and 9½ mls SSE of Manila. New Japbuilt field reported as basic training center.

## Runways:

Sep 44 photos show 2 parallel NE/SW strips. One sodded strip completed, other being surfaced, probably with crushed coral. Dimensions are not known. Field considered available DW only. Extension difficult owing to small creeks. Revetted dispersal area N.

#### Terrain:

Fairly level open riceland threaded with several sluggish shallow creeks which discharge into Manila B. Creeks flank field NE and S. 1 ml W near Manila B is an area of swampy salt beds.

## Defences:

See Current Intell Summaries.

#### AIRFIELDS MAP Based on Philippine Is, AMS - 8401 Statute Miles Seaplane Alighting Area Operational Non Operational Pre-war ..... Seaplane Bases\_\_ Proposed. Possible A'F site\_ DINGALAN BAY **AIRFIELDS** 1. Las Pinas 2. MANILA AIR CENTER +Mt Silao ndeba Swamp Nielson (Manila East) M2 Zablan (Manila North) Pasig -I5-M4 Marikina Guagua Ouezon Mb Gruz M5a Quezon (New) Grace Park M7 Mandaluyong Mt Driod M8 Mandaluyong Mt East M9 Balara Mt + Kabungan M10 Nichols Field MII Dewey Marijao-Mb+ Batay Boulevard 3. Mt. Angelo Montalban +ME Caymayumar Taytay Pateros MARIVELES MTS Caridad MAP North Channel Diablo Pass BAGUNA Navotas DE Muntinglupa Corregidor Caballo Talim Island Bongs 121° AGS | HQ 644 | 44 14 Nov 44 Allied Geographical Section

LAS PINAS PARANAQUE landing beach Not MANILA Devey Boulevard Air Strip Nichols field and Las Pinas Airfield and surrounding general terrain. Looking SE. May, 1944.

21 8. Nielson Airfield, Manila. Looking NE. Sep., 1944. Workshops tores and

#### Installations:

Several hutments immediately N. Workshops on creek bank \(^3\_4\) ml W. Eight buildings, possibly barracks S between field and Route 1B and another large building \(^1\_2\) ml farther S across Route 1B.

#### Communications:

Mile long road to Route 1B. Also seasonal roads to Route 1A at Paranaque and Las Pinas. Telephone and telegraph at Las Pinas. Japanese are reported using former Mackay radio station just W of field.

#### 2. MANILA AIR CENTER.

Engineer Supplies:

Engineer materials available to all fields in this center are:

Cement from Rizal Factory at Binangonan on Laguna de Bay, 22 mls SE of Manila. Sand and gravel in large quantities from banks of Marikina R. Crushed stone or aggregate from Talim I quarries (Laguna de Bay). Good water from wells and lines of metropolitan water system.

i MANILA 1 — NIELSON — 14°34′N, 121°01′E. 33ft ASL. Operational. (Photo 8).

## Location and History:

At Culiculi barrio, between Pasay and Ft McKinley, 6 mls SE of Manila. This was private airport of American Far Eastern School of Aviation and Philippine Airlines taken over by US Army. Was equipped with hangars, workshops, etc. Enlarged by Japanese. Runways:

Two pre-war black-topped runways have been enlarged to approx 3960ft × 328ft. The NW/SE runway and approx 2000ft of the NE/SW strip have been paved with concrete. Both can be extended W, and by filling drainage channel extension is possible E. Terrain:

On broad stretch of level riceland lying between Manila RR and Pasig R. Settlements in the vicinity include Malibay, Mandaluyong, Culiculi and Makati.

## Dispersal:

A white-topped taxiway estimated 80ft wide encircles field. Approx 34 bomber revetments E. Area available all directions, but soft in wet weather. No cover.

## Defences:

Intell Summary 245 reports 8 heavy guns (in action) and 13 medium A/A guns (possibly in action) SW corner near Route 57. Installations:

Workshops, stores and hangars N; 1 hangar and barracks area S. Some of these buildings were destroyed and others damaged in recent raid (see photo 8).

#### Communications:

Route 57 immediately S leads W 2 mls to connect with Route 1 at Pasay and E  $1\frac{1}{2}$  mls to Ft McKinley. A new road runs SE to

## [SECTION 4]

Route 54. A spur has been run from the Manila electric railway to field. Manila RR is short distance W. Radio and telephone at field.

ii MANILA 2 — ZABLAN — 14°37′N, 121°04′E. 35ft ASL.
Operational (Photo 9).

## Location and History:

At Camp Murphy 4 mls E of Manila and approx 3 mls NNE of Mandaluyong E field. Was formerly training field and head-quarters of Philippine AAF. Reported greatly improved by Japanese.

### Runways:

Photos show two cleared runways which cross. A newly built NNE/SSW strip 5000-6000ft is S almost parallel to barracks. Other runway NE/SW is thought to be pre-war strip enlarged to approx 3500ft. By draining rice paddies it should be possible to extend NE/SW runway to the SW, and to lengthen NNE/SSW strip at NNE end to 7000ft. Ample dispersal area all round field, although parts may be soft in wet weather. Cover limited to scattered low scrub.

#### Terrain:

Fairly level ground, mostly under rice cultivation, with scattered low scrub. Slowly falling terrain E to Marikina R 1 ml away.

## Defences:

Reports from various sources state large garrison stationed here, but no mention is made of defences. For defence details see current Intell Summaries.

#### Installations:

Japanese are reported to be utilising all pre-war buildings of Camp Murphy and to have constructed barracks and underground storage depots.

#### Communications:

A good 2-way road to Manila roadnet. Nearest rail link at Mandaluyong (S Felipe Neri) 3 mls SW. Barges can use Pasig and Marikina Rs. There was radio and telephone service at field, also commercial radio station  $\frac{1}{2}$  ml N (see photo 9).

iii MANILA 3 — PASIG — 14°35′N, 121°05′E. 20fr ASL. Operational. (Photo 10).

## Location and History:

2 mls NE of Pasig and 8 mls E of Manila. This field started by US Army has been enlarged and improved by Japanese. Reported operational in Jun 44.

## Runways:

An earth field was ready in Jun 44 with NW/SE runway 5940ft × 656ft. A report (Jul 44) states enemy was concreting runway. Extension probable SE to 8000ft. Ample dispersal area all sides, but no cover.

#### Terrain:

Strip located on flat, sandy Marikina Valley, which has as its boundaries Marikina R on W and Sierra Madre Ranges E. Marikina R is 1 ml W and foothills lie  $1\frac{1}{2}$  mls E, just beyond Taytay town. This valley extends for 5 mls N/S to Laguna de Bay.

## Defences:

None is reported. (See current Intell Summaries).

### Installations:

Captured documents make no mention of installations, however, other sources report a small warehouse and gasoline depot.

#### Communications:

A 2-way blacktop road (Route 21) to Manila roadnet. A single track RR from Pasig to Montalban and Taytay is reported abandoned. Whether rails have been removed is not known. Nearest RR is Manila branch line at Pasig. Barges can use Pasig and Marikina Rs. There was LD telephone, provincial telephone and telegraph at Pasig.

## iv MANILA 4 — MARIKINA — 14°38'N, 121°06'E. 40ft ASL.

Operational (Photo 10).

## Location and History:

Three-quarters ml E of Marikina and 9 mls ENE of Manila. US Army Air Corps started a field in this area in 41. Japanese have either continued this work or constructed a new field.

#### Runways:

Japanese planned a NNE/SSW runway 6560ft × 1640ft, photos of May 44 show field usable, but without grass or pavement on the runway. Dimensions probably as planned as length appears limited by rising ground NNE and Marikina R SSW. Sufficient dispersal area E, S and W, but no cover.

#### Terrain:

Located on a 1½ ml wide level plain which extends E from Marikina R to Sierra Madre. Close N the plain is interrupted by a 60ft spur from range jutting out W. The country continues level to S and widens as it approaches Laguna de Bay. Soil is sandy and well drained.

## Defences:

None is reported. (See current Intell Summaries).

#### Installations:

Quarters for 600 men are believed complete.

#### Communications:

Good AW road from Marikina to Manila (Route 53) or via Pasig (Route 21). Pre-war a single-track RR ran from Manila to Montalban via Pasig. The section from Pasig to Montalban has been abandoned. Barges of 6ft draft use Pasig and Marikina Rs to within  $2\frac{1}{2}$  mls of A/F, and 3ft draft boats to Marikina.

[SECTION 4]

v MANILA 5 and 5A — QUEZON FIELD — 14°39'N, 121° 02'E. 80ft ASL.

Operational. (Photo 11).

Location and History:

Reported situated in center of Diliman district, 4 mls NE of Manila and 3 mls NE of Zablan field. A new Jap-built field. It is believed the cross boulevards of Diliman Estate are utilised as runways of main field, with another strip astride Quezon Boulevard 3000 vds to NE.

Runways:

Two cross-runways planned; NE/SW—3937ft  $\times$  164ft; NW/SE—4593ft  $\times$  197ft. They were 20% finished in Feb 44 and scheduled for completion in Jun. The third strip, to NE, was reported E/W—1900ft  $\times$  164ft. Quezon City is not visible in available photos, but portion of E/W strip is visible, astride main highway to new university site.

Cross-runways can be extended along boulevards to about 9000ft. E/W strip is considered to be of maximum length.

Open gently rolling grassland with patches of scrub growth; rice paddies in the hollows.

Dispersal:

Good dispersal areas N and E.

Defences:

None is reported. (See current Intell Summaries).

Installations:

Japanese specifications do not call for installations. Nearby residential houses are undoubtedly used for quarters.

Communications:

Two surfaced highways, 54A and Quezon Boulevard, to Manila. Manila RR at Caloocan 4 mls W. Telephone at field.

vi MANILA 6 — GRACE PARK — 14°39′N, 120°59′E. 35ft ASL.

Operational (Photo 12).

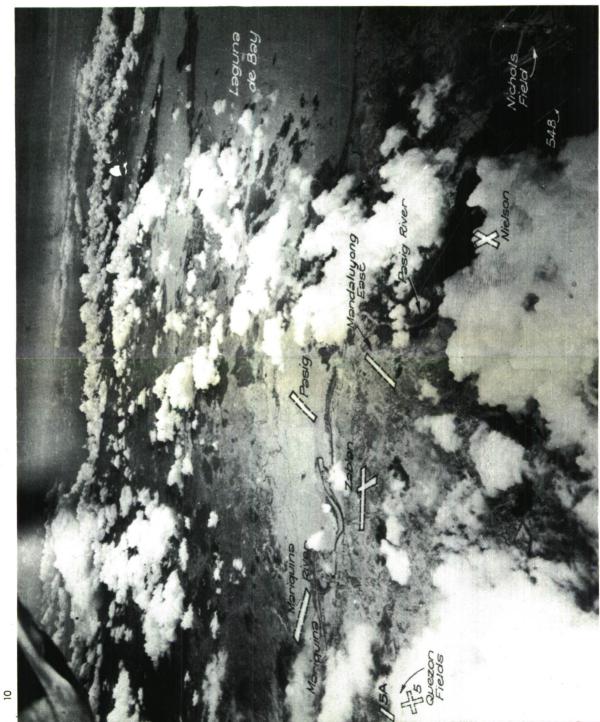
Location and History:

Between Routes 3B and 52 in La Loma barrio, Caloocan, Rizal, 4.3 mls N of Manila. Was private airport of Philippine Aerial Taxi Co. Photos of Sep 44 show Japanese have abandoned old runways and built a concrete strip approx 300 yds N (see photo 12).

Runways:

One, concrete, approx 3860ft × 100ft N/S. Could be extended by 1000ft at S end. A parallel strip of similar dimensions could be built W of present strip by commencing S near cemetery. Pre-war runways were ENE/WSW (black-top) 2730ft × 48ft NNE/SSW (grass) 1380ft × 48ft. They have not been built on and could easily be made serviceable.

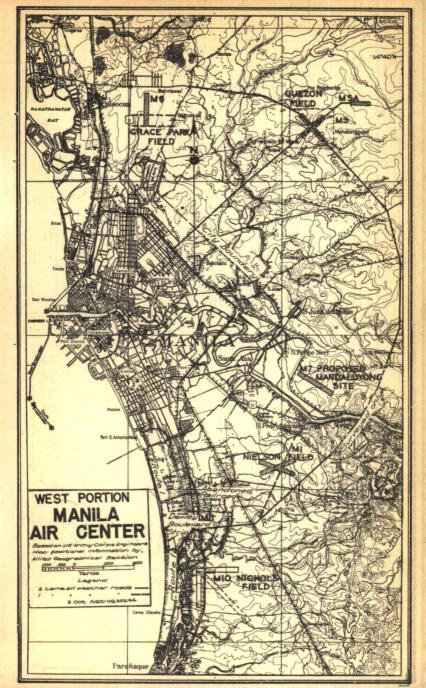
9. Camp Murphy, Rizal: showing position of new Jap-built airfield, Zablan. Looking NW. 1939



10. Relative positions of some of the airfields of the Manila Air Center. Looking east. May, 1944.

11. Site of Jap-built Quezon Airfield at Quezon City, Rizal. Looking NE. 1941.





Terrain:

Clear level area in northern suburbs of Manila. Area is very soft during rainy season.

Dispersal:

Revetments surround the field. There are several graded taxiways.

Defences:

AAF Summary 245 reports 6 medium A/A guns, 1 at S end of concrete strip and 5 along S side of Calle Samson between strip and Route 52. One S/L NE of strip near Calle Samson. A communication trench connects the S/L with a medium A/A position. Many trenches and foxholes near school on Calle Samson. Installations:

Area contains numerous Jap-built installations. Enemy is probably utilising many pre-war buildings surrounding field. (See photo 12).

Communications:

Good feeder roads to Routes 3, 52 and 54A. Manila RR is about 1000 yds W. Telephone at field.

vii MANILA 7 — MANDALUYONG — 14°35′N, 121°02′E.

Proposed A/F. According to a captured document of Feb 44, the Japanese were constructing a field near Mandaluyong barrio on N bank of Pasig R, 4 mls E of Manila. A NW/SE strip 3937ft × 984ft was reported 30% complete and scheduled for completion Jul 44. The only additional information is a report which states that there are two operational fields near Mandaluyong.

There are no good photos of this area, but Sep 44 photos indicate that there is no field at the above location.

The terrain in vicinity of Mandaluyong is gently undulating and it should be possible to construct a field there.

viii MANILA 8 — MANDALUYONG EAST — 14°35'N, 120° 03'E. 80ft ASL.

Operational. (See photo 10).

Location:

A newly constructed Japanese field on Pasig Boulevard near Mandaluyong barrio 5 mls E of Manila; 2 mls NE of Nielson Field.

Runways:

One graded strip NW/SE 3936ft × 984ft running lengthwise astride boulevard. Extensions are possible at both ends. Dispersal area is available N, S and E.

Terrain:

The ground from Pasig R between Guadalupe and Matapanaonabato rises steadily to form an approx rectangular plateau, oriented NW/SE. At SE end of plateau the ground falls away abruptly to a  $\frac{1}{4}$  ml wide river flat near Pasig. The field is on the plateau.

## [SECTION 4]

Defences:

None is reported. (See current Intell Summaries).

Installations:

No information available.

Communications:

Pasig Boulevard connects field to Manila roadnet. RR to Manila ½ ml SE at Pasig.

ix MANILA 9 — BALARA — 14°42′N, 121°05′E. 260ft ASL. Operational. (Photo 13).

Location:

About 1.4 mls S of Novaliches Dam and 12 mls NE of Manila. History:

A former military national airport believed enlarged by the Japanese.

Runways:

Intell reports state Japanese considered enlarging the pre-war grass runways, NW/SE 2625ft × 231ft and E/W 1969ft × 197ft to 3600ft × 600ft. NW/SE strip could be extended S to 5400ft and, with slight cutting and filling, it should be possible to add to E end of E/W strip.

Dispersal area is available on all sides. Secondary growth of little use for concealment.

Terrain:

Gently rolling grassland with sparse secondary growth lining creek beds and shallow valleys. One mile E is Marikina R. E of river is a 1½ ml wide plain then Sierra Madre (Mts).

Defences:

See current Intell Summaries.

Installations:

No information.

Communications:

A 2-way gravel road to Route 52. Manila telephone and telegraph at Novaliches, also telegraph at San Mateo.

x MANILA 10 — NICHOLS FIELD — 14°31′N, 121°00′E. 13ft ASL.

Operational. (Photo 14).

Location:

At Baclaran barrio, Rizal, 4 mls S of Manila.

History:

Formerly a US Army fighter field with full installations. Japanese have enlarged and paved both pre-war runways and are constructing a third one.

Runways:

The pre-war runways N/S and E/W are now both concreted, 3960ft × 297ft. Little progress has been made with the third





strip NW/SE, which bisects the angle formed by the other runways. An area 8700ft × 425ft has been cleared, but not surfaced. The N/S and NW/SE runways are thought to be of max length. E/W strip could be lengthened E to 6600ft.

#### · Terrain:

In the immediate vicinity of field are buildings and creek N; E open grassland; Cutcut Ck is S, swampland and ricefields lie S with field installations, Paranaque R and Manila B to W. Field is soft in wet weather.

#### Dispersal:

Revetments N, S and E. East the area extends to Manila RR.

Defences and Installations:

Extensive. (See current Intell Summaries).

#### Communications:

Manila S road is immediately W over Paranaque R. Railroad 2200 yds E. Manila B 800 yds W. Radio station, telephone and telegraph at field.

## xi MANILA 11 — DEWEY BOULEVARD — 14°32'N, 121° 00'E.

Operational (Photo 15).

#### Location:

At S end of Dewey Boulevard which extends southward from Manila Hotel to Baclaran barrio.

#### General:

Sep 44 photos show that the center parkway has been removed, giving a level strip 60ft wide and extending from S end of Dewey Boulevard to Calle Libertad.

The 110ft parkway between the boulevard and the residential section has not been graded, indicating that the boulevard is not a regular operational strip.

Recent Intell reports state that crated planes are being assembled in this vicinity and the boulevard is being used as a take-off strip.

## 3. MT ANGELO — 14°49'N, 121°22'E.

Non-operational.

#### Location:

In high forested mountains approx 32 air mls NE of Manila.

#### History:

Private airfield of Angelo Mining Coy. It is too small to be of military value. Field has not been used since 1939 or 1940, and is probably overgrown, making recognition difficult.

#### Runways:

One hard clay and gravel N/S runway 1980ft × 99ft. An E/W strip of about 1000ft was partly constructed. Field cannot be extended.

## [SECTION 4]

Terrain:

Surrounded by heavily timbered mountains (up to 3500ft). Dispersal:

An abundance of cover, but room only for small number of planes.

Communications:

Only communication is a foot trail, requiring about 4 days to reach Manila.

## B.—POSSIBLE AIRFIELD SITES.

MARIKINA R PLAIN. (Map 6)

This area is only one likely to provide airfield sites.

Japanese have constructed two 6000ft fields—Marikina and Pasig—on this wide level plain. It is thought other bomber fields could be constructed here.

This plain, bordered W by Marikina R and E by Sierra Madre (Mts) extends from Marikina S to Laguna de Bay. Probably the most suitable section would be between Marikina and Pasig. The plain widens from 1½ mls at Marikina to 3 mls near Pasig.

## C.—SEAPLANE LANDING PLACES.

No operational seaplane bases have been reported in this area. However, the facilities of the Naval seaplane base on Sangley Pt, Cavite, are available to Manila.

There are good alighting areas at Manila and Laguna de Bay.

Pan-American clippers normally landed in Canacao B, Cavite,
but they have landed directly in front of Manila Hotel in 8 to 11ft
of water.

1. MANILA B — 14°35'N, 120°58'E. Sea level.

Non-operational.

Alighting area just off Manila, 1 ml S of Pasig R.

History and Status:

Proposed but never developed as a base. A small basin is located at Manila Yacht Club, and planes can be taken ashore at beach opposite Camp Claudio-Paranaque.

Alighting Area:

Runs of adequate length in any direction in Manila B.

Obstructions:

Piers, breakwaters and anchored ships.

Anchorage:

Good shelter and mooring buoys. Basin is 500 yds square with depths from 5 to 14ft.

Bottom:

Mud and sand.

Swinging Room:

Ample.

Beaches:

Good beaches S of basin, a seawall to N.

Meteorological:

(See Sec 10).

Winds are mostly from NE or SW.

Base Facilities:

Marine railways at Engineer I.

#### 2. LAGUNA DE BAY.

Possible Landing Site.

Laguna de Bay, located SE of Manila, is a fresh-water lake about 6ft ASL. Shoreline is flat and muddy, with 2fm line 3 mls offshore in places.

Most suitable alighting area is on W side, where depths of 9—13ft extend for 14 mls N/S. Widths vary from 4 mls at S end of Talim I to 9 mls at N end of Talim I.

Beaches are not good around shore. The 2fm line is 400 yds offshore near Binan (Laguna).

Depths given are at annual LW level (Mar and Apr) which is 3 to 4ft below HW level of rainy season. At HW anchorage could be made nearer the shore.

## SECTION 5

## PHYSIOGRAPHY AND VEGETATION

(Maps 7, 8; Photos 16, 17.)

#### 1. PHYSIOGRAPHY.

## i. Central Sierra Madre:

Rough dissected forested range in eastern part of area, rising to over 4000ft with general N/S trend. Subsidiary ridges generally parallel to main ridge with longitudinal drainage. Fairly wide belt of grass-covered foothills bordering Central Luzon Plain, with low rolling terrain east of Manila City.

Movement in mountains is restricted to steep narrow trails.

Less restricted in foothills, especially on valley flats.

#### ii. Central Plain:

Represents southern part of Great Central Valley of Luzon. Western part is largely occupied by deltaic swamps of Guagua, Pampanga and Bulacan Rs. Eastern part between Manila City and Angat R heavily populated and well cultivated. Drained by number of streams rising in the Sierra Madre. Southern end of plain is blocked by large lake, Laguna de Bay, leaving only 5 ml wide gap between lake and Manila B.

Movement in the swamp areas is impossible at all times except by boat or barge. Area of permanent dry land only 5 mls wide is between Candaba Swamp and coastal delta. Movement difficult in rainy season from May to Oct. Major obstacles are irrigated rice paddies and practically all stream courses crossing the plain.

#### 2. RIVERS.

Rivers are an important factor in local transportation system.

Their value increased with damage to existing roads and railways.

Types of river craft used are as follows:

Larcha: Large wooden vessel, 60-100 tons capacity; 6ft draft.

Batil: Generally similar to a larcha, 10-50 tons capacity, 6ft draft.

Viray: Hollow log keel and built up sides with outriggers, 20 tons; 6ft draft.

Casco: Flat bottom barge, 30 tons; 3-6ft draft. (See photo 22).

Banca: Small craft hollowed out from single log, no outriggers; 1½-3ft draft.

Chief rivers are:

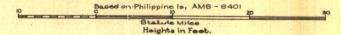
Pililla (Rizal): Enters north shore Laguna de Bay. A serious obstacle in floods only.

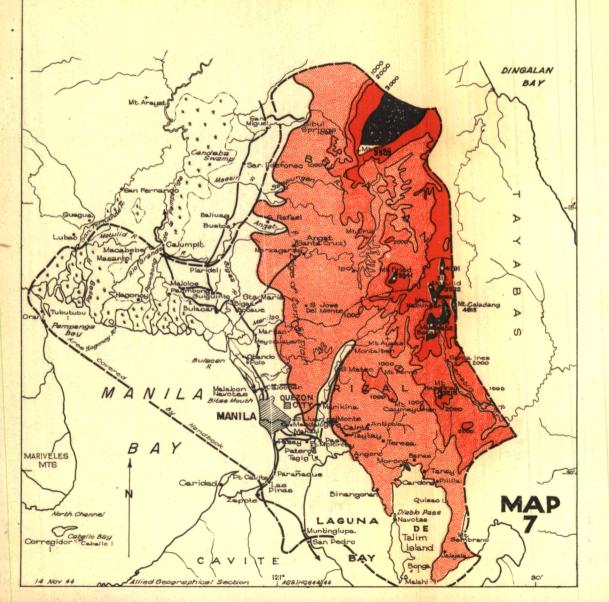
Morong (Rizal): Enters north shore Laguna de Bay. Lower reaches navigable for bancas. A serious obstacle in floods only.

Tagig (Rizal): A short stream connecting Laguna de Bay with Pasig R near Pasig town. It is 3 to 6ft deep and 50 to 100 yds

# PHYSIOGRAPHY

MAP





wide, but very shallow at Laguna de Bay end. A permanent and difficult obstacle.

Marikina (Rizal): Flows west through steep gorges to Montalban dam, then south through low rice cultivated valley to join Pasig R. 6ft deep and 60-100 yds wide for  $2\frac{1}{2}$  miles upstream from confluence with Pasig. 3ft deep and 40-100 yds wide beyond that up to Marikina. A serious obstacle, particularly in flood time.

Pasig (Rizal): About 14 mls long. Flows through Manila City to Laguna de Bay. Entrance channel, 87 yds wide, was well marked with buoys and lights. Upstream 1 ml to Jones Bridge, 110-200 yds wide and dredged to depth 18ft. There are 7 bridges with ample clearance for tugs, launches, cascos and other small craft. Channel from Jones Bridge to Laguna de Bay is 6 to 9ft deep and 60-100 yds wide. Banks are low with scrubby growth and rice paddies. An important obstacle at all times.

Paranaque (Rizal): Enters Manila B south of Manila City. 350 yds from mouth main channel flows north, leaving narrow thickly settled sandy area between Nichols A/F and Manila B. Channel generally shallow and used by bancas as far as Baclaran Bridge. 15 to 90 yds wide with low banks fringed with bamboo scrub. Many shallow channels off main stream. Whole area difficult obstacle at all times off roads.

Tinajeros: Rises in hills NE of Manila, and enters tidal waterways forming Navotas R north of Manila City. Entrance bar has 3ft depth at mean LLW. For about 1100 yds from mouth depth is 7ft, width 60-120 yds. Navigable for barges, tugs and river craft. North and east of Navotas town river channel runs 2½ mls to Tinajeros Bridge. This section 3ft deep and 50-100 yds wide. Used by casco type craft. West of Tinajeros, Binuangan R runs NW to connect with Bulacan R mouth. General width of channel is about 50 yds at SE end widening to 100-200 yds at NW end. It is about 3ft deep. All approaches to Tinajeros and Binuangan are impeded by fish ponds and many small waterways. Upper reaches of Tinajeros supply Novaliches Reservoir.

Meycauayan: Enters Bulacan R estuary. Entrance bar of Bulacan has 3ft at mean LLW. This increases to 5ft to confluence with Meycauayan. Banks low and covered with fish ponds. 3½ mls upstream from confluence with Bulacan, Meycauayan is joined by Marilao. Between this and town of Meycauayan, river is 1½ft deep and 50-150 yds wide and is used by bancas and cascos. A difficult obstacle and subject to quick floods.

Marilao: From Marilao town to junction with Meycauayan about 1½ mls, depth 1½ tt and 50 yds wide, navigable for bancas. Banks steep and muddy. Above town of Marilao narrow stream fringed with bamboos with rice fields beyond. A serious obstacle below Marilao.

Santa Maria: Rises in hills south of Norzagaray and flows west to Bulacan R estuary. From junction with Bulacan to Bocaue, distance 5 mls, depth is 3ft and width varies 60-400 yds, Low banks with fish ponds. Tidal to Bocaue. Beyond Bocaue depth 1½ft and navi-

## [SECTION 5]

gable for bancas for about  $1\frac{1}{4}$  mls. Below Manila RR bridge, river serious obstacle at all times. Above this, serious obstacle in flood time only.

Bigaa: Rises in hilly zone between Norzagaray and Plaridel. Joins Bulacan channel 4 mls from mouth. Between Bigaa town and confluence with Guiguinto, distant 3½ mls, river is stable, 3ft deep and 70 to 100 yds wide. Tidal up to Bigaa. Bancas can travel beyond Bigaa. Below junction with Guiguinto navigability is doubtful, but cascos could navigate it at all times. Bigaa R is difficult obstacle along most of its course.

Guiguinto: A small river flowing south to join Bigaa R. Reported navigable for bancas 3½ mls down stream from Manila RR bridge. Minimum depth 3ft and 20-50 yds wide. Steep banks are serious obstacle.

Hagonoy: One of the main branches of lower Pampanga R. It is about 10 mls long, forming a more navigable outlet to the sea than the main river. River channel is stable. Average width about 100 yds. Navigable for vessels drawing 3ft. Banks low, muddy and fringed with nipa and mangrove up to Hagonoy town, all wet rice fields above this. Lower delta region impassable at all seasons. Easiest mode of travel by boat or barge.

Lower Pampanga (See Handbook 40): Forms extensive delta in lower reaches, extending inland 3 to 6 miles. Contiguous with Guagua delta on west and Bulacan waterways on east. Main stream about 100 yds wide and navigable for 3ft draft vessels for about 23 mls from mouth. Tidal to junction with Hagonoy. Banks fringed with nipa and mangrove for about 3 mls and then with rice fields. A formidable obstacle at all times.

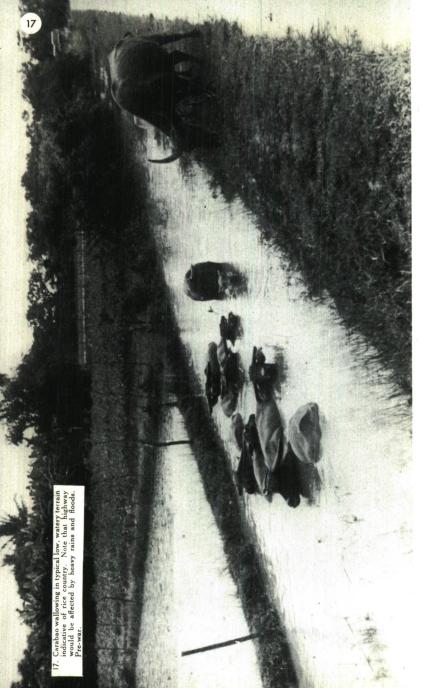
Guagua: Important tidal channel running southwards from Guagua about 12 mls to Manila B. Entrance bar 5ft at mean LLW. For 3 mls upstream from mouth depth of 14ft, width 400 yds. For next 9 mls to Guagua minimum depth of 6ft and 100-200 yds wide. Banks fringed with mangrove and nipa with many tidal waterways running in all directions. Tidal up to Guagua. Guagua delta impassable region at all times, except by boat or barge.

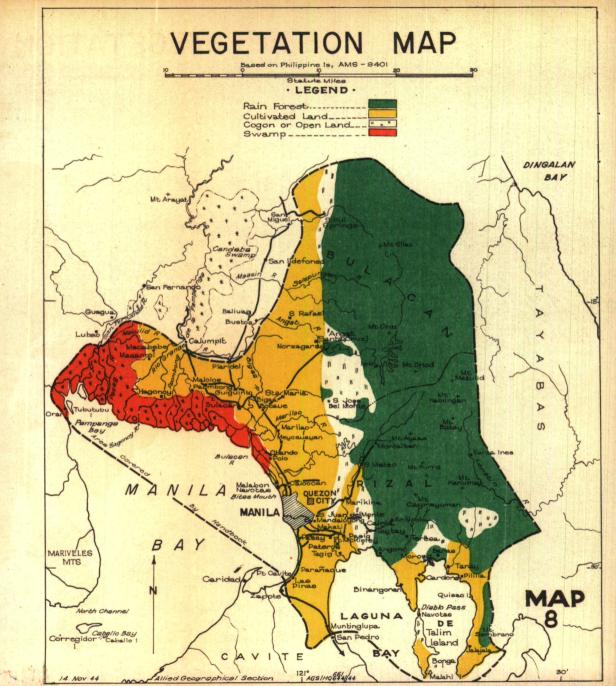
## 3. LAKES AND RESERVOIRS. Laguna de Bay:

A large freshwater lake SE of Manila City between the Sierra Madre and Manila B. 345 sq mls in extent with shoreline 134 mls long. Outlet via the Pasig, Tagig and Tipas Rs at NW corner. Lake level is subject to seasonal conditions, and is only a little higher than Manila B. Lowest during Mar or Apr, and rises 3 to 4ft during wet season. Average depth 7 to 17ft at annual low lake level, Navigation limited by 5ft bar at entrance to Pasig R. Talim I in lake, rocky and mountainous, otherwise lake is free of navigational obstacles. Shore approaches generally low, and marshy, especially along north and east shores. Western shore is relatively clear of vegetation. Lake forms a major natural obstacle on approach to Manila from south. Could be used as seaplane base.

[Continued on Page 51]







Novaliches Dam:

11 mls NE of Manila on upper Tinajeros R. Supplies part of Manila's water requirements.

Ipo Dam:

22 mls NE of Manila on Angat R. Supplies part of Manila's water requirements.

Montalban Dam:

18 mls NE of Manila. Used for irrigation purposes.

#### 4. CANALS.

Nine important waterways connect with Pasig R around Manila City. For details see Handbook 41A.

5. SWAMPS. (See Sub-sec 2-RIVERS).

Large deltaic area with numerous waterways, covers north shore of Manila B along lower reaches of Guagua, Pampanga and Bulacan Rivers. Marsh conditions extend inland on Guagua R for more than 10 mls, and on lower Pampanga for about 4 mls. Chiefly covered in mangrove and nipa. On lower Bulacan fish-ponds are numerous. Whole area is impassable at all times, except by boat or barge along tidal waterways.

#### 6. VEGETATION.

Three main types are found, comprising dense forest on the Sierra Madre, grassland on its western foothills and cultivated land in Central Plain.

Primary forest in dissected terrain is generally difficult to penetrate. Fringes near foothills are bordered by impenetrable secondary growth. Open grassland will provide easy movement only where terrain permits. Stream courses in foothills and Central Plain are bordered by scrub and bamboo, which provide good cover, but are difficult to penetrate.

On cultivated Central Plain rice lands are predominant, with numerous farms producing vegetables and fruit. Irrigated rice paddies are impassable in wet season from May to Oct but are relatively firm and dry from Nov through to May.

Marshy vegetation consisting of mangrove and nipa is predominant on Guagua-Pampanga Delta. Movement is restricted to waterways and tidal channels only.

## **SECTION 6**

## POPULATION, ADMINISTRATION, TOWNS

(Map 9; Photos 18, 19)

## A.—POPULATION.

## 1. GENERAL.

Bulacan and Rizal Provinces are the most densely populated areas in Central Luzon. The density increases as Manila is approached.

Excluding Manila, the total European population (including Americans) in Bulacan and Rizal was 2627; Chinese and Japanese 6503; native 768,482. (All figures from 1939 Gensus).

#### 2. EUROPEAN.

#### a. American.

Americans comprised more than 50% of all non-Asiatic population in Central Luzon.

They were mainly in business, industrial, shipping and engineering.

#### b. Spanish.

About 95% of the Spanish population lived in Manila and Rizal Province. Engaged mainly in tobacco, rope, sugar, lumber and shipping industries.

#### c. British and French.

Practically all were in Manila and Rizal Province. Engaged chiefly in importing and exporting, banking and clerical positions.

A few French were in the jewelry and perfume business.

#### d. Germans and Italians.

Germans, in the main, were representatives of German firms, tobacconists, and manufacturers and retailers of medical supplies.

Italians were few.

#### 3. ASIATICS.

#### a. Chinese.

Chinese were the largest Asiatic group and controlled the retail food trade; manufactured furniture, shoes, and fish nets; were in bakeries, restaurants, hotels, rice mills, salvage, carbonated beverages, distilleries, tailoring, soap manufacturing, tinsmithing and wholesale and retail hardware business.

#### b. Japanese.

Japanese were mostly resident in Manila. Engaged in such industries as cheap manufactured clothing, office and medical equipment, rubber shoes, athletic goods, building and contracting, fishing, mining and buying and selling of base metals.

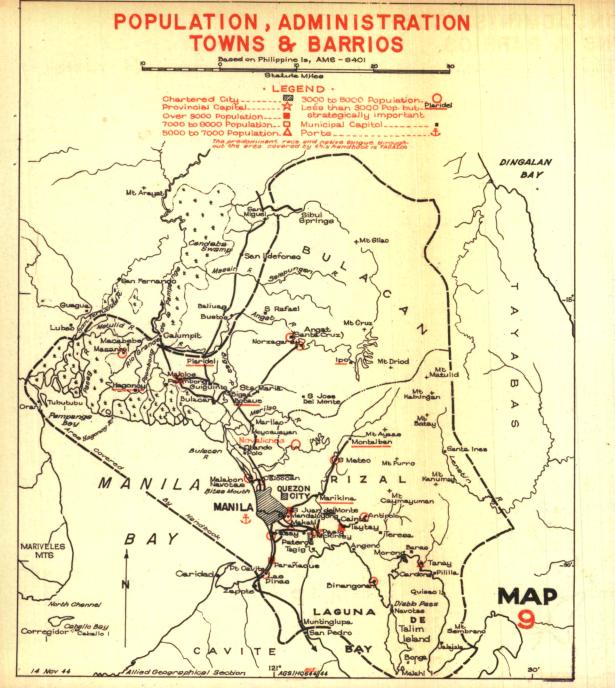
#### c. Other Asiatics.

Mostly British Indians engaged in retailing of clothing and yarn goods.

## 4. NATIVES.

## Filipinos.

Most natives, excepting in Manila City, were Christian Tagalogs.



Spanish and Chinese mestizos are generally the most prosperous, best educated and most influential of Filipinos.

#### 5. LANGUAGE.

Tagalog is the national language. English is the most common of foreign languages and is spoken by a large percentage of the natives.

Languages spoken:

Province	- 1	Tagalog	English	Spanish
Bulacan		331,225	100,928	4,593
Rizal (exclusive of Manila)		435,154	173,907	24,208

## B.—ADMINISTRATION.

#### 1. GENERAL.

Constitutional government in Philippines is in abeyance during Japanese occupation. The national government was Republican in form, with a President (all embracing powers over all executive departments, bureaus, and offices); a Legislature (a National Assembly of 24 members in the Senate and 120 members in the House of Representatives; the Judicial (a supreme and inferior court system).

Local government consisted of Provinces, municipalities, and poblacions. In each province was a Provincial Board composed of provincial governor and 2 elected members. Board supervised Municipal Councils, maintained roads and collected insular taxes.

Municipal Council is legislative body of a municipality and

Municipal Council is legislative body of a municipality and comprises a mayor, vice mayor, and councillors whose number depends on size of municipality.

## 2. GOVERNMENT SINCE JAP OCCUPATION.

The old Commonwealth Government was used as basis for Japanese puppet government. Minor adjustments in existing system and introduction of Japanese-controlled political party, the Kalibapi, plus the voice of the Japanese Military Administration constitute the major changes.

There are only 14 or 15 municipalities surrounding Manila where municipal governments are known to be functioning.

## 3. PUBLIC ORDER AND POLICE.

Average Filipinos are law-abiding but can be incited to mob action readily. This fervor dissipates rapidly when faced by even

a small organized force.

The main police force was the Constabulary. The Japanese have continued the use of the Constabulary and incorporated into it all civilian law enforcement agencies. It is inversely proportionate in size to the number of Japanese troops in the area. Where guerilla forces are active the garrisons are mostly Japanese.

Another check on guerilla activities is use of Neighborhood Associations. By threats of suspension of food rations, over which the Associations have control, family heads were made responsible

for reporting anything suspicious within their area.

The Constabulary is generally not pro-Japanese and, it is expected, would join with Americans without much coaxing.

## C.—TOWNS.

#### GENERAL

A municipal capital is generally the most important town in a municipality; provincial capitals the most important in any Province.

Most recent records available concerning towns and barrios are pre-war so that certain changes in the statistics given are to be expected.

## 1. MALOLOS (BULACAN) — 14°51′N — 120°48′E.

Capital of Bulacan Prov. Population of municipality—33,384. Roads are mostly well-drained, blacktop surface. General country-side is low and subject to flooding.

Chief buildings are Capitol, municipio, three large schools, a large church and many old Spanish and modern residences.

Area outside of town is wet and offers few camp sites. Fish ponds surround the town.

Electric current from Manila, ice plant (10 ton), rice mill, fishing and rice are the main resources.

Water is piped to main buildings from central tower. Source: artesian wells.

Telephone and telegraph. Good roads.

#### 2. PASIG (RIZAL) — 14°34′N — 121°04′E.

Capital of Rizal. Old town in thickly-populated area.

Population of municipality—27,541—poblacion—1121.

Aside from main highway, roads are inclined to be narrow with houses close to kerbs. Area is low and subject to flooding. Manila electric street-car service. Important barge waterways along Marikina and Pasig Rs.

Important buildings include modern Capitol, municipio, large stone-wall church and convent, several schools and a large market building.

Area has no good camp sites.

Electric power from Manila. Ice plant (10 tons), lumberyards, rice and some waterway traffic are principal industries.

Water from artesian wells pumped to central tower and piped to main buildings. Capacity—85,000 gallons a day.

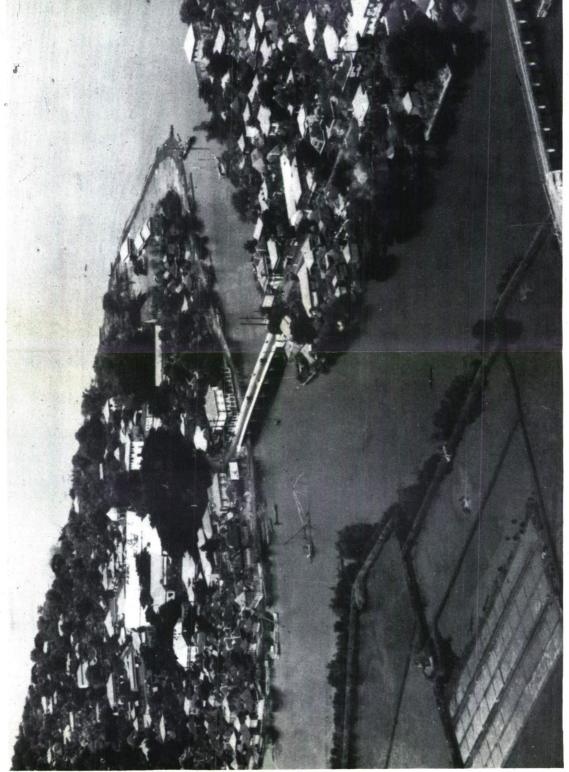
Telephone and telegraph available.

## 3. OTHER IMPORTANT TOWNS.

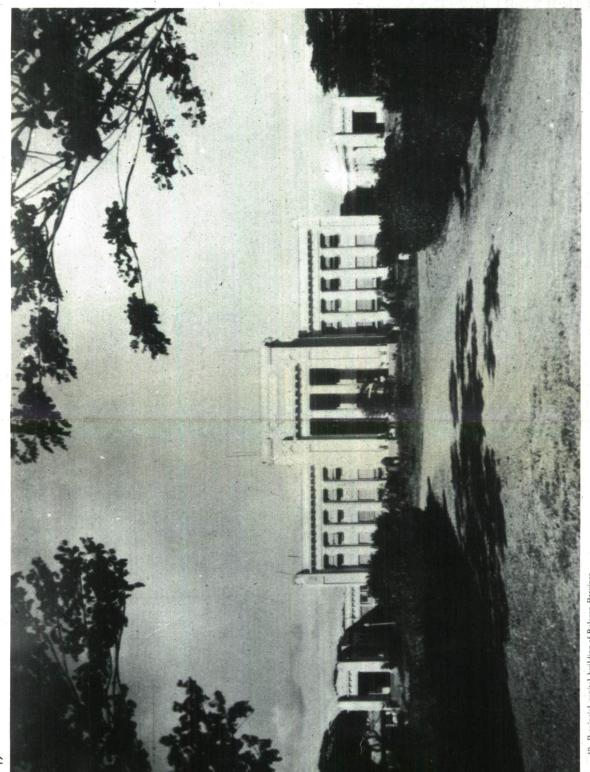
Details of other important towns follow in tabulated form.

Because of proximity to Manila there are no other large, developed ports in the area. Small ship slipways and barge-building facilities were found at many of the coastal towns. Malabon, Navotas, Paranaque and Las Pinas all had small shipbuilding facilities and docking area for barges and shallow-draft boats.

(See following table).



Part of town of Paranaque, Rizal. Looking SW. 1933.



19. Provincial capital building of Bulacan Province at Malolos. 1934.

POPULATION AND TOWNS INFORMATION.

# POPULATION AND

	(Municipality)	(incl Route Nos)	Buildings
14°56′N 121°02′E	3417 (11,060)	65C. River permanent but swift current.	- M u n icipio; t church; convent; school.
14°57′N 120°54′E	1478 (22,972)	5A:88A. Ferry SE to Route 65C, RR. Angat R navigable for barges down- stream but cur- rent swift.	large schools; about 300 good houses.
14°49′N 120°54′E	483 (12,037)	RR. Bigaa R for barges.	About 10 con- crete and 200 good houses; large church and seminary; school.
14°48′N 120°55′E	2279 (12,345)		About 200 good houses; large church; convent; and market.
14°48′N 120°52′E	833 (11,931)	61B. Barges on waterways.	Municipio; large school; church; convent; PC Barracks.
14°50′N 120°53′E	603 (6199)	3B.	Very few good buildings.
14°50′N 120°44′E	2118 (29,734)	69; waterways navigable for barges.	Several modern buildings.
14°53′N 121°09′E			Small municipio; church; school; about 20 good houses. About 10 large buildings at mine.
14°45′N 120°57′E		3B, 63. RR.	About 80 wood buildings; munici- pio; church; con- vent; school.
14°44′N 120°58′E	2416 (16,082)	3B, 61A, RR.	M u n icipio; church; convent; school; several old adobe stone houses.
	121°02′E  14°57′N 120°54′E  14°49′N 120°54′E  14°48′N 120°55′E  14°48′N 120°52′E  14°50′N 120°53′E  14°50′N 120°44′E  14°50′N 120°57′E  14°45′N 120°57′E	121°02′E (11,060)  14°57′N 120°54′E (22,972)  14°49′N (22,972)  14°48′N (12,037)  14°48′N (12,345)  14°48′N (12,345)  14°50′N (6199)  14°50′N (29,734)  14°53′N (29,734)  14°55′E (5682)  14°44′N (2416	121°02′E

CAMP SITE	WATER SUPPLY	INDUSTRIES AND SUPPLIES	SIGNAL COMMUNICATIONS	GENERAL
Poor. Flooded.	Mostly surface wells; a few art wells.	Elec plant, Diesel 60 kw.	Telephone, tele- graph.	On S (left) bank of upper Angat R. Gently rolling SW.
Excellent for 300 yds each side Route 5A for 2 mls SW of town. Good cover.	Art wells—water pumped to tower.	Elec current from Manila. Içe plant. Rice, hat-weaving. Bamboo plentiful.	LD telephone and telegraph.	Important strate- gically; located on high ground commanding river- roads and RR.
Poor. Flooded.	Art wells—water pumped to tower.	Elec current from Manila. Ice plant, rice mill, lumber yards, bus depots, rice, mangoes.	graph.	Low, flooded area in wet weather.
Poor. Flooded.	Art wells—water pumped to tower.	Elec current from Manila. Rice mill, lumber yards, rice, mangoes.	LD telephone and telegraph.	Low, flooded area in wet weather.
Poor. Flooded. Some big acacia trees in town.	Art wells—water pumped to tower.	Elec current from Manila. Rice mill, rice, mangoes, fish.	graph.	Low flooded area Mostly open rice paddies.
Poor. Flooded.	Art and surface wells only.	Elec current from Manila. Small rice mill; rice.	Telephone.	Serious roadblock at bridge in May 42. Low, flooded area.
Very poor. Flood- ed.	Art wells—water pumped to tower.	Elec current from Manila. Alcohol distillery (molasses and niposap), nipa thatch fish.	graph.	Tidal marshe south, low ric paddies and grass land north.
Fair. Some steep hills but good cover.		Manila water sup- ply dam on Angat R, also big gold- mine.	t	Important area Forested hills Manila wate supply reservation and big gold mining plant.
Poor. Flooded.	Art well; hand	Elec current from Manila. Rice fruit.	LD telephone and telegraph.	Unimportant. Low flooded area. Ho sulphur springs.
road just	pumped to tower 100,000 gpd.	Elec current fron Manila. Ice plan 15 tons a day Big leather tan nery. Chines noodle (bijou factory using ric flour, small ric mill.	e 0) e	Important indus trial center. Clea of floods.

Town	LOCATION	1939 POPULATION TOWN (Municipality)	TRANSPORT FACILITIES (incl Route Nos)	IMPORTANT BUILDINGS
NORZAGARAY.	14°55′N 121°03′E	3839 (10,789)	65A. Angat R not navigable here.	
OBANDO.	14°43′N 120°56′E	1041 (10,026)	51B. Waterways navigable for barges.	About 6 stone, 1 wood; municipio big rice mill.
PAOMBONG.	14°50′N 120°47′E	497 (11,269)	69.	About 3 stone, 1 wood.
PLARIDEL.	14°53′N 120°52′E	1106 (11,161)	(Quingua) R	About 90 goo (adobe and hard wood).
POLO.	14°42′N 120°57′E	766 (13,468)	51B, 61A. Polo R navigable for barges.	Big municipio church; convent school; 6 bi warehouses.
SAN JOSE DEL MONTE.	14°49′N 121°03′E	761 (5826)	63.	
SAN RAFAEL.	14°57′N 120°58′E	1360 (12,269)	88B.	
SANTA MARIA.	14°49′N 120°58′E	2174 (14,987)	65A.	About 3, old stone.
PAMPANGA PROVINCE. MACABEBE.	14°54′N 120°43′E	2851 (20,149)	70.	3 stone, 50 wood
MASANTOL.	14°54′N 120°42′E	3165 (14,095)	70.	
PROVINCE. ALABANG.	14°25′N 121°03′E	1641		9 large wood buildings; 16 big stables.
ANGONO.	14°32′N 121°09′E	965 (3896)	21B. Laguna de Bay navigable for barges.	

# Information—continued.

CAMP SITE	WATER SUPPLY	Industries and Supplies,	SIGNAL COMMUNICATIONS	GENERAL
Fair. In church grounds or on rocky hills south; some cover.	Surface wells.	Elec current from Angat. Rice and some fruit.		River flats N, rocky hills S. Acacia, mango, and bamboo clumps.
Poor. Flooded.	pumped to tower;	Elec current from Manila. Rice mill 2000 sacks palay daily. Rice, fish, mangoes, water- melons.		Low rice paddies E, fish ponds W. A few mango trees.
Poor. Flooded.	Art wells and hand pumps.	Elec current from Manila. Rice, fish.		Low rice paddies N. Fish ponds S.
Poor. Flooded S of river. Good sites on N bank.	hand pumps.	Elec current from Manila. Rice, fruit.	LD telephone and telegraph.	Strategically important bridges. Surroundings low. Rice paddies; scattered mango and bamboo.
Poor. Flooded.	Art wells—water pumped to tower; serve Obando also.	Elec current from Manila. Big ric mill. Wood MT body factory (sta- tion waggons), 3 garages; rice cake (Poto) factory.	graph.	Strategically important road center. Surroundings low. Rice paddies.
	Mostly surface		Telephone, telegraph.	
	Art and surface	Elec plant, Diesel	Telephone, telegraph.	
Poor. Flooded.	Art and surface wells.	Elec current from Manila. Rice ex- ported		Difficult river crossing.
Poor. Flooded.	Art wells; hand	Elec current from Apalit. Ice plant 10 tons daily.		Not important. Low rice paddies and marsh.
	Art wells; hand	Elec current from Apalit.	Telephone, tele- graph.	Low, rice paddies and *grassland E; salt marsh W.
Fair W of road junc. Scattered trees.	Art wells—wate	r Cattle and horse breeding farm.	Prov telephone telegraph.	, Important road junc and govern- ment stock farm on edge of Lag- una de Bay.
	Art well, hand pumps and rain water.			Not important. Narrow low land between hills and Laguna de Bay.

Town	LOCATION	1939 POPULATION Town (Municipality)	TRANSPORT FACILITIES (incl Route Nos)	IMPORTANT BUILDINGS		
ANTIPOLO.	14°35′N 121°10′E	4093 (6135)	60A.			
BARAS.	14°31′N 121°16′E	2120 (2120)	21C. Laguna de Bay navigable for barges.			
BINANGONAN.	14°28′N 121°11′E	3673 (16,588)	21C. Laguna de Bay navigable for barges.	Many good houses; cement factory, ½ ml NW.		
CAINTA.	14°35′N 121°07′E	544 (3075)	21B.	Nil.		
CALOOCAN.	14°39′N 120°58′E	7232 (38,820)	51A and 54. RR.	Manila RR repair center. Many good houses. PC barracks.		
CARDONA.	14°29′N 121°14′E	1997 (6366)	21C. Laguna de Bay navigable for barges.	Nil.		
JALAJALA.	14°21′N 121°19′E	725 (1532)	60B. Laguna de Bay navigable for barges.			
LAS PINAS.	14°29′N 120°59′E	3493 (6822)	1A (old RR re- moved). Water- ways navigable for barges.	vent; church;		
MAKATI.	14°34′N 121°02′E	5037 (33,530)	21A. Manila elec tramline. Pasig R navigable for barges.	M u n icipio; church; school.		

CAMP SITE	WATER SUPPLY	INDUSTRIES AND SUPPLIES	SIGNAL COMMUNICATIONS	GENERAL
Fair. Very little	Piped from 16,000 gal steel tank; also surface wells.	Elec current from Manila.	Telegraph.	Surrounded by rocky hills. Open grassland with occasional clumps of bamboo.
Poor.	Art wells. Hand pumps.		Telephone, tele- graph.	Not important. Narrow low land between hills and Laguna de Bay. (Road block area).
Good camp site in cement factory yard. No cover.		Elec current from Manila. Large cement factory ½-ml NW, 2 over-head cableways, each about 700 yds, to quarries.	graph.	Important quar- ries. Lake port for barges (road block area).
Poor. Flooded.	Mostly piped.	Elec current from Manila.	Telegraph.	Not important. Low. Rice pad- dies.
Fair at golf course: ½ ml NE, N of Route 54, E of RR. No cover.		Elec current from Manila. Big RR rolling stock repair shops. Biscuit factory, ice plant (cap 20 tons daily).		Very important RR center. Low area between main N RR and fish- ponds on Dagat- dagatan B.
Poor, rocky hills.	Art wells.	Elec current from Manila.		On rocky cliffs verlooking una de Bay (road block area).
	Mostly lake or rain water; a few surface wells.			Not important. Narrow low land between hills and Laguna de Bay.
Fair. Sandy strip between Route 1A and Manila B. Some cover.		Elec current from Manila. Salt beds, small lime kilns; rice, fish.	graph.	Important strate-gically. Road block area between salt beds east and Manila B W.
Fair on hills S of town, also race track NW. No cover.		Elec current from Manila. Insular Sugar Refinery N bank of Pasig R. Adobe quarry on S bank of Pasig R used for race- track.	Commercial radio station.	A suburb of Manila on S bank of Pasig R.

Town	LOCATION 19.  LOCATION To (Munici		TRANSPORT FACILITIES (incl Route Nos)	IMPORTANT BUILDINGS				
MALABON.	14°40′N 120°57′E	3125 (33,285)	54. Waterways suitable for barges.	Many big modern				
1.0								
MANDALUYONG	14°35′N 121°01′E	3851 (18,200)	53. RR. Manila elec tramline; Pasig R navigable for barges.	school building				
MARIKINA.	14°38′N 121°06′E	2700 (15,166)		M u n icipio church; schoo and some big wood houses.				
MONTALBAN.	14°44′N 121°09′E	1726 (6402)	53.	M u n icipio school; church convent; about 30 good houses.				
MORONG.	14°31′N 121°14′E	1771 (8623)	21C.	Nil.				
MUNTINGLUPA.	14°23′N 121°03′E	2654 (9288)	1B, RR, Laguna de Bay.	Muni zipio; big church; convent; school; many good houses.				
NOVALICHES (Barrio)	14°43′N 121°02′E	3266	52, 62.	About 50 good houses in town. NE for 5 mls along Route 52 are: Malaria Control station. RC seminary; Gold Leaf Tobacca Co Ranch; AGP Co, Club Hous b.				
NAVOTAS.	14°39′N 121°03′E	2765 (20,861)	54. Waterways navigable for barges.					

CAMP SITE	WATER SUPPLY	INDUSTRIES AND SUPPLIES	SIGNAL COMMUNICATIONS	GENERAL
Poor. Flooded, and crowded.	Piped from Man- ila supply. Also art wells.	Manila. Sugar Refinery, Yanco Slipways build and repair small wood vessels and barges. Cigar fac- tory, ice plant (10 tons daily), fish, rice and nipa market.		Important trial and shallow waterway Low tidal area.
Poor. Crowded.	Piped from Man- ila supply. Some art wells.	Elec current from Manila. Coconut oil factory.	Manila system.	Residential and industrial suburl of Manila on Nank of Pasig R
Good. Open, well - drained, sandy flats both sides Marikina R; a little cover.	Piped from Man- ila supply. Some art wells.	Elec plant, Die- sel 328 kw. Ice plant (cap 5 daily), shoe fac- tory. Sand and gravel taken from S of here. Rice.		On E bank o Marikina R. Im portant bridge.
Excellent on foot- hills \(^3\) ml SE. Well drained. Good cover, sec- ond growth.		Elec plant, Diesel 22 kw. Rice and some cattle on hills.	Telephone, tele- graph.	In a wide valle; between mountains E and hill W. Near old cit; water supply re servoir now used (or irrigation down valley (S).
Poor. Rocky hills no cover.	Mostly art wells, some surface wells.			Not important Narrow low land between hills and Laguna de Bay.
Poor. Flooded.	Mostly art wells, hand pumps.	Elec current from Manila. Clay pot- tery. Rice.	LD telephone and telegraph.	Low, rice paddies on Laguna d Bay.
Extensive sites on rolling grassy hills, but little cover.	Art wells at each center or ranch.	Mixed farming. Adobe pits in town.	Manila system.	Important area or rolling grass hills, mixe farms. Manil water supply reservation. Dar 2½ ml ESE.
Poor. Flooded.	Mostly art wells hand pumped. Some piped from Malabon.	Elec current from Manila. Big fish- ing center.	Manila system.	Densely populate waterway center.

PASAY.  1 PATEROS.  1	14°33′N 120°59′E 14°33′N 121°00′E 14°33′N 21°04′E	21,125 (21,125) 4768 (55,161) 1884 (7160)	IA, 57. Taft Avenue east and Dewey Boulevard.  59. Tagig R takes small barges	dential area of Manila.  Church and big school. Mostly nipa huts only.
PILILLA.	21°00′E 14°33′N 21°04′E	(55,161)	nue east and Dewey Boulevard.  59. Tagig R takes small barges to Manila but too shallow south	dential area of Manila.  Church and big school. Mostly nipa huts only.
PILILLA.	21°04′E		takes small barges to Manila but too shallow south	school. Mostly nipa huts only.
	14°29′N		Bay.	
	21°18′E	2705 (5461)	21C. Laguna de Bay navigable for barges.	Nil.
	14°38′N 21°02′E	39,012	54.	First-class new residential and university area of Manila.
	14°36′N 21°02′E	6219 (18,870)	53. S Juan R navigable for barges.	Old first-class residential area of Manila.  Big schools.
	14°42′N 21°07′E	4,227 (6134)	53.	Nil.
	14°32′N 21°04′E	783 (12,087)	59. Tagig R takes small barges N to Manila but too shallow S to Laguna de Bay.	Nipa houses.
	14°30′N 21°17′E	6320 (8223)	21C. Laguna de Bay navigable for barges.	
	14°34′N 21°08′E	10,484 (10,891)	21B, 60A.	Nil.
	14°34′N 21°12′E	862 (2425)	60A.	Nil.

CAMP SITE	WATER SUPPLY	Industries and Supplies	SIGNAL COMMUNICATIONS	GENERAL
	ila. Also many	Elec current from Manila. Salt beds, lime kilns, rice mill, ice plant— 10 tons daily.	Manila system.	Important strate- gically. Road block area be- tween salt beds E and Manila B W.
Polo Club.	City supply piped.	City facilities.	Manila system. Main radio sta- tion.	First-class residential area of Manila.
Poor. Swampy.		Elec current from Manila. Big duck farms.	Telegraph.	Not important.
Poor. Flooded.	Mostly art wells and hand pumps.		Telegraph.	Low rice-land be- tween hills and Laguna de Bay.
Fair. Extensive rolling land. Some cover.	City supply piped.	City facilities.	Manila system.	New residential area on rolling grassland.
Thickly settled area.	City supply piped.	City facilities. Water reservoir in middle. Large coconut oil and margarine and soap factory.		Old residential area on rolling land.
Excellent on foot- hills 3ml E. Well drained, good cover, second growth.	,		Telegraph.	Not important. Near city water supply pipeline from Wawa Dam.
Poor. Flooded.	Art wells, hand pumps.	Elec current from Manila. Big duck farms.	Telegraph.	Not important.
Fair. In foothills E of town. Some cover.	Art wells, hand pumps.	Elec plant Diesel 45 kw. Rice.	Probably telegraph.	Low riceland be- tween hills and Laguna de Bay.
Fair.	Some piped, mostly art wells.	Elec current from Manila. Ice plant —5 tons daily.	Telegraph.	Important road junction.
Fair. Little cover.	Art and surface wells.			Unimportant. In rough hills. Grassland and some clumps of bamboos.

## SECTION 7.

# TRANSPORTATION AND SIGNAL COMMUNICATIONS.

(Maps 10, 11; Photos 20, 21, 22) A. TRANSPORTATION.

#### 1. GENERAL.

Transportation is well developed. It includes railways, streetcars, buses, trucks, river craft and animal-drawn wheeled carts and sleds.

#### 2. RAILROADS.

Manila RR Co operated 3ft 6in gauge RR lines N through the area, connecting such towns as Caloocan, Meycauayan, Marilao, Bocaue and Bigaa. At Bigaa a line forks left through Guiguinto, Malolos and Calumpit and then N along the western side of Central Luzon Plain. A branch line continues N from Bigaa through Plaridel, Baliuag and San Miguel to Cabanatuan. Another branch runs E from Manila connecting Mandaluyong, Macati, Pasig and Taytay. A third branch runs S from Manila along W shore of Laguna de Bay and passes through Muntinglupa, continuing S to Legaspi in Albay Province.

Because of low, easily flooded nature of terrain, and many rivers and streams, bridges are particularly numerous. These bridges are mainly single track and make it easy to put a line out of use with demolitions.

Many modern locomotives, passenger and freight cars and rail motor cars and trailers were available.

#### 3. TRAMWAYS.

A modern tram system was operated in Manila with suburban lines running N to Malabon and E to Pasig. The Tramway company also operated 125 buses.

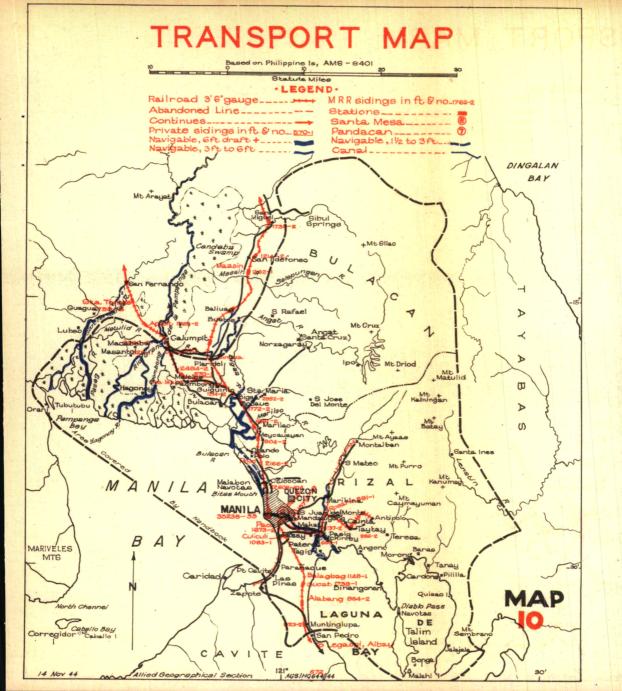
## 4. RIVER AND WATERWAY TRAFFIC.

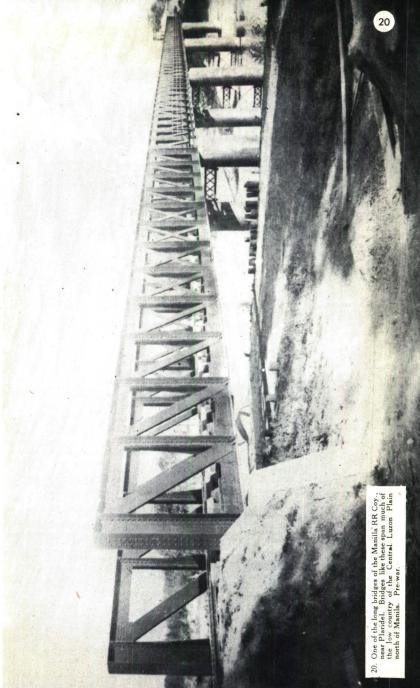
There were estimated to be 500 seagoing barges of from 100 to 700-ton capacity in Manila area. Steel and wood barges, open and hatched, were used. They were towed by steam and diesel launches, with regular service between Manila and all points accessible by inland waters. At Manila cargoes were transferred to smaller native barges (cascos) for transport on adjacent rivers.

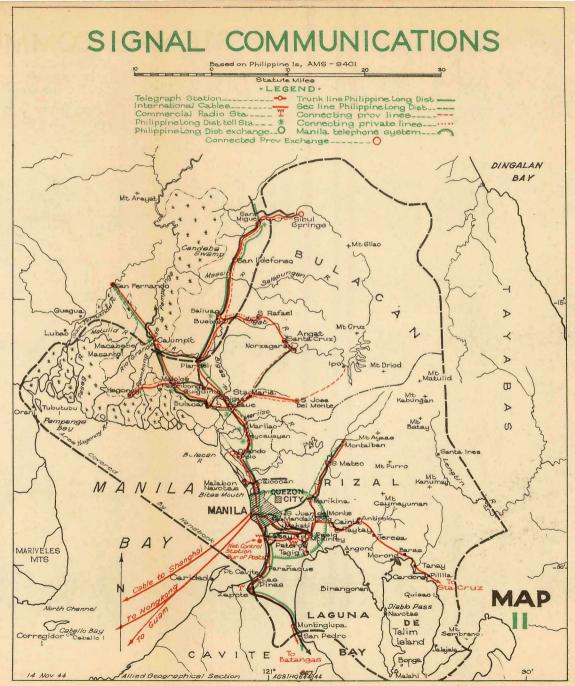
A large percentage of total freight carried on rivers, streams and canals, is done by small native boats, hauling fish, cane, rice and other produce.

## 5. TRUCKS, BUSES, AUTOMOBILES.

Trucks and passenger vehicles were of standard American manufacture. War damage, lack of replacement parts and poor maintenance have undoubtedly left available vehicles in bad condition and of little military value.







## 6. NATIVE ANIMALS — PORTERS.

The carabao (water buffalo) is the native's main work animal. It cannot be used as a pack animal or worked during the heat of day. It requires frequent wallowings in mud to keep its temper under control. It sometimes becomes vicious and attacks anyone in sight. Is used principally in rice paddies and for hauling native 2-wheeled carts and sleds.

Oxen, where found, are better work animals, standing up much better to the heat.

Native horses are small and wiry and of little use as pack or draft animals; are tiresome as saddle horses.

City Filipinos are not good porters but rural dwellers are very good. Average load is about 80 lb. Mountain people carry 80 lb. at  $2\frac{1}{2}$  mls per hour for 10 hours daily.

## B. SIGNAL COMMUNICATIONS.

## 1. GENERAL.

All main towns are connected by one of several interlocking communications systems. These are: government telegraph and radio, Philippine Long Distance Telephone Co, provincial telephone systems and private telephone systems. Overseas radio-telephone was available from Manila.

## 2. PROVINCIAL TELEPHONE SYSTEM.

Bulacan had 163 stations and 155 mls of fixed lines. Rizal had 30 stations and 84 mls of fixed lines. Bulacan system is connected to Philippine Long Distance Telephone Co, whereas Rizal had an independent system probably connecting all municipalities.

Philippine Long Distance Telephone Co served mostly Manila but also had stations in Bulacan, Pampanga and Tarlac Provinces. Provincial exchanges in Bulacan, Nueva Ecija and Tarlac as well as private exchanges in Pampanga and Tarlac were also connected to it, serving a total of 26,882 telephones.

## 3. TELEGRAPH AND CABLE.

Telegraph system owned and operated by Bureau of Posts. System is inter-provincial and inter-island and uses radio for much of its inter-island communication. Equipment consists of standard keys, relays, sounders, switchboards and batteries including simplex and duplex equipment. Most of the lines were hung on posts made of 2in pipe set in concrete. The net control radio station of the Bureau of Post was located at Pasay, just S of Manila.

Three international cables, one from Shanghai, one from Hongkong and one from Guam-Japan-USA connected with Manila.

#### 4. RADIO.

The Bureau of Posts supervised inter-island commercial radio communication. Only station in this area was net control station at Pasay.

Radio Corp of America, Mackay Radio and Telegraph Co, Globe

## [SECTION 7]

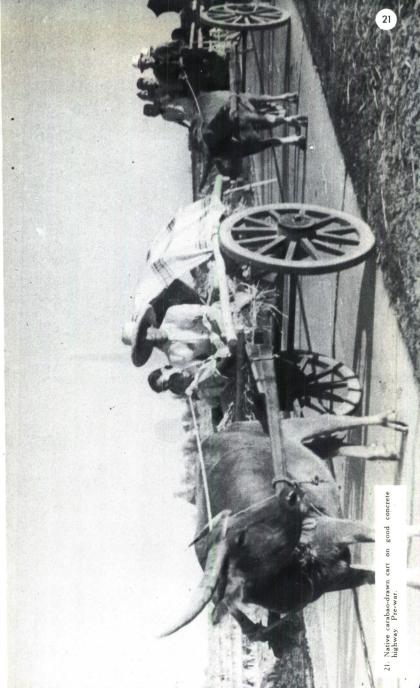
Wireless Ltd, and Philippine Press Wireless all transmitted commercial radiograms from Manila.

Pan-American Airways, Iloilo-Negros Air Express and Philippine Airlines operated aeronautical radio stations.

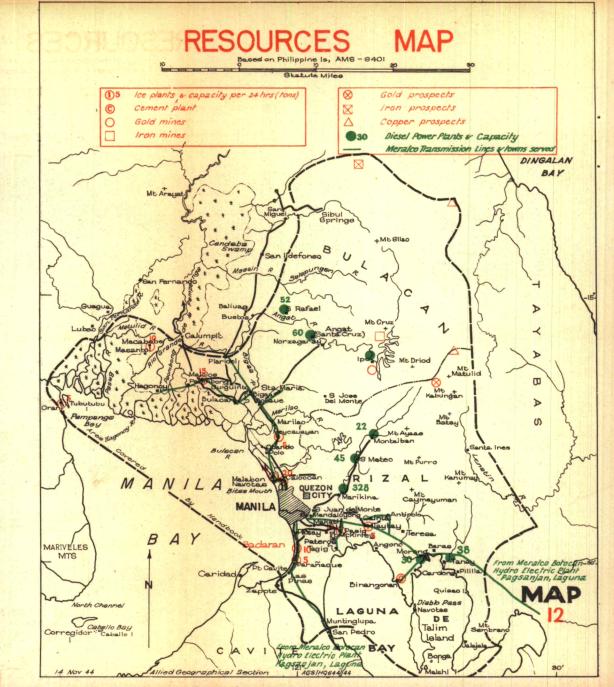
Four commercial broadcasting stations operated from Manila — KZRM — 50kw; KZIB — 1kw; KZRF — 1kw; KZRH — 50kw.

#### 5. POSTAL SERVICE.

There was an extensive postal service operated by Bureau of Posts.



22. Native river boat of the Casco type used extensively for moving produce up and down the many rivers off Manila Bay. Pre-war.



## SECTION 8.

## RESOURCES.

(Maps 12, 13; Photos 23, 26)

#### 1. GENERAL.

Industry and manufacturing were more extensive in Bulacan and Rizal because of their proximity to the Manila market. Large quantities of perishable garden produce were grown in Rizal and Bulacan. Relatively large amounts of rice and some sugar-cane were also grown in Bulacan.

Water for the area was supplied largely through artesian wells and pumped wells. Sub-surface water was available at from 50 to 400ft by drilling.

Fuel for operating internal combustion engines has now been limited mainly to sugar alcohol. There are no producing oilfields in the Philippines.

Skilled and semi-skilled labor is available, particularly in Manila area.

Note: For details on "Resources" pertaining to Manila City see Handbook 41-A.)

#### 2. FOODSTUFFS.

Quantities of canned and imported foods were available in Manila. Rizal and Bulacan augmented supplies of imported foods with fresh garden produce.

Staple food is rice. Bulacan is large rice-producing province; Rizal produced little rice per capita.

Bulacan produced limited quantities of centrifugal sugar.

Cassava, or tapioca is widely grown, though more for its starch content than as a food.

Certain varieties of bananas and the green papaya are used as vegetables or eaten as fruits when fully ripened.

Insufficient quantities of tea, coffee and cocoa are grown.

## Native Fruits and Vegetables:

Following is a list of principal native fruits and vegetables:

Ubi - Red root vegetable, similar to sweet potato. Used cooked as a vegetable and in making ice cream.

Cassava — Root from which tapioca is made. Some forms are poisonous if not properly prepared.

Gabe - Small root vegetable similar to potato.

Camote - Sweet potato.

Ampalaya — Bitter, cucumber-like vegetable. Is reputed to have anti-malarial medicinal value. Bitterness can be removed by proper cooking.

Upo — Similar to squash.

Tugue — Yam.

Jackfruit - Type of breadfruit eaten green as vegetable, ripe as fruit.

## [SECTION 8]

Kalamansi — Small citrus fruit used in making jam and drinks.

Lanzones — Small fruit growing in clusters.

Santolo - Fruit-eaten raw.

Siniguelas — Fruit similar to yellow plum.

Atis — Custard apple.

Tamarinds — Fruit used in making drinks.

Kamias - Edible root.

Caimitos - Egg-shaped fruit eaten raw.

Sinkamas — Plant resembling string bean, but with turnip-like root. Eaten raw.

Makopa - Pink spongy fruit-eaten raw.

Pili — Oily nut similar to almond,

Camatis - Tomato.

Patola - Long yellowish squash.

Saguing — Eating banana.

Saba — Cooking banana.

Some food processing is done, particularly in Manila area.

Fish are sun-dried, salted and smoked but most meat is consumed fresh. Limited amounts of ham and bacon are prepared in Manila. Rice, if kept dry, will keep indefinitely but will mould if allowed to get wet.

Small ice plants were located at:

Bulacan — Sibul Springs (2 tons a day), Meycauayan (5), Malolos (15).

Rizal — Taytay (5), Malabon (10), Caloocan (20), Pasig (10), Baclaran (10), Paranaque (5), Marikina (10).

The large Insular Sugar Refinery at Mandaluyong, Rizal, has an estimated yearly capacity of 26,465 tons of sugar.

Main food imports were wheat flour, rice, dairy products, vegetables and canned fish.

Animal, Poultry, Dairy Produce:

Carabaos, chickens, ducks and other farmyard animals were numerous. Carabao meat is dark and coarse and generally not palatable to white men.

Fresh meat will not be available in quantity.

#### 3. FORAGE.

Imported horses and cattle cannot live on Philippine grasses (cattle must have at least one-eighth Indian blood before they can thrive on local forage). A small amount of grass was planted and harvested between seasons, in rice paddies. This grass was cut, bundled, and sold to carramatta (native animal-drawn vehicles) owners.

Stubble in harvested rice paddies, corn fodder, young cogon and other native grasses are used as forage for cattle. No forage is stored.

#### 4. FUEL.

The quantity and variety of fuels were greater in the lower half of Central Luzon Plain. Large oil storage tanks and the ease of shipping and handling liquid fuels at Manila made its influence felt throughout this area.

All gasoline, kerosene and coal was imported.

Wood is principal domestic fuel; most had to be hauled overland from mountains, or from off-lying islands. Mangrove produces a good grade of charcoal and is widely used.

Coconut oil can be used as a fuel or for lighting purposes but generally it is unsatisfactory. It will not burn well in restricted places and is useless in automobiles.

Alcohol is widely used. As a motor fuel, it is inefficient unless small amounts of lubricating oil and gasoline are added.

Large oil and gasoline storage tanks and small refineries were all located in Manila.

Manila Gas Co supplied Manila and suburbs. Daily capacity was 77,000 cub ft.

#### 5. CONSTRUCTION MATERIALS.

Lumber is principal construction material. Many woods, however, are not impervious to rot and anay (white ants). Concrete or steel should be used in construction close to the ground and lumber used for upper floors.

Most natives are good carpenters, though not accustomed in the use of nails and screws or military type construction.

Following is list of more abundant woods found in E parts of Rizal and Bulacan Provinces or in adjacent provinces.

Almon — Diameter to 6½ft. Weight 35.5lb cub ft. Durable for interior but not exterior. General construction, boxes, crates and mining timber. Excellent boat planking.

White Lauan - Wt 33.6lb cub ft.-Same as Almon.

Tangile — Diameter to 6½ft. Moderately hard and light weight 35.2lb cub ft. Durable for interior. Moderately durable for exteriors, veneer and boat planking.

Red Lauan — Diameter to 7½ft. Weight 36.5lb cub ft. Only moderately durable when exposed to weather or in contact with ground. Interiors and boat planking.

Tiaong — Diameter to 4½ft. Weight 30.5lb cub ft. Same as tangile and red lawan.

Akle — Diameter 4ft but commonly 1½-2ft. Resembles black walnut, hard and heavy. Weight 47lb cub ft. Durable when exposed to weather. Resists termites and insects. Finest cabinet wood, gun-stocks.

Amugio — Diameter 2-4ft. Weight 50lb cub ft. Moderately durable for exteriors, house construction, posts, beams, joists, rafters, flooring.

Apitong — Warps and shrinks; needs seasoning. Weight 48lb cub ft. Posts, flooring, bridge, wharf construction, including piles (treated), barges and lighters, telegraph poles.

## [SECTION 8]

- Guijo Diameter to 6ft. Brownish red. Weight 53lb cub ft. Very common. General construction beams, joists, bridges, furniture, ship framing, wharves and vehicle frames.
- Ipil Diameter to 6ft. Weight 53lb cub ft. Very strong. High grade construction, furniture, house posts, door and window frames.
- Malugai Diameter to 3½ft. Light to dark red. Weight 45lb cub ft. Beam joists, rafters, flooring, masts and spars.
- Yakal Diameter to 6ft. Yellowish gray wood. Weight 58lb cub ft. Flooring, beams, joists, ties, bridge and wharf construction, ship framing and docking, substitute for teak in ship building.

Pine is cut in Zambales and Mountain Province, but little was shipped to this area. Coconut trees can be used for temporary structures, especially as posts.

Aside from lumber dealers, and 12 mills in Manila, there were no other sawmills of any consequence in area covered by this Handbook.

Native houses are usually made from bamboo and nipa thatching, tied together with rattan lashings. Cogon grass makes a good thatch; flooring is usually of wood, split bamboo or woven matting. Sawalli (woven bamboo) is often used for siding. In emergencies, natives can quickly construct shelters of this type for temporary use.

A large rock quarry is located at Mt Arayat (Pangasinan Prov) but generally good gravel and sand can be obtained from stream beds. No gravel or sand will be found in the swampy region of Pampanga R.

## 6. WATER RESOURCES.

Water resources are fairly well developed with many towns having distribution systems. Water is usually supplied only to main buildings; natives use public faucets.

The water table is high and the ground easy for drilling. Water can be obtained usually at depths from 50 to 400ft. Streams coming from government water supply reservation in Sierra Madre (Mts) of East Bulacan and Rizal supply fresh water.

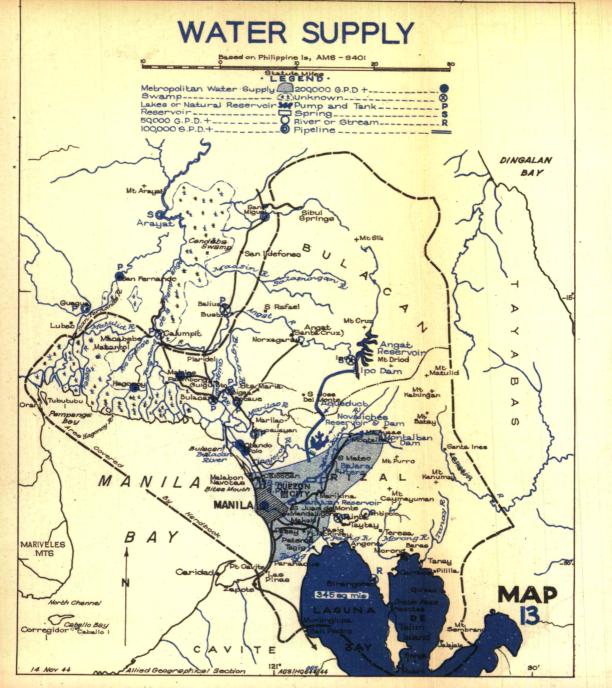
## i. Manila water supply reservoirs:-

Angat R (Ipo Dam), 30 ml north of Manila (watershed area 154,000 acres).

Novaliches Reservoir and Dam, 15 mls north of Manila (6,200 acres).

Marikina R, 20 mls NE of Manila (Flowing river).

The large lake Laguna de Bay is stagnant and dirty and unsuited for drinking water.



## ii. Water Supply Systems:-

#### Bulacan Prov:

Facilities.		Capacity		
		(gallons daily)		
Bigaa	Pump and tower	Unknown		
Bocaue	Pump and tower	100,000		
Bulacan	Pump and tower	Unknown		
Hagonoy	Pump and tower	200,000		
Meycauayan	Pump and tower	100,000		
Polo	Pump and tower	144,000		
Obando Ext	Palo System	57,600		
Malolos	Pump and tower	360,000		
Ipo	Spring	Unknown		
Rizal Prov:				
Antipolo	Pump and tower	50,000		
		16,000 gal storage		
Taytay	Pump and tower	Unknown		
Binangonan	Steam	Unknown		
Cainta	Steam	Unknown		
Manila	Dams and Reservoir	58,000,000		

iii. Towns served by Manila System:-

Balintawak, Caloocan, Malabon, Makati, Mandaluyong, Marikina, Fort McKinley, Paranaque, Pasay, Pateros, Sta Mesa, Quezon City, Montalban, San Francisco Del Monte.

San Juan — One 100,000 gal storage tank. One 200,000 gal storage tank.

Pasig — One 85,000 gal storage tank.

In addition, 83 tested artesian wells were in Manila and vicinity.

Artesian or pumped wells served most of the towns not supplied
by developed systems.

#### 7. MINERALS.

Only active mining installations in the area were: Ipo Gold Mining Co at Ipo, Bulacan, 31 mls NE of Manila. Camp was self-contained with strong-material staff houses, diesel power plant (estimated 1200 hp) blacksmith, machine shop and 200-ton cyanide plant. Capacity 67.330 tons of ore per year; Bulacan Mines, 9 mls east of Angat, Bulacan, where ore was mined by primitive methods. Native furnaces produced about 200 tons of cast iron annually, used for making native farm implements.

#### 8. REPAIR FACILITIES.

Manila was well supplied with repair facilities.

Large machine shops, iron works, rope, shoe, soap and quinine factories, textile mills, cement, bottle, match, paint and can factories. Well-equipped shops and garage of transportation and communication companies were available.

Installations were centered mainly along or near Pasig R, although lack of space has forced a lot of smaller industries to spread out N and S of Manila along Manila B. Large repair shops of

## [SECTION 8]

Manila RR were at Caloocan while a large cement plant was at Binangonan on Laguna de Bay.

Local filling stations and garages had hand tools.

#### 9. NATIVE LABOR.

Labor is mostly unskilled. Some carpenters, plumbers and electricians were available. A man claiming to be a skilled laborer should be carefully watched until proved capable.

Laborers should be employed through native foreman (capataz); one Capataz to each 25 men.

Rates of pay (pre-war) are shown for various laborers.

#### Amount in US dollars:

nount in 05 donars.					
Blacksmiths	\$0.54	per	day		
Boat carpenters	1.28	29	,,		
Bus drivers	0.56	77	22		
Carpenters	0.75	99	99		
Chauffeurs	0.57	99	"		
Electricians	0.92	99	77		
Miners	0.62	22	22		
Painters	0.64	22	22		
Plumbers	1.00	"	"		
RR Engineers	0.86	77	22		
Auto Mechanics	2.00	99	99		
Sugar Centrals	0.72	99	99		
Laborers	0.50	"	***		.1
Surveyors			\$30.00		mth
Draftsman	20.00		22.50		??
Foreman	30.00		75.00 100.00	::	**
Accountant	17.50		35.00	"	"
Typists	17.50	to	33.00	99	99

#### 10. CURRENCY, WEIGHTS AND MEASURES.

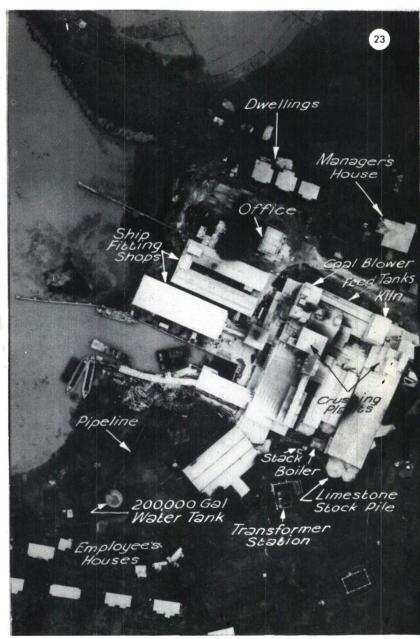
1 centavo	equals	½ US cent
100 ,,	99	1 peso
1 peso	69	\$0.50 US

The metric system of measurement is used throughout the Philippines. (See Appendix "E".)

#### 11. POWER.

Manila Electric Co furnished most power throughout the area.
Small privately-owned diesel plants under 350kw capacity supplied all power not furnished by Manila Electric Co in Bulacan and Rizal. Macabebe and Masantol in Pampanga were supplied by 124kw private diesel plant located at Apalit, Pampanga.

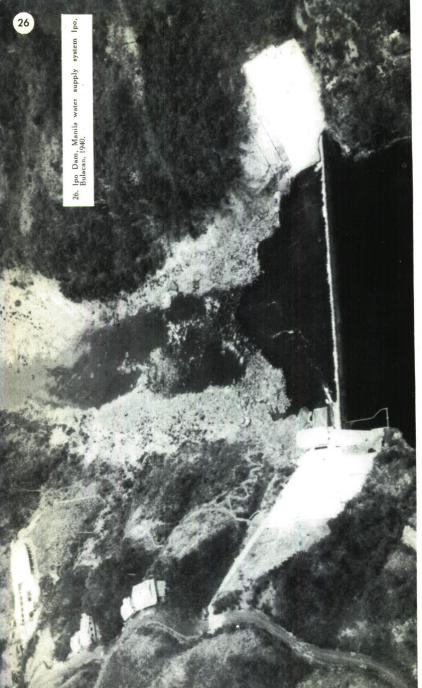
Total capacity Manila Electric Co 77,108kw. Power was supplied from 3 inter-connected plants: Isla de Provisor 29,500 kw steam plant in Manila; 17,608kw hydro-electric plant 60 mls from Manila in Laguna Prov; and Calaray 30,000kw hydro-electric plant in Laguna Prov.



 Rizal Cement Plant on Laguna de Bay, Binan gonan, Rizal.







## SECTION 9.

## MEDICAL PROBLEMS.

(Photo 27)

#### 1. GENERAL.

Climate is tropical with well defined wet and dry seasons. Average temperature is about 80°F. Warmest temperature is about 100°F and coolest about 63°F. Diseases common to tropical countries are prevalent here.

#### 2. DISEASES.

Malaria: Benign, sub-tertian and quartan malaria occur, although the latter two are much less common.

Mosquito vectors include: Anopheline barbirostris, A filipinae, A maculatus, A minimus var flavirostris, A philippineesis, A pseudobarbirostris, A subpictus var indefinitus.

Anopheline minimus var flavirostris which prefers shallow, shaded, foothill streams is most dangerous carrier.

Dengue: Prevalent carrier mosquitoes are: Aedes aegypti and Aedes albonictus.

Typhus: Mite-borne or endemic typhus occurs. Mites are wide-spread.

Filariases: Uncommon mosquito-borne disease.

Dysentery:

- i. Bacillary dysentery is common although normally sporadic. Precautions should be taken by troops to sterilize water, check insect and other contamination.
- ii. Amoebic dysentery is not so prevalent. Other forms of dysentery are also uncommon.

iii. Diarrhoea is of frequent occurrence.

Typhoid and Paratyphoid Fevers: Both are common though normally less prevalent than dysentery. May have spread.

CHOLERA: None recorded some years before war. Reported epidemic in 1943. Must maintain highest standards of hygiene to guard against this and other bowel diseases.

Yaws: Common but responds to NAB injections.

Fungus Infections of Skin: Tinea, seborrhoea and pityriasis are common.

Scabies: Caused by burrowing mite. Widespread.

Tropical Ulcer: Scratches and abrasions unless treated with antiseptic dressings are liable to form rapidly spreading ulcers.

Leprosy: Occurs, known cases isolated with temporary detention for suspects.

Venereal Disease: Gonorrhoea is widespread. Syphilis is less common; chancroid uncommon.

Tuberculosis: Greatest single cause of death in Philippines. All necessary hygienic precautions should be taken.

## [SECTION 9]

Influenza: Common. It frequently leads to more dangerous respiratory diseases.

Respiratory Infections: Bronchitis, broncho-pneumonia and lobar pneumonia are common and before the war were a major cause of disability among American forces in PI.

Smallpox: Practically non-existent.

Chicken Pox: Found occasionally.

Measles: Common.

Trachoma: A common eye disease.

Malnutrition and Beri Beri: Some were encountered before the war-has probably increased since.

Worm Infestations: Widespread. Most common are: round worms, hookworms, flat worms, and whip worms. Other rare types are occasionally found.

Plague: None in recent years but may exist under wartime

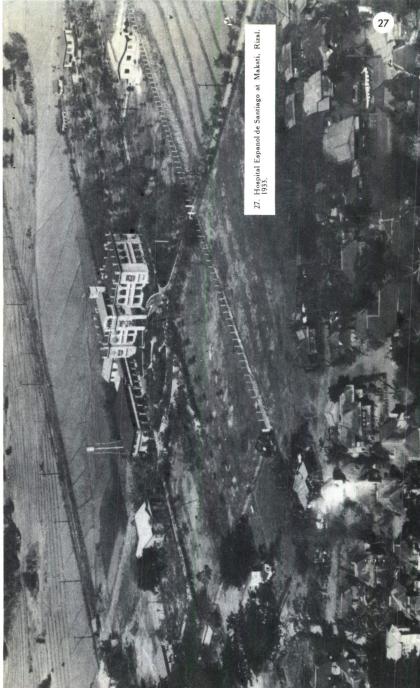
#### 3. HOSPITALS.

Following is a list of pre-war hospitals in the area.

Hospital	Location	Туре	Beds
Quezon Institute	Quezon City, Rizal	Tuberculosis	641
National Psychopathic	Mandaluyong "	Insane	1600
Central Luzon			
Leprosarium	Caloocan "	Leper	444
Welfareville	Mandaluyong "	Special	150
Fort McKinley	Pasig ,,	Military	200
Harrison	Pasay "	General	35
Hospital Espanol de			
Santiago	Makati "	General	80
Manila Heights	San Juan ,,	Special	33
Santol Tuberculosis	"		
Sanitarium	Caloocan "	Tuberculosis	271
Antipolo Emergency	Antipolo "	General	6
Del Monte Sanitarium	S F Del Monte "	Mental	20
Mercy Hospital	Pasay	General	25
Pasig General	Pasig ,,	Mental	10
Bulacan Provincial	Malolos, Bulacan	General	45
Santas Clinic	" "	General	21

#### 4. PESTS.

- a. Pest mosquitoes, flies, cockroaches and rats are common. Flies and rats constitute a medical hazard and steps should be taken to control or eliminate them.
  - b. Itch mites occur and may cause skin irritation.
- c. The red-backed spider, latrodectus hasselti, occurs, and can give a dangerous and painful bite.
  - d. Poisonous snakes are infrequent.



#### SECTION 10.

# METEOROLOGICAL CONDITIONS.

#### 1. CLIMATE.

Two pronounced seasons; one dry in winter and spring, corresponding with the period of NE monsoon from Nov to May, the other wet in summer and autumn corresponding with SW monsoon from Jun to Nov. Temperature and humidity are uniformly high with little seasonal variation.

#### 2. RAINFALL.

Wettest months during SW monsoon in Jun, Jul and Aug. Driest months during NE monsoon in Jan, Feb and Mar. In wet season mean monthly precipitation ranges from 7.3 to 24.7 inches from Jun through Oct with highest falls in Jul and Aug.

Yearly and monthly rainfall averages in inches at principal stations in or in near vicinity of area are as follows:

	Antipolo (Rizal)	Manila	Malolos (Bulacan)
Jan	1.1	 .98	 .74
Feb	.80	 .48	 .40
Mar	.74	 .74	 .49
Apr	1.4	 1.2	 .72
May	7.8	 5.1	 7
Jun	12.8	 9.8	 13.6
Jul	24	 17	 18.5
Aug	24.7	 16.5	 18.6
Sep	18.5	 14.3	 11.7
Oct	10.7	 7.9	 7.3
Nov	8	 5.6	 8
Dec	4	 2.5	 2.2
Year	115	 82	 90

Rainy days are most frequent from Jul through Oct with 17 to 22 days a month, while from Jan to Apr only 3 to 5 days have precipitation.

Serious floods are at times caused by abnormally heavy rainfall associated with typhoons.

#### 3. WINDS.

NE (Winter) Monsoon: Nov till Mar or Apr. Direction mainly N and NE tending easterly toward end of season. Wind steady, especially in Jan averaging 15-20 mph.

SW (Summer Monsoon): Jun to Sep or Oct generally from westerly quarter. Intermittent and less steady than NE monsoon. Follows transitional period of variable winds and calms. Steadiest in Jul and Aug with average speed at height of 10-15 mph.

Squalls (Collas): Accompanied by much rain—prevalent during SW monsoon, especially near land.

Land and sea breezes well marked, especially where monsoon is weak.

# [SECTION 10]

Typhoons (baguios): May occur in any month, but more prevalent from Sep through Nov. Least probable from Jan through Mar. Cause great damage, especially in unprotected harbors. Often accompanied by much rain persisting for days. Impossible for foot troops to march against force of wind.

#### 4. CLOUD AND VISIBILITY.

Cloudiness is relatively high in all months with least in spring averaging from three-tenths to five-tenths. Maximum in summer, averaging seven-tenths from Jun to Sep. Cloud amount normally follows seasonal distribution of rainfall. Maximum cloudiness is in late afternoons, and minimum in mid-morning and evening.

When SW winds blow uninterruptedly for several days, overcast skies with low cloud bases (1000-2000ft) prevail.

Visibility is generally good. Fog rare. Early ground mist is rapidly dissipated.

### 5. TEMPERATURE.

Consistently high and uniform with minimum temperatures in winter (Dec-Feb).

Temperature at sea level seldom exceeds 95°F or falls below 65°F. Above 3000ft, cooler conditions prevail.

#### 6. HUMIDITY.

High, with seasonal variation amounting to 15%. Lowest values in Apr, usually below 75%, highest in summer and autumn, usually between 80 and 85%.

# 7. OTHER PHENOMENA.

Small land tremors are frequent; severe earthquakes rare. Thunderstorms with squalls and heavy rains are frequent from May to Oct.

# 8. EFFECTS OF CLIMATIC CONDITIONS.

- i. Sea: Unloading operations hampered by typhoons and storms. Ships endangered in port.
- ii. Land: Operations are difficult during rainy season. Highways are blocked and rivers flooded during typhoons. Vitality of foot troops is lowered by hot dry season. Construction of new airfields in rice country almost impossible when ground becomes saturated. Runways of most airfields, unless paved, unusable during rainy season.
- iii. Air: Cloud cover and low visibility are greatest during rainy season. Typhoons and wet landing fields are the main hazards.

### APPENDIX "A"

# DIAGRAMS OF TIDES, SUNLIGHT AND MOONLIGHT

### EXPLANATION OF FOLLOWING DIAGRAMS

#### AREA COVERED:

The astronomical data is for sea level and will not vary more than 5 minutes over a radius of 60 miles in the lower latitudes; in the higher latitudes the area covered is less.

A footnote is inserted below the diagram when both the tidal and astronomical data are applicable to places some distance from

the one shown in the heading.

#### TIME USED:

Times on the diagram are for the time meridian indicated in the heading. When another time meridian is to be used in the field, it will be found convenient to change the figures representing hours on the left of the large diagram to conform to the new time. If the time meridian to be used is east of the one shown on the diagram, increase the figures by 1 hour for each 15°; if west, decrease the figures similarly.

#### DATES:

In the upper diagram, each day from midnight to midnight is represented by a space between two lines. In the lower diagram, where the days are represented by vertical lines covering the period from noon of one day to noon of the next, the dates at the bottom differ from those at the top because the date changes in passing through midnight.

#### TIDES:

The times of the tides are shown by curves in the lower diagram. By noting the sequence of the tides during a day, the height of any particular tide can be found from the upper diagram.

#### TWILIGHT:

Three types of twilight are shown. In the evening, civil twilight starts at sunset and ends when the sun is 6° below the horizon. Objects can be readily distinguished and a newspaper can be read. At the end of civil twilight, the brightness of the sky is still about 20 times as great as when the full moon is at zenith. Civil twilight is followed by nautical twilight which ends when the sun is 12° below the horizon. All the brighter stars are visible, general outlines can be distinguished, but the horizon will usually be indistinct. The end of nautical twilight may appear to be the beginning of solar darkness, but a small amount of light from the sun may still be refracted or reflected until the end of astronomical twilight when the sun is 18° below the horizon. In the morning the twilights occur in reverse order.

#### MOONLIGHT:

During astronomical twilight and solar darkness, periods of moonlight and dim moonlight are shown. During the period of

# Diagrams of Tides, Sunlight and Moonlight-continued.

moonlight, the intensity of light will vary between the brightness of the full moon at zenith and about one-third of this value. During the period of dim moonlight, the intensity varies from about onethird to one-tenth of the brightness of full moon at zenith.

#### MOON'S PHASES:

The phases of the moon are shown below the day on which they occur.

#### TEMPERATURES:

The average monthly temperatures of the air and sea water in the vicinity are shown below the diagram.

#### WINDS:

A wind rose is given showing for the month the average frequency and strength of the winds. The top of the rose is north. The length of the arrow, measured from the outside of the circle and compared to the scale to the right, shows the percentage of observations during which the wind has blown from the direction indicated. The number of feathers shows the average force of the wind on the Beaufort scale. The figure in the circle gives the percentage of calms.

#### SOURCES:

Tide predictions are from the annual or special tide tables issued by the US Coast and Geodetic Survey. Other data are obtained from publications of the US Navy Department, the British Admiralty, and other sources.



TIME MERIDIAN: 120°E.

NOVEMBER, 1944

LAT. 14°35'N. LONG. 120°58'E

SUNLIGHT AND MOONLIGHT DATA COMPUTED FOR LAT. 14°35'N. LONG. 120°58'E.

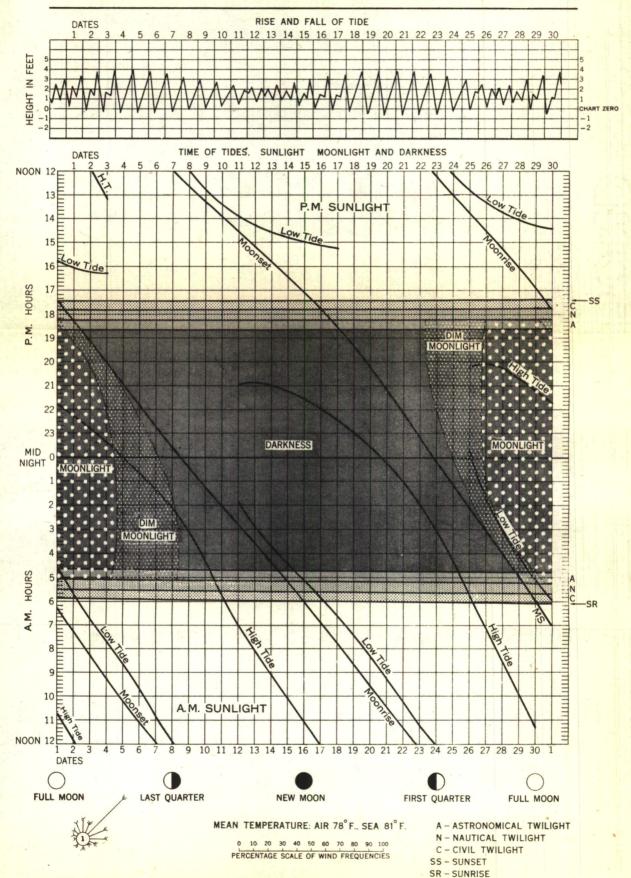
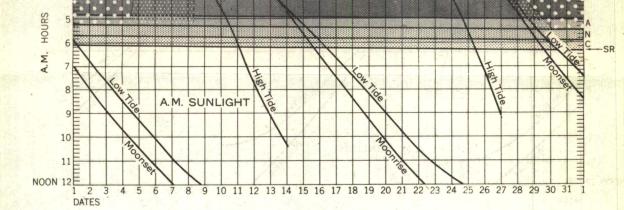
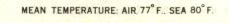


DIAGRAM OF TIDES, SUNLIGHT AND MOONLIGHT DECEMBER, 1944 MANILA BAY\* TIME MERIDIAN: 120°E. SUNLIGHT AND MOONLIGHT DATA COMPUTED FOR LAT. 14°35'N. LONG. 120°58'E. LAT. 14°35'N. LONG. 120°58'E. RISE AND FALL OF TIDE DATES 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 CHART ZERO TIME OF TIDES. SUNLIGHT. MOONLIGHT AND DARKNESS DATES 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 NOON 12 Low Tide ow Tid 13 14 15 P.M. SUNLIGHT 16 17 18 20 DIM MOON 21 LIGHT 22 23 MOONLIGHT DARKNESS MID NIGHT O MOONLIGHT 2 DIM





LAST QUARTER NEW MOON

0 10 20 30 40 50 60 70 80 90 100 PERCENTAGE SCALE OF WIND FREQUENCIES

A - ASTRONOMICAL TWILIGHT

**FULL MOON** 

- N NAUTICAL TWILIGHT
- C CIVIL TWILIGHT
- SS SUNSET
- SR SUNRISE

FIRST QUARTER

MOON LIGHT

HEIGHT IN FEET

HOURS

# DIAGRAM OF TIDES, SUNLIGHT AND MOONLIGHT

**JANUARY 1945** MANILA BAY\* TIME MERIDIAN: 120°E. SUNLIGHT AND MOONLIGHT DATA COMPUTED FOR LAT. 14°35'N. LONG. 120°58'E. LAT. 14 35 N. LONG. 120 58 E. RISE AND FALL OF TIDE DATES 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 HEIGHT IN FEET CHART ZERO -1 -2 TIME OF TIDES, SUNLIGHT, MOONLIGHT AND DARKNESS DATES 22 23 24 25 26 27 28 29 30 31 10 11 12 13 14 15 16 17 18 19 20 21 NOON 12p 13 P.M. SUNLIGHT 14 15 16 17 18 P.M. 19 DIM 20 MOONLIGHT 21 22 23 DARKNESS MOONLIGHT MID NIGHT DIM MOONLIGHT C A.M. 8 10 A. M. SUNLIGHT 11 NOON 12E 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 9 DATES **FULL MOON** LAST QUARTER **NEW MOON** FIRST QUARTER

MEAN TEMPERATURE: AIR 76° F., SEA 78° F.

0 10 20 30 40 50 60 70 80 90 100

PERCENTAGE SCALE OF WIND FREQUENCIES

\*This diagram is also applicable, without change, to the coast of Luzon from BALAYAN BAY to SUBIC BAY inclusive and to LUBANG ISLAND. A – ASTRONOMICAL TWILIGHT N – NAUTICAL TWILIGHT

C - CIVIL TWILIGHT

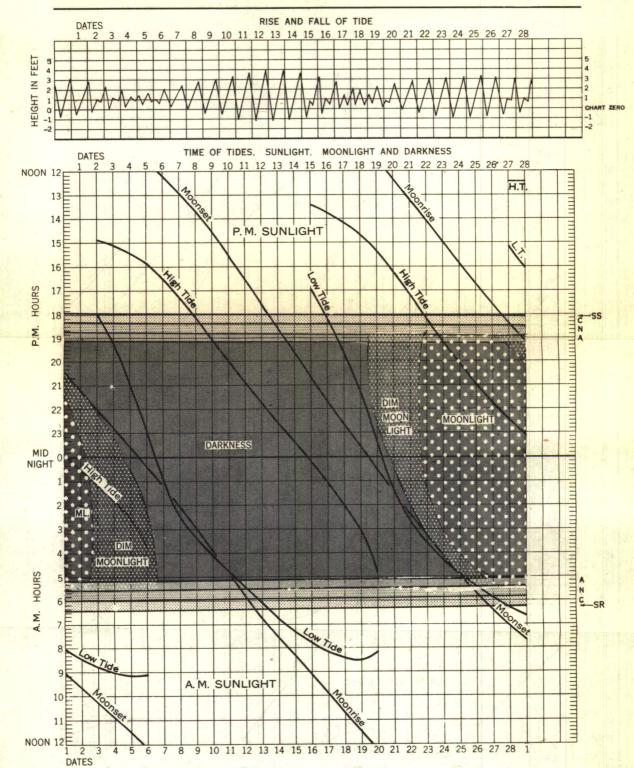
SS - SUNSET SR - SUNRISE MANILA BAY\*

TIME MERIDIAN: 120°E.

FEBRUARY, 1945

LAT. 14 35 N. LONG. 120 58 E.

SUNLIGHT AND MOONLIGHT DATA COMPUTED FOR LAT. 14°35'N. LONG. 120°58'E.





LAST QUARTER

MEAN TEMPERATURE: AIR 77° F., SEA 79° F.

**NEW MOON** 

FIRST QUARTER

0 10 20 30 40 50 60 70 80 90 100 PERCENTAGE SCALE OF WIND FREQUENCIES A - ASTRONOMICAL TWILIGHT

N - NAUTICAL TWILIGHT

C - CIVIL TWILIGHT

FULL MOON

SS - SUNSET

SR - SUNRISE

# DIAGRAM OF TIDES, SUNLIGHT AND MOONLIGHT

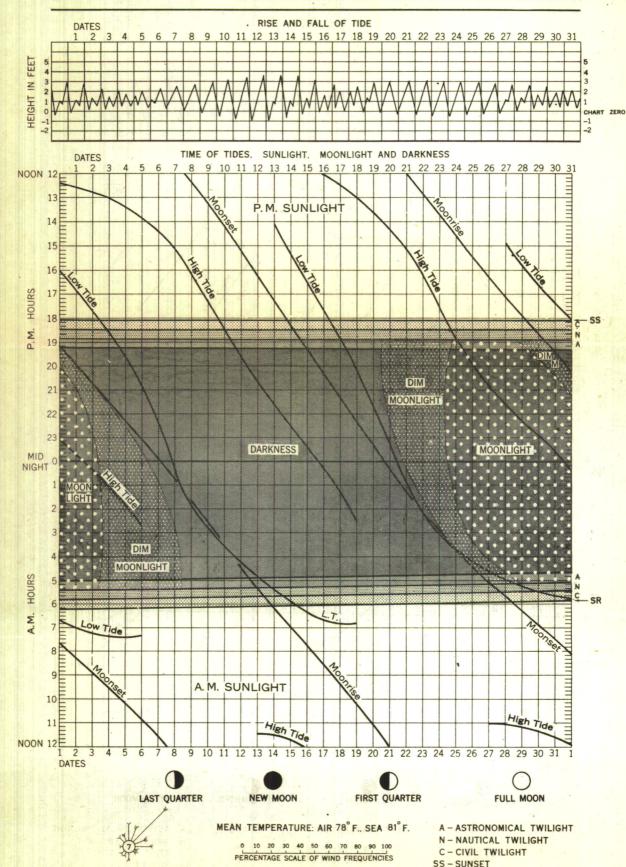
MANILA BAY\*

TIME MERIDIAN: 120°E.

MARCH, 1945

LAT. 14°35'N. LONG. 120°58'E.

SUNLIGHT AND MOONLIGHT DATA COMPUTED FOR LAT. 14°35'N. LONG. 120°58'E.



\*This diagram is also applicable, without change, to the coast of Luzon from BALAYAN BAY to SUBIC BAY inclusive and to LUBANG ISLAND.

U.S. COAST AND GEODETIC SURVEY

SR - SUNRISE

# APPENDIX B

#### GAZETTEER OF PLACE NAMES:-

This list includes all place names used in Terrain Study 94 (Central Luzon).

Place names within the area covered by Handbook 41-Manila, are indicated by \*.

#### Name

ABACA R ABO ABO (Talisay) R ABUCAY ACOJE A/F AGLOLOMA B

AGLAO AGNO R AGOS R

AGUANG (DIMANIBUNG) R AKLE \*ALABANG ALIAGA ALOU R

AMO R AMUNGAN AMOT CR ANAO \*ANGAT ANGELES

ANGELES SOUTH (LARA) A/F 27 mls S Tarriac.

\*ANGELO
\*ANGONO
ANONANG R
\*ANTIPOLO
\*APALIT
ARENAS PT
ARENETA

ARAYAT MT ARINGUAY Cr

ARINGUAY Cr AYALA Bridge

BABUYAN
BACATAN R
\*BACLARAN
BACOLOR
BADIO
BAGAC
BAGBAG
BAGONGILOG
BAGUMBAYAN
BAHAY PARE
BAJACBOJAC R
BAKA R

Distance and Direction.

99 mls NNE of Manila. Adjacent to Balanga. 3 mls N Balanga.

28 mls N Iba. 18 mls SW Balanga. 28 mls NW Balanga.

28 mls NW Balanga. 3 mls S Lingayen. 39 mls E Manila. 82 mls NNE Manila.

82 mls NNE Manila.
31 mls S Cabanatuan.
14 mls SE Manila.
8 mls W Cabanatuan.
29 mls N Cabanatuan.
14 mls S Balanga.

3 mls NW Iba.
30 mls NNE Cabanatuan.

16 mls N Tarlac.
23 mls N Manila.
24 mls S Tarlac.
27 mls S Tarlac.

32 mls NE Manila. 14 mls E Manila. 15 mls S Iba. 14 mls E Manila. 24 mls NE Balanga. 21 mls N Iba.

15 mls N Manila. 10 mls NNW of S Fernando.

13 mls N S Fernando. 27 mls NW Balanga.

Manila City.

18 mls S Balanga.

Tarlac-Pangasinan Prov Bdry.

5 mls S Manila.
23 mls NE Balanga.
28 mls NE Cabanatuan.
12 mls WSW Balanga.
23 mls N Manila.
7 mls E Manila.

6 mls N Balanga.
30 mls N Manila.
20 mls NW Balanga.
14 mls NW Tarlac.

Name

BALALES R BALANGA BALANGA R \*BALARA A/F BALAYAN BAY BALAYON R BALER BALETE PASS BALIBAGO \*BALICULING R BALIMBING R BALINAG BALING BOC BOC R BALINGCANAWAY BALINTAWAK BALOC BALOY R BALSIC R \*BALUIAG BALUARTE P: BAMBAN BAMBAN R \*BAMBANG BANABA BANCAL R BANGANTALINGA R BANGAT R BANI Pt BANTUG BARANKA \*BARAS BATALAN R BAYAMBANG BAYANDATE R BYANTIG R BAYBAY R BAYTO (CABALUAN) R BETIS \*BIAK-NA-BATO BIANGUE BIAY Cr \*BIGAA BINAGA PORT BINAGA R \*BINANGONAN

BINAUANGAN R BINIPTICAN (BINICTICAN) PT

BINASA R

Distance and Direction.

3 mls W Cabanatuan. 14°41'N, 120°30'E. Adjacent to Balanga. 12 mls NE Manila. 55 mls S Manila. 18 mls W Balanga. 45 mls NE Cabanatuan. 44 mls N Cabanatuan. 22 mls S Tarlac. 37 mls N Manila. 13 mls SSE Manila. 25 mls N Manila. 4 mls N Iba. 6 mls E Tarlac. 5 mls NE Manila. 11 mls NW Cabanatuan. 73 N by W Manila. 13 NNW Balanga. 25 mls N Manila. 30 mls N Iba. 15 mls S Tarlac. 15.5 mls S Tarlac. 9 mls SE Manila. 26 mls S Tarlac. 3.5 mls NW Iba. 2 mls N Iba. 11 mls SSW Tarlac. 17 mls N Iba. 17 mls NE Cabanatuan. 6 mls SE Manila. 21 mls E Manila. 18 mls W Balanga. 24 mls NW Tarlac. 18 mls W Balanga. 16.3 mls NW of Tarlac. 23 mls NW Manila. 27 mls N Iba. 5 mls SW S Fernando. 36 mls NNW Manila. 12 mls E Iba. 29 mls N Iba. 16 mls N Manila. 18 mls WNW Balanga. 18 mls WNW Balanga. 18 mls SE Manila. Prov of Zambales 17 mls NW Balanga. 13 mls SW Balanga.

25 mls WNW Balanga.

Name

BUED

BINONDO Canal
BINUANGAN R
\*BITAS R
BITNUNG Mt
\*BOCAUE
BOCBOC (or MINATULA) Cr.
BOLINAO
BONGABON
\*BOSOBOSO
BOTOLAN
BUCAO R
BUCOT

BUIONG PT
\*BULACAN
\*BULACAN R
BULSA (ORIONES) R
BULU R
BULUALTO
BUNDOC
\*BUNLO R
BURGOS
\*BUSTOS

BYANTIG R

\*CALUMPIT CAMAYA Pt

CAAROSIPAN R CABANGAN CABCABEN CABALLO I CABALUAN (or BAYTO) R CABANATUAN CABATAGON CABATUAN CABAYOC Pt CABIAO CABUCBUCAN CABU CR CABUSILAN Mts CAIBOBO (KAYBOBO) PT \*CAINTA CALAGUIMAN R CALAGUAGUIN B **CALAMBA** \*CALANATA CALIPAHAN \*CALOOCAN CALULUT R CALUMPANG

Distance and Direction.

Manila City. 15 mls SW Balanga. 3 mls N Manila. 33 mls SE Iba. 14 mls N Manila. 3 mls S Cabanatuan. 34 mls NW Lingayen. 15 mls NE Cabanatuan. 19 mls E Manila. 4 mls SE Iba 5 mls SE Iba. 7 mls W Cabanatuan. 23 mls N Tarlac. 19 mls WNW Balanga. 15 mls NW Manila. 10 mls NW Manila. 3 mls SW Tarlac. 40 mls N Manila. 18 mls S Cabanatuan. 11 mls SE Tarlac. 13 mls N Manila. 16 mls NW Tarlac. 25 mls N Manila.

12 mls NW Tarlac.

28 mls S Iba.

12 mls SE Iba.

16 mls S Balanga.

22 mls S Balanga.

27 mls N Iba.

15°29'N, 120°58'E.

26 mls NE Cabanatuan.

16 mls E Iba.

12 mls WSW Balanga.

18 mls SW Cabanatuan.

16 mls ENE Cabanatuan.

16 mls ENE Cabanatuan.

20 mls E Iba.

10 mls ENE Cabanatuan.

21 mls EW Balanga.

21 mls SW Balanga.

22 mls SW Balanga.

34 mls S Iba.

23 mls NW Manila.

24 mls NW Manila.

25 mls NW Manila.

25 mls NW Manila.

25 mls NW Manila.

27 mls S Balanga.

Name

CAMAYAN Pt CAMILING CAMP CLAUDIO CAMP MURPHY CANACAO B CANARIN LAKE CANDABA CANDABA SWAMP CANDELARIA CAPAS CAPITANGAN CAPONES IS CARABAO IS \*CARDONA CARMEN CARRANGLAN CASTILLEJOS \*CATNON R CAUT CAWAYANKILING R CAVITE CAYUAG CHIQUITA ISLET CINCO CINCO R CINCO PICOS CLARK A/F COCHINOS PT CONCEPCION CONVERSION CORONEL (SANTOR) R CORREGIDOR ISLAND **CUBAO** CUBI PT \*CULICULI CULIS CUTCUT R CUYAPO

DAGUPAN
DALANAOAN
\*DAPDAP R
DAPUA PT
\*DARANGAN R
DASOL Bay
DAU
DAU EAST A/F
DAUANA R
DE LA RINA Canal
DEL CARMEN
\*DEWEY Boulevard

Distance and Direction.

21 mls WNW Balanga. 18 mls NW Tarlac. 6 mls S Manila. 4 mls E Manila. 8 mls S Manila. 11 mls NE Tarlac. 18 mls SW Cabanatuan. 25 mls NNW Manila. 21 mls N Iba. 10 mls S Tarlac. 2 mls N Balanga. 28 mls S Iba. 28 mls S Balanga. 20 mls E Manila. 27 mls N Tarlac. 33 mls N Cabanatuan. 29 mls NW Balanga. 16 mls N Manila. 10 mls E. Tarlac. 12 mls S Iba. 8 mls SW Manila. 27 mls NW Balanga. 22 mls W Balanga. 3 mls W Cabanatuan. 39 mls SSE Iba. 50 mls NW Manila. 19 mls S Balanga. 12 mls SE Tarlac. 29 mls NE Cabanatuan. 16 mls NE Cabanatuan. 20 mls S Balanga. 6 mls E Manila. 20 mls NW Balanga. 5 mls SE Manila. 12 mls N Balanga. 1 ml S Tarlac. 21 mls N Tarlac.

7 mls E Lingayen.
30 mls SE Iba.
12 mls S Tarlac.
18 WNW Balanga.
15 mls E Manila.
38 mls N Iba.
21 mls S Tarlac.
22 mls S Tarlac.
22 mls S Tarlac.
11 mls SW Balanga.
Manila City.
39 mls NW Manila.
City of Manila.

#### Name

DIAMMAN R DIGMALA R DILADILA Creek DILAYUPING I DIMANIBUNG (AGUANG) R 5 mls NE Manila.

DINALUPIHAN 14 mls NE Manila. DINAMAGAT R DINGALAN Bay DIRITA R DITALI DIZON DOLORES

# Distance and Direction.

30 mls NNE Cabanatuan. 15 mls NE Cabanatuan. 7 mls W San Fernando. 9 mls N Balanga. 14 mls NW Balanga. Zambales Prov.
55 mls NE Manila. 25 mls S Iba. 52 mls NE Cabanatuan. 30 mls SE Tarlac. 26 mls NE Balanga.

EL FRAILE I EMAN PT EMAN PT ESTERO De MATIMBO ESTERO De VITAS

26 mls S Balanga. 16 mls W Balanga. 17 mls NW Manila. City of Manila.

FAROLA Lighthouse FLORIDABLANCA

FORT DRUM (EL FRAILE I) FORT FRANK (CARABAO I) FORT HUGHES (CABAILO I) \*FORT McKINLEY FORT MILLS (Corregidor I) FORT STOTSENBURG FORT WINT (Grande I)

Manila Harbor.

12 mls WSW San Fernando (Pampanga).
26 mls S Balanga.
29 mls S Balanga.
22 mls S Balanga.
4 mls SE Manila

4 mls SE Maniia 20 mls S Balanga. 21 mls S Tarlac. 22 mls W Balanga.

GANADO Canal GAPAN GOGO R

Manila City. Manila City.
12 mls S Cabanatuan. 8 mls Tarlac. 8 mls WSW Balanga. GOGO R

\*GRACE PARK
GRANDE Island
GRULLO R

\*GUADALUPE

\*GUAGUA
GUIGUINTO

\*GUIGUINTO

\*GUIGUINTO

\*GUIGUINTO

\*GUIMBA
GUIMBA
GU

Name

\*HAGONOY HERMANA Islands \*HERMOSA

IBA
ILOG BALIWAG
INAIRAN R
INFANTA
\*INFANTA
\*IPO
\*IPO
DAM

JAEN JALAKAK (CABANGAN) R \*JALAJALA

KABAYO R
KALAKLAN PT
KAPINTALAN
KARAYAN R
KAY BO BO (CAI BO BO) PT
KILANG R
KINABAKBAGAN Reef
KITANG (QUITANG) PT
KUYAKUY R

LABANGAN \*LABANGAN R LADIAOAN (Lake) \*LAGUNA DE BAY LAGUNDI LAKE LOOC LA LOMA LAMAO LA MONJA Island LA PAZ LARA \*LAS PINAS LAUR \*LAWANGBATO L'AWIS R LAYAC \*LENATIN R \*LEYBAN LIBERTADOR LICAB LICAB R LILIMBON Cove LIMAY

Distance and Direction.

23 mls NW Manila. 30 mls NNW Iba. 11 mls N Balanga.

15°20′N, 119°59′E. 11 mls NW Cabanatuan. 9 mls N Iba. 34 mls N Iba. 50 mls E Manila. 23 mls NE Manila. 23 mls NE Manila.

10 mls S Cabanatuan. 12 mls S Iba. 29 mls SE Manila.

15 mls W Balanga.
21 mls NW Balanga.
42 mls N Cabanatuan.
23 mls S Iba.
16 mls SW Balanga.
9 mls SSE Balanga.
Off Iba, Zambales.
10 mls SSE Balanga.
23 mls S Iba.

6 mls W Lingayen. 22 mls NW Manila. 22 mls NW Tarlac. 10 mls SE Manila. 35 mls NW Manila. 32 mls SSW Iba. 4 mls N Manila. 12 mls S Balanga. 21 mls S Balanga. 22 mls S Iba. 27 mls S Tarlac. 8 mls S Manila. 16 mls NE Cabanatuan. 17 mls N Manila. 18 mls N Iba 13 mls NNW Balanga. 28 mls E Manila. 31 mls E Manila. 21 mls N Iba. 14 mls WNW Cabanatuan. · 14 mls WNW Cabanatuan. 18 mls S Balanga. 9 mls S Balanga.

#### Name

LIMUTAN R
LINGAYEN Gulf
LIPAY (MASINLOC) R
LOKANIN PT
LOLUMBOY
LOOC, Lake
LOS COCHINOS
LOS FRAILES Islands
LUACAN
\*LUBAO
LUBLUB
LUCAPON
LUCENA
LUCSUAN

LUISITA
\*LUNETA
LUPAO

MAASIN MABALACAT MABANGCAL MABATANG MACABACLAY \*MACABEBE MACAPSING \*MACATI \*MADLUN (SAN MIGUEL) R MAGALANG MAGALAWA I **MAGUMBALI** MAKATI \*MALABON MALALAN R MALIBAY MALINING MALIMBA R \*MALINTA MALIS \*MALOLOS MALOMA R MAMATAD MANDALUYONG MANGALINIOUEN PT MANGATAREM MANGUNI R MANILA MAPALAD MAPANUETE R

MARAPO R

#### Distance and Direction.

12 mls W Balanga.
16°10′N, 120°10′E.
15 mls N Iba.
14 mls SSE Balanga.
11 mls N Manila.
32 mls SSE Iba.
19½ mls S Balanga.
21 mls W Balanga.
21 mls W Balanga.
4 mls S Manila.
31 mls NE Cabanatuan.
25 mls N Iba.
Batangas Prov.
12 mls W San Fernando (Pampanga).
6 mls SE Tarlac.
Manila City.
27 mls N Cabanatuan.

27 mls N Manila. 18 mls S Tarlac. 18 mls SW Tarlac. 4 mls N Balanga. 17 mls NE Cabanatuan. 27 mls NW Manila. 17 mls NE Cabanatuan. 5 mls E Manila. 39 mls N Manila. 19 mls S Tarlac. 13 mls NW Iba. 24 mls S Cabanatuan. 5 mls SE Manila. 4 mls N Manila. 31 mls NW Manila. 5 mls SE Manila. 22 mls N Tarlac. 27 mls N Manila. 7 mls N Manila. 19 mls NW Manila. 20 mls NW Manila. 20 mls SE Iba. 21 mls S Cabanatuan. 4 mls E Manila. 24 mls NW Balanga. 29 mls NW Tarlac. 50 mls N Manila. 14°36′N, 120°58′E. 9 mls E Sta Cruz, Zambales. 28 mls SE Iba. 33 mls NW Manila.

Name

MARELLA R \*MARIKINA MARIKIT \*MARILAO \*MARILAO R MARINGALU R MARIVELES MARGOT \*MASANTOL MASINLOC MATAGAN R MATAIN MATALVI. MATAPAONA BATO MATULID R MATUNAS R MAUBAN R MAYAGAO PT MAYANTOC MAYANGA I \*MAYBANCAL \*MAYPAJO \*MEYCAUAYAN MEXICO

MINALIN MONCADA \*MONGO R \*MONTALBAN MORON \*MORONG MT ANGELO MOUNT BITNUNG MOUNT DOME PEAK MOUNT GATAS MOUNT MABOLINOC MOUNT NATIB MOUNT PINATUBO MOUNT PURRO MOUNT SAMAT MUERTO R MUNOZ \*MUNTINGLUPA MURCIA

NABUNGA NAIC NANCA R NANGKA NAMPICUAN Distance and Direction.

28.5 mls SE Iba. 9 mls NE Manila. 29 mls NE Cabanatuan.

11 mls N Manila. 11 mls N Manila.

30 mls NNE Cabanatuan. 17 mls S Balanga.

Stone quarry nr Ft Stotsenberg, 27 mls NW Manila.

15 mls N Iba. 35 mls SSE Iba. 23 mls NW Balanga.

14 mls N Iba. Manila City. 31 mls NE Manila.

Bataan Prov, 12 mls N Balanga.

Bataan Prov.

19 mls W Balanga. 17 mls NW Tarlac. 23 mls NW Balanga. 20 mls E Manila.

Manila City. 9 mls N Manila.

3 mls NNE San Fernando

(Pampanga).

4 mls S San Fernando (Pampanga)

17 mls N Tarlac. 15 mls NE Manila. 16 mls NE Manila. 18 mls W Balanga. 19 mls E Manila. 29 mls NE Manila. 33 mls SE Iba. 14 mls E Iba. 23 mls E Iba. 33 mls SE Iba.

10 mls WNW Balanga.

28 mls ESE Iba. 18 mls NE Manila. 6 mls S Balanga. 28 mls SE Iba.

15 mls N Cabanatuan. 15 mls SE Manila.

6 mls S Tarlac.

29 mls SE Iba. 23 mls SW Manila. 12 mls NE Manila. 12 mls NE Manila. 17 mls N Tarlac.

Name

NATIB MT NAULO PT \*NAVOTAS NAYOM R NAZASA B NIBANGA R NICHOLS A/F \*NIELSON A/F \*NORZAGARAY \*NOVALICHES

\*OBANDO O'DONNELL OLONGAPO \*ORANI \*ORANI CHANNEL ORION ORIONES (BULSA) R OYON B

PABANLAG PACO **PAGSANJAN** PAITAN PALANGINAN PT PALASAN PT PALAUIG PALAUIG REEF PAMATUAN R PAMPANGA B PAMPANGA R \*PANDACAN PANDAN R PANDAN PT \*PANDI PANDIL I PANGOLISANAN R **PANIBATUJAN** 

(PANITBATOHAN) PT PANTABANGAN PANIKIAN R PANIOUI \*PAOMBONG \*PARANAQUE R \*PASAG R \*PASAY

\*PASIG \*PASIG R

\*PATEROS PATLIN (O'DONNELL) R

PAYSAWAN B

Distance and Direction.

10 mls W Balanga. 25 mls N Iba. 4 mls N Manila. Zambales-Pangasinan boundary. 36 mls S Iba. 20 mls NW Balanga. 5 mls S Manila. 5 mls SE Manila. 22 mls N Manila. 10 mls NE Manila.

8 mls N Manila. 13 mls SW Tarlac. 19 mls NW Balanga. 8 mls N Balanga. 8 mls N Balanga. 5 mls S Balanga. 3 mls SW Tarlac. 16 mls N Iba.

21 mls N Balanga. 2 mls SE Manila. 40 mls SE Manila. 25 mls NE Tarlac. 1 ml W Iba. 18 mls S Balanga. 9 m!s NW Iba. 8 mls NW Iba. 27 mls SE Iba. 25 mls NW Manila. 25 mls NW Manila. 2 mls E Manila. 6 mls S Balanga. 6 mls S Balanga. 19 mls N Manila. 16 mls W Balanga. 16 mls S Balanga.

16 mls W Balanga. 27 mls NE Cabanatuan. 17 mls S Balanga. 13 mls N Tarlac. 20 mls NW Manila. 7 mls S Manila. 28 mls N Manila. 4 mls SE Manila. 8 mls SE Manila. Manila City. 8 mls SE Manila. 12 mls SW Tarlac. 14 mls SW Balanga.

#### Name

PAYSAWAN R PAYUGBUG Trail PENARANDA PENARANDA R PEQUENA I PETAMBU PT PICO LEON PILAR \*PILILLA PINA R PINAMBARAN PINAOD PINEDA **PINTO** PINULOT PLANAS R \*PLARIDEL (QUINGUA) \*POLO **POONBATO POPONTO** PORAC PORAC WEST A/F PORAC (PAMPANGA) R PORT BINANGA
PORT MASINLOC
PORT MATALVI
PORT OLONGAPO
PORT SILANGUIN PROVISOR I PUCOT R
PULANG BULI PULILAN PULONG BATO PT PUNCAN

PUNDAGUIT (PUNDAQUIT) R 29 mls S Iba. PURA

PULIPO I

**OUENABUAN** OUEZON \*QUINGUA (PLARIDEL) \*OUISAO OUITANG (KITANG) PT QUITANGUIL R

RAMOS RATON Islet RIO CHICO RIVERA PT RIZAL

#### Distance and Direction.

14 mls SW Balanga. SE Iba. 9 mls S Cabanatuan. 9 mls S Cabanatuan. 24 mls NW Balanga. 25 mls NW Balanga. 11 mls NE Cabanatuan. 1½ mls SE Balanga. 25 mls E Manila. 10 mls N Balanga. 20 mls S Cabanatuan. 28 mls S Cabanatuan. 7 mls E Manila. 18 mls NE Cabanatuan. 16 mls NW Balanga. 25 mls N Balanga. 21 mls NW Manila. 7 mls N Manila. 14 mls E Iba. 20 mls N Tarlac. 28 mls S Tarlac. 27 mls S Tarlac. 25 mls NW Manila. 18 mls W Balanga. 14 mls N Iba. 12 mls N Iba. 19 mls NW Balanga. 28 mls W Balanga.

17 mls S Balanga. 19 mls S Cabanatuan. 22 mls NW Manila. 7 mls SSW Balanga. 29 mls N Cabanatuan.

Manila City.

10 mls N Tarlac.

25 mls N Iba.

29 mls SE Tarlac. 5 mls NE Manila. 21 mls NW Manila. 27 mls SE Manila. 10 mls SSE Balanga.16 mls N San Fernando.

12 mls N Tarlac. 34 mls N Iba. 16 mls NW Cabanatuan. 19 mls NW Balanga. 18 mls NE Cabanatuan.

Name ROSALES

\*ROSARIO

SACOBIA (BAMBAN) R SABALAY Reef

SALASA (SALAZA) R

SALIAN SALUPAGUI R SALVADOR I

SALVADO

SAMAT MT. \*SAMPALOC SAMPALOC PT

SAN AGUSTIN SAN ANTONIO

SANTIBANES Canal SAN CLEMENTE SAN FELIPE

SAN FELIPE NERI SAN FERNANDO

(PAMPANGA) SANGLEY PT SAN ILDEFONSO

SAN ISIDRO SAN JOSE

\*SAN JOSE DEL MONTE \*SAN JUAN

\*SAN JUAN DEL MONTE

SAN JUAN DE MATA SAN JULIAN \*SAN LAZARO SAN LEONARDO

SAN LUIS

\*SAN MARCOS SAN MARCELINO A/F

SAN MANUEL \*SAN MATEO SAN MIGUEL

\*SAN MIGUEL (MADLUM) R SAN MIGUEL DE MAYUMA

SANTA MONICA

SAN NARCISO SAN NICOLAS \*SAN PEDRO

\*SAN PEDRO \*SAN RAFAEL

\*SAN ROQUE SAN SEBASTIAN

\*SAN SIMON SAN VICENTE R

SANTA ANA \*SANTA CRUZ Distance and Direction.

28 mls E Lingayen. 8 mls E Manila.

17 mls N San Fernando.

22 mls N Iba. 10 mls NNW Iba.

3 mls N Balanga. 80 mls N Manila.

14 mls NW Iba.

6 mls N Balanga. 5 mls SW Balanga. 27 mls E Manila.

42 mls S Iba.

13 mls N San Fernando.

27 mls S Iba. Manila City.

22 mls NW Tarlac.

19 mls S Iba.

4 mls E Manila. 15°02′N, 120°41′E.

7 mls SW Manila.

28 mls S Cabanatuan.

12 mls SW Cabanatuan. 18 mls S Balanga.

16 mls NE Manila. 7 mls SW San Fernando.

4 mls E Manila. 5 mls NW Tarlac.

16 mls N Tarlac. RR Station Manila.

8 mls S Cabanatuan. 7 mls E San Fernando.

24 mls NW Manila. 27 mls SE Iba.

21 mls N Tarlac. 13 mls NE Manila. 4 mls S Tarlac.

39 mls N Manila. 37 mls N Manila.

8 mls SW San Fernando.

22 mls S Iba.

13 mls W San Fernando. 17 mls SE Manila.

25 mls N Manila.

6 mls SE San Fernando. 7 mls E San Fernando.

6 mls SE San Fernando. 22 mls NW Iba.

7 mls NE San Fernando.

30 mls N Iba.

Distance and Direction.

SANTA CRUZ (BALVARTE) Pt 29 mls N Iba. SANTA CRUZ R SANTA FE SANTA IGNACIA \*SANTA INES SANTA ISABEL \*SANTA LUCIA \*SANTA MARIA SANTA MESA \*SANTA MONICA R SANTA ROSA SANTIAGO SANTA CRISTO \*SANTO DOMINGO SANTO NINO SANTOR R SANTO ROSARIO SANTO TOMAS \*SAN YSIDRO VALLEY SAYSAIN SEXMOAN \*SIBUL SPRINGS SIBUYAN Sea SIKSIKAN SILANGANAN MT SILANGUIN I SINABACAN SISIMAN SISIMAN B STOTSENBERG Fort SUBIC SUBIC B

SUCAT SUESTE PT

TABLANG TABONES Is TABUATING R TAGIG TAGUDIN **TAGUMBAO TALAVERA** TALIM I \*TALIPTIP R TALISAIN B TALISAY (ABO ABO) R **TALUGTUG** TAMBO R TAMBOVE Roads

29 mls N Iba. 27 mls SE Iba. 13 mls NW Tarlac. 26 mls E Manila. 19 mls NW Manila. 24 mls N Manila. 16 mls N Manila. City of Manila.
6 mls SE San Fernando. 5 mls S Cabanatuan. 11 mls S Tarlac. 16 mls S Cabanatuan. 4 mls SE San Fernando. 19 mls SSE Iba. 16 mls NE Cabanatuan. 13 mls NW Cabanatuan. 22 mls SSE Iba. 23 mls E Manila. 13 mls SW Balanga. 8 mls SW San Fernando. 40 mls N Manila. South of Luzon.
9 mls N Cabanatuan. 10 mls W Balanga. 39 mls S Iba. 23 mls N Iba. 17 mls S Balanga. 17 mls S Balanga. 15 mls NW San Fernando. 35 mls SE Iba.

Bataan-Zambales 20 mls NW Balanga. 11 mls SE Manila. 24 mls WNW Balanga.

12 mls NE Cabanatuan. 35 mls S Iba. 6 mls S Cabanatuan. 9 mls SE Manila. La Union\_Prov 16°55'N, 120°25'E. 8 mls N Tarlac. 7 mls NW Cabanatuan. Laguna de Bay 25 mls SE Manila. 12 mls NW Manila. 33 mls S Iba. Adjacent to Balanga. 30 mls SE Iba. 7 mls S Cabanatuan. 25 mls W Lingayen.

Name

\*TANAY TAPULAO R TARLAC TAWIRAN \*TAYTAY TAYUMAN TAYUMAN Junc TELABASTAGAN \*TERESA TIAWIR R TICTIC TINAJEROS TIPAS TONDO TORTUGA Reef TORTUGA I TUBANG \*TUBUTUBU I \*TULIAHAN \*TULIAHAN R TUNASANCILLO \*TUNASANCILLO R

UACON R UMAGO R UMINGAN

VEGA GRANDE VIAY VICTORIA VILLAR VILLASIS Bridge VISAYAN Sea VISORIA

\*WAWA

\*ZABLAN A/F ZAPOTE ZAPOTE R ZARAGOZA Distance and Direction.

25 mls E Manila. 8 mls N Balanga. 15°29'N, 120°35'E. 11 mls NW Manila. 11 mls E Manila. 15 mls SE Manila. Manila. 8 mls NW San Fernando. 17 mls E Manila. 4 mls SW Balanga. 18 mls S Balanga. 5 mls N Manila. 9 mls SE Manila. Manila City. 22 mls N Iba. 2 mls NE Balanga. 1 ml W Tarlac. 8 mls N Balanga. 7 mls NE Manila. 10 mls E Manila. 16 mls SE Manila. 16 mls SE Manila.

24 mls N Iba. 11 mls SW Balanga. 41 mls E Lingayen.

26 mls NE Cabanatuan.
28 mls N Iba.
8 mls NE Tarlac.
20 mls SE Iba.
25 mls SE Lingayen.
South of Luzon.
8 mls NW Cabanatuan.

17 mls NE Manila.

7 mls E Manila. 10 mls S Manila. 9 mls S Manila. 12 mls W Cabanatuan.

# APPENDIX "C"

# JAPANESE EQUIVALENTS OF PLACE NAMES

This Appendix—Japanese symbols and phonetics for place names in the Manila Area—will be issued later as Additions and Amendments to this Handbook.

# ADDITIONS AND AMENDMENTS TO HANDBOOK 41

# MANILA

# APPENDIX "C"

# JAPANESE EQUIVALENTS FOR PLACE NAMES

Allied Translator and Interpreter Section, SWPA, supplies the following list of Japanese equivalents for place names in the Central Luzon area.

Name	Romaji	Character *
BULACAN PROVINCE:	BURAKAN SHU	ブラカン州
ANGAT	ANGATTO	アンガット
BALIUAG	BARIUAGU	バリウアグ
BIGAA	BIGAA	ピカー
BOCAUE	BOKAUE	ボカウエ
BULACAN	BURAKAN	ブラカン
BUSTOS	BUSUTOSU	フストス
CALUMPIT	KARUMUPITTO	カルムヒット
GRACE PARK AIRFIELD	GURESU PAAKU HIKOJO	グレスパーク飛行場
GUIGUINTO	GUIGUINTO	グイグイント
HAGONOY	HAGONOI	ハゴバ
MALOLOS	MAROROSU	イロロス
MARILAO	MARIRAO	マリラオ
MEYCAUAYAN	MEIKAUAYAN	メイカウアヤン
NORZAGARAY	NORUZAGARAI	ノルザガライ
OBANDO	OBANDO	オバンド
PAOMBONG	PAONBON	パオンボン
PLARIDEL	PURARIDERU	つ°ラリデル
POLO	PORO	ボロ
PULILAN	FURIRAN	プリラン
SAN ILDEFONSO	SAN IRUDEFUONSO	サンイルデフオンソ
SAN JOSE del MONTE	SAN HOSE DERU MONTE	サン本セデルモン
SAN MIGUEL	SAN MIGUERU	サンミグエル
SAN RAFAEL	SAN RAFUERU	サンラブエル
SANTA MARIA	SANTA MARIA	サンタマリア
PAMPANGA PROVINCE:		パンパンガ州
MACABEBE	MAKABERE	マサベレ
MASANTOL	MASANTORU	マサントル

Appendix "C"-continued.

Name	Romaji	Character
RIZAL PROVINCE:	RIZAARU SHU	リザール州
ANGELO AIRFIELD	ANHERO HIKOJO	アンヘロ悪行場
ANGONO	ANONO	アンオノ
ANTIPOLO	ANCHIPORO	アンチボロ
BALARA AIRFIELD	BARARA HIKOJO	バララ飛行場
BARAS	BARASU	バラス
BINANGONAN	BINANGONAN	ビナンゴナン
CAINTA	KAINTA	カインタ
CALOOCAN	KARUKAN	カルカン
CARDONA	KORUDONA	カルドナ
DEWEY-BOULEVARDE	DEUEI BUREBUARUDE DEUEI YUHODO	デウエイプレスアルデ
JALAPATA	YARAPATA	ヤラパタ
LAS PINAS	RASU PINIASU	ラスピニアス
MABALACAT AIRFIELD	MABARAKATTO HIKOJO	マバラカツト飛行場
MAKATI	MAKACHI	マカチ
MALABON	MARABON	マラボン
MANDALUYONG	MANDARUYONGU	マンダルヨング
MARIKINA	MARIKINA	マリキナ
MONTALBAN	MONTARUBAN	モンタルバン
MORONG	MORON	モワン
MUNTINGLUPA	MINCHINRUPA	ミンケンルバ
NAVOTAS	NOBATASU	11797
NICHOLS AIRFIELD	NIKOROSO HIKOJO	ニコロス飛行場
PARANAQUE	PARANIAKE	パラニアケ
PASAY	PASAI	パサイ
PASIG	PASHIGGU	パシツグ
PATEROS	PATEROSU	ノペテロス
PILILLA	PIRIRA	ピッラ
QUEZON CITY	KUIZON SHI	クイゾンや
SAN JUAN del MONTE	SAN FUAN DERU MONTE	サンファンデルモンテ
SAN MATEO	SAN MATEO	サンマテオ
TAGIG	TAGIGGU	タギッグ
TANAY	TANAI	9+1
TAYTAY	TAITAI	47 47
TERESA	TERESA	テレサ

# APPENDIX "D"

# GLOSSARY OF TAGALOG WORDS

Many Tagalog and Spanish words, describing vehicles, methods, fruits, etc., which do not occur in America or Europe, have been adopted by the American and European population, resulting in little use of the English equivalent. Some are--

Adobe—A consolidated volcanic ash, used for building stone during the Spanish era.

Bangas—A fresh or salt water fish maturing in three months, generally grown in artificial ponds.

Baguio-Typhoon.

Bodega-Warehouse.

Banca-A canoe made by hollowing out a log; no outriggers.

Batil—A small sailing boat with decking but no cabin--10 to 50 tons.

Carramatta—A high two-wheel horse-drawn carriage for two passengers. Generally with upholstered seat and highly decorated.

Calesa—A high two-wheel horse-drawn carriage for four passengers. About the same size as a carramatta, but has two wooden seats along the side.

Colla-Local squall.

Cogon-Native grass similar to kunai of New Guinea.

Dango-A unit of length, the span of the outstretched palm.

Depa-A unit of length the distance between the outstretched arms, about 6 feet.

Estero-A navigable canal.

Kaingan—Farmland prepared by burning off the grass or the forest.

Mestizo—A Filipino of mixed blood, ie, Spanish mestizo, American mestizo, Chinese mestizo.

Muscovado—Crude raw sugar with a high molasses content.
manufactured in old type sugar mills.

Palay-Unhusked rice.

Poto-A native sweetened rice cake.

Sawalli-Mats woven from split and shaved bamboo, used for drying palay, carpets, flooring, walls of houses and baskets.

Sitio-A small group of houses within a barrio.

# APPENDIX "E"

# WEIGHTS AND MEASURES

Metric system was official in the Philippines, but as scales and standard volume measures were not available in the agriculture areas, standard condensed milk cans, kerosene tins and beer bottles are used as substitutes. Outside of the large industries most products are sold by volume with the ganta or salop (3000 cc—3.17 liquid quarts) as the basic measure.

- 1 chupa =  $\frac{1}{8}$  ganta = 375 cubic centimeters.
- 1 ganta = 8 chupa = 3 liters = 3000 cc.

In some areas 9 chupa = 1 ganta or 3 chupas = 1 liter.

A chupa of uncooked rice is considered one-third of a rice ration or sufficient for one meal.

- 1 kilo = 1000 grams = 2.2051b = 35.274oz.
- 1 M ton = 1000 ko = 2204.62lb = 1.102 short ton = .984 long ton.

11b = .4536 ko.

- 1 S ton = 2000lb .89 long tons = 907 metric tons.
- 1 L ton = 2240lb = 1.12 short tons = 1.106 metric tons.
- 1 Sq yd = .836 sq meter.
- 1 Acre = 4046.873 sq meter = 0.404 hectares.
- 1 Sq mile = 640 acres = 258.9 hectares.
- 1 Sq meter = 10.76 sq feet.
- 1 Hectare = 11959.8 sq yds = 10,000 sq meter = 2.47 acres.

Unit	Item	Volume		Weight	
		Metric	US	KO	lbs
ganta	palay	3 liters	0.084 km	1.72	3.784
ganta	rice	3 liters	0.084 km	2.30	5.06
ganta	shelled corn	3 liters	0.084 km	2.34	5.148
ganta	shelled peanuts	3 liters	0.084 km	1.10	2.42
ganta	mungos	3 liters	0.084 km	2.34	5.148
arroba	rice	16 liters	0.45 kn	12.26	26.97
cavan	Palay	25 ganta	2.13 kn	43.0	94.60
cavan	rice	25 ganta	2.13 kn	57.5	126.5
cavan	R A REAL PROPERTY OF THE PARTY	25 ganta	2.13 kn	58.5	128.7

2.05 cavans palay = 1 cavan cleaned rice.

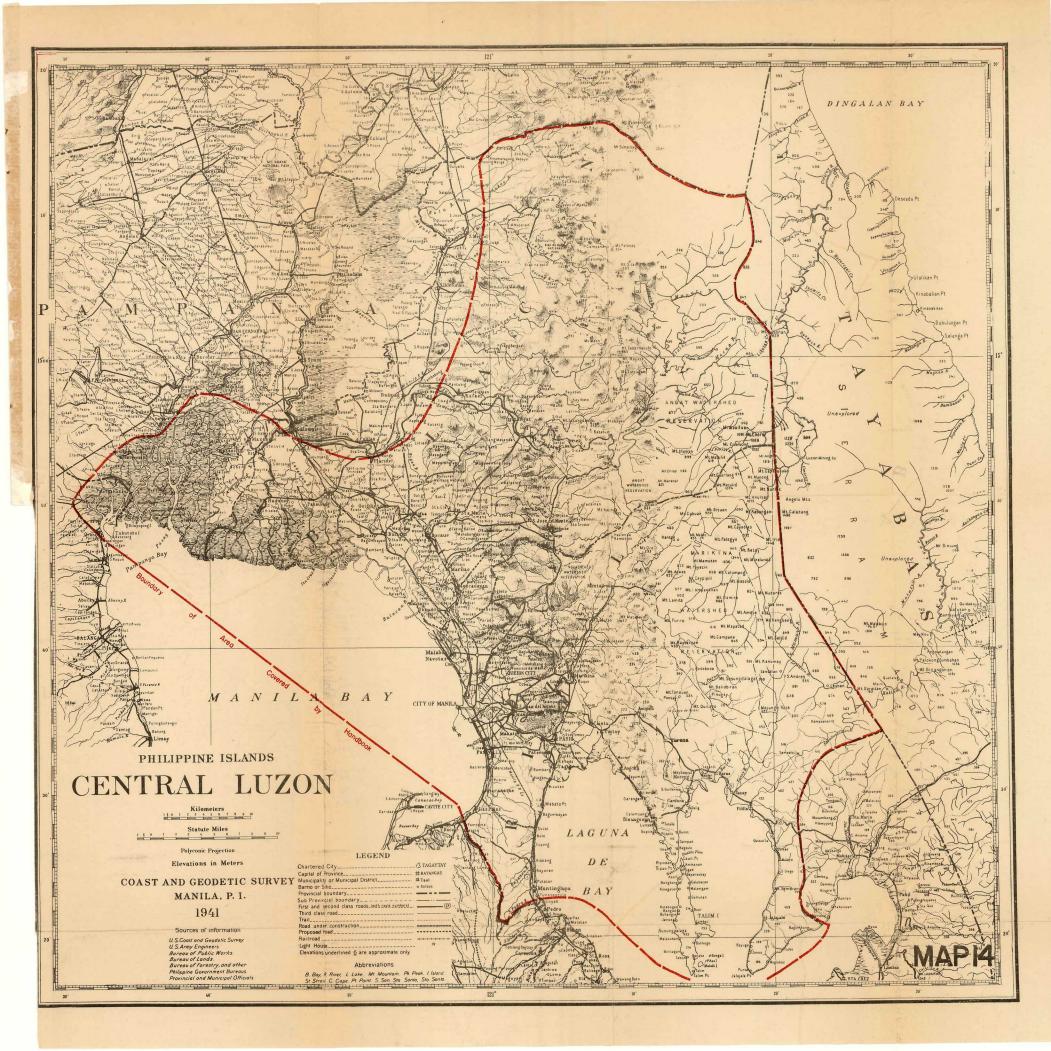
2.47 cavans corn on cob = 1 cavan shelled corn.

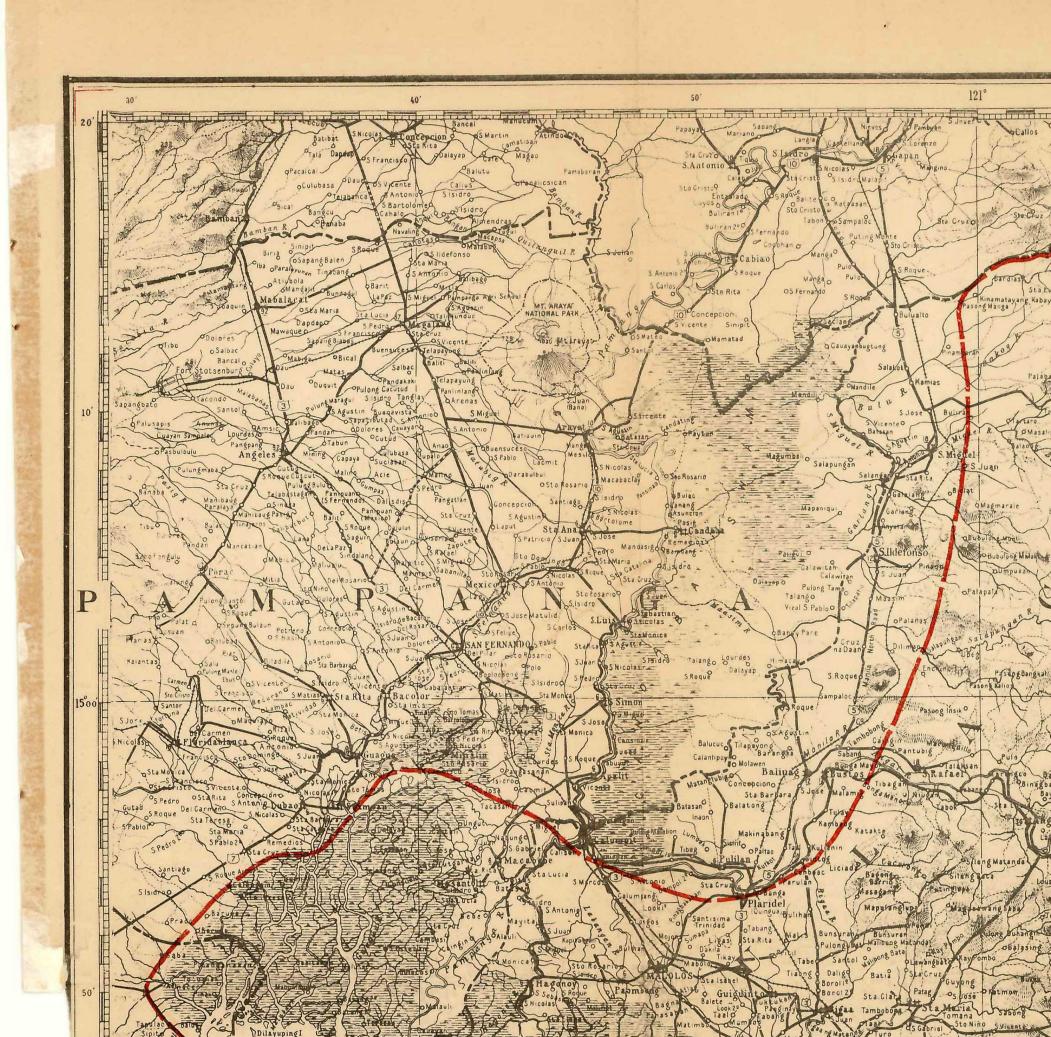
quintal rice (quintal tobacco picul	4 liters	1.80 kn	49.04 46 63.25	117.8 101.2 139.15
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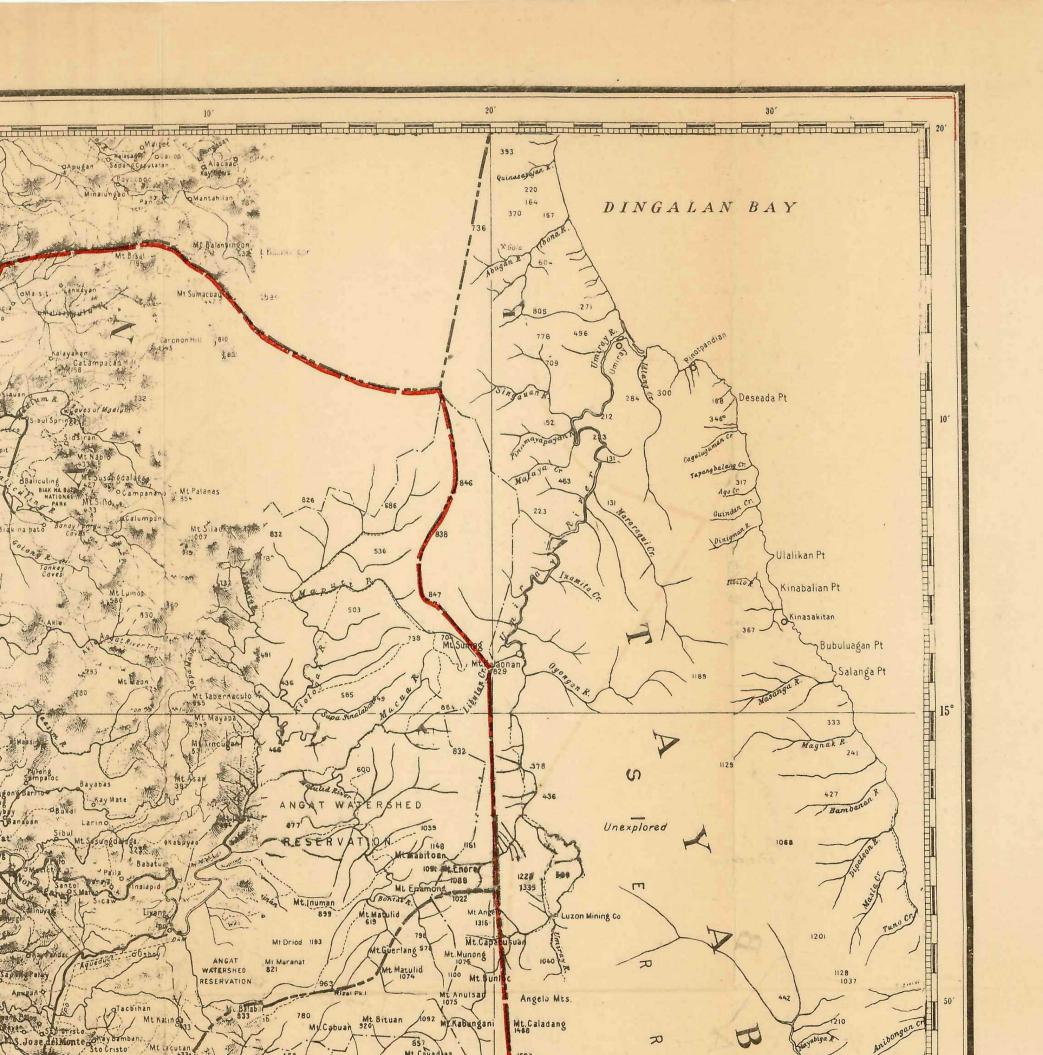
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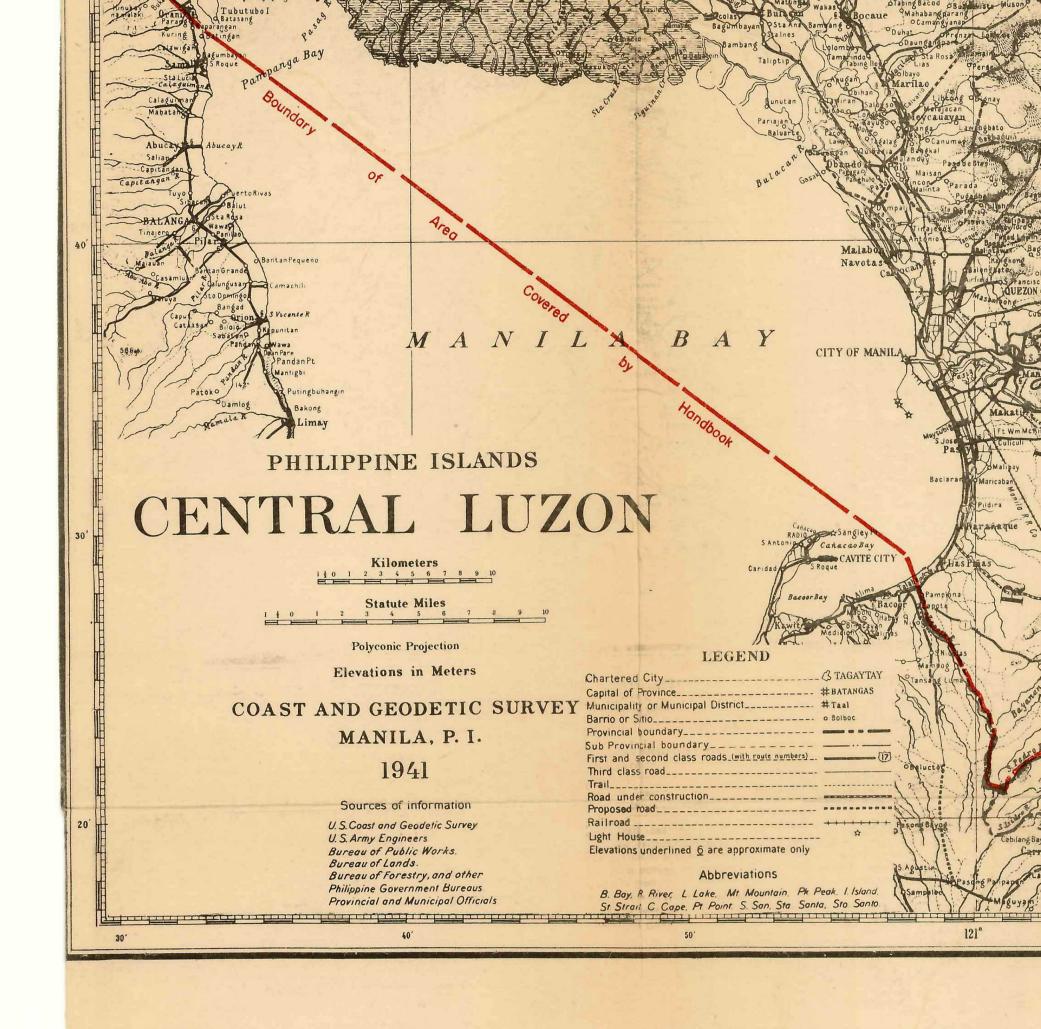
#### SUBSTITUTE MEASURE

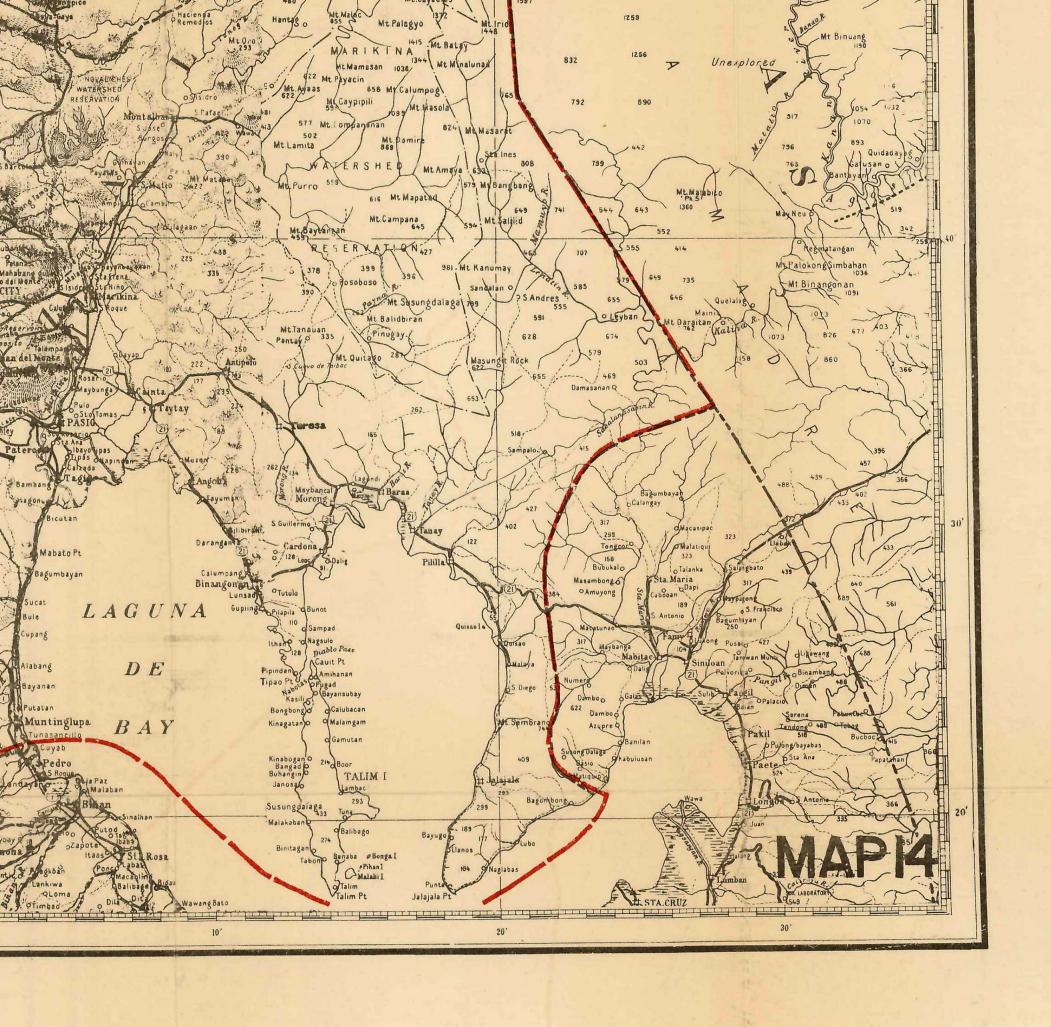
- 10 leche (condensed milk can) = 1 ganta.
  - 6 salmon (std salmon can) = 1 ganta.
- 1 kerosene (5 gallons square can) = 6 ganta.
- 1 Fresco (square face gin bottle) = 1400 cc.
- 4 beer bottles = 1 fresco.
- 1 Dango = span from finger to thumb, approx 8in.
- 1 Depa = span of outstretched arms, approx 6ft.











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ALLIED GEOGRAPHICAL SECTION

And Southwest Pacific Area

**TERRAIN HANDBOOK 42** 

# **BATAAN-ZAMBALES**

(Central Luzon)

PHILIPPINE SERIES

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**TERRAIN HANDBOOK 42** 

## BATAAN-ZAMBALES

(Central Luzon)

PHILIPPINE SERIES

01243

24 NOVEMBER 1944

General Headquarters, Southwest Pacific Area, 24 November 1944.

This Handbook contains information on the Provinces of Bataan and Zambales (west side of Central Luzon), which area is defined in the Orientation Map.

It is intended to provide basic topographical information of military interest for the use of Officers in Forward Areas.

The maps included are intended as guides only, to be used in conjunction with Operational Maps.

By command of General MacARTHUR.

R. K. SUTHERLAND, Lieutenant General, U.S.A., Chief of Staff.

Official:

C. A. WILLOUGHBY, Brigadier General, G.S.C., Asst. Chief of Staff, G-2.

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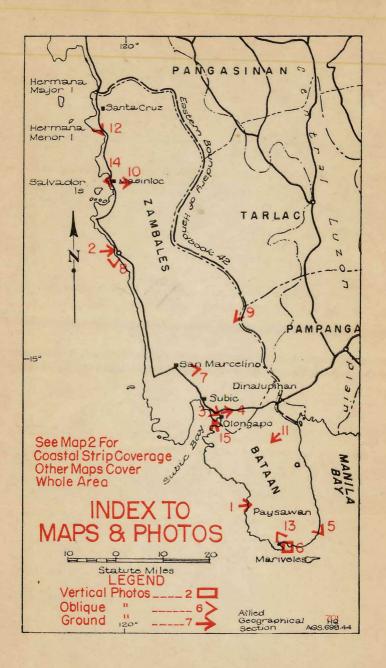
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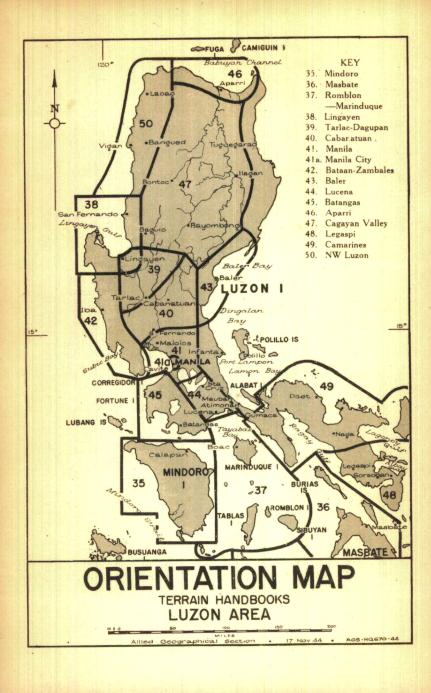
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# BATAAN—ZAMBALES (W Central Luzon)

## SECTION I.

## INTRODUCTION AND GENERAL DESCRIPTION

(MAP I)

## 1. LOCATION AND AREA COVERED (See Orientation Map):

Area covered by this Handbook is on the W side of Central Luzon and comprises the Provinces of Zambales and Bataan.

#### 2. GENERAL DESCRIPTION:

The high Zambales Mt Ra stretches from southern tip of Bataan to Lingayen Gulf. Except for small coastal plains, the terrain is mountainous with several peaks over 5000ft. Heavy forest and steep-walled valleys make movement over this range difficult for any but small bodies of troops.

Coastal areas are limited to isolated small plains averaging 1 to 2 mls in depth, except between San Narciso and San Antonio (Zambales), where the plain extends inland for about 10 mls. The only coastal plain of any significance is at Balanga locality, on the W side of Manila B.

Vegetation generally is rain forest on the higher slopes, cogon grass on the cut and burned slopes and some pine forest on the lower slopes of the northern Zambales Ra. Vegetation of the cultivated plains is controlled by nature of the soil; well-watered soil is planted in rice; drier or sandy soil is planted in corn or root crops. Swamplands are negligible, though a few rivers leave large swampy delta areas around their mouths, mainly along N part of Zambales coast.

Main road is Route 7, 1-lane, all-weather, which runs along W coast of Zambales. Other branch roads connect coastal barrios around Bataan Pen. Jap-built railroad extends from Floridablanca (Pampanga)

to Dinalupihan (Bataan).

Important towns include Iba, provincial capital of Zambales; Masinloc, Olongapo, Santa Cruz and Subic, in Zambales; Balanga, provincial capital of Bataan; Dinalupihan, Mariveles and Orani, in Bataan,

Population in the area is sparse.

#### 3. SPELLING:

Spelling is in accordance with Directions for Treatment of Geographical Names in the Philippines (issued 5 May 44 by US Board on Geographical Names). For details see AGS Terrain Study oo.

Geographical Names). For details see AGS Terrain Study 90. Different maps and charts may substitute certain letters for others in spelling place names. Most common are: c to k; gu to k; j and h to y; f to p; and v to b. The changes will be noticed also in pronunciation by the inhabitants.

## 4. STANDARD TIME: MEASUREMENTS: CURRENCY:

Standard time is 8 hrs ahead of GMT.
Metric system is used throughout the Philippines.

## [SECTION 1]

Following measurements are used in this Handbook:-

Standard nautical miles and fathoms where referring to sea measurements; statute miles and yards for land distances, Road distances are in kilometers; elevations in feet above sea level.

The peso is the main item of coinage.

 $\begin{array}{ccc}
100 & \text{centavos} &=& 1 & peso \\
1 & peso &=& \$0.50 & \text{(US)}.
\end{array}$ 

Copper, silver and paper money is used.

#### 5. WATER:

There are many free-flowing artesian wells, especially around San Marcelino (SW Zambales). Several towns have water distribution systems. Shallow wells, streams and rivers are subject to contamination. All drinking water should be treated.

## 6. MILITARY IMPORTANCE:

Philippine Is generally are strategically placed across the important trade routes of the Far East,

The area described is little developed outside of its large deposits

of chromite and other strategic metals.

The high, rugged and heavily-covered mountains with their narrow defiles offer the enemy many opportunities for defensive positions against attacks from Central Luzon Plain. The long coastline along the China Sea offers landing opportunities for reinforcements from that direction.

There are many sites for air strips along the coastal plain, and Subic B offers protected anchorages for ships and sea planes. Bataan

heights control the west side of the entrance to Manila B.

#### 7. APPROACHES:

The only suitable approach to the area is by sea from the west. Approaches from the east are over limited highways passing through defiles or over unimproved mountain foot-trails.

#### 8. MOVEMENT:

Movement by foot troops is possible throughout the area in any season. Only a few large trails exist, but mountains are interlaced with hunting and prospecting trails. Most streams can be used as trails through mountains except near top of divides where streams drop rapidly over many high falls and through narrow box canyons. There is little forest undergrowth except near small streams. Red lateritic soil of the mountains is not fertile; cogon grass is stunted, facilitating movement; soil does not become muddy but is extremely slippery during wet season.

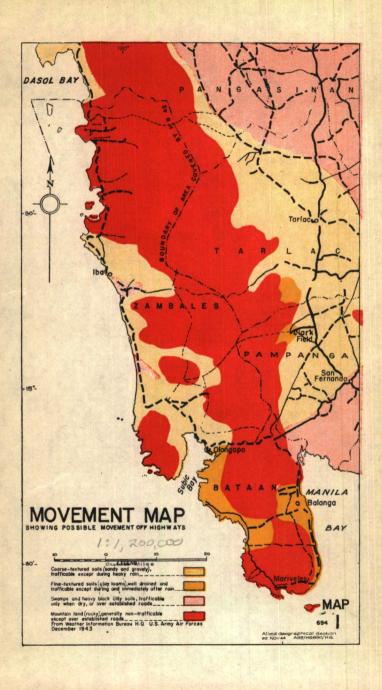
MT movement is limited to roads in wet weather, except along

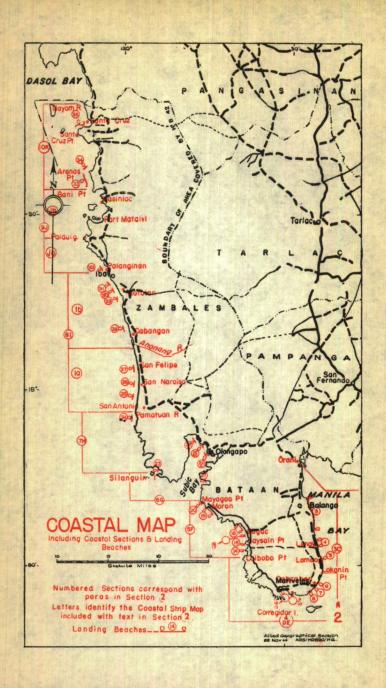
portions of San Marcelino Plain.

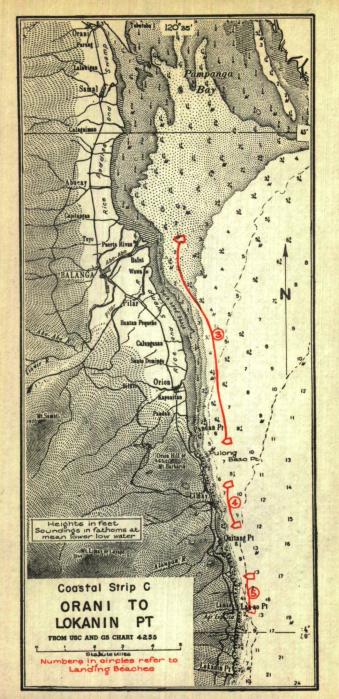
Tracked vehicles can move in the lower foothills and along flood

plains in dry and moderately wet weather.

Although the plains and lower mountain slopes are dry during the strong NE monsoon (Nov-Jan), streams frequently flood, retarding movement. In the high mountains during this period 40-60ins of rain fall a month; 2in of rain in 1 hr, usually in late afternoon thunderstorms, is not uncommon. Flash floods last from 1 to 8 hrs, occurring generally at night, receding by early morning.







## SECTION 2.

## DETAILED DESCRIPTION OF COASTLINE

(Described in clockwise direction)

## (MAP 2)

1. ORANI TO LOKANIN PT—14°48'N, 120°32'E to 14°28.5'N, 120°36'E (Map 2, Coastal Strip C):

(Note: Coastal Strip Maps A and B and description of Beaches 1 and 2 appear in Handbook 41—Manila.)

a. Anchorages:

LIMAY—14°34'N, 120°36'E: A small town. Anchorage available in 7 to 9fms, mud bottom, about 1000 yds offshore.

b. Off-lying Is:

TORTUGAS I: Small and swampy; off mouth of Abo-Abo (Talisay) R.

#### c. Shoreline:

From abreast Orion Hill south to Lokanin Pt are patches of

boulder-strewn reef, broken by short sandy beaches.

Orani to Abo-Abo (Talisay) R is low and swampy, faced by mud banks and shoal water eastwards up to 5 mls. Almost continuous mangrove fringe up to 100 yds wide. Swampy coastal plain broken by many small streams.

Abo-Abo (Talisay) R to abreast Orion Hill, see Beach 3 below. Orion Hill to Limay, cliffy and faced by boulder-strewn reef.

Limay S 1½ mls, see Beach 4 below.

Quitang Pt to Lokanin Pt is cliffy, with boulder-strewn reef and short steep-to beaches. See following description Beach 5 in front of Lamao.

## d. Landing Beaches:

BEACH 3: Abo-Abo (Talisay) R to Pulong Bato Pt, 7½ mls of very flat beach 400-1200 yds wide at LW. Details lacking. Chart shows 1fm line 150-500 yds off shore from LW mark. Small LC will probably ground 100-300 yds from HW mark. Movement to coastal road between Balanga and Pilar not difficult; flat, sandy, with coconuts and sugar cane. South of Pilar many rice paddies and some cultivation.

BEACH 4: Extends about 1200 yds N and 1700 yds S of mouth of Limay R. North section at LW is 50-100 yds wide with 1fm- and 2fm-lines 75 and 225 yds offshore respectively. South section at LW is about 200 yds wide with 1fm- and 2fm-lines 100 and 170 yds offshore respectively. LCV and LCM barges at HW probably ground 50-75 yds offshore N of river; and 100-150 yds offshore S of river. Beach near Limay is firmly packed below HW line. Movement inland for MT not difficult for 200-400 yds; sandy flat, little vegetation.

BEACH 5: From mouth of Lamao R N for 1150 yds. Probably 50-75 yds wide at LW; 10-15 yds at HW. At LW 1fm-line is about 60-120 yds offshore, and 2fm-line line 175 yds off. Small LC should reach sand and pebble beach at HW. Many fish traps near Lamao Pt.

[Section 2]

Road from long pier to coastal road. Movement inland from beach not difficult.

#### e. Hinterland:

Low coastal plain 1½ to 2½ mls wide from Orani to Orion Hill (465ft). Non-operational airfield near Pilar (see Sec 4, Airfield 17). Very little firm ground along plain; mostly rice paddies, swamp or ish ponds, broken by many small streams.

South from Pandan Pt is a narrow coastal shelf between cliff-faced shoreline and even mountain slopes rising westwards to over 4000ft. Rivers mostly small, only Abucay, Balanga and Abo-Abo (Talisay) Rs.

may be entered at HW by shallow draft vessels.

## f. Vegetation:

Mangrove fringe 100 yds wide and continuous N of Abo-Abo (Talisay) R; patches between here and Pandan Pt. Coastal plain mostly mangrove, nipa or grassy swamp; fish ponds and rice paddies. Sugar cane is grown near Balanga, supplying a sugar central (mill). Undulating lower mountain slopes partly cleared; heavy forest on mountains. (See Photo 11 in Sec 5.)

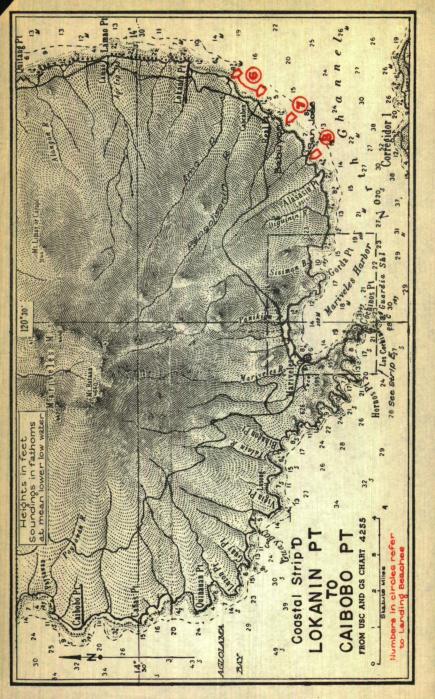
## g. Roads and Trails:

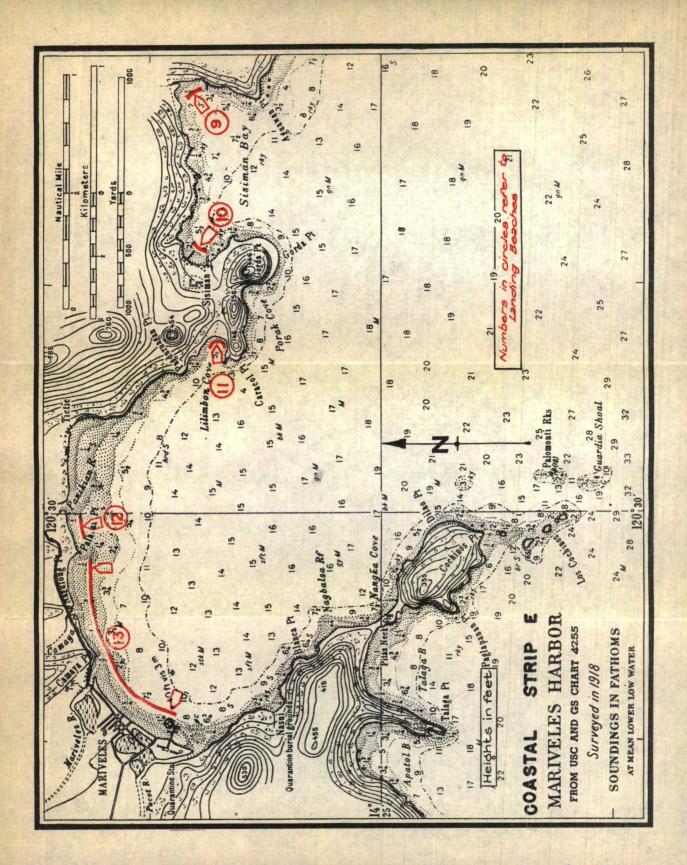
Route 110 is the only sure road over the swampy coastal plain, varying ½ to 1½ mls from coast. South of Orion it winds along narrow shelf above cliff-faced shoreline.

Route 111 crosses Bataan Pen from Pilar to Bagac on W coast. Many old inland trails were developed into trails suitable for jeeps during 41-42.

#### h. Towns:

Chief towns are Balanga (pop 4582), the Provincial Capital; Abucay (6485); Pilar (3712); Orion (6753); and Limay (2608).





 LOKANIN PT TO CAIBOBO (KAYBOBO) PT—14°28.5′N, 120°36′E, to 14°32′N, 120°22′E (Map 2, Coastal Strips D, E):

## a. Anchorages:

i. CABCABEN, 14°27'N, 120°35'E. Anchorage in 7-10fms 800 yds off pier.

ii. MARIVELES Hb, 14°26'N, 120°29'E. Natural harbor, water area 1300 acres; depth 5 to 20fms; protected from all but SE winds. (See Photos 5, 6, in Sec 4; 13 in Sec 6.)

iii. GUAY B, 14°27'N, 120°25'E. Anchorage 5-10fms, sheltered from NE.

## b. Off-lying Is:

Los Cochinos are 5 rocks 20-70ft high extending \(\frac{1}{2}\) ml SE of Cochinos Pt. Sunken rock with least depth of \(\frac{1}{2}\) fm over it lies in middle of northern channel.

#### c. Shoreline:

East of Mariveles Hb shore is fringed by steep-to reef, broken by

short sandy beaches. Reef W of harbor is generally wider.

From Lokanin Pt to Sisiman B shore is mostly steep-to, backed by low cliffs. Many small bays and short beaches. Small pier at Cabcaben.

Sisiman B is 1200 yds wide at entrance and ½ ml long; it has one pier on E shore and two on W shore; E and NW shores are sandy beaches.

Mariveles Hb is  $1\frac{1}{2}$  mls wide at entrance and has NW length of  $1\frac{3}{4}$  mls. It has port facilities and good beaches on N and NW shores.

Cochinos Pt is a bold rounded headland rising to 355ft. Westward of this point, shore is steep-to with widening reefs and many sharp cliffs. Many small bays with short steep-to beaches, exposed to SW weather. In Apr 42 Japanese landed a battalion at Agloloma B and 2 inlets to N, using rubber assault boats.

## d. Landing Beaches:

BEACH 6: Extends for 1500 yds between Amo and Pangolisanan Rs, in front of Cabcaben. At LW it is 40-75 yds wide, 2%-4% sloped bottom. LCV and LCM barges could use this beach at any time. Probably landing points for LC1s and LSTs. MT movement inland to developed camp area would be easy. Cabcaben has two jetties off beach. Route 110 turns inland W to Mariveles.

BEACHES 7 & 8: Short reef-free sand beaches are situated within inlets at Babuyan (7) and San Jose (8). Suitable for LC, but no inland communications are known except unconfirmed trails.

BEACH 9: In NE corner of Sisiman B; beach 250 yds long. At LW it is 50-75 yds wide; 1fm 80 yds and 2fm 125 yds offshore. Suitable for any LC at HW. Jetty at S end of beach. Trail suitable for jeeps W to Sisiman and north to Route 110B.

BEACH 10: In NW corner of Sisiman B, narrow beach 200 yds long. Steep bottom and 3fm line only 75 yds offshore at LW. Two good piers off beach, and MT roads W to Mariveles Hb.

[Section 2]

BEACH 11: In Lilimbon Cove in SE corner of Mariveles Hb; 250 yds long. At LW 25 yds wide, steep shelving bottom, 3fm-line 70 yds offshore. Two good piers and MT roads to Mariveles.

Sandy beaches line shore from Tictic barrio to Pucot R.

BEACH 12: Extends for about 200 yds E of Palasan Pt; shallow bottom, 1fm line about 250 yds offshore at mouth of Panikian R. Suitable for small LC at HW.

BEACH 13: Extends from Palasan Pt to Pucot R, broken by Camaya Pt and Mariveles R. NE section is fairly shallow, shelving

2%-4% slope at LW. Shelves more steeply at HW.

SW of Camaya Pt, bottom shelves steeply, particularly toward S end. All types of barges could use this. Two excellent piers near S end; 14-19fm anchorage offshore. Route 110B skirts beach all the way.

## e. Hinterland:

No level plain except small area NW from Mariveles Hb. Small flats at head of many inlets, but terrain generally slopes upwards to Mt Bataan, 4660ft.

Many ravines and heavy forest make movement off roads or trails impracticable. Rivers are small and swift-flowing; not known

to be navigable.

Route 110 turns inland at Cabcaben, winding over 800ft slopes to

Mariveles Hb, thence NW to Bagac.

Airfields are located 2 mls north of Cabcaben, at Cabcaben, and at Mariveles along the small cultivated Mariveles Valley, which supplies part of the local food supplies. (See Sec. 4.)

## f. Vegetation:

Mostly dense tropical forest. Some grassy spurs near coast and rice paddies near Cabcaben and Mariveles.

## g. Roads and Trails:

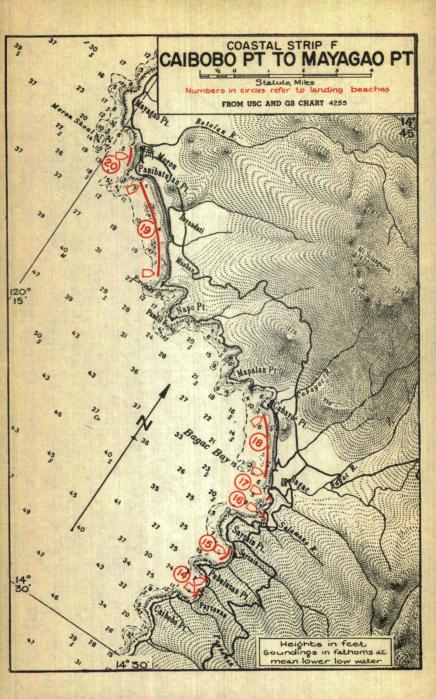
Route 110 turns W near Cabcaben and climbs to about 800ft, winding steeply down to Mariveles, thence NW to Bagac. Both sections run up to 3 mls inland on steep mountain slopes.

Several old inland trails were developed into trails suitable for jeeps during 41-42. Tank tracks were also cut down the crest of

most spurs between Route 110 and the coast.

## h. Towns:

Mariveles (pop 2235), on NW shore of Mariveles Hb; has limited port facilities.



 CAIBOBO (KAYBOBO) PT TO MAYAGAO PT—14°32′N, 120°22′E to 14°41′N, 120°15′E (Map 2, Coastal Strip F, Photo 1):

## a. Anchorages:

i. PAYSAWAN B, 14°32'N, 120°23'E, on W coast of Bataan; pier and short railroad.

ii. BAGAC B, 14°35′N, 120°23′E, unsheltered, in 5-10fms off small town of Bagac. Three fm shoal lies ½ ml W of town.

## b. Off-lying Is:

Pandil I, 42ft high on reef S of Napo Pt.

## c. Reefs:

Chief offshore hazard is Moron Shoal, 1½ mls W of Panibatujan Pt. Least depth 5½fm and irregular bottom between it and shore.

From Caibobo Pt shore fringed with continuous reef up to 400 yds wide. In bays, particularly Saysain, sandy beaches overlie this reef.

Bagac B is almost free of exposed reef. From Cabayoc Pt N, broad drying reef recurs except for small breaks to Naro Pt. Panibatujan Pt has exposed reef seaward for 600 yds. From Batalan R a drying reef 200-500 yds wide extends around Mayagao Pt.

#### d. Shoreline:

Caibobo Pt is low and wooded. In Paysawan B the low shoreline is broken by a steep section at the head of the bay with short beaches (14) each side and a stone pier on the S shore.

Saysain B is flanked by reef and steep-to shore at entrance but has

1000 yds of reef-free and steep-to beach (15) at its head.

From Saysain Pt to Bagac R, shore is steep-to except for 2 short beaches (16 and 17).

North of Bagac R is 1 ml of sandy beach (18), very wide at LW. From Cabayoc Pt to Eman Pt is steep-to and cliffy; small beaches

in bays.

From Eman Pt to Panibatujan (Panitbatohan) Pt is about 3 mls of beach (19); at Moron, close N of Panibatujan Pt, another  $\frac{1}{2}$  ml stretch of beach (20) fronts the town, with a small stream, the Moron R, between beach and coastal road which ends at Moron.

Shoreline is low at mouth of Batalan R, but becomes steep-to

toward Mayagao Pt.

## e. Landing Beaches:

BEACH 14 (Photo 1): Two short sandy stretches in Paysawan B; N section coral-free; S section has a fringing reef. Good stone jetty at S end of bay suitable for a Liberty ship. Route 110D, a 1-lane seasonal road from Mariveles to Bagac, is accessible from the beach.

BEACH 15: In Saysain Inlet, 100 yds suitable for LC. Reef-free and fairly steep-sloped. Movement not difficult \(\frac{3}{4}\) ml inland to Route 110D.

BEACH 16: South corner of Bagac B; 250 yds long; wide at LW and reef-free; 5fm line is 400 yds offshore. Route 110D passes close to beach. Probably suitable only for small LC.

## [SECTION 2]

BEACH 17: Just south of a rocky point at mouth of Bagac R. Beach is 500 yds long, fairly wide and probably reef-free. 2fm line 500 yds offshore at LW. Route 110D accessible at N end. Probably suitable only for small LC.

BEACH 18: From Bagac R extends 1 ml NW. At LW 5fm line 800 yds offshore; gently sloping bottom and beach very wide, but probably suitable for HW landings, especially at S end. Bagac is terminus of Route 111 eastwards to Pilar.

BEACH 19: Eman Pt to Panibatujan (Panitbatohan) Pt, 3 mls of good landing beach. At LW 100-150 yds wide; generally fairly steep and probably suitable for LC at tide stage. The 5fm line is 400-600 yds offshore. Good access to Route 110E.

BEACH 20: Off Moron is an 800 yd sandspit 200 yds wide at LW and probably difficult for MT. Before the war a bridge crossed Moron R, which separates sandspit from town and coastal road.

## f. Hinterland:

Terrain wooded and sloping to Bataan Mts. At Bagac is a plain 3 mls x 2 mls with an irregular valley to 650ft saddle about 3½ mls NE.

Route 111 crosses to Pilar through this saddle.

Another small coastal plain extends from Moron, NW up Batalan R Valley, thence steep slopes to Mt Silanganan (3620ft). Many ravines with intermittent streams cross the area. Streams usually fordable. No navigable river mouths reported.

## g. Vegetation:

Mostly tropical forest. Small cleared patches on crest of some spurs. Small rice paddy areas near Bagac and Moron.

## h. Roads and Trails:

Route 110 skirts the coast and Route 111 runs E through a saddle between Mt Natib and Mt Samat. High spot on road 650ft.

Several trails down mountain spurs to the coast and across the peninsula between Mt Samat and Mariveles Mts were made suitable for jeeps in 41-42.

## i. Towns:

Bagac (pop 2191) and Moron (1593).

Moriveles Mts

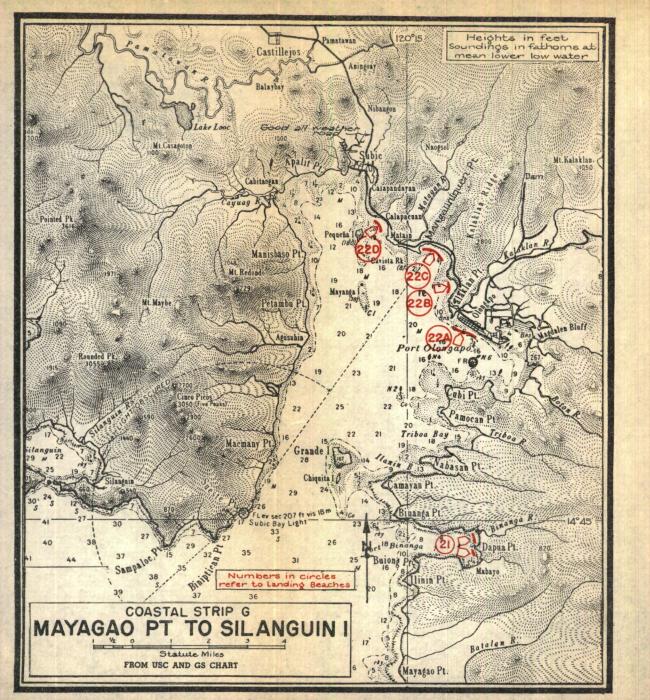
Paysowan Village

Landing beach

PAYBAWAN BA

1. Paysawan Beach, Bataan. Looking E. Pre-war.





4. MAYAGAO PT TO SILANGUIN I—14°4′N, 120°15′E to 14°46′N, 120°06′E (Map 2, Coastal Strip G):

## a. Anchorages:

- i, PORT BINANGA, 14°44'N, 120°16'E: A small bay adjoining E entrance point to Subic B. Sheltered, except from W; 4-6fms; mud bottom.
- ii. PORT OLONGAPO (SUBIC B) (See Photo 15 in Sec 10), 14°49'N, 120°16'E. Subic B is 8 mls N/S and 3-5 mls wide. Port Olongapo, at E side of bay, was a naval base and Subic B a naval anchorage.

## (b) Off-lying Is:

- i. GRANDE I, 14°46′N, 120°14′E: Located in middle entrance to Subic B. Is 1000 yds N/S, 800 yds wide, 167ft elevation. Fort Went, on the island, commands entrance to Subic B.
- ii. CHIQUITA I: This small island lies \( \frac{1}{2} \) ml S of Grande I, to which it is connected by reef.
- iii. MAYANGA I: Lies 3½ mls N of Grande I; rises to 38ft; small; shoals extend ½ ml N and ½ ml S.
- iv. PEQUENA I: Lies 14 mls N of Mayanga I; 180ft. high; shoal water extends 1 ml S, 4 ml W and NE to eastern shore of Subic B.
- v. SILANGUIN I: Forms S entrance point to Port Silanguin.
  Bare rounded island 705ft high; joined to land by rocky reef.
- vi. LOS FRAILES Is: Six small rocky islets lying \(\frac{3}{4}\) to 1\(\frac{3}{4}\) mls SW from Silanguin I. Sunken and other rocks around and between them.

### c. Reefs:

Shores and islands of Subic B fringed by coral reef up to 800 yds wide. Mostly covered at LW. Along heads of inlets, reef-covered by beaches of sand, sand and mud, or coral sand and mud.

From Sueste Pt W exposed reefs fringe mainland shore and

Silanguin I.

#### d. Shoreline:

From Mayagao Pt to Buiong Pt shoreline is cliff-faced, at first

backed by level plain then rising hill slopes.

Port Binanga is 1000 yds wide and 13 mls long (E/W). Its shores are fringed by reef up to 175 yds wide except along head of bay, where there are sandy beaches (No 21) divided by vertical cliffs 60-70ft high at Dapua Pt. Shores generally steep-to.

Eastern shore of entrance to Subic B is steep-to behind wide reef, mostly submerged; broken by several small bays flanked by cliff-faced

wooded headlands. Largest of these bays is Port Olongapo.

Shores of Port Olongapo are low and generally marshy. Concrete sea-wall around shore of inner harbors. West of naval installations is

landing beach (No 22), 1300 yds long.

Kalaklan Pt, at NW part of Port Olongapo, is low and wooded, but rises steeply to 345ft. For about 1½ mls N of this point shores are steep-to as far as Maquinaya R, thence uninterrupted beach to Subic, but bad shore reefs prevent landings except at beaches 22B, C and D.

## [SECTION 2]

Town of Subic is on low swampy ground between Guagadi and Nibangan Rs.

North and W shores of Subic B are steep-to and rise steeply to

2000-3000ft.

West of Biniptican Pt, the SW entrance point to Subic B, the coast is exposed, with steep cliffs rising behind reef.

## e. Landing Beaches:

Within Subic B the only beaches feasible for unloading and deployment of mechanised equipment are in vicinity of Olongapo. Amphibious forces would have to force strong coastal defences at entrance to bay. West coast entirely unsuitable for landings.

BEACH 21: Port Binanga has beaches divided by Dapua Pt. North section is 600 yds long, wide at LW; 2fm line is about 150 yds offshore. South section is 250 yds long, very wide at LW; 2fm line over 300 yds offshore.

Beaches backed by steep-to sloped terrain only 400 yds inland,

and no roads.

BEACHES 22A-D: Inner part of Subic B has 4 good beaches between Olongapo and Subic. MT from barges would have no difficulty in reaching Route 7, an excellent highway.

BEACH 22A: Located between Olongapo township and Kalaklan R. It is 1300 yds long, fairly wide, shelving from steep at SE end to shallow at NW end. Suitable for all types of LC at HW. At LW large craft could use SE end near pier.

BEACH 22B: In first small cove north of Kalaklan Pt, About 500 yds long; fairly wide above HW and steeply shelving; 2fm-line about 150 yds offshore at LW. All LC could use this even at LW.

BEACH 22C: Located in inlet just E of Mangaliniquen Pt, Beach is 1300 yds long. Excellent for all craft, 3fm-line 150 yds offshore at LW. Small boat jetty in center,

BEACH 22D: In inlet NE of Pequena I. 800 yds long, wide at LW, steeply shelving; 3fm-line 125-150 yds offshore. Excellent for all craft at all tide stages.

## f. Hinterland:

From Mayagao Pt to Port Olongapo terrain is rugged and forested. North of Olongapo and along Kalaklan R is a swampy area 2½ mls by 1½ mls. Some fish ponds and rice paddies, but mostly exposed mud.

Similar but smaller areas spread around river mouths at Subic

and Cayuag.

Rugged wooded hills lie between N head of Subic B and the wide sandy plain at Castillejos.

West of Subic B lie steep, rugged mountains.

Kalaklan R is probably navigable for small craft near its mouth,

## g. Vegetation:

Around Olongapo, Matain, Subic and Cayuag are small patches of cultivation; in some river valleys and on western mountain slopes are grass, notably on Mt Redondo.

To N and E mountain slopes have heavy tropical forest.

## h. Roads and Trails:

Route 7 from W coast of Zambales runs over a 150ft saddle just N of Subic, and along NE shoreline of Subic B, thence across base of Bataan Pen to Central Luzon road net at San Fernando (Pampanga Prov).

It is an excellent 1-lane all-weather road.

No reported trails on E side of Subic B except inter-barrio trails along coast. Trail T9 runs E from Subic to Luacan. Trail T10 runs N to Poonbato.

#### i. Towns:

This coastal section was a naval and military reservation, and native population was small.

## [SECTION 2]

5. SILANGUIN I TO PAMATUAN R—14°46′N, 120°06′E to 14°57′N, 120°03′E (Map 2, Coastal Strip H):

## a. Anchorages:

- i. PORT SILANGUIN, 14°46'N, 120°08'E: Sheltered from all winds except W and SW. Best anchorage is in 17-20fms abreast sand beach within S point of mainland.
- ii. NAZASA, TALISAIN and CALAGUAGUIN Bs: Easy of access; useful in NE monsoon.

## h. Off-lying Is:

- i. TABONES ISLETS, 14°49'N, 120°04'E: Two small rocky islets about 1 ml NW of Nazasa B. Larger one is 129ft high. Bases of both islets undercut by sea.
- ii. CAPONES IS: Three small islands 1 to  $2\frac{1}{2}$  mls offshore northward of Capones Pt. Capon Grande has deep water, then rocks around it; it had a white square brick light tower on a western hillside. Top of tower 234ft above sea level.

## c. Shoreline:

From Silanguin I to N point of Calaguaguin B reef is continuous and up to about 400 yds wide.

Shores of Port Silanguin are steep-to and cliffy in places except along head of bay. Sand beach overlays reef at Silanguin barrio (Beach 23).

Northward to Pundaguit (Pundaquit) R shore is generally high and rocky; unsuitable for landing. Capones Pt appears reddish and rises to 1090ft.

From Pundaguit R to Pamatuan R is a clear sandy beach (24). A string of uncharted offshore reefs is said to lie off this beach.

## d. Landing Beaches:

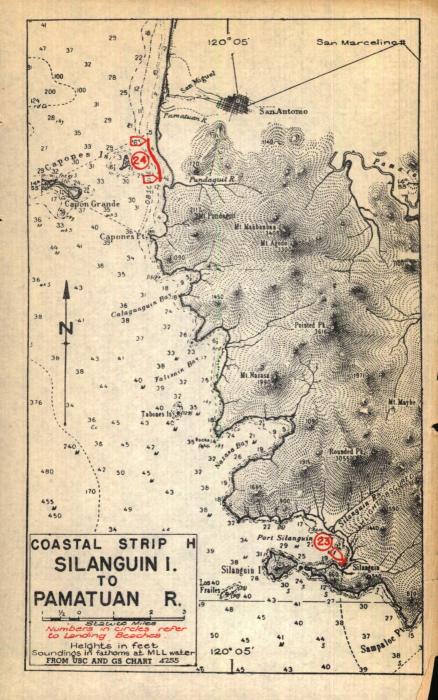
BEACH 23: In Port Silanguin fronting Silanguin barrio is beach 600 yds long and suitable for small LC. Inland terrain slopes gently 500-600 yds, generally firm and few trees. No known roads. Coastal trails only. Protected anchorage.

BEACH 24: From Pundaguit R extends 1½ mls N. Sand bottom slopes very steeply; 3fm-line 100-150 yds offshore. Surf runs high on this open coastline, especially during SW monsoon (May-Oct).

Many detached coral reefs over 1000 yds offshore are visible in clear water. Beach is suitable for all types of LC during NE monsoon.

Behind beach are fairly steep sand dunes. Three unimproved roads run inland from beach, converging at Pamatuan R S of San Antonio. This river is navigable for small craft as far as San Antonio. Hinterland flat, partly wooded, partly grassy. MT can move easily in this area.

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#### e. Hinterland:

From Port Silanguin to Pundaguit is mountainous and was uninhabited, being a military reserve. Broad plain N and E is low-lying, swampy and sandy in parts; large rice-producing area.

Airfields near San Marcelino (Photo 7 in Sec 4) and Santa Fe. (See Sec 4.)

Pamatuan is the only important river.

## f. Vegetation:

Mountains have patches of tropical forest and grassland. Plain to N mostly in rice, or open sandy grassland with clumps of bamboo.

## g. Roads and Trails:

Except near San Antonio there are no roads and few trails. Trail T11 runs NE to Fort Stotsenburg.

#### h. Towns:

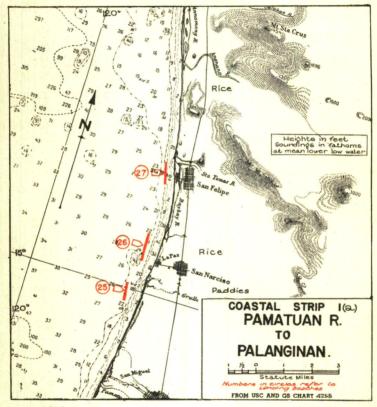
No important towns or villages.

## [Section 2]

6. PAMATUAN R TO IBA PT (Palanginan)—14°57′ N,120°03′E to 15°20′N, 119°58′E (Map 2, Coastal Strips I(a), I(b)).

## a. Anchorages:

IBA, 15°19'N, 119°58'E: Open roadstead ¼ ml S of landing in 3fms, sandy bottom. Offshore conditions generally bad in SW monsoon (May-Oct).



## b. Off-lying Is. None.

#### c. Reefs:

Several charted off-lying reefs within 8 mls of shore. Shallowest

covered by 2fms at LW.

A chain of detached reef patches reported to roughly follow 10fmline from Capones Pt to San Narciso. No indication of depths, but thought to be well covered. The only shore reef fringes Iba Pt. It is 1½ mls long and up to 600 yds wide.

## d. Shoreline:

Between Pamatuan R and Iba Pt practically the entire 24½ mls is suitable for large-scale landings during NE monsoon (Dec-May). During SW monsoon, coast is exceedingly dangerous for small craft due to heavy surf.

Approaches are clear except for some well-covered shoal patches. Beaches generally are wide and free from obstructions.

Behind beaches are generally high sand dunes. Near rivermouths tidal streams or coastal lagoons often run parallel to beaches for a considerable distance. In wet season many of these are a difficult obstacle. In dry season may be crossed usually by MT. These lagoons and streams may change position.

## e. Landing Beaches:

BEACH 25: About 1 ml long; wide, shelves gradually at LW but steeply at HW when it is suitable for all types of LC. High sand dunes or low bluffs behind beach. An unimproved road runs inland to San Narciso through grass or rice land to Route 7 about 1½ mls inland.

BEACH 26: Extends from La Paz, 1 ml north. Fairly steeply-sloped bottom; 3fm-line 200 yds offshore. Suitable for all types of LC. Beach very wide and MT movement across steep sand dunes may be difficult. Good road to San Narciso and Route 7 from S end.

BEACH 27: Extends for 1 ml S of Santo Tomas R; about 100 yds wide at N end, tapering to 40 yds at S end. At LW it is fairly steep in places off Santo Nino and suitable for large craft. At HW suitable along entire length.

Between beach and Route 7 at San Felipe are 2 rivers. A good MT road crossed these in 41.

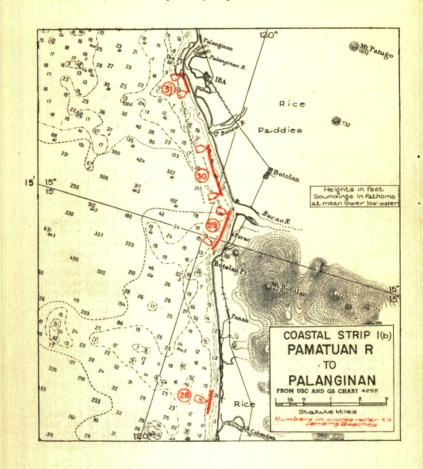
BEACH 28: Near Cabangan is beach 1350 yds long; very wide above HW; at LW it has a steep sloped bottom, 3fm-line 125 yds offshore. Ideal beach in NE monsoon.

An unimproved road runs E to Route 7 at Cabangan through flat cultivated area suitable for MT.

BEACH 29: From Bucao R south for 1½ mls on N half fronting Porac. It is about 100 yds wide between LW and HW. South half shelves more steeply from HW line, above HW line beach is 150 to 200 yds wide, fairly steep on S half. Excellent for all types of LC. Easy access to Route 7E.

## [SECTION 2]

BEACH 30: Between Bucao and Bancal Rs. Three mls suitable for landing beach. 3fm-line is 150 yds offshore. Behind wide sand beach and high dunes some 2 mls of rice paddies lie between coast and Route 7. This is probably impassable in wet SW monsoon.



BEACH 31 (Photo 2 in preceding Coastal Sub-division 3, Photo 7 in Sec 4): Fronts airfield just W of Iba. Bottom slopes gradually and is only fair for small LC. Inland for 500 yds is level with few trees to Palanginan R, which has swamps and rice paddies along its banks.

16

## f. Hinterland:

Eastward from coast between Pamatuan and Santo Tomas Rs, a low valley runs inland for over 10 mls. Large rice paddies near coast become flooded in wet season, but inland soil is sandy and MT movement off roads is less restricted.

North to Bucao R is a coastal plain 1 to 2 mls wide, rising irregularly in steep grassy slopes to mountain ranges.

Bancal and Bucao R valleys extend E and SE from Iba; cultivated mostly in rice paddies, commencing 300 yds inland from shore.

Zambales Mts rise eastwards and form a difficult barrier between this coast and Central Luzon.

Many rivers flow W to coast; several are used by shallow-draft barges near mouth. In wet season they become raging torrents, flooding wide areas. Pamatuan, Santo Tomas, Jalakak and Bucao are principal rivers.

Non-operational airfields near Biangue about 8 mls up Bucao R, and at Iba (Photo 8 in Sec 4).

Route 7 runs 1 to 2 mls inland from coast.

## g. Vegetation:

Lowlands planted chiefly in rice, corn or cassava; some sandy grassland with clumps of bamboo. Lower mountain slopes mostly cogon grass. Scrub and heavy forest on some gorges and crests.

#### h. Roads and Trails:

Route 7 runs 1 to 2 mls inland from coast.

A trail suitable for jeeps runs E from Botolan  $7\frac{1}{2}$  mls, thence an old cavalry trail (T12) crosses mountains to O'Donnell in Central Luzon.

#### i. Towns:

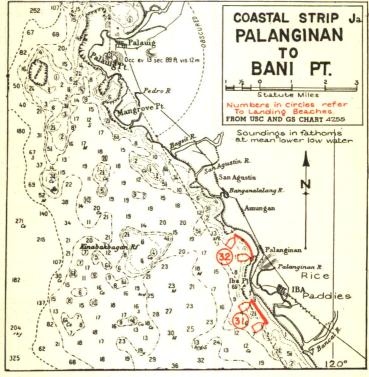
Iba (pop 3078) the capital of Zambales Prov. San Antonio (6025); San Narciso (6338); San Felipe (4033) and Botolan (1385).

### [SECTION 2]

 IBA PT (Palanginan) TO BANI PT—15°19′N, 119°58′E to 15°34′N, 119°55′E (Map 2, Coastal Strips J(a), J(b)).

### a. Anchorages:

- i. PALAUIG B—15°27'N, 119°54'E: Exposed to NW. Area restricted to ½ ml diameter. Depths 7–8fms, sandy bottom. Many reefs and shoals.
- ii. PORT MATALVI, 15°30'N, 119°56'E: Difficult to enter but an excellent all-weather anchorage and is the only typhoon anchorage between Olongapo and Bolinao Hb.
- iii. PORT MASINLOC, 15°32'N, 119°56'E: Good shelter except from N and W. Entrance narrow and winding. Concrete pier N of Masinloc town (Photo 14 in Sec 6).



### b. Off-lying Is:

i. MAGALAWA I, 15°30'N, 119°53'E: small flat and wooded island at SW entrance to Port Matalvi. It is surrounded by a wide

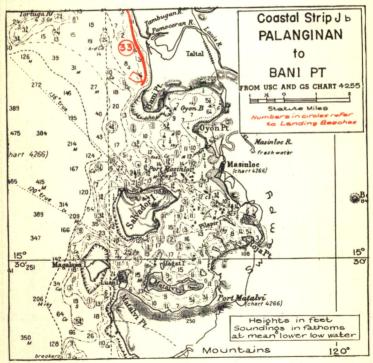
detached reef. Sunken reefs extend nearly 5 ml N and S. Small group of huts on sandspit E.

ii. LUAN I: Located ½ ml E of Magalawa I and separated from it by a narrow channel. Knoll 118ft high on N side; S end is flat. Reef with least depth 1fm runs NNE for ½ ml.

iii. MATALVI I: Located ½ ml E of Luan I. It is 100ft high and wooded. A smaller island 88ft high lies close E and is connected to Matalyi by reef.

iv. LAGAT I: North of Matalvi I. It is small, low and mangrove covered. Situated on reef extending § ml N from Matalvi I.

v. SALVADOR I: Situated 1½ mls N of Matalvi I. Almost 2 mls ENE/WSW and 1½ mls wide; 100ft high, steep NW and NE sides and slopes gradually S. Alupihing Pt, NW extremity, is 100ft high, covered with bamboo. North shore fringed by reefs partly bare at LW. Width of reef widens from about ½ ml at NW corner to about ½ ml near NE corner. This reef forms edge of channel into Port Masinloc.



### [Section 2]

### c. Reefs:

Off-shore and shore reefs along this section of coast are dangerous hazards. Many navigation aids have been destroyed. Great caution or expert local knowledge required. US Charts 4210 and 4266 show reefs.

### d. Shoreline:

From Iba Pt N to Palauig Pt a sand beach is broken by exposed

reefs. Beach is backed by mangrove fringe.

At Palanginan, 1½ mls N of Iba, is a beach 1 ml long and generally free of reef (Beach 32). North of this beach the shore is fringed with mangrove almost continuously and has many off-shore shoals.

From Palauig Pt to Bani Pt terrain is swampy with steep hills

behind.

Masinloc town is on a low coastal flat, but approaches to the shore are difficult.

Oyon B, 13 mls N of Masinloc, has steep-to shores rising quickly to sharp hills. Bani Pt, the NW entrance point, has several rounded hills near its S shore.

### e. Landing Beaches:

BEACH 32: At Palanginan. About 1600 yds long, very wide. Bottom has a shallow slope, 1½fm-line over 300 yds off-shore. Suitable only for small craft at HW. MT could easily reach Route 7, 200 yds E.

### f. Hinterland:

North from Iba coastal plain narrows to 1 ml but widens again near Palauig Pt. A range of hills runs E to Matalvi Pt. The coastal plain on the mainland E of Matalvi Is is broken by many small hills and swampy areas.

Mountains to the E are low and irregular.

Movement of MT off the road generally difficult.

Chief rivers are Salasa and Lipay (Masinloc). Possibly navigable for shallow-draft barges.

### g. Vegetation:

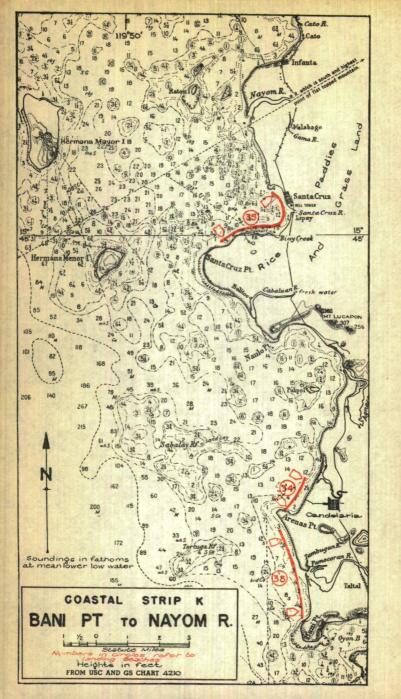
Coastal areas have patches of rice; small mangrove swamps, and clumps of bamboo are common. Large cogon grass areas cover most mountain slopes, with some patches of heavy forest.

### h. Roads and Trails:

Route 7 runs close to shoreline except for an inland section through hills E of Palauig.

### i. Towns:

Chief towns are Masinloc (pop 1547) and Palauig (1334).



8. BANI PT TO NAYOM RIVER—15°34'N, 119°55'E to 15°48'N, 119°53'E (Map 2, Coastal Strip K):

### a. Anchorages:

SANTA CRUZ, 15°46'N, 119°54'E. This town had a wharf at which ocean-going vessels loaded ore.

### b. Off-lying Is:

- i. HERMANA MAYOR I, 15°48′N, 119°48′E: Located 7 mls W of Santa Cruz. It is 2½ by 1 ml and lies on a bank covered with less than 10fms. This bank extends 4½ mls N, surrounding Culebra Islet, and 2 mls S. Island is partly wooded and rises 130ft on SE side. Wide reef along W and S shore is exposed at LW.
- ii. HERMANA MENOR I:  $2\frac{1}{2}$  mls SSE of Hermana Mayor I; less than half size of that island, rises to 54ft and is wooded. It has sandy beaches and is surrounded by shoal water. A good channel  $\frac{1}{2}$  ml wide runs between island and Santa Cruz Pt, but requires expert knowledge.
- iii. RATON I:  $4\frac{1}{2}$  mls E of Hermana Mayor I. It is low, covered with bushes, and has sandy beaches surrounded by reefs, parts of which bare at LW and should not be approached by large vessels nearer than  $1\frac{1}{2}$  mls.

iv. PULIPO I: 1½ mls SE of Naulo Pt and about ½ ml W of mainland shore. Small, low and wooded. Not prominent offshore.

### c. Reefs:

Approaches to this coast are through many off-lying reefs and

shoals (see US Chart 4210). Expert knowledge necessary.

A wide reef extends around Bani Pt, otherwise the shores are free of reef as far as Naulo Pt. Wide fringing reef again occurs around Santa Cruz Pt, and off the small point N of Santa Cruz town.

### d. Shoreline:

Between Bani Pt and Arenas Pt  $3\frac{1}{2}$  mls N is a sandy beach (Beach 33) free of reef, broken by Lauis R.

Arenas Pt is low and sandy, surrounded by shoal water, extending

1 ml seaward.

Beach 34 runs a mile to San Vicente R (about 2 mls NE of Arenas Pt).

Shoreline to Naulo Pt is generally low and swampy with mangroves.

Steep-to sections at Lucapon and Naulo Pt.

Sandy shore with shallow water several 100 yds out lies between Naulo Pt and Santa Cruz Pt. The latter is low and swampy with large trees like mangrove.

Beach 35 runs E and N of Santa Cruz (Baluarte) Pt.

From the bight fronting Santa Cruz town to Nayom R is a wide sandy beach backed by low plain. 1fm-line about 600 yds out.

### e. Landing Beaches:

BEACH 33: Extends between Bani and Arenas Pts. Reef-free sand beach with firm terrain ashore. At LW 3fm-line about 100-200

### [SECTION 2]

yds offshore except near Pamocoran R. Suitable for all LC at all tide stages. Route 7 is 13 mls inland.

BEACH 34: Extends NE from Arenas Pt for approx 1 ml to San Vicente R. Said to be free of rocks or coral, shelving fairly steeply. Many shoals offshore but wide channels between them. A 1\frac{3}{4}fm shoal lies about 1400 yds NW of center of beach suitable for all LC at any tide stage.

BEACH 35: Within Santa Cruz inner harbor a sand beach runs 3\frac{3}{4} mls, ending just N of town; broken by Biay Creek and Santa Cruz R S of town.

Deep water approach from China Sea is very difficult due to dangerous shoal water 6 mls W of harbor.

Ifm-line generally over 200 yds off. At best, it is poorly suited for other than small craft landings.

### f. Hinterland:

Low coastal plain 2-3 mls wide, generally swampy with grass, mangrove and rice paddies. (Photo 12 in Sec 5.)

Some sections of firm ground suitable for MT connect shore with Route 7.

About 2 mls E of Arenas Pt are 2 small lakes.

Rugged hills rise E of coastal plain, leading to mountainous interior, from where many streams flow. Important rivers are Lauis, Bayto (Cabuluan) and Nayom, all with big swamps near mouths.

An airfield is located on the level plain behind Santa Cruz Pt. (See Sec 4, A25.)

### g. Vegetation:

A mangrove fringe extends along a great part of shoreline and in swamps around large river mouths. Some rice paddies and grazing land occupy coastal plain, with cogon grass and patches of heavy forest on hills and mountains.

### h. Roads and Trails:

Route 7 runs within about ½ ml of shore most of the way. It cuts across the base of peninsula E of Santa Cruz Pt where a 1-lane all-weather road runs to Acoje pier at Port Santa Cruz. Trail T13 runs E to join Route 13B.

### i. Towns:

Chief towns are Candelaria (pop 998) and Santa Cruz (1334).

LEGEND

 A/F
 ...
 Airfield

 HW
 ...
 High Water

 LW
 ...
 Low Water

 LLW
 ...
 Lower Low Water

 L/C
 ...
 Landing Craft

## LANDING BEACH SUMMARY

Continued from overpage

INFORMATION COMMON TO ALL BEACHES.

All depths given at mean LLW.

Beach information mostly from USC and GS Charts, some informants, and photo coverage.

Tidal ranges: (Higher HW height to lowest tide).

Manila B, 4.8 ft.

West coast Zambales and Bataan (including Subic B), 4.3 ft.

BEACH ORIENTATION Map and Photo Ref	BEACH No 26 Coastal Strip "Ia"	BEACH No 27 Coastal Strip "Ia"	BEACH No 28 Coastal Strip "Ib"	BEACH No 29 Coastal Strip "Ib"	BEACH No 31 Coastal Strip "Ib" (Photo 2)	BEACH No 34 Coastal Strip "K"
OBJECTIVE	La Paz, San Narciso and coastal Highway 7.	San Felipe and Highway 7.	Cabangan and Highway 7.	Botolan and Highway 7.	Iba, Iba A/F and Highway 7.	Candelaria and Highway 7.
APPROACH FROM SEA	Clear.	Clear.	Clear.	Clear.	Clear from SW direction.	Clear from W between Saba- lay and Tortuga Reefs.
DEPTHS OFFSHORE (At mean LLW)	1 fm 50-125 yds offshore, S to N. 3 fms approx. 200 yds off- shore.	1 fm 60-75 yds offshore. 2 fms approx. 150 yds offshore. 3 fms approx. 225 yds offshore.	1 fm less than 40 yds offshore. 3 fms 100-125 yds offshore.	South half: 3 fms less than 100 yds offshore. North half: 1 fm 70 yds offshore, shore, 3 fms 200 yds offshore.	1 fm approx. 125 yds offshore. 2 fms 150-300 yds offshore. 3 fms 400-600 yds offshore.	1 fm less than 50 yds offshore. 2 fms approx 150 yds offshore. 3 fms approx 300 yds offshore.
DIMENSIONS: Length Width IW	1 ml (approx.). 50-150 yds. Wide.	1500 yds. 40-100 yds south to north ends. Very wide at north end.	1350 yds. 100-150 yds. 100-150 yds.	14 mls. 150-200 yds. Very wide above HW line.	1400 yds. 500-600 yds (reported). 500 yds (reported).	1 ml (approx). Wide. Wide.
SLOPE AT: LW Line	2-4%. Reported steep.	2-3%. Reported fairly steep.	4-10%. Very steep.	South half: approx. 10%; north half 2-3%. South half: Very steep; north	1-2%. Shallow (reported).	Fairly steep. Fairly steep.
SURF CONDITIONS	Dangerously high surf during SW season. Generally little to moderate in NE season.	Dangerously high surf during SW season. Generally little to moderate in NE season.	Dangerously high surf during SW season. Generally little to moderate in NE season.	Dangerously high surf during SW season. Generally little to moderate in NE season.	Dangerously high surf during SW season. Generally little to moderate in NE season.	Partially protected in SW season with moderate surf.
BEACH OBSTRUCTIONS for LC	None.	None.	None.	None.	Shifting sand bars.	None.
CHARACTER OF SOIL. Suitability for MT	Firm below HW line. Wide sandy beach and steep dunes. Probably difficult for MT.	Wide sandy beach. Probably difficult for MT above HW line.	Very wide sand beach above HW line with numerous high dunes.	Sandy beach very steep above HW line on S half, difficult for MT. Gentle on N half.	Reported firm and suitable for MT.	Not known.
ACCESS TO ROAD SYSTEM	Unimproved coastal road 100- 200 yds inland. Excellent MT road inland to San Narciso and Route 7D at S end.	Numerous roads inland to Santo Nino. Good MT road to San Felipe and Route 7D.	Unimproved road from center of beach to Cabangan 1½ mls inland.	Route 7E, 1-300 yds inland from beach. Route 115C and Trail T12 inland to O'Donnell.	Good MT roads just inland from beach connecting with Routes 7E, F.	Good MT road from beach to Candelaria and Route 7F.
HINTERLAND: Type of soil, terrain and vegetation with relation to movement and dispersal for MT	La Paz barrio at S end. Be- tween beach and highway (1500 yd) flat cultivated ter- rain suitable for MT.	Flat populated area with numerous streets and buildings. Santo Nino and Baybay Rs between beach and San Felipe.	Wide sand beach backed by wooded and cultivated flat terrain. Easy cross-country movement for MT. Route 7D 1½ mls inland.	Wide sand beach backed by grassy plain 2-300 yds inland on S half. Town of Botolan on sandy plain inland from N half.	Level sandy grassy area with little vegetation. A/F just inland.	Firm level terrain suitable for MT.
MISC. INFORMATION	USCGS Chart 4211.	Santo Tomas R navigable for LCV and LCM barges. USCGS Chart 4211.	USCGS Chart 4211.	USCGS Chart 4210.	USCGS Chart 4210	USCGS Chart 4210.
LANDING SUITABILITY AND REMARKS	Excellent landing beach for all LC in NE season. Excellent manoeuvrability in hinterland.	Good landing beach for all LC in NE season. Move- ment to highway would be hindered by rivers.	Excellent landing beach for all LC in NE season.	Excellent landing beach in NE season for all LC. Very easy access to Highway 7E along this beach.	Fair landing beach for small LC at HW. Large LC would ground 50-100 yds. offshore.	Good landing beach for all LC at tide stage.

### LEGEND

A/F ... Airfield
HW ... High Water
LW ... Low Water
LLW ... Lower Low Water
L/C ... Landing Craft

# LANDING BEACH SUMMARY (With Handbook 42. Bataan-Zambales)

This Summary covers 13 beaches considered to be the most important tactically of 33 selected sites. For all suitable landing beaches and full description of coastline see Sec 2.

(For locations see Map 2 and coastal strips) [SUMMARY CONTINUED OVERPAGE]

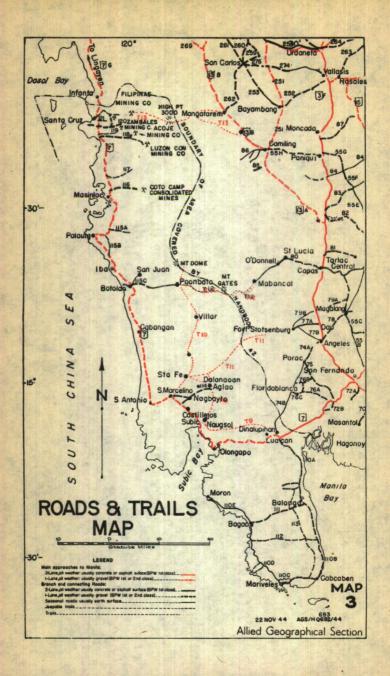
### INFORMATION COMMON TO ALL BEACHES.

All depths given at mean LLW.

Beach information mostly from USC and GS Charts, some informants, and photo coverage.

Tidal ranges: (Higher HW height to lowest tide).
Manila B, 4,8 ft.
West coast Zambales and Bataan (including Subic B), 4.3 ft.

Clear from bay.  Clear from bar.  Clear from bar.  Concrete seawall around bar.  Clear.  Clear.  Clear.  Clear.  Clear.  Clear.  Clear.  Cle	ENTATION oto Ref	BEACH No 4 Coastal Strip "C"		BEACH No 6 Coastal Strip "D"	BEACH No 13 Coastal Strips "D, E".	BEACH No 18 Coastal Strip "F"		1 1
Clear from bay.  Clear from from bay.  Concrete seavall around.  C		Limay and coastal road.	ao and access to coastal	Cabcaben and coastal road.	Mariveles town and airstrip.	Bagac and MT road to Pilar.	San Antonio and Highway 7.	San Narciso and Highway 7.
1fm 60-140 yds offshore. 2ms 150-250 yds offshore. 2ms 200-300 yds offshore. 2ms 200-300 yds offshore. 2ms 200-300 yds offshore. 2ms 200-100 yds offshore. 2ms 20-100		r from bay.	Clear from bay.	Clear.	Clear.	Clear.	Clear around either side of Capones Is.	Clear.
NS: 1½ mls. 50-100 yds N of river; 50-75 yds. 10-15 yds reported.  Narrow N of river; wide S of 10-15 yds reported.  Narrow N of river; wide S of 10-15 yds reported.  Narrow N of river; wide S of 10-15 yds reported.  Narrow N of river; wide S of 10-15 yds reported.  Narrow N of river; wide S of 10-15 yds. 10-15 yds.  None: Reported somewhat steep. Fairly steep.  Storms, otherwise slight.  None: Reported somewhat steep. Fairly steep.  Numerous fish traps near river mouth. Chart indicates season.  None: Re OF Generally firm and suitable Sand and pebble beach suit-some offshore rocks.  None: Treatment of the Narrow None: Treatment		60-140 yds offshore. 150-250 yds offshore. 200-300 yds offshore.	(ap-	1 fm 50-100 yds offshore. 2 fms 110-175 yds offshore. 3 fms 150-400 yds offshore.	NE of Mariveles R: If mappox, 100 yds. offshore. 3 fins appox, 175 yds offshore. SW of Mariveles R: 3 fins less than 125 yds off- shore.	1½ fms 50-100 yds offshore. 2½ fms approx. 500 yds off- shore at center.	1 fm 20-30 yds offshore. 2 fms 50-75 yds offshore. 3 fms 100-150 yds offshore.	1 fm 80-175 yds offshore. 3 fms approx. 250 yds offshore.
Probably shallow.  Moderately heavy during SW storms, Otherwise only slight.  Storms, otherwise slight.  None.  No	:: :	J o	150 yds. 50-75 yds. 10-15 yds reported.		1 ml. 25-100 yds. Narrow.	2 mls approx. 150-200 yds. Not known.	12 ml. 50-100 yds. 25-75 yds.	1 ml. 30-50 yds. 20-40 yds.
Moderately heavy during SW storms, Otherwise only slight.  Storms, otherwise slight.  None.  Numerous fish traps near river mouth. Chart indicates season.  None offshore rocks.  Generally firm and suitable sand and pebble beach suit-able for MT.  MT roads from beach to coastal road just inland, to coastal road, Route 110B.  Flat sandy soil with little vege-concrete seawall around. Succeed with low vegetation. In area, Japs have son area here.  Concrete seawall around S Long jetty at Lamao.  Son area have soil search at any fairly good landing beach at any foir small LC at any; Early sood landing beach at any for small LC at any; storms a storms.	::	2%. ably shallow.		2-4%. Fairly steep.	2-15% NE-SW. Steep.	Not known. Not known.	6-10%. Very steep.	1-3%. Reported steep.
None.  Numerous fish traps near inver mouth. Chart indicates some offshore rocks.  Generally firm and suitable Sand and pebble beach suitable for MT.  MT roads from beach to coastal road just inland, to coastal road, Route 110B.  Flat sandy soil with little vege- Gently rising firm terrain cleared ground. In area Japs have son are here.  Concrete seawall around S Long jetty at Lamao.  Concrete seawall around S Long jetty at Lamao.  Concrete seawall around S Long jetty at Lamao.  MCGGS Chart 4211.  Fair landing beach at any Fairly good landing beach in the search of the small LC at any the search at any for small LC at any the search at any the search at any the search at any to the small LC at any the search at any the sea		erately heavy during SW ns, otherwise slight.			Well protected in both seasons.	High surf in SW season.	Dangerously high surf during SW season. Generally little to moderate in NE season.	Dangerously high surf during SW season. Generally little to moderate in NE season.
Generally firm and suitable Sand and pebble beach suit- for MT.  MT roads from beach to coastal road from beach at jetty to coastal road, Route 110B.  Flat sandy soil with little vege- Gently rising firm terrain coastal road, Route 110B.  Concrete seawall around S Long jetty at Lamao.  Concrete seawall around.  USCGS Chart 4211.  Fair landing beach at any for small LC at HW. Pos- small LC at any tages and proper able for MT.  Unimproved road road from beach at jetty and inland, beach at any fairly good landing beach state and to coastal road, with little vege- Concrete seawall around.  USCGS Chart 4211.  Two long jetties good landing beach state and to small LC at any terrain classing point.  USCGS Chart 4211.  Good landing beach state any for small LC at any terrain classing point.		a'	Numerous fish traps near river mouth. Chart indicates some offshore rocks.	None.	None.	None.	Reported rocky along beach.	None.
MT roads from beach to coastal road just inland, to coastal road, Route 110B.  Flat sandy soil with little vege- ration. Easy movement for MT.  Concrete seawall around S Long jetty at Lamao.  USCGS Chart 4211.  Fair landing beach at any Fairly good landing beach in LC at HW. Pos- small LC at any t		firm and suitable		probably suit-	White sand, mostly suitable for MT.	Not known.	Reported generally firm be- tween LW and HW lines. Steep grade above HW line.	Reported generally firm be- tween LW and HW lines. Steep grades above HW line.
Flat sandy soil with little vege- ration. Easy movement for covered with low vegetation.  M.T.  Concrete seawall around S Long jetty at Lamao. USCGS Chart 4211.  Fair landing beach at any Fairly good landing beach ide. Small LC at HW. Pos- son area forund sound search of properties area.  The forund of Long jetty at Lamao.  Son area have long jetties bein point to long		t t		Unimproved road net along beach, and inland from beach to coastal road, Route 110B.	Good MT road (Route 110B) just inland from beach. Route 110C 2 mls inland.	MT road to Bagac at S end, connects coastal road (Routes 110D and E) and inland road (Route 111).	Unimproved roads and tracks inland from beach to San Antonio and connect with Routes 7D, 7C and Trail T11.	Unimproved roads and trails to San Narciso. Highway No 7D 14 mls inland across grassland and rice fields.
Concrete seawall around S Long jetty at Lamao. USCGS Chart 4211.  Fair landing beach at any Fairly good landing beach ide. Small LC would for small LC at HW. Pos-		sandy soil with little vege- n. Easy movement for		Numerous warehouses large garri-	Partially cleared area well developed with roads and port facilities. Airstrip just NW of town.	Flat cultivated area crossed by numerous small rivers, suitable for MT generally.	Flat, partly wooded, partly grassy firm terrain 1-2 mls inland.	Flat grasslands 400 yds in- land from beach. Ricefields and wooded sections farther inland to Highway 7D.
Fair landing beach at any Fairly good landing beach tide. Small LC would for small LC at HW. Pos-		crete seawall around S of Limay R at mouth.		Two long jetties off Pan- golisanin Point. USCGS Chart 4211.	Two excellent piers just off beach at town. USCGS Chart 4255.	The best known road across Bataan Pen runs W from Bagac (Route 111). USCGS Chart 4211.	Pamatuan R reported fordable at San Antonio in dry season. USCGS Chart 4211.	Ricefields would support MT in dry season. USCGS Chart 4211.
ground 50 to 150 yds off- sibly suitable for larger shore on firm flat sand LC north of town. bottom.			Fairly good landing beach for small LC at HW. Pos- sibly suitable for larger LC north of town.	beach for time. Suit- LC at HW	Excellent landing beach for all LC at any tide. LST section in vicinity of piers.	Probably suited for HW landings for all LC. Best section at S end.	Good landing beach in NE season for all types of LC.	Good landing beach in NE season. Large LC would be limited to high tides.



### **SECTION 3**

### ROADS AND TRAILS

(SEE MAP 3; PHOTOS 3, 4)

### 1. GENERAL:

Area covered by this Handbook is mostly mountainous. Main roads run near the coast except where they cross Bataan Pen in 2 places and from the head of Subic B NW to Zambales coast.

Main features of roads in Bataan Prov are the impossibility of driving off the road to any extent, either due to low swampy areas along E coast or to mountain sections elsewhere, which are often covered in heavy forest.

In Zambales Prov an unusually large number of streams and swampy areas are crossed along W coast. Many of these streams are fordable in dry weather but become raging torrents after rain. Vehicles can leave the road on a large sandy flat around San Marcelino and several smaller coastal pockets to the N, but movement is mostly confined to the road. Many small grassy hills are found near the road on this coast. Cover usually consists of scattered bamboo clumps or patches of low forest.

Towns and barrios usually have many large acacia or mango trees and clumps of bamboo and banana. Nipa huts often line each side of the roadway for some distance near each settlement.

Drinking water is not likely to become a problem except along mountain sections in W Bataan during the dry season, where permanent mountain streams may be up to 2 mls apart. Most settlements have excellent artesian wells but great care should be taken to avoid dirty containers. All water should be treated before use.

Most roads in this area become very dusty in dry weather. Road accidents have also been caused by skidding on loose river gravel scattered sometimes on otherwise well-made roads.

Road signs and distance markers, showing kilometer distances to the next large town, were placed along most roads. Discrepancies were common, particularly at provincial boundaries. Tables of road distances are at the end of this Section.

Vehicles drive on left-hand side.

### [SECTION 3]

### 2. ROAD CLASSIFICATION:

### Two-lane all-weather:

At least 16ft wide, of hand-placed rock base where necessary; surface usually asphalt or gravel; 4ft shoulders; culverts at least 16ft wide; bridges often only 10ft wide. Maintained before war as "First-Class Road" by Philippine Bureau of Public Works.

Note: Philippine Bureau of Public Works defines a "First-Class Road" as follows: "Well graded and surfaced, thoroughly drained and constantly maintained; bridges and culverts generally built at all crossings, permanent, or supplanted by ferries of 2-ton capacity or more; roads continuously passable except possibly in typhoon season; width of right-of-way 49ft, of roadway 23ft, and of metalled surface 9 to 16ft."

### One-lane all-weather:

Usually 9ft wide, of hand-placed rock base (Photo 3) and 12ft surface of gravel; sometimes blacktop; 4ft shoulders; vehicles pass by driving on thinly surfaced shoulders. Culverts usually 16ft wide and bridges usually 10ft wide. Maintained before war as "First-Class Road" by Philippine Bureau of Public Works.

### Seasonal:

Usually graded for at least 20ft crown in flat areas, and 16ft or less in mountain areas. Usually unsurfaced and may become impassable during wet weather. Bridges and culverts usually 10ft wide. Maintained before war as "Second-Class Road" by Philippine Bureau of Public Works.

Note: Philippine Bureau of Public Works defines a "Second-Class Road" as follows: "Fairly well graded, at least partly surfaced, and generally intermittently maintained bridges and culverts at most stream crossings; some temporary structures; passable in dry season but may be locally impassable during rainy season."

It is safe to assume that, although sometimes metalled, seasonal roads in hilly or mountainous areas can support only one lane of military traffic and are subject to frequent washouts or landslides. Boggy conditions can be expected on the lowlands long after rain has ceased.

Only those seasonal roads, trails suitable for jeeps, and foot trails which appear to be of special importance, have been described.

Good road metal was quarried near Mariveles (Bataan Prov) and at road cuts north of Masinloc, and about 6 mls S of Sta Cruz (Zambales Prov). Less suitable road material is available at numerous road cuts and sandy river beds. Timber for bridge repairs is available usually several miles off main roads.

### Abbreviations used here include:

AW —All weather

Prov Bdry —Provincial boundary

Km —Kilometer (1000 meters or 1093yds)

MI —Statute MI (1760 yds)
RRX —Railroad crossing
Rd Junc —Road junction
Rd X —Road crossing

Rd June — Road Juneton — Road crossing — Road crossing — Temporary wood — Wind truss

" WTs Wood truss
" STs —Steel truss
" SG —Steel girder

" CG —Reinforced concrete slab and girder

" M —Masonry " A —Arch

Dimensions: Length; width; height above normal water level or dry flood plain.

### 3. TRAILS:

Foot trails link almost every settlement and lead from coast to mountain areas, usually along crests of spurs.

The only 3 main trails crossing Zambales Mts and several lesser

trails are dealt with in some detail at end of road section.

Local guides will probably be readily available.

Earthen dykes around rice paddies in the coastal areas provide usually good footing, even in flood time.

### 4. ROAD DETAILS:

### ROUTE 7

### Summary:

This National Highway runs southwards down W coast of Zambales Prov to San Antonio (14°57′N, 120°05′E), thence eastwards across the head of Subic B and base of Bataan Pen to San Fernando (Pampanga Prov), 15°02′N, 120°41′E, on Route 3D, 66.1 km (41.1 ml) from Manila.

From Infanta (Pangasinan Prov) to San Fernando (Pampanga

Prov) is 218.0 km (135.5 ml).

At the end of 1941 this road was in a good 1-lane, AW condition to Dinalupihan in NE corner of Bataan Prov, thence 2-lane, AW to

San Fernando with all streams bridged.

Any estimates of its present capacity must take into account the unusually large number of important stream crossings on the Zambales coast, all of which are subject to violent floods in wet weather; the rugged terrain of the Bataan section, which is subject to land slides; and the fact that the section through Pampanga Prov came under heavy strain during the battle for Bataan.

Main towns on this route include Sta Cruz, Masinloc, Castillejos,

Olongapo and Guagua.

Branch roads lead mainly to mining developments in Zambales,

and Route 110 down E coast of Bataan Pen.

Distances have not been adjusted for the 5.1 km (3.2 ml) shortening of Route 3C since it is unlikely that kilometer posts on the ground will have yet been moved.

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ROUTE 7G:   INFANTA Mun. (15°50 N, 119°54′E) on SW coast of PANGA-SINAN Prov. Route 7G runs southwards.   289.2   179.7   SURFACE.	Detail	Distance to via Conne Route (not correc MALOLOS Km	ecting 3 ted for	Class and Terrain
179.7   179.	ROUTE 7G:			
Water about 420ft wide. Tidal.   Prov Bdry PANGASINAN-ZAM-BALES.   285.5   177.4	INFANTA Mun. (15°50'N, 119° 54'E) on SW coast of PANGA- SINAN Prov. Route 7G runs southwards.	289.2	179.7	SURPACE.
STA CRUZ.   Branch E (left) is Trail 13 to San Clemente.   281.3   174.8   Rice paddies (Photo 12).	Water about 420ft wide. Tidal.	287.2	178.5	Level coastal plain.
Branch E (left) is Trail 13 to San Clemente.  Route 7G ends, 7F begins.  Radio Sta near road W (right).  STA CRUZ R. TW 377x20x19ft (8 spans).  Rd Junc. Branch E. ROUTE 121. Possible Jeep Trail 5 km (3.1 ml) to Aguado Hermanos Ptn.  VIAY Rd. Cr ROUTE 120. West 1-lane AW 2.2 km (1.4 ml) to Acoje wharf. East 1-lane AW 22 km (13.7 ml) to Zambales Chromite Mining Coy Ltd. Branch to Filipinas Mining Coy.  ACOJE A/F, east (left).  CABALUAN or BAYTO R. Suspension steel and wood 203x7x22ft. Fordable 100 yds upstream.  Creek. CG 24x14x8ft.  Rd Junc. Branch NE and E ROUTE 119, possible Jeep trail about 12 km (7.5 ml) to MADALAO.  Small knoll E (left) elev 120ft.  Rd Junc. Branch E is ROUTE 118. 27 km (16.8 ml) to ACOJE Mine, thence about 8 km (5.0 ml) to Luzon Consolidated Mining Coy.  Creek CG 92x14x8ft.  Rd Junc. Branch W (right) to wharf 272.0 169.0	GAMA R. TW 66x13x6ft.	285.5	177.4	
Radio Sta near road W (right).   281.2   174.7	Branch E (left) is Trail 13 to San	281.3	174.8	Rice paddies (Photo 12).
STA CRUZ R. TW 377x20x19ft (8 spans).         280.9         174.5           Rd Junc. Branch E. ROUTE 121. Possible Jeep Trail 5 km (3.1 ml) to Aguado Hermanos Ptn.         280.2         174.1           VIAY Rd. Cr ROUTE 120. West 1-lane AW 2.2 km (1.4 ml) to Acoje wharf. East 1-lane AW 22 km (13.7 ml) to Zambales Chromite Mining Coy. Ltd. Branch to Filipinas Mining Coy.         278.2         172.9           ACOJE A/F, east (left).         276.9         172.1         ONE-LANE AW. GRAVEL SURFACE.           CABALUAN or BAYTO R. Suspension steel and wood 203x7x22ft. Fordable 100 yds upstream.         274.8         170.8           Creek. CG 24x14x8ft.         274.8         170.8           Rd Junc. Branch NE and E ROUTE 119, possible Jeep trail about 12 km (7.5 ml) to MADALAO.         272.7         169.5           Small knoll E (left) elev 120ft.         272.7         169.5           Rd Junc. Branch E is ROUTE 118. 27 km (16.8 ml) to ACOJE Mine, thence about 8 km (5.0 ml) to Luzon Consolidated Mining Coy.         272.1         169.1           Creek CG 92x14x8ft.         272.1         169.1           Rd Junc. Branch W (right) to wharf         272.0         169.0	Route 7G ends, 7F begins.			7G: 7F:
Rd Junc. Branch E. ROUTE 121. Possible Jeep Trail 5 km (3.1 ml) to Aguado Hermanos Ptn.  VIAY Rd. Cr ROUTE 120. West 1-lane AW 2.2 km (1.4 ml) to Acoje wharf. East 1-lane AW 22 km (13.7 ml) to Zambales Chromite Mining Coy. Ltd. Branch to Filipinas Mining Coy.  ACOJE A/F, east (left).  CABALUAN or BAYTO R. Suspension steel and wood 203x7x22ft. Fordable 100 yds upstream.  Creek. CG 24x14x8ft.  Rd Junc. Branch NE and E ROUTE 119, possible Jeep trail about 12 km (7.5 ml) to MADALAO.  Small knoll E (left) elev 120ft.  Rd Junc. Branch E is ROUTE 118. 272.7 l69.5 about 8 km (5.0 ml) to Luzon Consolidated Mining Coy.  Creek CG 92x14x8ft.  Rd Junc. Branch W (right) to wharf 272.0 l69.0	Radio Sta near road W (right).	281.2	174.7	
5 km (3.1 ml) to Aguado Hermanos Ptn.  VIAY Rd. Cr ROUTE 120. West 1-lane AW 2.2 km (1.4 ml) to Acoje wharf. East 1-lane AW 22 km (13.7 ml) to Zambales Chromite Mining Coy Ltd. Branch to Filipinas Min- ing Coy.  ACOJE A/F, east (left).  CABALUAN or BAYTO R. Suspension steel and wood 203x7x22ft. Fordable 100 yds upstream.  Creek. CG 24x14x8ft.  Rd Junc. Branch NE and E ROUTE 119, possible Jeep trail about 12 km (7.5 ml) to MADALAO.  Small knoll E (left) elev 120ft.  Rd Junc. Branch E is ROUTE 118. 27 km (16.8 ml) to ACOJE Mine, thence about 8 km (5.0 ml) to Luzon Consolidated Mining Coy.  Creek CG 92x14x8ft.  Rd Junc. Branch W (right) to wharf		280.9	174.5	
Coy Ltd. Branch to Filipinas Mining Coy.  ACOJE A/F, east (left).  CABALUAN or BAYTO R. Suspension steel and wood 203x7x22ft. Fordable 100 yds upstream.  Creek. CG 24x14x8ft.  Rd Junc. Branch NE and E ROUTE 119, possible Jeep trail about 12 km (7.5 ml) to MADALAO.  Small knoll E (left) elev 120ft.  Rd Junc. Branch E is ROUTE 118. 27 km (16.8 ml) to ACOJE Mine, thence about 8 km (5.0 ml) to Luzon Consolidated Mining Coy.  Creek CG 92x14x8ft.  Rd Junc. Branch W (right) to wharf 272.0 169.0	5 km (3.1 ml) to Aguado Hermanos	280.2	174.1	
CABALUAN or BAYTO R. Suspension steel and wood 203x7x22ft. Fordable 100 yds upstream.  Creek. CG 24x14x8ft.  Rd Junc. Branch NE and E ROUTE 118. 27 km (16.8 ml) to ACOJE Mine, thence about 8 km (5.0 ml) to Luzon Consolidated Mining Coy.  Creek CG 92x14x8ft.  276.7  171.9  GRAVEL SURFACE.  274.8  170.8  274.2  170.4  170.4  169.5  ONE-LANE AW. GRAVEL SURFACE.	Coy Ltd. Branch to Filipinas Min-	278.2	172.9	
272.7   169.5	ACOJE A/F, east (left).	276.9	172.1	
Rd Junc. Branch NE and E ROUTE   119, possible Jeep trail about 12 km (7.5 ml) to MADALAO.	Suspension steel and wood 203x7x22ft.	276.7	171.9	GRAVEL SURFACE.
119, possible Jeep trail about 12 km (7.5 ml) to MADALAO.  Small knoll E (left) elev 120ft.  Rd Junc. Branch E is ROUTE 118. 27 km (16.8 ml) to ACOJE Mine, thence about 8 km (5.0 ml) to Luzon Consolidated Mining Coy.  Creek CG 92x14x8ft.  Rd Junc. Branch W (right) to wharf 272.0 169.0	Creek. CG 24x14x8ft.	274.8	170.8	
Rd Junc. Branch E is ROUTE 118. 27 km (16.8 ml) to ACOJE Mine, thence about 8 km (5.0 ml) to Luzon Consolidated Mining Coy.  Creek CG 92x14x8ft.  Rd Junc. Branch W (right) to wharf 272.0 169.0	Rd Junc. Branch NE and E ROUTE 119, possible Jeep trail about 12 km (7.5 ml) to MADALAO.	274.2	170.4	
thence about 8 km (5.0 ml) to Luzon Consolidated Mining Coy.  Creek CG 92x14x8ft.  Rd Junc. Branch W (right) to wharf 272.0 169.0	Small knoll E (left) elev 120ft.	272.7	169.5	
Rd June. Branch W (right) to wharf 272.0 169.0	thence about 8 km (5.0 ml) to Luzon	272.4	169.3	GRAVEL SURFACE.
	Creek CG 92x14x8ft.	272.1	169.1	
	Rd Junc. Branch W (right) to wharf of Luzon Consolidated Mining Co.	272.0	169.0	

Detail	Distance Km	to Manila Ml	Class and Terrain
UACON R. TW 271x10x6ft.	270.4	168.0	
SINABACAN.	268.0	166.5	Along narrow spit between coast and river. Wide rice paddies.
SAN VICENTE R. TW 202x10x9ft.	264.6	164.4	
CANDELARIA. Branch W (right) 1-lane seasonal 1.8 km (1.1 ml) to coast at LIBER- TADOR.	263.8	163.9	
Small knolls each side. Lake E (left).	262.0	162.8	
Creek CG 58x14x12ft.	261.0	162.2	The Market Walls
LAUIS Rd Junc. Branch E (left) is ROUTE 117. Possible Jeep trail about 11 km (6.8 ml) to Solar Mining Co.	260.7	162.0	
LAUIS R. TW 388x8x4ft.	260.3	161.7	
Climbs over a small spur 100ft high.	258.0	160.3	
Rd Cr. ROUTE 116 one-lane AW crushed chromite ore surface and 12-ton bridges W (right) about 1 km (.6 ml) to MASINLOC wharf; and E (left) about 27 km (16.8 ml) to Consolidated Mining Co at COTO.	255.3	158.7	Along Oyon B.
LIPAY-R. TW 316x14x7ft.	253.9	. 157.8	
MASINLOC. (Photo 14 in Sec 6).	252.9	157.1	Along coast. Patches rice and light forest.
Rd Junc. Branch W (right) 1-lane AW 0.6 km (0.4 ml) to MATALVI- Port and Zambales Lumber Co wharf for inter-island steamers.	250.8	155.8	
BARCO. Cutin hill. Good road block area.	249.3	154.9	ONE-LANE AW. GRAVEL SURFACE.
SANTO ROSARIO R. TW 79x11x8ft.	246.1	152.9	
SAN LORENZO. CG 79x20x7ft. Climbs steeply.	245.2	152.4	Many small hills and spurs.
Crest 240ft elevation. Zigzag descent.	243,0	151.0	Light second growth. Many unsurfaced logging trails E to heavy timber.
INAIRANR. TW 220x12x9ft. Climbs over spur 100ft elevation.	240.5	149.5	
Rd Junc. Branch E (left) ROUTE 115A. Trail (probably take Jeeps) about 9 km to Zambales Lumber Co.	239.1	148.6	1 A 24

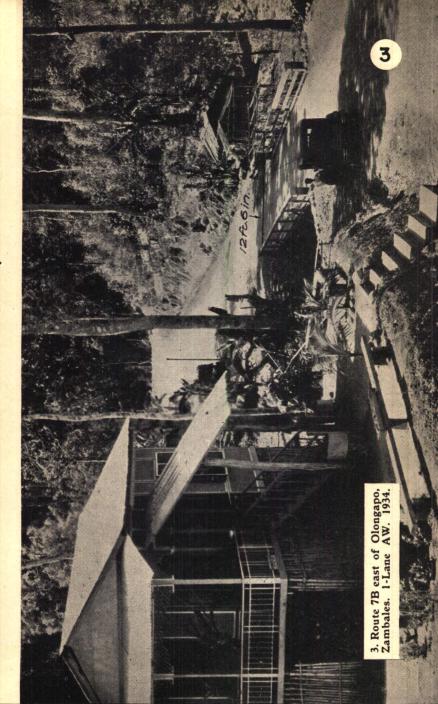
Detail	Distance to Km	Manila Ml	Class and Terrain
Rd Junc. Branch S (ahead) ROUTE 115B unsurfaced but AW about 8.3 km (5.2 ml) to AMUNGAN on 7F.	238.3	148.1	Hard sandy soil.
Route 7F turns W (right).			
PALAUIG on coast. Route 7F turns S along coast.	233.6	145.2	
PEDRO R. Old bridge was TW 123x11x9ft. Concrete bridge reported under construction in 39.	231.3	143.7	ONE-LANE AW. GRAVEL SURFACE. Along coast.
BAGSIT R. TW 354x10x9ft.	227.6	141.4	
SAN AGUSTIN R. WB 157x10x7ft.	226.3	140.6	
BALINGBOCBOC R. WB 118x13x 7ft.	224,5	139.5	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
AMUNGAN Branch N (left) is ROUTE 115B. Possible Jeep trail about 8.0 km (5 ml) to Route 7F at 239.1 km (148.6 ml).	223,8	139.1	
Creek TW 26x16x7ft.	223.7	139.0	
BANGANTALINGA R. CG 47x14x 10ft.	221.2	137.5	ONE-LANE AW. GRAVEL SURFACE.
PANIBUATAN Rd Cr. Branch SW (right) 1-lane AW 0.3 km (0.2 ml) to beach. Branch SE (ahead) seasonal road loop through IBA A/F 2 km (1.2 ml) to Iba. Route 7F turns NE (left).	219.3	136.3	Iba A/F (Photos 2 in Sec 2, No 8 in Sec 4).
River CG 98x14x10ft.	219.2	136.2	
	217.5	135.2	7F: 7E.
IBA. Prov capital.	217.5	135.2	
Route 7F ends; 7E begins SE.			Gravel surface ends; Asphalt surface begins.
BANCAL R. (N branch). CG 143x20x18ft (3 spans).	215.1	133.7	
Small island.		* .	Asphalt surface ends; Gravel surface begins.
BANCAL R. (S branch). CG 433x20x18ft (13 spans).	214.9	133.5	Mary O. Company
BANCAL.	214.6	133.3	
Creek. CG 35x20x16ft.	214.2	133.1	
BOTOLAN. Asphalt streets, Old stone bridge 48x20ft in main street. Route 7E runs E.	211.3	131.3	Gravel surface ends; Asphalt surface begins.
Rd- Junc. Branch E (ahead) is 1-lane seasonal 3 km (1.9 ml) to SAN JUAN. Route 115C is trail (passable for Jeeps) 12 km (7.5 ml) E to cooperative mines near POON-BATO, at start of Trail No 12. Route 7E turns S (right).	210.3	130.7	Asphalt surface ends; Gravel surface begins.
	20		-

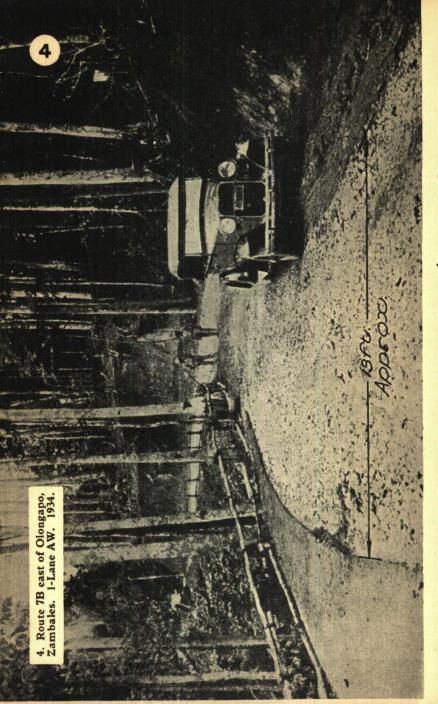
Detail	Distance t	o Manila Ml	Class and Terrain
BUCAO R. STs 765x20ft (9 spans 80ft each). Pony rivetted steel truss 39. Old bridge downstream was TW 452x8x3ft. Not fordable. In dry season water 2000ft x 3ft, sandy bottom. Banks 3ft., sandy.	207.3	128.8	W MYSERCAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
Insular Chromium Co. Warehouse.	207.1	128.7	
PORAC barrio N of road.	205.0	127.4	
Creek. CG 46x14x11ft.	200.0	124.3	Along coast on narrow coastal strip.
Creek. Two CG bridges 57x14x10ft.	199.9	124.2	and the same
CAWAYANKILING R. TW 141x13x12ft.	197.6	122.8	
Creek. CG 69x14x9ft.	195.2	121.3	La Company of the Market
CABANGAN. Branch NW (right) seasonal 1.3 km (0.7 ml) to S Isidro. Route 7E ends: 7D begins.	193.5	120.2	7E: 7D
CABANGAN R. STs 244x18x19ft (2 spans) unfordable. In dry season water is 160x3ft.	193.1	120.0	ONE-LANE AW. GRAVEL SURFACE.
River CG 69x14x11ft.	190.4	118.3	Patches rice.
ANONANG R. TW 277x10x14ft. not fordable. Dry season 120x4ft. Sandy bottom. Banks 5ft, muddy.	189.4	117.7	Narrow open sandy plain
River. TW 79x10x8ft.	188.8	117.3	a a measy
MALOMA R. TW 277x11x18ft.	188.4	117.1	
Rd Junc. Branch E (left) jeep trail 2 km (1.2 ml) towards BALING-TAGAC.	187.8	116.7	MAN STATE OF THE S
Creek. CG 33x12x3ft.	184.3	114.5	. The state of the
STO TOMAS R. TW 653x11x9ft. Possibly fordable downstream. Dry season water 600x2ft to 3ft. Bottom stony and muddy. Banks low but steep and muddy. On N bank is steep side-cut in limestone. Frequent landslides. Good roadblock area.	183.1	113.8	Road block area.
S FELIPE.	182,1	113,2	ONE-LANE AW. GRAVEL SURFACE.
Cemetery W (right).	180.6	112.2	Wide, open sandy plain.
Swamp RW 318x13x11ft.	180.2	112.0	Passable for jeeps all weather between streams.
BANGA R. TW 204x12x9ft.	179.9	111.8	Rice, corn, clumps bam- boo.

Detail	Distance Km	to Manila Ml	Class and Terrain
CAAROSIPAN R. TW 115x12x9ft (new 1940).	179.4	111.5	
MUERTO R. TW 469x12x9ft (new 1940).	178.8	111.1	
SAN NARCISO. Branch W (right) 1-lane AW 1.3 km (0.7 ml) to La Paz on beach.	177.1	110.1	
KARAYAN R. CG 39x20x12ft.	176.4	109.6	
KUYAKUY R. TW 79x10x8ft.	175.5	109.1	
GRULLO R. CG 26x14x10ft.	174.9	108.7	
River. CG 66x14x11ft.	174.5	108.4	
MABANGEAL R. TW 66x14x8ft.	174.1	108.2	
DIRITA R. CG 36x14x13ft.	172.3	107.1	
DINAMAGAT R. TW 138x14x12ft (6-span)	170.9	106.2	
SAN ANTONIO. Branch W I-lane AW 2.6 km (1.6 ml) to S MIGUEL near coast.	169.2	105,1	7D: 7C
Route 7D ends; 7C begins runs E.	k it		
Upper DINAMAGAT R. CG 36x14x8ft.	165.1	102.6	Wide open sandy plain. Jeeps can use all weather
Cemetery N (left).	162,5	101.0	except at streams. Rice.
SAN MARCELINO. Route 7C turns SE.	161.4	100.3	
NABUNGA Rd Junc. Branch NE is Route 114. One-lane AW about 10 km (6.2 ml) to DALANAGAN.	158.9	98.7	
TALUGTUG Rd Junc. Branch NE about 2½ km (1.6 ml) to Route 114.	156.3	97.1	ONE-LANE AW. GRAVEL SURFACE.
Starch factory N (left).	155.4	96.6	
CASTILLEJOS.	154.5	96.0	
Branch roads, 1-lane AW except at rivers run: West and SW to Lake LOOC, total about 6 km (3.7 ml). North past starch factory to MAGBAY on Route 114, about 4.5 km (2.8 ml). NE up PAMATUAN R Valley about 4.5 km (2.8 ml).			
PAMATUAN R. CG 138x14x16ft. Possibly fordable in dry season. Sandy bottom.	152.4	94.5	

Detail	Distance t	to Manila Ml	Class and Terrain
ARINGUAY Cr. Large rock fill. Route 7C turns southwards, winds and climbs 5% grade.	151.0	93.8	Hilly, patches of forest.
Crest elev 150ft. Wide cut in red clay with boulders. Gentle grade down.	150.0	93.2	
			Grassy hills. Patches coconuts E. Rice paddies W.
SUBIC. At head of SUBIC B.	146.2	90.8	Follows shore of Subic B.
Tidal swamp TW 99x20x11ft.	145.9	90.7	
MATAGAN R. TW 149x11x10ft. Bdry of naval reservation.	141.5	87.9	Many side cuts and good road block areas.
US naval rifle range N (left) with 7 large wood buildings between road and beach.	140.0	87.0	Winds around coast. Many side-cuts.
Cemetery NE (left).	137.0	85.1	
KALAKLAN R. CG 266x20x15ft (7 spans). End spans repaired with narrow structure May 44.	136.4	84,8	
OLONGAPO. (Photo 15 in Sec 10). Naval base on Subic B.	135.8	84.4	ONE-LANE AW. GRAVEL SURFACE.
Isolated branch road or tramline from E shore of Port OLONGAPO SE for about 3½ km (2.2 ml).			SINVED BOIN ACE.
Route 7C ends, 7B begins. Runs N.			7C; 7B
Creek TW 82x16x9ft.	135.1	84.0	
BAJACBOJAC R. TW 80x13x18ft.	133.6	83.0	Cleared river Valley.
Rd Junc. Branch N of CABARET building, for about 4 km (2.5 ml) up MABAYOWAN R to dam.	132.5	82.3	Patches cultivation. Poor soil.
Route 7B winds and climbs between mountains.	130.0	80.8	Heavily forested mountains.
SANTOLITA R. TW 101x10x26ft. Fordable in dry weather. Rocky bottom.	125.1	77.7	
Crest of saddle about 700ft elev. Good camp site. Route 7B descends gently down BINASA R Valley.	123.2	76.6	
Creek TW 27x19x18ft.	120.9	75.1	
Creek TW 46x17x7ft.	120.3	74.8	Narrow gorge. Several
BINASA Cr. TW 83x13x19ft. Fordable dry weather.	118.5	73.6	small logging concessions. Heavy forest (Photos 3, 4).

Detail	Distance Km	to Manila Ml	Class and Terrain
Creek TW 80x10x17ft.	117.6	73.1.	one of the state of
Prov Bdry ZAMBALES-BATAAN.	114.5	71.2	
CULO barrio.	113.0	70.2	Valley opens out to about 1 ml wide. Cleared.
Creek TW 37x18x7ft.	112.3	69.8	
NABAO Cr. TW 46x12x16ft. Fordable.	111.1	69.0	
Tramline crossing.	110.3	68.6	Wide plain. Rice paddies,
DILADILA Cr. TW 40x13x6ft.	109.1	67.8	sandy soil.
DINALUPIHAN.	107.4	66.7	
Branch N is Route 74, 35.3 km (21.9 ml) to ANGELES on Route 3E.			ONE-LANE AW. GRAVEL SURFACE.
Route 7B ends; 7A begins. Runs S (right).			7B; 7A
Tramline X.	105.9	65.8	
LAYAC Rd Junc. Branch SW (right) is Route 110.  BATAAN coastal road about 143 km (88.9 ml).  Route 7A turns NE (left).	105.5	65.6	TWO-LANE AW. GRAVEL SURFACE ENDS. BLACKTOP BEGINS.
			Level, open cane and rice fields.
Creek. TW 39x18x12ft.	105.3	65.4	Sandy soil.
Creek. TW 58x18x11ft.	105.2	65.4	Many small wood beam bridges.
BALSIC R. CG 180x18x12ft.	104.4	64.9	
Tramline X.	101.2	62.9	
Tramline X.	100.1	62.2	
River. TW 114x11x11ft.	97.8	60.8	
River. TW 58x19x3ft.	94.0	58.4	
River. TW 52x19x5ft.	92.7	57.6	
River. TW 59x19x7ft.	92.3	57.4	
PORAC R. CG 62x14x9ft.	89.2	55.4	
LUBAO. Branch E (right) is Route 72B alternative road loop through SEX-MOAN to GUAGUA, 6.3 km (3.9 ml). Route 7A runs N.	88.9	55,2	
RRX SANTO TOMAS Station.	87.9	54.6	The state of the s
River. CG 126x14x9ft.	86.1	53.5	Birthoff





Detail	Distance Km	e to Manila Ml	Class and Terrain
SAN ANTONIO Rd Junc. Branch NW (left) is Route 76 to DEL CARMEN area.	84.8	52.7	Rice and cane NW; fish ponds or swamps SE.
GUAGUA. Branch NW (left) is Route 75 to Porac.	82.0	51.0	
BACALOR. Old road loop follows N bank of river. Route 7A runs NE.	77.7	48.3	TWO-LANE AW. BLACKTOP.
SAN JUAN. Route 7A turns E. Old army A/F N.	73.6	45.7	
SAN FERNANDO Station N.	71.9	44.7	
SAN FERNANDO on Route 3E. (Route 7 ends)	${71.2} 66.1$	44.2 41.1	Old distance. New distance.

### Note:

San Fernando-Manila on Route 3 is 66.1 km (41.1 ml) but all distances on Route 7 and Bataan roads are recorded on the old road records, since km posts have probably not yet been corrected on the ground.

Deduct 5.1 km (3.2 ml) for true road distances to Manila.

### ROUTE 110

### Summary:

Starts at Moron (14°40'N, 120°17'E) on NW coast of Bataan, just S of entrance to Subic B; runs southwards to Mariveles at S end of Bataan; thence up E coast to Layac road junc on Route 7A, just S of Dinalupihan (14°52'N, 120°28'E). Total distance about 143 km (88.9 ml).

The first 70 km (43.5 ml) were considered to be seasonal road in 41, although considerable surfacing and improvements were completed during battle for Bataan in 41. The balance was well graded and surfaced, 1-lane AW.

Considerable maintenance work is necessary on this route due to steep mountainous terrain and large number of rivers.

Important towns include Mariveles and Balanga.

Road maintenance materials are generally readily at hand on this route.

Deduct 5.1 km (3.2 ml) for true road distances to Manila.

Detail	Distance via Route Km	to Manila es 110, 7, 3 M1	Class and Terrain
ROUTE 110E STARTS.			San
MORON (14°40'N, 120°17'E). Located on NW coast of BATAAN Prov, just S of entrance to SUBIC B.	248.5	154.4	ONE-LANE SEASONAL Rice paddies.
MORON R. TW 80x10ft.	247.5	153.8	Narrow coastal plain. Mountains E.
BAYANDATE R. TW 60x10ft.	245.5	152.6	
BALAYON R.	243.8	151.5	La la caractera de la caracter
MAUBAN R. TW 40ft. Route 110E begins climb. Winding.	242.5	150.7	Winds on mountain spurs.
Crest of saddle, 260ft elev.	240.5	149.5	Many side cuts.
Creek. TW 60x10ft.	234.5	145.7	Rough surface. Heavy forest.
High Point (elev about 800ft).	233.0	144.8	
End of old road.	223.5	138.9	The second second
KABAYO R. TW 80x10ft. Route 110E descends steeply.	222.3	138,1	
UMAGO R. TW 60x10ft.	219.7	136.5	Patches of rice and grass-land.
LIMUTAN R. TW 80x10ft.	219.4	136.3	
River. 40x10ft.	218.8	136.0	
Rd Junc. Branch NE (left) is Route 111 to PILAR Rd Junc 25.2 km (15.7 ml). Route 110E turns SW (right).	218.3	135.6	ONE-LANE SEASONAL ENDS; 1-LANE AW BEGINS.
BAGAC, on central W coast. Elev 30ft.	217.5	135.2	
Route 110E ends, 110D begins, runs SE.			110E: 110D.
BAGAC R. TW 60x10ft.	217.4	135,1	ONE-LANE AW ENDS; SEASONAL BEGINS. (Sections of AW; rolling patches of forest.)
SAYSAIN Rd Junc. Branch W (right) about 1 km (0.6 ml) to Saysain town on coast Route 110D turns E (left).	211.6	131.5	(Photo 1.)
Rd Junc. Branch E (ahead) is Route 112, a jeep trail across Bataan S of MT SAMAT to Route 110B near LIMAY fronting Manila B. Route 110D turns S (right).	210.0	130.5	
SAYSAIN R. (No record of bridge.)	209.2	130.0	

Detail	Distance to via Routes I		Class and Terrain
Hairpin turn (elev 300ft) 1.1 km (0.7 ml) from coast at PAYSAWAN. Several trails, but no road visible to coast.	205.5	127.7	
PAYSAWAN R. (No record of bridge) (elev about 600ft).	203.7	126.6	
BINUANGAN R. (No record of bridge) elev 260ft. About 2.6 km (1.6 ml) from W coast.  Route 110D again climbs.	200.0	124.3	Heavily forested mountains. Many side-cuts. Surface rough.
(Elev about 800ft). Edge of heavy forest.	192.8	119.8	
			ONE-LANE SEASONAL
(Elev about 1300ft.). High point.	190.5	118.4	Winds in cleared mountain area. Patches heavy forest.
(Elev about 900ft.) Begins steep descent.	184.8	114.8	ratches heavy lotest.
(Elev about 400ft.)	182.6	113.5	
Elev about 300ft. Rd Junc. Branch E (left) is Route 110C, by-pass to avoid MARIVELES 9.3 km (5.8 ml). It is 1-lane seasonal winding over mountain spurs; patches forest and cultivation or grassland; many branch roads and trails to MARIVELES B. This cut-off saves about 2.4 km (1.5 ml). On 12 May 44 Route 110C appeared to be in wellused condition and may have been improved to AW.	182.2	112.6	
Route 110D continues S, descends gently.			
PUCOT R. TW 36x10x12ft. Route 110D runs ESE along valley beside Mariveles A/F.	179.0	111.2	ONE-LANE SEASONAL
Rd Junc. Branch N about 2.1 km to Route 110C.	177.6	110.4	ONE-LANE SEASONAL ENDS: 1-LANE AW BEGINS.
MARIVELES at MARIVELES Hb.	177.2	110.1	(Photos 6, 13)
Route 110D ends; 110B begins. Route 110B runs E along coast.			110D: 110B.
MARIVELES R. TW 178x10x10ft.	176.8	109.9	ONE-LANE AW.
Route 110B turns N inland.	175.7	109.2	Patches of cultivation in
Rd Junc. Branch N to 110C, 1.3 km (0.8 ml).	175.2	108.9	coastal valley.
(Elev about 180ft.) Rd Junc. Branch N and W is Route 110C (see above). Route 110B climbs steeply on 6 hair- pin turns.	173.0	107.5	

Detail	Distance to via Routes Km		Class and Terrain
(Elev about 700ft.) Route 110B runs NE.	169.5	105.3	Heavily forested mountains.
(Elev about 800ft.) PARANG Rd Junc. Branch SE (right) is possible jeep trail down to Sisiman on coast; about 3 km (1.9 ml).	169.0	105,0	
(Elev about 800ft.) "Little Baguio" Rd Junc. Branch SE (right) is pos- sible jeep trail down crest of a long spur to BAYAKAGUIN Pt and Barrio ALASASIN on coast. 5 km (3.1 ml).	167.9	104.3	(Photo 5 in Sec 4.)
(Elev about 500ft.) Rd Junc. Branch SE (right) is alternative road loop.	165.4	102.8	
(Elev about 400ft.) Rd Cr. Branch SW (right) is end of above loop. Branch N is Route 113, the "back road," seasonal.	164.3	102.1	
Route 110B leaves heavy forest for grassy clearings and patches of second growth.	163.5	101.6	Patches second growth and heavy forest.
(Elev about 40ft.) PANGOLISANIN R. 1'W 63x10x11ft. Route 110B turns N.	161,3	100.2	
CABCABEN. Barrio on coast, with small pier.	161.0	100.0	
CABCABEN A/F NW (left) of Route 110B.	160.5	99.7	
AMO R. TW 91x10x8ft.	159.9	99.4	
BATAAN A/F. Crosses Route 110B.	155.0	96.3	
LAMAO R. TW 92x10x14ft. Irrigation canal runs W.	152,1	94.5	
Agricultural school.	152.0	94.4	
LAMAO barrio with pier SE (right).	151.6	94.2	
ALANGAN R. TW 58x12x9ft.	147.9	91.9	ONE-LANE AW.
KILANG R. TW 46x13x8ft.	146.0	90.7	
LIMAY on coast. Branch SW (left) 1-lane AW to small lumber mill, 4 km (2.5 ml), thence W to Route 113. Rails and ties of old lumber tramline removed pre-war.	144.8	90.0	
LIMAY R. TW 135x19x7ft.	144.7	89.9	
Rd Junc. Branch W (left) is Route 112, possible jeep trail across Bataan S of MT SAMAT to Route 110D near SAYSAIN on W Coast.	144.0	89.5	

Detail	Distance to via Routes Km		Class and Terrain
Rd Junc. Branch SW (left) is 1-lane AW to DAMLOG $3\frac{1}{2}$ km (2.2 ml), thence W by possible jeep trails to Route 113.	139.6	86.7	
PANDAN R. TW 69x12x10ft.	139.0	86.4	Numerous possible jeep trails run west to heavily forested mountains.
Rd Junc. Branch SW (left) is possible jeep trail to Route 113 near PATOC, about 5 km (3.1 ml).	138.8	86.3	
Rd Cr. Branch E (right) 1-lane AW to coast, 0.6 km (0.4 ml). Branch W (left) 1-lane AW 1.4 km (0.9 ml), thence possible jeep trail to Route 113 about 4 km (2.5 ml).	137.9	85.7	
SAN VICENTE R. CG 49x20x9ft.	137.8	85.6	ONE-LANE AW. GRAVEL.
ORION municipality on both sides of SAN VICENTE R. Branch E (right) to coast 1-lane AW 0.6 km (0.4 ml).	137.7	85,5	Coastal plain opens out. Rice paddies.
PILAR.	132.0	82.0	
Route 110B ends; 110A begins.			110B: 110A.
PILAR R. M Arch 31x20x5ft.	131.9	81.9	ONE-LANE AW BEGINS. BLACKTOP pre-war.
Rd Junc. Branch SW is Route 111, 1-lane AW to BAGAC on W coast, 26.0 km (16.2 ml).	131.1	81.5	Rice paddies W. Swamps and fish ponds E
TALISAY (ABO-ABO) R. "Talisay Bridge" CG 240x18x16ft (9 spans).	129.8	80.7	
BALANGA. Prov capital. Branch NE (right) 1-lane AW to coast about 2½ km (1.6 ml); SW (left) about 8 km (5.0 ml) to Route 113, through the Bataan Sugar Milling Coy about mid-way.	129.4	80.4	
BALANGA R. SG 41x17ft. River navigable for 40-ton lighters up to this bridge.	129.2	80.3	
Rd Junc. Branch W 1-lane AW to GUITOL (Elev about 200ft) on Route 113 about 4 km (2.5 ml), also NW through Cadre.	129.1	80.2	
CAPITANGAN Rd Junc. Branch W (left) to Route 113 at (Elev about 80 ft) about 2 km (1.2 ml).	126.3	78.5	
SALIAN Rd Junc. Branch W (left) 1-lane to ABUCAY Hacienda (Elev about 750ft) about 8 km (5.0 ml).	124.7	77.5	

Detail		to Manila s 110, 7, 3 Ml	Class and Terrain
ABUCAY R. CG 63x14x14ft.	124.5	77.4	
ABUCAY Municipality. Branch W (left) 1-lane AW to Route 113, about 1 km (0.6 ml).	124,4	77.3	
MABATANG Rd Junc. Branch W (left) is terminus of Route 113.	122.3	76.0	
CALAGUIMAN R. TW 102x19x12ft.	120.8	75.1	
SAMAL R. STs. 58x14x11ft.	119.3	74.1	ONE-LANE AW. BLACKTOP pre-war.
ORANI R. CG 112x14x14ft.	115.5	71.8	Rice paddies W, fish ponds E.
ORANI on coast. Route 110A turns NW inland.	115.3	71.7	Rice paddies.
TAPULAO R. CG 48x14x14ft.	113.4	70.5	
HERMOSA. Route 110A turns W.	111.0	69.0	
CULO R. TW reported 104x20x24ft.	105.6	65.6	
LAYAC Rd Junc. Branch NE is Route 7A to SAN FERNANDO, 34.3 km (21.3 ml). Branch NW is continuation Route 7A to DINALUPIHAN, 1.9 km (1.2 ml).	105.5	65.5	
(Route 110 ends)			

### Summary:

Starts at Bagac Rd Junc (14°36'N, 120°24'E) on Route 110E near W coast of Bataan Prov. Route 111 runs eastwards from Bagac across the peninsula to Pilar on E coast. Total 25.2 km (15.7 ml).

Detail	Distance t Km	to Manila Ml	Class and Terrain
BAGAC Rd Junc 0.8 km (0.5 ml) NE of BAGAC. Route 111 runs NE.	156.3	97.1	ONE-LANE AW. Very rough gravel surface.
DAUANA R. TW 155x13x15ft. Route 111 winds and climbs.	154.4	95.9	Heavily forested mountains.
(Elev about 650ft.) High spot.	150.0	93.2	
GOGO R. TW 65x12x21ft.	148.8	92.5	
River. TW 38x19x19ft.	148.0	92.0	

Detail	Distance t	o Manila Ml	Class and Terrain
Rd June. Branch S (right) is possible jeep trail about 5 km (3.1 ml) to Route 112.	147.9	91.9	
River. TW 111x13x28ft.	145.5	90.4	the state of
River. TW 41x10x12ft.	144.2	89.6	
Rd Junc. Branch S (right) is possible jeep trail to Route 112, about 4 km (2.5 ml).	144.1	89.5	
TIAWIR R. TW 157x8x9ft.	142.3	88.4	Winds down mountain gorge N of Mt Samat.
Rd Junc. Branch N (left) is the "Bani Bani" Trail said to be passable for jeeps to Route 113, about 8 km (5.0 ml).	141.0	87.6	
MALUYA R. TW 113x13x12ft (unconfirmed).	138.6	86.1	
Rd Junc. Branch S (right) is Route 113. Route 111 turns NE.	135.9	84.4	Coastal plain. Open farm- land and rice paddies, patches secondary growth.
Rd Junc. Branch S (right) possible jeep trail to Orani, total about 6 km (3.7 ml).	135.2	84.0	
Rd Junc. Branch NW (left) is Route 113.	134.9	83.8	
PILAR Rd Junc on Route 110A. (Route 111 ends)	131.1	81.5	

### Summary:

This is alternative E/W jeep trail across Bataan Pen from Saysain (14°34'N, 120°23'E) on W coast to Limay on E coast.

It was reported by one reliable informant to have been completed for MT during the later stages of the battle for Bataan in 1942, but no accurate location or distance records have been obtained.

Total distance is said to be similar to Route 111.

Terrain is generally extremely steep and difficult, and considerable rock blasting was necessary to enable bulldozers to force side-cuts around sides of steep gorges. Mountain streams were crossed by temporary bridges (tree trunks thrown across) with 4" x 12" sawn slabs spiked decking.

It is estimated that unless constant maintenance and improvement has been carried out this route would not remain open during wet seasons due to washouts and landslides.

Summary:

This is another emergency road said to have been completed early in 1942. It runs northwards from "Little Baguio" area on Route 110B to Mabatang road junc on Route 110A; 122.3 km (76.0 ml) from Manila (old distances). This was referred to generally as the "back trail" or "evacuation road" running generally parallel to E coast of Bataan Prov along foothills from 4-7 km (2.5 to 4.4 ml) inland. Its construction was similar to Route 112 S of Route 111; the northern portions had no temporary bridges at streams.

### ROUTE 114

Summary:

Starting at Nabunga (14°57'N, 120°10'E) on Route 7C at 158.9 km (98.7 ml), Route 114 runs NE through Nagbayto Agricultural School to Dalanaoan, total about 10 km. (Photo 7 in Sec 4.)

It is 1-lane, AW over a level sandy plain, mostly rice paddies,

cassava, or grassland, with patches of bamboo.

There are numerous branch roads in many directions, and MT can travel off road almost anywhere in all weather except across streams in flood.

Good drinking water can be obtained almost anywhere by driving

a perforated pipe a few feet into the sandy soil.

### ROUTE 115A

Summarv:

Commencing at a road junc (15°27'N, 119°57'E) on Route 7F at 239.1 km (148.6 ml) Route 115A runs E to Zambales Lumber Camp, about 9 km (5.6 ml).

Said to be a rough seasonal logging road, climbing to about 600 ft

elev.

### ROUTE 115B

Summary:

Starts at road junction (15°27'N, 119°56'E) on Route 7F at 238.3 km (148.1 ml) and runs S to Route 7F at Amungan, total 8.3 km 5.2 ml).

It is 1-lane unsurfaced; said to be passable in all weather except at streams which had no bridges and may become impassable in flood time.

It forms a useful dry-weather short-cut reducing distance via

Palauig on Route 7 by 6.2 km (3.9 ml). It runs through rolling sandy country with patches of rice or open grassland.

### ROUTE 115C

Summary:

Commencing at road junction just E of Botolan (15°18'N, 120°01'E) on Route 7E at 210.3 km (130.7 ml), Route 115C runs E.

### Route 115C-continued.

It is 1-lane seasonal to San Juan, 3.0 km (1.9 ml). A jeep trail also runs up-river for about 12.0 km (7.5 ml) to Poonbato, near Co-operative mines.

This is western end of old O'Donnell-Botolan cavalry trail (No 12).

### ROUTE 116

### Summary:

Commencing at a road crossing just N of Masinloc (15°32'N, 119°57'E), on Route 7F at 255.3 km (158.7 ml), Route 116 runs W about 1 km (0.6 ml) to a deep-water wharf on Oyon Pt. This section crosses a swamp by a causeway about 10 ft high, then loops around a knoll on the point.

It runs E for about 27 km (16.8 ml) to Coto, a chromite mine

operated by Benguet Con Mining up to Dec 41.

This was a I-lane, AW road, surfaced with crushed chromite ore and wood bridges at all streams good for 12 tons. It winds up S side of South Lauis R Valley in heavily forested mountains, climbing with frequent side-cuts about 800 ft, and descends to Coto, said to be about 450 ft elev.

### ROUTE 117

### Summary:

Commencing at Lauis road junc (15°36'N, 119°56'E) on Route 7F at 260.7 km (162.0 ml) Route 117 runs E to Solar Mining Co about

It was said to be possible jeep trail only, winding up N side of North Lauis R Valley in heavily forested mountains to about 1400 ft elev at the mine.

### ROUTE 118

### Summary:

Commencing at Lucapon (15°42′N, 119°56′E) on Route 7F, Route 118 runs eastwards to Chromite Mines. Total about 35 km (21.8 ml).

Detail	Distance t	to Manila Ml	Class and Terrain
A PARTY OF THE PAR	App		
Rd Junc on Route 7F. Route 118 runs NE.	272.4	169.3	ONE-LANE AW GRAVEL SURFACE IN DEC 41.
Quarry and rock crusher right.	277.0	172.1	Winds north of a small knoll.
Creek. Wood, Howe Truss 100x10x75 ft in a steep gorge.	278.0	172.8	
Climbs about 8%.	279.0	173.4	Level grassland.

Detail	Distance Km	to Manila Ml	Class and Terrain
Crest of steep hill. Route 118 continues to climb about 4% grade.	280.0	174.0	Winding into pine forest.
Enters rain forest. Winds along S side of hills. Many side-cuts.	281.0	174.6	Rain forest in steep mountains.
Creek. TW 150x10x40ft. Unfordable due to steep bank. No detour.	285.0	177.1	
Small sawmill N (left) of Pons Lumber Co.	287.0	178.3	
High point on road (elev about 2300ft). Shelf road on south side of a steep gorge. Descends.	296.0	183,9	
Rd Junc. Branch, on a sharp U-turn, down grade for about $1\frac{1}{2}$ km $(0.9$ ml) ACOJE Chromite Mining Co. Route 118 continues eastwards.	298.0	185,2	
Luzon Consolidated Mining Co.	307.0	190.8	

### Summary:

Commencing at a road junction just N of Lucapon (15°42'N, 119°56'E) on Route 7F, Route 119 is said to be possible jeep trail only eastwards along Bayto (Cabatuan) R to Madalao; total about 12 km (7.5 ml).

### ROUTE 120

### Summary:

This is important branch road running W from Viay road cr (15°44′N, 119°54′E) on Route 7F at 278.2 km (172.9 ml) to Acoje wharf. About 2.2 km (1.4 ml). One-lane, AW road. Overseas shipments of chromite ore were made from this wharf in 41.

Route 120 also runs E for about 22 km (13.7 ml) to Zambales Chromite Mining Co. A 1-lane, AW road with only one short steep grade; the balance being through undulating pine covered hills. At km 21 an AW road leads 5 km N through level pine country to Filipinas Mining Co.

### ROUTE 121

### Summary:

Commencing at road junction just S of Sta Cruz R (15°46'N, 119°55'E) on Route 7F at 280.2 km, Route 121 runs E to Aguado Hermanos, 5 km (3.1 ml).

Present condition of road unknown, probably passable for jeeps.

### 5. TRAIL DETAILS:

### TRAIL 9: Subic to Luacan (about 1½ days):

Commencing at Subic (14°53'N, 120°14'E) on Route 7C, at the head of Subic B, Trail 9 runs eastwards to Luacan on Route 7B, just W of Dinalupihan. Early in 1944 this trail was said to be in good condition for foot troops.

Reported that before construction of Route 7 this trail was one of main means of transport in this area, but few people live along it,

and brushing will probably be necessary most of the way.

Grades are said to be steep in places and footing rough and stony; slippery in wet weather. It mostly runs through densely forested mountain country. Plenty of drinking water, and no difficult stream crossings were reported.

### TRAIL 10: Subic to Villar and Trail 12 (2½ days):

From Subic on Route 7C, Trail 10 runs northwards to Poonbato, on Route 115C, about 10 ml E of Botolan, on Route 7C.

First section to Aglao takes about 1 day. Early in 1944 was in good condition, but through heavily forested mountainous country with steep grades; rough and stony under foot; slippery in wet weather. No difficult stream crossings reported. Drinking water plentiful from mountain streams.

From Aglao a trail runs N to Trail 11, while Trail 10 turns almost W to Santa Fe, about 21 hrs. It runs through flat open sandy loam country which is always passable for jeeps across country except at

streams in flood. It connects with Route 114 at Dalanaoan.

From Sante Fe, Trail 10 turns N to Villar, about 1 day. This section has mostly easy grades in open rolling cogon grassland with patches of high forest and bamboo, and could be made passable for jeeps with little work. There are occasional stony areas (limestone) but mostly red clay soil, slippery in wet weather.

Several stream crossings are difficult in wet weather. Drinking water is plentiful. There are several small isolated barrios and small patches of cultivation. This was cattle-raising area, but practically

all stock had been killed off by Jul 44.

From Villar, the old Payugbug trail turns NW to join Route 115C and Trail 12 at Poonbato, about 10 mls E of Botolan. This section was about 9 mls and passable for jeeps in dry weather; easy grades in open cogon country. Bucao R runs westwards, N of Route 115C. This has a wide sandy flood plain in dry weather, but can take jeeps. In flood difficult to ford on foot, impossible for vehicles. New reconnaissance branch trail was cut from this junction northwards to Dome Peak early in 1944; but was not developed.

### TRAIL 11: San Marcelino to Fort Stotsenburg (3 days):

From San Marcelino (14°48'N, 120°09'E) on Route 7C. Trail 11 runs NE to Fort Stotsenburg.

First section to Santa Fe crosses open sandy plain (take jeeps except

at streams in flood); about 2 hrs.

At Santa Fe, Trail 10 is crossed, Trail 11 heading E and NE up Marella R to Mt Pinatubo.

### [Section 3]

This is old cavalry trail, and early in 1944 was said to be in good, well-worn condition; 1½ days. Grades are extremely steep and footing is stony and rough. It travels rolling cogon grass foothills with patches of forest in higher mountain areas. Three difficult stream crossings reported.

Drinking water available at frequent mountain streams.

From Mt Pinatubo, Trail 11 turns eastwards for about 1 day to Fort Stotsenburg. Mostly through mountainous country, with steep grades and rough underfoot. Patches of forest thin out to rolling cogon grassland near Fort Stotsenburg.

No bad stream crossings reported. Drinking water plentiful in

dry weather from mountain streams.

### TRAIL 12: Botolan to O'Donnell (3 days):

A well established trail (called locally "Capas Trail") over one of few gaps in Zambales-Cabusilan Mts. Early in 44 was reported to be in good condition.

The first section eastwards from Botolan (15°18'N, 120°01'E) on Route 7D is along Route 115C, which is a jeep trail in dry weather for

at least 12 mls to Poonbato.

Trail 10 runs SE to Villar, while Trail 12 continues to wind east-wards up Bucao R, climbing on fairly easy grades to mountain pass near Mt Gatas. It descends by easy grades down O'Donnell R to Mabancal at end of Route 80.

This mountain section is mostly through rolling cogon grass country with frequent patches of high forest. Four small streams are crossed, said to be almost impossible to cross in flood. Footing is generally

fairly stony on mountain slopes.

Drinking water is plentiful from mountain streams.

### TRAIL 13: Santa Cruz to San Clemente (3 days):

Commencing at Santa Cruz (15°46'N, 119°55'E) on Zambales coast near Zambales-Pangasinan Prov Bdry, Trail 13 runs eastwards to San Clemente on Route 13B in Northern Tarlac Prov. It follows Route 122 for first 9 mls to Filipinas Mining Coy. This section said to be rough, mining trail, possibly take jeeps, with several steep pinches. May be badly washed out and unfit for vehicles.

From Filipinas Mining Coy, Trail 13 is said to be well-beaten foot

trail with fairly easy grades, mostly in heavy forest.

High point is about 3000 ft some 3 mls E of Acoje Mining Coy. It turns NE, descending by easy grades for about 4 mls to a trail junction. A branch trail continues NE and eastwards to Mangatarem on Route 13B; Trail 13 turns eastwards, descending by fairly easy grades to lowlands at San Clemente.

No recent information has been obtained concerning the condition

of these trails.

### 6. IMPORTANT BRIDGES

Size in Feet			W.	Lana	Lat	Route		
Length	Width	Height	Type	Name	Long	Lat		
377	20	19	CG	STA CRUZ	15°45½'N	119°55′ E	7F	
203	7	22	W Susp	BAYTO	15°43½'N	119°54½′E	7F	
271	10	6	TW	UACON	15°41′ N	119°56′ E	7F	
202	10	9	TW	S VICENTE	15°37½′N	119°56′ E	7F	
388	8	4	TW	LAUIS	15°36′ N	119°56½′E	7 <b>F</b>	
316	14	7	TW	LIPAY	15°33′ N	119°57′ E	7F	
220	12	9	TW.	INAIRAN	15°27½′N	119°57′ E	7F	
123	11	9	TW	PEDRO	15°25′ N	119°55′ E	7 <b>F</b>	
354	10	9	TW	BAGSIT	15°23½′N	119°56½′E	7F	
98	14	10	CG	(IBA)	15°20′ N	119°58′ E	7 <b>F</b>	
143	20	18	CG	BANCAL (N Branch)	15°19′ N	119°59½′E	7E	
433	20	18	CG	BANCAL	15°19′ N	119°59½′E	7E	
			(13 span)					
765	20	_	STs	BUCAO	15°16′ N	120°02′ E	7E	
		10	(9 span)	CAWAWARIET INC	15°114′N	120°021′E	7E	
141	13	12	TW	CAWAYANKILING IALAKAK	15 112 N 15°10′ N	120 02½ E 120°03½'E	7D	
244	18	19	STs TW	JALAKAK ANONANG	15°074'N	120°03½'E	7D	
277	10	14	TW		15°07′ N	120°04′ E	7D	
277	11	18 9	TW	MALOMA STO TOMAS	15°044'N	120°04′ E	7D	
653 318	11 13	11	TW	(SWAMP)	15°03′ N	120°04½′E	7D	
204	12	9	TW	BANGA	15°02½′N	120°04½'E	7D	
115	12	9	TW	CAAROSIPAN	15°02½'N	120°04½'E	7D	
469	12	9	TW	MUERTO	15°02′ N	120°04½'E	7D	
138	14	12	CG	DINAMAGAT	14°58′ N	120°05′ E	7D	
138	14	16	CG	PAMATUAN	14°56′ N	120°13′ E	7C	
99	20	11	TW	(SWAMP) SUBIC	14°53′ N	120°141'E	7C	
149	111	10	TW	MATAGAN	14°51′ N	120°14½'E	7C	
266	20	15	CG	KALAKLAN	14°49½'N	120°16′ E	7C	
101	10	26	TW	SANTOLITA	14°51′ N	120°20′ E	7B	
83	13	19	TW	BINASA	14°51′ N	120°23′ E	7B	
180	18	12	CG	BALSIC	14°51½′N	120°29′ E	7A	
178	10	10	TW	MARIVELES	14°26′ N	120°29½'E	110B	
91	10	8	TW	AMO	14°28′ N	120°35½'E	110B	
92	10	14	TW	LAMAO	14°31′ N	120°36½′E	110B	
135	19	7	TW	LIMAY	14°34′ N	120°35½'E	110B	
240	18	16	CG	ABOABO	14°40½′N	120°33′ E	110A	
			(9 span)			2 2 10		
41	17	-	SG	BALANGA	14°41′ N	120°32′ E	110A	
102	19	12	TW	CALAGUIMAN	14°45′ N	120°32′ E	110A	
112	14	14	SG	ORANI		120°32′ E	110A	
104	20	24	TW	CULO		120°28½′E	110A	
155	13	15	TW	DAUANA		120°24½′E	111	
111	13	28	TW	(RIVER)		120°28′ E	111	
157	8	9	TW	TIAWIR	The second secon	120°29½′E	111	
113	13	12	TW	MALUYA	14°38′ N	120°31′ E	111	
1	1	1		1		1	1	

### [Section 3]

### 7. APPROXIMATE ROAD DISTANCES

a. From Iba—15°20'N, 119°59'E (Zambales Prov). (Province and main route number shown in brackets.)

(Bat. = Bataan; Pam. = Pampanga; Pang. = Pangasinan; Zbs. = Zambales.)

то				From Km	IBA M1
ALAMINOS	(Pang. 7G)	• •		123.1	76.5
BALANGA	(Bat. 110A)			134.2	83.4
BOLINAO	(Pang. 272)			163.5	101.6
BOTOLAN	(Zbs. 7E)	 		6.3	3.9
CABANGAN	(Zbs. 7D)	 		24.1	15.0
CANDELARIA	(Zbs. 7F)	 		46.2	28.7
CASTILLEJOS	(Zbs. 7C)	 		63.1	39.2
CULO	(Bat. 7B)	 	٠,	104.6	65.0
GUAGUA	(Pam. 7A)	 		135.5	84.2
INFANTA	(Pang. 7G)			71.6	44.5
LINGAYEN	(Pang. 7G)		٠.	161.7	100.5
MANILA	(7 and 3)	 		210.8	131.0
MASINLOC	(Zbs. 7F)	 		35.3	21.9
OLONGAPO	(Zbs. 7B)	 		81.8	50.8
PALAUIG	(Zbs. 7F)	 		16.1	10.0
SAN ANTONIO	(Zbs. 7D)	 		48.5	30.1
SAN FELIPE	(Zbs. 7D)	 		35.4	22.0
SAN FERNANDO	(Pam. 3D)			146.5	91.0
SAN MARCELINO	(Zbs. 7C)	 		56.2	34.9
SAN NARCISO	(Zbs. 7D) .	 		40.4	25.1
STA CRUZ	(Zbs. 7F) .	 		63.8	39.6
SINABACAN	(Zbs. 7F) .			50.4	31.3
SUBIC	(Zbs. 7C) .			71.4	44.4

Note: Some distance figures above do not agree with previous records, as a result of further research.

b. From Balanga—14°41′N, 120°32.5′E (Bataan Prov). (Province and main route number shown in brackets.)

(Bat. = Bataan; Pam. = Pampanga; Pang. = Pangasinan; Zbs. = Zambales.)

то				From BAL Km	ANGA Ml
ABUCAY	(Bat. 110A)		٠.	5.0	3.1
ABUCAY HACIENDA	(Bat.)			12.8	7.9
BAGAC	(Bat. 111)			28.4	17.6
CABCABEN	(Bat. 110B)			31.6	19.6
DINALUPIHAN	(Zbs. 7A)			24.0	14.9
GUAGUA	(Pam. 7A)			47.5	29.5
HERMOSA	(Bat. 110A)	• •	٠.	18.3	11.4
IBA	(Zbs. 7E)			134.2	83.4
LAMAO	(Bat. 110B)			22.2	13.8
LIMAY	(Bat. 110B)			15.5	9.6
LINGAYEN	(Pang. via Rou	te 3)	٠.	201.8	125.4
LINGAYEN	(Pang. via West	Coast)	٠.	296.0	183.9
"LITTLE BAGUIO"	(Bat. 110B)			38.5	23.9
MANILA	(Route 3)			123.9	77.0
MARIVELES	(Bat. 110B)		٠.	47.8	29.7
MORON	(Bat. 110E)			58.5	36.4
ORANI	(Bat. 110A)		٠.	14.0	8.7
ORION	(Bat. 110B)			8.3	5.1
PAYSAWAN	(Bat. 110D)			40.4	25.1
PILAR	(Bat. 110B)		٠.	2.6	1.6
SAMAL	(Bat. 110A)	••	٠.	10.3	6.4
SAN FERNANDO	(Pam. 3D)		٠.	58.4	36.3
SAYSAIN	(Bat. 110D)			34.3	21.3

Note: Some distance figures above do not agree with previous records, as a result of further research.

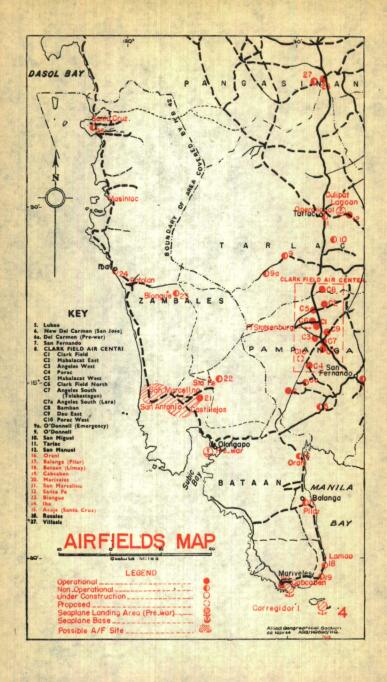
# [Section 3]

# 8. HIGHWAY MILEAGE BETWEEN MAIN POINTS ON LUZON:

	MANILA (Manila).	APARRI (Cagayan Prov.).	BAGUIO (Benguet Prov.).	BATANGAS (Batangas Prov.).	CABANATUAN (Nueva Ecija Prov.)	LEGASPI PORT (Albay Prov.).	LINGAYEN (Pangasinan).	SAN FERNANDO (Pampanga Prov.).	TARLAC (Tarlac Prov.).
MANILA (Manila)		367	157	72	72	333	128	40	76
APARRI (Cagayan Prov.).	367		239*	439	295	700	302	339	325
BAGUIO (Benguet Prov.)	157	239*		229	102	490	63	117	80
BATANGAS (Batangas Prov.).	72	439	229		144	295	200	112	149
CABANATUAN (Nueva Ecija Prov.).	72	295	102	144		405	83	44	30
LEGASPI PORT (Albay Prov.).	333	700	490	295	405	4.	461	373	410
LINGAYEN (Pangasinan Prov.).	128	302	63	200	83	461		88	51
SAN FERNANDO (Pampanga Prov.).	40	339	117	112	44	373	88	٠.,	37
TARLAC (Tarlac Prov.)	.76	325	80	149	30	410	51	37	

Note.—Some distance figures on this table do not agree with previous tables, as a result of further research.

<sup>\*</sup> Via Bontoc, poor road. Via W Coast is 309 mls, good road.



# SECTION 4

# AIRFIELDS, POSSIBLE SITES, SEAPLANE BASES

(MAP 4: PHOTOS 5-8)

## A. AIRFIELDS

#### GENERAL:

There are 10 airfields in this area, 2 of which are known to be

operational—Mariveles and San Marcelino.

Remaining fields are classified as non-operational although possibly the Japanese may have developed and may be using 2 pre-war fighter fields, Cabcaben and Bataan.

In following description airfields are numbered to correspond

with TS 94—Central Luzon.

# 16. ORANI—14°45′N, 120°32′E.

## Non-operational.

General:

Exact location not known; probable location about 4 mls due S

of Orani in NW corner Manila B.

This field is mentioned in captured documents, but no other information is available. It is believed one of US Army fighter strips built in 1942.

# 17. BALANGA (PILAR) (BAGAC)—14°40′N, 120°34′E.

# Non-operational.

General:

US Army constructed a bomber strip in vicinity of Pilar town in 1942. Captured Japanese documents indicate this field has been abandoned. No information is available as to location or runways. Intell report (Jul 44) reports field non-operational and possibly a dummy field.

# 18. BATAAN (LIMAY)—14°29′N, 120°36′E (Photo 5).

# Non-operational.

Location and History:

About 2 mls N of Cabcaben; height above sea level 100 ft. US Army fighter strip built in 1942. Reported non-operational, but Sep 44 photos indicate it may be operational.

Intell report dated 11 Nov lists as operational a field 2½ mls NNE

of Cabcaben. This is believed to refer to Bataan A/F.

# [Section 4]

Runways:

One, NW/SE, estimated 3600-4000ft, sloping to SE.

Terrain:

Commanded on 3 sides by forested hills; Manila B to SE.

19. CABCABEN—14°28′N, 120°36′E (Photo 5).

# Non-operational.

Location:

Pre-war US Army fighter field situated in Amo R Valley N of Cabcaben. Elev—20ft.

Reports and photos indicate field was abandoned in May 44, however an Aug 44 report states 7 new large barracks.

Runways:

One, NW/SE, approx 3200ft.

## 20. MARIVELES—14°26′N, 120°29′E (Photo 6).

#### Operational.

Location and History:

On southern tip of Bataan Pen; at Mariveles town head of Mariveles Hb. Height above sea level—20ft. Former US Army field improved by Japanese.

Runways:

One paved or coral-surfaced E/W strip 4000 x 132ft. River to W and town to E prevent extension. Dispersal area very limited.

On only flat area on W side of Mariveles Hb and extends parallel to and immediately N of Pucot R. Surrounding terrain is mountainous and wooded.

Defences:

Eight A/A guns mounted (see current Intell Summaries).

Engineer Materials:

All construction materials are available in vicinity. Rock quarry at Lilimbon Cove, E entrance of harbor.

#### Installations:

Buildings have been erected by Japanese.

#### Communications:

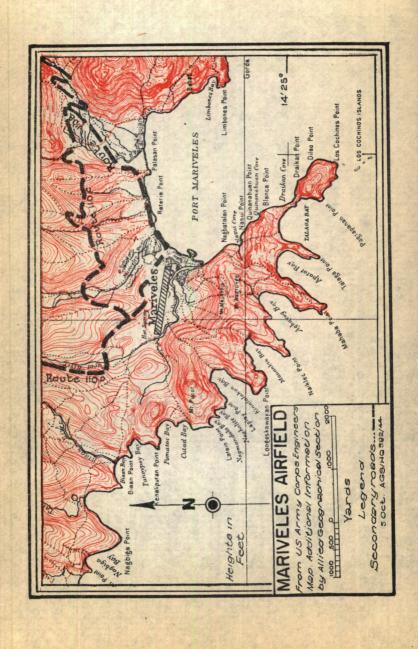
Route 110B (1-lane AW) to Balanga via Cabcaben; Route 110D (1-lane seasonal) to Balanga via Paysawan B and Bagac. Prov telephone and telegraph at Mariveles. Inter-island cable to Corregidor.

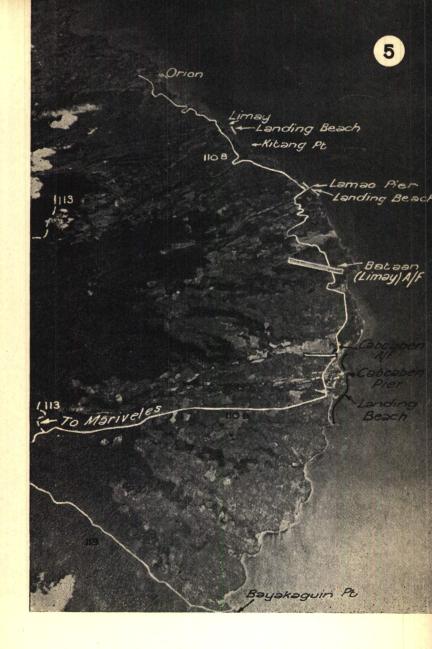
# 21. SAN MARCELINO—14°58'N, 120°13'E (Photo 7). Operational.

Location and History:

About 2 mls N of Castillejos and 4 mls E of San Marcelino; 210ft above sea level. Reported to be pre-war US Army field greatly enlarged.

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5. SE Bataan. Jun 44.

6

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Landing Be sen

Lilimbar

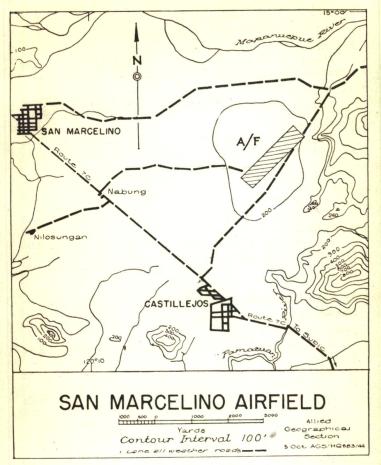
to Bagac

Vertical only

X Appears to beford only

Mariveles

6. Mariveles Harbor, Bataan. Vertical. Jun 44.



Runways:

One, NE/SW, 6300ft x 1320ft, believed AW. Another strip, 3600ft x 650ft, scheduled for completion Mar 44 is not visible in latest photos. Extension possible to double the length SW. Ample dispersal area; no cover.

#### Terrain:

At E end of wide sandy agricultural plain. Wooded hills rising to mountains to E. Mapanuepe R, flowing E/W, is 1 ml N and Pamatuan R 1½ mls S.

[Section 4]

Defences:

See current Intell Summaries.

Engineer Materials:

Gravel and sand from rivers; rock and timber from nearby mountains. Water obtainable by sinking shallow wells.

Installations:

Barracks W of center of field. Hangars in trees N.

Communications:

A I-lane AW road to Route 7C at Castillejos. Prov telephone and telegraph at San Marcelino and Castillejos.

22. SANTE FE—15°01′N, 120°16′E.

Non-operational.

General:

Located about 4 mls E of Sante Fe, with Marella R to W and mountains E and S; 400ft above sea level.

Small pre-war field with a sandy loam strip 1290ft x 120ft. Has been abandoned for some years. Area approx 6000ft x 1200ft is available for construction of field. Construction material is available in near vicinity.

# 23. BIANGUE EMERGENCY FIELD—15°16'N, 120°33'E. Non-operational.

Probable Location:

Across Bucao R just S of Biangue (Bengue) barrio 8½ mls E of Botolan.

A large level area, grass-covered, with scattered trees which was used for emergency landings. No runways or installations.

An informant states that the level valley floor, which extends along S bank of Bucao R west to river mouth, is unusually dry and suitable for airfield construction.

# 24. IBA-15°20'N, 119°58'E (Photo 8).

Non-operational.

Location and History:

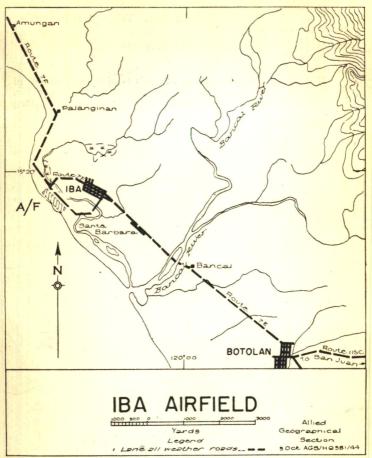
On sandy coastal strip at Panibuatan barrio, \(^3\)4 ml W of Iba, W coast of Zambales; elev 10 ft. Originally a Commercial National airport, later a US Army fighter field.

Runways, etc.:

One pre-war NW/SE, AW strip 3300ft x 330ft; hard grass and sand surface. Could be extended N by removal of barracks and S along beach. Ample dispersal area; little cover.







#### Terrain:

On a level sandy coastal plain, which extends E, under rice cultivation, for approx 5 mls. Bancal R, flowing SW, crosses plain 3 mls E. Immediately E a tributary of this river parallels field.

# Engineer Materials:

Sand and gravel from beach and river respectively; timber from hills N.

#### Installations:

Pre-war wooden barracks were N of strip.

## [Section 4]

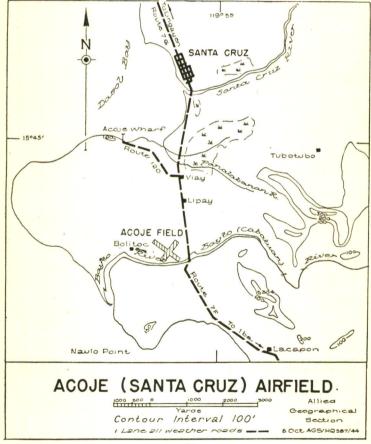
Communications:

Route 7E to Iba and 7F to Sta Cruz. Telegraph at Iba. Good anchorage near field.

# 25. ACOJE (SANTA CRUZ)—15°44′N, 119°54′E. Non-operational.

Location and History:

NW corner of Zambales Prov, 2½ mls S of Santa Cruz, W of Route 7F at Lipay; elev 6ft. Private field of Acoje Mining Co. Believed non-operational, but reported 2 Oct 44 as enemy refuelling base.



Runways. etc.:

Two pre-war level, hard grass, AW strips, NW/SE, 2295ft x 298ft; NE/SW 1542ft x 237ft. Both runways can be lengthened northward. *Terrain*:

Built on narrow flat coastal strip. Rice paddies stretch N almost to coast. Immediately S is Bayto R and Route 7F borders W edge. One ml S of Santa Cruz, just E of Route 7F, is swamp area approx ml x 1½ mls in area.

Engineer Materials:

Limestone quarry on Acoje road 3 mls E of Lucapon. Gravel from Bayto R.

Communications:

Route 7F passes W edge of field. Prov telephone and telegraph at Santa Cruz.

## B. POSSIBLE AIRFIELD SITES:

ZAMBALES PLAIN:

This level plain is located between Panatuan and Santo Tomas Rs in SW corner of Zambales Prov. It is 85 sq mls in area and offers excellent possibilities. Large, all-weather runways of similar dimensions to San Marcelino field (No 21), which is located on the plain, could be easily constructed.

Area consists of coarse-textured gravelly soil, which drains rapidly and is trafficable except after heavy rain. There is good road communication. Route 7, the main highway from Mariveles to

Lingayen, passes through the center of the plain.

# C. SEAPLANE LANDING PLACES:

1. OLONGAPO—14°49'N, 120°17'E. NE corner of Subic B, just S of town of Olongapo.

Operational.

History:

Former US Navy Station. No reports of Japanese activity here.

Alighting Area:

2 mls E/W and 1 ml N/S. Depth over 9fms.

Obstructions

A stone beacon is situated on S of run, marking Caiman Shoal (9ft of water). Bay is 6 mls wide E/W with mountains rising from shoreline.

Anchorage:

Just E of naval station in inner typhoon harbor; mud bottom. Ample swinging room for several aircraft anchored simultaneously. Beaches:

Sea wall and wharves form W and S side; mud flats exposed at LW form N and E sides. Good beaches in front of town. (See Landing Beach 22a.)

Meteorological:

See Sec 10. Prevailing winds are NE/SW or SW/NE.

[Section 4]

Base Facilities:

Seaplane ramp and shop facilities on Rivera Pt. Ramp is on S or channel side of point. Depth of water over the shoal here is not known, but PBY's have used ramp.

2. CORREGIDOR B—14°23′N, 120°37′E. Located at S side and near E end of Corregidor I, at entrance of Manila B and 30 mls SW of Manila.

Non-operational.

History:

An auxiliary seaplane landing area. Appears to be unused by Japanese.

Alighting Area:

 $1\frac{1}{2}$  mls E/W, 1 ml N/S.

Obstructions:

Open to S.

Anchorage:

In a cove on S side of Corregidor. N side of island has been used also.

Beaches:

A good sand beach suitable for seaplanes is just E of the S dock.

Winds are generally from NE or SW. A relatively strong current flows between Caballo I and Corregidor I.

Base Facilities:

Former US Army fortress facilities were available at this base.

3. MARIVELES HB—14°26′N, 120°30′E. Located at S end of Bataan Pen, which is on NW side of entrance to Manila B. Non-operational.

History:

Auxiliary seaplane station.

Alighting Area:

1½ mls NW/SE, 1 ml E/W.

Obstructions:

Shoals close to shore.

Anchorage:

NW part of bay about 400ft N of quarantine pier. Shelter from all but SE winds. Bottom is soft mud except at reef near shore. Swinging room ample for many planes.

Beaches:

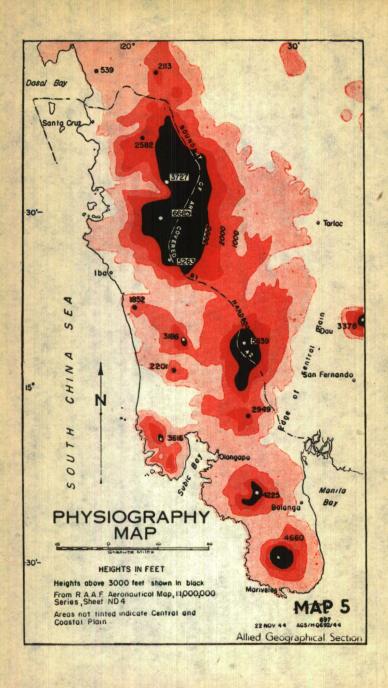
There are sand beaches suitable for hauling out seaplanes. (See Landing Beach 13.)

Meteorological:

See Sec 10. Winds are usually from NE or SW.

Base Facilities:

Nil. An operational airfield with barracks and installations is immediately W of beach (Mariveles—No 20).



## SECTION 5

## GENERAL PHYSIOGRAPHY

(MAPS 5, 6; PHOTOS 9-12)

## 1. PHYSIOGRAPHY

#### i. Main Zambales Ra:

The western side of this range flanks Central Luzon Plain. Mountains consist of a broad complex mass of ridges and peaks. Falls steeply to China Sea coast, but more gradually to Central Luzon Plain. Average elev about 3000ft with highest summits at High Peak (6686ft), Saw Tooth Mt (5924ft) and Mt Pinatubo (5842ft). Range rough and deeply dissected, forested on higher slopes and grass-covered along foothills.

Movement very difficult in higher parts but less restricted on foothills. One good pass at S end of main range followed by Highway 7 connecting Subic B with Central Luzon Plain. Main obstacles are larger streams which are impassable after heavy rains in wet season,

but easily forded during dry season.

# ii. Bataan Pen:

Consists of Mt Natib (4226ft) in N and Mariveles Mts, with Mt Bataan (4662ft), in S. Bases of these volcanic cones touch to leave narrow corridor about 650ft elev. Except E of Mt Natib, where small coastal plain develops, slopes generally reach sea to form bold promontories.

Mountain slopes, scored by deep ravines and heavily forested, restrict free movement to small coastal plain and highway and road across peninsula between the 2 mountains. Many jeep trails are on northern slopes of Mariveles Mts. Main obstacles are wet rice paddies and swampy area on coastal plain, and lower courses of large streams which are subject to floods during rainy season.

#### iii. Cinco Picos Prom:

Located W of Subic B and connected with Zambales Ra by narrow belt of hills about 1000ft high. Terrain is rough and covered in forest and grassland. Movement restricted to foot-troops only, over rough mountainous trails.

# iv. Coastal plains:

Generally narrow and disconnected by low spurs from Zambales Ra. Largest area extends inland about 10 mls between mouths of

Sto Tomas and Pamatuan Rs, and almost to Subic B.

Coastal plains are planted mainly in coconuts and rice. Route 7 gives free coastwise movement only. Main obstacles are lower reaches of larger streams, and wet rice paddies during rainy season from May to Oct.

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## [Section 5]

#### 2. RIVERS

All are relatively small and of minor importance. Chief rivers are:

## i. Orani (Bataan Prov):

Rises near Mt Natib in Central Bataan. Flows through thicklyforested areas and the narrow coastal rice growing district of Orani into NW corner of Manila B. Reported an important obstacle throughout course.

# ii. Calaguiman (Bataan Prov):

Flows in an easterly direction from mountainous region of Mt Natib, and enters Manila B south of Orani R mouth.

## iii. Balanga (Bataan Prov):

Small, but navigable for vessels drawing 6ft for about 2 mls from coast. Source approx 4 mls W of Balanga.

## iv. Abo Abo (or Talisay) (Bataan Prov):

Drains area between Mts Natib and Mariveles and flows through sandy coastal plain. Enters W side of Manila B about 2 mls NE of Balanga. Not navigable for even small bancas. Subject to violent floods.

## v. Lamao (Bataan Prov):

Flows eastwards past Lamao barrio to SW shore of Manila B. Banks steep and heavily wooded. Is serious obstacle to movement. Used to irrigate small area N of river.

# vi. Mariveles (Bataan Prov):

Flows southwards from source in Mariveles Mts to Mariveles B. Lower reaches probably navigable for shallow draft vessels for a few hundred yds upstream.

# vii. Kalaklan (Zambales Prov):

Flows SSW into Port Olongapo (Subic B). Banks on lower reaches low and muddy. Navigable for 2 mls for vessels drawing 6ft.

# viii. Pamatuan (Zambales Prov):

Rises near Mt Mabolinoc, 5½ mls NNE of head of Subic B, and enters sea close to San Antonio. Skirts southern side of wide coastal flood plain. Its banks are low, bordered with timber and bamboo clumps. Navigable for bancas for 2 mls, but channel is unreliable due to shifting sandbanks. Serious obstacle only when in flood.

# ix. Santo Tomas (Zambales):

Rises near Mt Bitnung in SE part of Prov and reaches China Sea near San Felipe. It forms N boundary of wide coastal flood plain, bordered on S by Pamatuan R. Fordable in dry weather, but serious obstacle in wet season.

## x. Anonang (Zambales Prov):

Rises in Cabusilan Mts and flows E into China Sea about halfway between San Felipe and Cabangan. River fordable a few miles upstream in dry weather but information regarding navigation is lacking. Subject to violent floods in wet season.

#### xi. Cabangan (or Jalakak) (Zambales Prov):

Drains small area E of Cabangan. Navigable for shallow draft bancas in lower reaches. Unstable sand bar at mouth. River is 160'ft wide during dry weather at Cabangan town.

#### xii. Bucao (Zambales Prov):

Rises near Mt Pinatubo at Zambales-Pampanga Bdry. Flows WNW and reaches W coast through wide sandy flood plain near Botolan town. During floods area between normal river channel and Botolan becomes a raging torrent. In lower reaches banks are low with patches of bamboo, low timber and cultivation in open grassland.

## xiii. Lauis (Zambales Prov):

Formed by 2 branches, draining mountain area E of Masinloc town. It flows into China Sea 5 mls NW of that town. A major obstacle in flood time.

# xiv. Cabaluan (or Bayto) (Zambales Prov):

Located near N boundary of Zambales Prov. Drains large area E of Sta Cruz Pt. In dry weather 30 yds wide and 5ft deep where crossed by Route 7F. Banks steep and high upstream from this point. A serious obstacle during floods.

# xv. Nayom (Zambales):

Forms boundary between Zambales and Pangasinan Prov. Enters sea about 1 ml S of Infanta. Flows through thinly forested mountain area to cultivated valley extending about 6 mls inland from coast. Shallow bar at mouth with 3 to 4ft at HW. Water deeper inside and craft drawing 6ft can ascend 2 mls. Shallow draft bancas can ascend farther 2 mls. Banks in lower reaches low and swampy. At ferry crossing on Route 7G, river is 140 yds wide, decreasing to 30 yds at end of tidal influence. A major obstacle at all seasons.

# Types of Native Craft:

Larcha: Large wooden vessel, capacity 60-100 tons, 6ft draft.

Batil: Generally similar to Larcha, 10-50 tons, up to 6ft draft.

Viray: Hollow log keel, built-up sides; with or without outriggers, up to 20 tons, 4-6ft draft.

Casco: Flat bottom barge, seldom used outside Manila area, 30 tons, 3-6ft draft.

Banca: Small craft hollowed from single log; with or without outriggers. 1½-3ft draft.

# [Section 5]

#### 3. LAKES

Looc (Zambales Prov):

This is only lake in area. Situated between San Antonio town and NW corner of Subic B. Length \(\frac{3}{4}\) ml; width \(\frac{1}{2}\) ml. Reported shallow. Max depth 6ft.

#### 4. SWAMPS

None of any appreciable extent. Small mangrove and nipa areas found along W coast at lower Nayom R and between Arenas Pt and Mataloi Pt, also N side of Port Olongapo. Impassable at all times.

## 5. VEGETATION

## i. Forest:

Covers high Zambales Ra continuing to Bataan Pen and portion Cinco Picos Prom. Pine forests with grass and light undergrowth found in scattered areas on ridges over 4000ft, mainly on western slopes Zambales Mts. Secondary forest largely fringes primary forest.

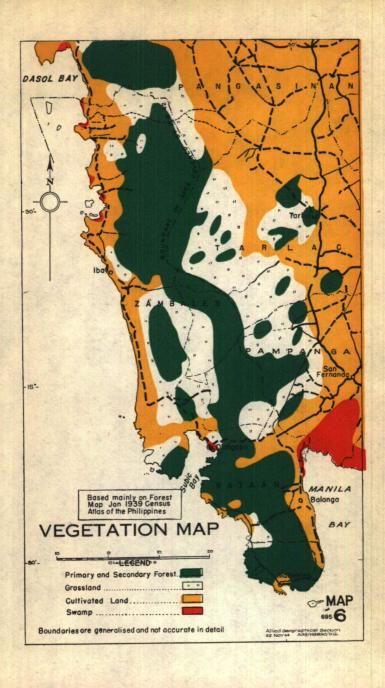
Movement for foot-troops through primary forest relatively easy, but difficult in dense secondary growth at forest edge. Tracked vehicles could operate in lighter secondary growth where terrain permits.

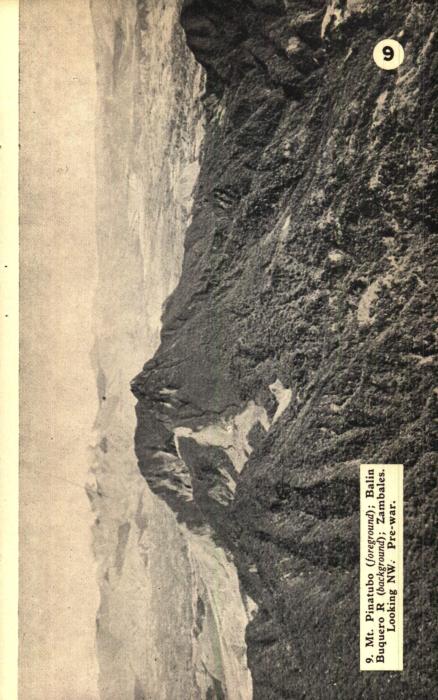
#### ii. Grasslands:

Cogon grass covers extensive areas along western foothills of Zambales Mts. Easily burned during dry season. Passable to MT where terrain allows. Density and coarseness hindrance to foot troops.

#### iii. Cultivation:

Along China Sea coastal strip coconuts form main crop, providing good cover with little undergrowth. Rice is main crop in San Antonio and E Bataan coastal plains. Paddies firm and dry allowing free movement from Nov to May. Impenetrable bamboo clumps provide good cover near most settlements and river banks.

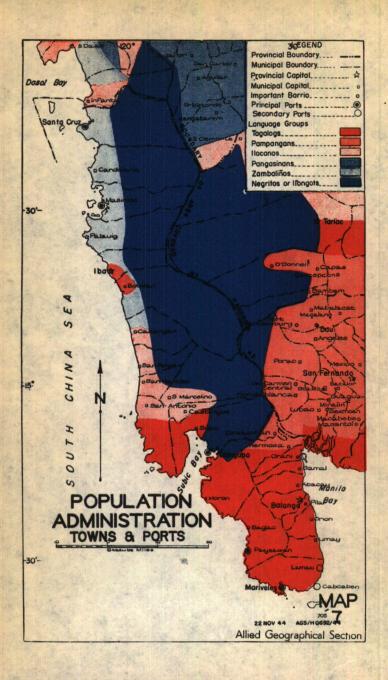




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11. Rain Forest, Bataan. Pre-war.

12. Rice Lands, Coastal Plain, Santa Cruz, Zambales. Looking NW. Pre-war.



# SECTION 6

# POPULATION, ADMINISTRATION, TOWNS

(MAP 7; PHOTOS 13, 14)

#### 1. POPULATION.

Total population was 193,354 of which 99½% were Filipinos. Chinese comprised greatest part of foreign population. For distribution of population see Table—Towns Information at end of this Section.

All figures quoted are from 1939 Census.

## i. European:

Americans (123), Spaniards (7), other nationalities (51).

At outbreak of war some Americans returned to USA. Most of those who remained were interned.

#### ii. Asiatic:

a. Chinese (631). Before the war they were engaged mainly in retail food trade and manufacturing enterprises. They were not interned but forced to give strong support to Japanese activities.

b. Japanese (54). Pre-war influence negligible.

#### iii. Natives:

Racial grouping consists of Tagalogs (74,472), Ilocanos (65,846), Zambalinas (50,051), Pampanguenos (21,213), Visayans (1,705), Pagasinons (899) and Bicolonos (313).

Negritos: Small-statured black people; primitive and pagan in culture. There were 4347 scattered throughout high forested regions in this area.

Tagalog, the national language, is most widely spoken, with Iloko (Ilocano) next.

English is spoken by a third of the population and about  $1\frac{1}{2}\%$  speak Spanish.

People are reported to be pro-American.

#### 2. ADMINISTRATION.

#### i. Pre-war:

Philippine Government was republican in form and based on principle of separation of executive, legislative and judicial powers. Nearly all powers were centralised in the National Government at Manila.

Local government consisted of 48 provinces and 12 chartered cities. The provinces, apart from chartered cities were divided into poblacions and barrios. Each poblacion consisted of 2 or more barrios.

## [Section 6]

The governing body of a province was the Provincial Board comprising provincial governor and 2 elected members.

In the area covered in this Handbook there were 24 municipalities and no chartered cities. Balanga was provincial seat in Bataan Prov and Iba in Zambales Prov.

#### ii. Police:

Philippine Constabulary, municipal police, and a few provincial guards. Fifty per cent of the pre-war Constabulary were USAFFE personnel.

Reports State Japanese increased the strength of Constabulary and gave them wider powers, but co-operation with Japanese is reported to be not good. Constabulary are responsible to Japanese MP.

# iii. Government since Japanese Occupation:

In Manila a puppet government appointed by Japanese continues to exercise authority through the old provincial system, but provincial governors formerly elected by people are now appointed by President of Republic.

The Japanese Military Administration is liaison between Japanese Army and Philippine Executive Commission or civil governments.

#### 3. PRINCIPAL PORTS.

## i. Mariveles, Bataan, 14°26'N, 120°29'E.

Natural harbor; depths 5-20 fms; area 1300 acres; deep clear entrance; sheltered from all but SE winds.

Wharf accommodation for a 450ft vessel drawing 23ft. HHW is 9 hrs 53 mins, the HHW height 3.3ft above and lowest tide 1.5ft below chart datum (mean LLW).

There are nine piers as follows:

Pier 1: Quarantine Wharf at NW corner of harbor; connected to shore by causeway; face 300ft, berthing space 300ft, depth 25-28ft; S side 120ft, berthing space 45ft, depth shallow; N side 45ft, berthing space 45ft, depth shallow, building 11,200 sq ft alongside.

Pier 2: North of Quarantine wharf; open timber pile pier with timber deck; face 20ft long; depth 8ft. South and N sides each 400ft long, depth 8ft off end.

Pier 3: North entrance of Lilimbon Cove; 100ft long.

Pier 4: 200 yds E of Pier 3; loading pier for quarry, 60ft long.

Pier 5: At head of Lilimbon Cove; 20ft x 70ft, connected to shore by causeway 100ft x 10ft.

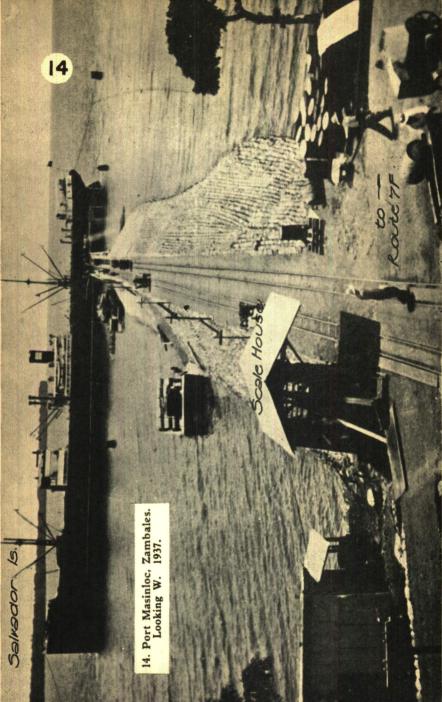
Pier 6: South side of Cove; 50ft x 50ft, approachable by lighters.

Pier 7: NW of Sisiman B; 275ft x 10ft.

Pier 8: 175 yds NW and similar to Pier 7; appears in ruins.

Pier 9: East side Sisiman B; no details.

Querantine Pier 13. Mariveles Harbor, Bataan. Looking SE. Oct 41. Floating Dock Mariveles R Mariveles Harbor - Quarry Corregidor Is. -Novy Pier



ii. Paysawan B, 14°31'N, 120°23'E.

West coast of Bataan, 4 mls S of Bagac. No information available. Pre-war photos show rock-filled jetty with an L-shaped timber pier at least 150ft long, with large ships both sides. On shore is small barrio, stock piles of sawn lumber and large portable crane. Standard gauge RR from shore to pier head.

# iii. Olongapo, Subic B, 14°29'N, 120°17'E.

Port Olongapo is small cove in middle of E shore of Subic B; extends 2 mls NW/SE and \(\frac{3}{4}\) ml wide. In NE part of port is small basin which provides good holding and AW shelter. Access to basin is through narrow channel between shoals.

Subic B extends 8 mls N, 3½ mls wide. Olongapo was former

naval base, with Subic B a naval anchorage.

Three ships can berth at marginal wharfs. Excellent shelter in basin; good shelter near towns of Olongapo and Subic.

Entrance channels are E and W of Grande I. Channel W is 11 mls wide, deep and clear; E channel is narrow and tortuous.

HHW at Olongapo is 9 hrs 45 min, the HHW height 3.1ft above, lowest tide 1.5ft below chart datum (mean LLW).

There are 6 piers but no cargo handling facilities. The piers are:
Pier 1: Marginal Wharf; in inner harbor N side of Rivera Pt;
350ft x 50ft, depth alongside 32ft.

Pier 2: Marginal Wharf; on E tip of Rivera Pt; 350ft x 50ft, depth 34ft alongside.

Pier 3: Marginal wharf; S side of Rivera Pt; 350ft x 50ft, depth 48ft alongside.

Pier 4: Trestle pier W of No 3; depth 30ft off end.

Pier 5: Trestle pier with L-head located in front of town; depth 32ft off end; shore-reef prevents full use.

Pier 6: Trestle pier at former rifle range midway between Olongapo and Subic; depth 40ft off end.

# iv. Masinloc (Zambales), 15°32'N, 119°57'E.

a. Port Masinloc: Located NE of Salvador I. Irregular-shaped harbor with anchorage area 1\frac{3}{4} mls long, \frac{1}{2} ml wide; depth from 6\frac{1}{2} to 21fms. Good shelter except during northerly and westerly weather. HHW is 9 hrs 30 min; the HHW height 2.8ft above and lowest tide 1.5ft below chart datum (mean LLW).

There is one reinforced concrete pier, connected with a stone and concrete-grouted causeway 1 ml NW of town. Berthing space 60ft, depth of water 37ft. A 24in hand-powered, double-track RR ran from ore bin to pier head.

b. Port Matalvi: About 2\frac{3}{4} mls S of Port Masinloc. Excellent typhoon harbor with mud bottom anchorage in 6-12fms; area 2 mls long, 300-500ft wide. One wooden wharf 1 ml S of Masinloc town; length of face 300ft, berthing space 300ft, depth 32-36ft. Believed in bad state of repair. A sawmill was alongside wharf.

# [SECTION [6]

v. Santa Cruz (Zambales), 15°46'N, 119°54'E.

Santa Cruz Port is located in natural harbor in a cove in SE corner of Dasol B. Harbor is exposed, has a winding channel and many shoals.

Best anchorage is 100 yds NW of pier in 9-10fms, mud bottom-HHW is 9 hrs 20 min, the HHW height is 2.7 ft above and the lowest tide is 1.5ft below chart datum (mean LLW).

The pier—1½ mls SW of Santa Cruz town—was used for shipping chromite ore. Has been reported destroyed. It was of timber construction 500ft long, approx 10ft wide with T-head 200ft by approx 20ft; berthing space 200ft, depth at face 40ft.

There were no loading facilities. A hand-powered, double-track RR ran from ore bin to pier head.

#### 4. SECONDARY PORTS:

i. Orani (Bataan), 14°48′N, 120°32′E.

Port is of little commercial importance as bay is very shoal with 1fm line 4.4 mls offshore.

Small vessels (60 tons) have used right bank of Orani R just inside mouth. River may be entered at LW by boats drawing 5ft.

ii. Lamao (Bataan), 14°30′N, 120°36′E.

Located on W side of Manila B. There is a small pier, and road communication. The 10fm-line is  $\frac{1}{2}$  ml offshore.

iii. Cabcaben (Bataan), 14°27′N, 120°35′E.

Located on W side of Manila B. There is a small pier and road communication. The 10fm-line is ½ ml offshore.

[Section 6]

POPULATION AND TOWNS INFORMATION

Town	Town Municip.		TRANSPORT	IMPORTANT BUILDINGS	
LOCATION			FACILITIES		
BATAAN PROV. 1. ABUCAY. (14° 43′ N, 120° 32′ E)	6485	10,216	Route 110A	Small municipio; church; big convent; school. 30 wooden buildings.	
2. BAGAC. (14° 36′ N, 120° 23′ E)	2191	2,958	Routes 110D and 111	Stone church, about 20 small wooden huts.	
3. BALANGA. (14° 41′ N, 120° 32′ E)	4582	11,684	Routes 110A and 110B Vessels (4-5 ft draft carrying 40 tons can us Balanga R to wharf just E of bridge on Route 110A. Sugar Centra has 2-ft gauge tramway network.	church and convent; 30 good houses. Most buildings fairly old.	
4. DINALUPI- HAN. (14° 52′ N, 120° 28′ E)	3041	8821	Routes 7A, 7B, 110, 74 Railroad spurs, 3' 6' gauge, within 2 mls NE and S.	20 old wood buildings	
5. HERMOSA. (14° 50′ N, 120° 30′ E)	2668	6819	Route 110A	Nipa huts only	
6. LIMAY. (14° 34′ N 120° 36′ E)	2608	3978	Route 110B and good branch roads NW and SW to Route 113.	30 small wooden buildings.	
7. MARIVELES. (14° 26′ N, 120° 29′ E)	2235	4444	Routes 110B, 110D. Important harbor. 2 piers for Liberty ships. A/F.		
8. MORON. (14° 41′ N, 120°16′ E)	1593	3301	Route 110E. Sandy beach.		
9. ORANI. (14° 48′ N, 120° 32′ E)	7628	9658	Route 110A. Near coast	Nipa huts only	
10. ORION. (14° 37′ N, 120° 35′ E)	6753	10,909	Route 110B	Municipio, church, school cannery, 10 wooden houses.	
11. PILAR. (14° 40′ N, 120° 34′ E)	3721	5346	Routes 110B, 111	Small municipio, church, school, and about 10 wooden houses.	

	WATER SUPPLY	INDUSTRIES AND SUPPLIES	SIGNAL COMMUNICATIONS	GENERAL		
	Flowing art wells.	Elec from Balanga. Ice plant. Rice, sugarcane, pineapples, cincomas (starchy root crops), fish, goats.	Prov telephone	Rice paddies and roll- ing grassy hills and cultivation W. Fish ponds E.		
	Mostly art wells	Fishing and rice	Prov telephone	A small coastal town. Small rice paddies.		
The second second	Art wells: water pumped to tower.	Elec plant, diesel 20 kw. Ice plant, cap 10 tons dly. Small gar- age. Sugar Central, 1.9 mls SW, 300 tons cane daily. Rice, fish, goats and cincomas.	telegraph. Secondary	Capital of Bataan. Un- important, but good camp site. Built be- tween 2 rivers, ½ ml apart and 1½ mls in- land from Manila B.		
	Flowing art wells.	Sugar-cane, rice, cin- comas.	Prov telephone and telegraph.	Important road center but of little importance otherwise.		
		Rice	Prov telephone	Salt marsh E. No importance.		
	Art wells. Hand pump.	Small circular sawmill 2 mls SW.	Prov telephone and telegraph.	Sandy beach E, rolling hills secondary growth W.		
	Piped from spring and art wells.	Large amounts of hard rock quarried for Manila breakwaters, etc., from Lilimbon Cove.	phone, telegraph.	Small town. Useful harbor, steep and mountainous surroundings. Strategically important.		
	Surface wells or rain water.	Fishing, a little rice	Prov telephone. Sec- ondary radio station.	Small and isolated.		
	Art wells	Elec current from Balanga. Ice plant, cap 5 tons dly. Fish.	Telegraph	No importante.		
	Flowing art wells.	Elec current from Balanga. Small guava and mango cannery. Ice plant, cap 5 tons daily. Fish, cincomas, sugar-cane, timber telegraph poles from forest.		Sandy beach E. Wide cultivated valley NW. Forested mountains SW.		
Since of	Flowing art wells.	Elec current from Balanga. Fishing; rice sugar-cane.	Prov telephone	Fish ponds E. Cultivation W.		

	Town	POPULATION		TRANSPORT	IMPORTANT	
LOCATION		Town Municip.		FACILITIES	Buildings	
12	1. SAMAL. (14° 46′ N, 120° 33′ E)	4679	7404	Route 110A	Modern municipio. Large convent, school, large GI shed, about 30 good houses.	
	PROV. BOTOLAN. (15° 18' N, 120° 01' E)	1385	11,817	Routes 7E, 115C; Trai	Small municipio, school, chapel.	
2	. CABANGAN. (15° 10′ N, 120° 03′ E)	1814	5310	Routes 7D, 7E	Small municipio, school, chapel.	
3	ARIA. (15° 38′ N, 119° 06′ E)	998	5682	Route 7F	Small municipio	
4	CASTIL- LEJOS. (14° 56′ N, 120° 12′ E)	2220	5362	Routes 7C, 114	Big municipio (wood). Small church, big convent, school, 15 good houses.	
5.	(15° 20′ N, 119° 59′ E)	3078	8299	Route 7E. Overseas vessels have anchored off shore in favorable weather.	Old capitol of brick; church; convent; 3 schools; PC barracks; about 100 good houses.	
6.	MASINLOC. (15° 32′ N, 119° 57′ E)	1547	7012	Routes 7F, 116, pier for overseas vessels 1½ mls NW, also 1½ mls SE. Fair anchorage.	Small municipio, church, convent, about 15 good houses.	
7.	OLONGAPO. (14° 49′ N, 120° 17′ E)	8644		Routes 7B, 7C. Big harbor and naval base.	Naval reservation. Hotel, cine, cabaret, about 10 good houses.	
8.	PALAUIG. (15° 26′ N, 119° 54′ E)	1334	6026	Route 7F	3.	
9.	SAN ANTONIO. (14° 57′ N, 120° 05′ E)	6025	6637	Routes 7C, 7D	Big municipio, two churches, convent, school, 4 big and about 60 small good houses.	
10.	SAN FELIPE. (15° 04′ N, 120° 04′ E)	4033	6551	Route 7D	Big municipio, school, small church, 2 big houses.	

	WATER SUPPLY	INDUSTRIES AND SUPPLIES	SIGNAL COMMUNICATIONS	GENERAL
	Flowing art wells.	Elec current from Balanga. Ice plant, cap 3 tons daily. Abandoned starch factory near beach. Rice, cassava, sugar-cane, fish.		Fish ponds E. Patches cultivation and roll- ing grassy hills W.
	Art wells, hand pumps.	Small rice mill	Prov telephone, telegraph.	Not important. On a sandy coastal strip. Rice paddies.
	11 /4	Rice	Prov telephone, telegraph.	Not important. On a sandy coastal strip. Rice paddies.
	Mostly surface wells. A few art wells.	Rice and coconuts	Telegraph	Not important. On a sandy coastal strip. A few rice paddies and coconuts.
	wells. Easily	Starch factory 1 ml N. Good market for vege- tables.	Prov telephone, telegraph.	Important center on wide sandy plain. Mostly cassava, sweet potatoes, and vegetable fields, clumps of bamboo, rice.
	Art wells and hand pumps.	Ice plant, cap 5 tons daily. Large market and rice warehouses.		Capital of Zambales.  1 ml W along beach was pre-war airfield. Coastal plain mostly riceland.
	Surface wells	Sawmill at Matalvi, 14 mls SE. Some rice and vegetables.	Prov telephone, telegraph.	Important shipping port for chromite ore and lumber. Wharf for overseas vessels. Very swampy, broken country. Some forest.
	Dam 4½ mls N. No details.	Pier for overseas ves- sels and naval base facilities. Supplies stored. Local farms insignificant.	Prov telephone, tele- graph. US Naval radio facilities.	Very important harbor and naval base. Tidal waterway and swamps. Broken steep hills N.
A SALLAND	Surface wells		Prov telephone, tele- graph.	Not important. On a narrow coastal strip.
	Gravity pipe to reservoir.  Many surface wells.	Big bus depot and repair shop. Cassava, vegetables and rice.	Prov telephone, telegraph.	Fairly important town. Wide low sandy plain N and E. Mountains S. Clumps of bamboo.
	wells. Some	Small starch factory muscovado sugar mill Fish, rice, cassava.	Telegraph	Wide sandy coastal plain runs E. For- ested mountains N.

Town	Popul	LATION	TRANSPORT	IMPORTANT BUILDINGS	
LOCATION	Town	Muni-	FACILITIES		
11. SAN MARCELINO. (14° 58′ N, 120° 09′ E)	4111	8409	Route 7C. Trail T11 NE to Fort Stotsenburg.	Big municipio, new part concrete, church and convent, school, few good houses.	
12. SAN NARCISO. (15° 01' N, 120° 04' E)	6338	9723	Route 7D	Big modern municipio, church, convent, school, 20 big, 150 small good houses.	
13. SANTA CRUZ. (15° 46' N, 119° 55' E)	1334	11,194	Routes 7F, 7G. Acoje wharf for overseas vessels 1½ mls SW. A/F 2 mls S. Trail T13 E to Route 13B.		
14. SUBIC. (14° 53′ N, 120° 14′ E)	1257	14,923	Routes 7B, 7C. Trails T9 and T10. Anchorage in Subic B.	Small municipio, school and only 1 big house.	

WATER SUPPLY	INDUSTRIES AND SUPPLIES	SIGNAL COMMUNICATIONS	GENERAL
Surface and art wells. Hand pumps. Easily obtainable by spears.	Rice, vegetables.	Prov telephone, telegraph.	In wide sandy plain. Rice, cassava, sweet potato fields, some bamboo clumps.
Surface wells	Ice plant, cap 10 tons daily. Rice, vegetables.		Wide sandy plain E Surrounded by rice paddies.
Mostly surface wells. One art well, hand pump.		Prov telephone, telegraph.	Important shipping port for chromite ore also A/F on narrow coastal strip. For ested mountains E.
small dam;	Small circular sawmill. Fish, rice, coconuts, cattle, some timber.	Prov telephone, telegraph.	Strategically import ant road block area to N end of Subic B Steep grass hills, tida swamps. Patches of forest.

#### SECTION 7

## TRANSPORTATION: SIGNAL COMMUNICATIONS (MAP 8)

#### A. TRANSPORTATION:

#### 1. GENERAL:

Bataan Prov: Was served by a good road system. There is no railroad other than a new extension of the Manila railroad reported by the enemy now to reach N part of province. Much freight was moved by shallow-draft water transport from tidal river mouths on the E coast to Manila.

Zambales Prov: Was served mainly by trucks on Route 7 which hugs W coast and connects with main road and rail nets at both ends. No railroads. Movement by water was not well developed; a limited amount in small craft in tidal rivers and from ports used to be small extent by overseas vessels.

Short disconnected tramlines of various gauges served several sawmills, mines and sugar central at Balanga (Bataan Prov).

Vehicles registered before the war were:

Bataan Prov —107 automobiles, 107 trucks.

Zambales Prov—112 automobiles, 175 trucks.

Buses, usually 35-passenger, operated over all main roads.

Since enemy occupation the removal of many vehicles and a shortage of fuel and tires have curtailed normal transport facilities.

Commercial airlines did not operate regularly in this area.

#### 2. ANIMAL TRANSPORT:

Greater amount of farm produce was hauled on 2-wheeled carts or crude sleds. The carabao (water buffalo) was the main farm work animal, although oxen were common for draft purposes in Zambales.

Many wiry and strong, but small, native horses were used for light pack and draft duties. A small 2-wheeled buggy (carromata) was used in areas served by roads.

#### 3. PORTERS:

Porters in mountain areas carry loads about 50 lbs on their backs, with the aid of a head-band; they normally carry over bad trails at 4 kms an hour for 10-hr day, for 2 or 3 successive days.

## B. SIGNAL COMMUNICATIONS:

#### 1. TELEPHONE:

There was no long-distance telephone service, but local telephone service connected main towns within each province. Breaks of only about 2 mls existed between Bataan-Zambales, 10 mls between Bataan-Pampanga and 21 mls between Zambales-Pangasinan Provs.

Bataan had 22 stations and 66 mls of fixed line.

Zambales had 26 stations and 206 mls of fixed line.

#### 2. TELEGRAPH AND CABLE:

Bureau of Posts operated telegraph lines which connected all main towns on Route 110 from Mariveles, along E coast of Bataan, and towns along Route 7, with the rest of Luzon. Messages to Zambales coast were sent via Dagupan in Pangasinan Prov.

A submarine cable connected Mariveles (Bataan) to Corregidor I.

#### 3. RADIO:

Bureau of Posts operated a 2-way station at Moron (Bataan), and an emergency station at Balanga (Bataan). There were naval signal facilities at Port Olongapo (Subic B).

#### 4. POSTAL SERVICE:

Private bus companies carried mail to Bataan and Zambales via Dinalupihan (Bataan), and Dagupan (Pangasinan).

#### **SECTION 8**

#### RESOURCES

(MAPS 9, 10)

#### 1. GENERAL:

Chromite mining was most important industry in Zambales; 420,000 tons were produced in 1938. In Bataan there are good timber areas and several sawmills. Sugar cane was grown extensively in NE Bataan. Main Sugar Central is at Balanga.

#### 2. FOODSTUFFS:

Chief foodstuffs grown were rice, sugar, cassava, cincomas, sweet potatoes and green vegetables. Some tropical fruits and fish are plentiful.

Along Zambales coastal plain large quantities of rice and vegetables were grown, but little sugarcane. Sugar supply was transported from Balanga Sugar Central.

Pigs, ducks, chickens, goats, carabao and other cattle were kept. A few farmers had a small number of turkeys, pigeons, guinea hens and rabbits.

#### 3. FORAGE:

Small areas of grazing land lie along foothills of Zambales Ra. Stubble in harvested rice paddies, corn fodder, young cogon and other grasses are used as forage. No forage is stored.

#### 4. WATER:

Plentiful water supply along Zambales plain from rivers and free-flowing shallow artesian wells. Water must be treated.

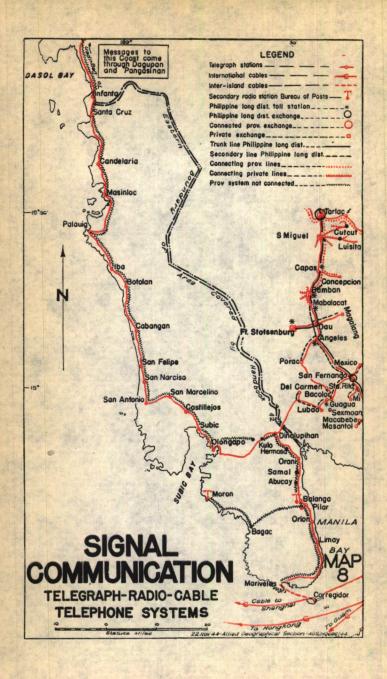
Known water facilities are:

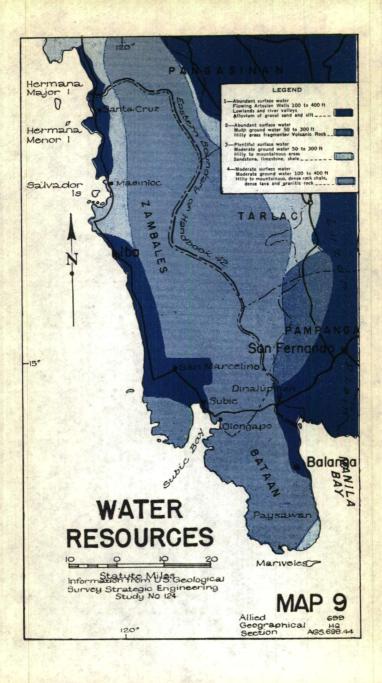
#### Zambales Prov:

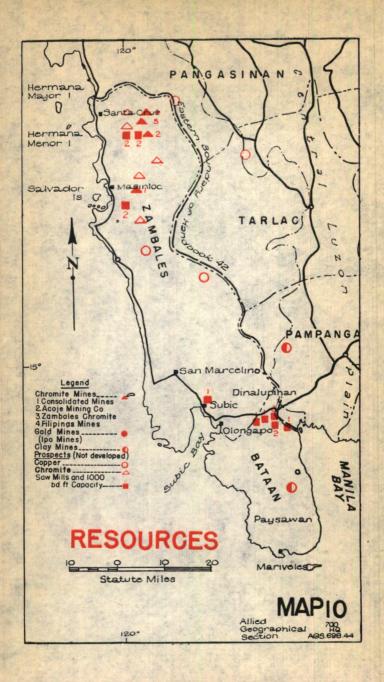
San Antonio 117,00 gal reservoir. Subic, small dam and 15,000 gal tank; Olongapo, pump and tower (unknown capacity);

#### Bataan Prov:

Balanga, pump and tower (100,000 gpd); Mariveles, spring (capacity unknown).







#### 5. FUEL:

There are no oil wells or coal mines. Wood is main domestic fuel; ample supplies obtainable from mountain slopes. Imported kerosene was main lighting fuel.

Japanese have maintained production of coconut oil and copra for fuel purposes.

### 6. CONSTRUCTION MATERIALS:

Abundance of rain forest timber from Zambales Ra. There were sawmills at Pinulot, Luakan, Balut, Culis, Barabahan, Mapalad, Acoje, Subic and Masinloc barrios. Total output of these mills was 20,000 bd (super) ft daily.

Gravel and sand are obtainable from most stream beds; sand from beaches also. A developed rock quarry is located at Mariveles; and limestone quarry about 3 mls E of Lucapon (NW Zambales).

#### 7. POWER:

Only power plant in Bataan was at Balanga. This diesel plant (over 100 KW) supplied Orani, Samal, Abucay, Pilar and Orion. In Zambales private plants of unknown capacity were at Olongapo, Acoje pier, Acoje Mining Co. and Masinloc (Consolidated Mines).

#### 8. NATIVE LABOR:

Total male population in 15-45 age group is 48,000; mostly unskilled. The Filipino, under close supervision and good leadership, makes an excellent laborer. Laborers on new projects are generally obtained by hiring a native foreman (capataz) who supplies laborers at an agreed price.

#### 9. MINERALS:

Rich, well-developed chromite mines are located inland from Masinloc and Santa Cruz towns.

Japanese are reported actively mining high grade ore in Santa Cruz area (NW corner Zambales Prov).

## SECTION 9

## MEDICAL PROBLEMS

#### 1. GENERAL:

Climate is tropical with well-defined wet and dry seaons. Average temperature is about 80°F; max about 100°F and min about 63°F. Diseases common to tropical countries are prevalent here.

#### 2. DISEASES:

Malaria: Benign, sub-tertian and quartan malaria occur, though latter two are much less common.

Mosquito vectors include: Anopheles barbirostris, A filipinae, A maculatus, A Minimus var flavirostris, A philippinersis, A pseudobarbirostris, A subpictus var indefinitus.

Anopheles minimus var flavirostris which prefers shallow, shaded, foothill streams is the most dangerous carrier.

Dengue: Prevalent carrier mosquitoes are: Aedes aegypti and A albopictus.

Typhus: Mite-borne or endemic typhus is known to occur. Mites are widespread and care should be taken.

Filariasis: Uncommon mosquito-borne disease.

## Dysentery:

- i. Bacillary dysentery is common though normally sporadic. Precautions should be taken to ensure sterilization of water, control of insect and other contamination.
- ii. Amoebic dysentery is not so prevalent. Other forms of dysentery are also uncommon.
  - iii. Diarrhoea is of frequent occurrence.

Typhoid and Paratyphoid Fevers: Both are common, though normally less prevalent than dysentery. May have spread.

CHOLERA: None was recorded for some years before war. There was reported to be an epidemic in 1943. It is necessary for all troops to maintain the highest standards of hygiene to guard against this and other bowel diseases.

Yaws: Common, but responds to NAB injections.

Fungus Infections of Skin: Tinea, seborrhoea and pityriasis are common and cause much discomfort.

Scabies: Caused by a burrowing mite. Widespread and common.

Tropical Ulcer: Scratches and abrasions, unless treated with antiseptic dressings, are liable to form rapidly spreading ulcers. Food deficiencies increase the liability for their development.

Leprosy: Occurs; known cases were isolated and suspects detained.

Venereal Disease: Gonorrhoea is widespread. Syphilis is less common; chancroid uncommon.

Tuberculosis: Greatest single cause of death in Philippines. All necessary hygienic precautions should be taken.

Influenza: Common. It frequently leads to more dangerous respiratory diseases.

Respiratory Infections: Bronchitis, broncho-pneumonia and lobar pneumonia are common and before the war were a major cause of disability among American forces.

Smallpox: Practically non-existent. Chicken Pox: Found occasionally.

Measles: Common.

Trachoma: Common eye disease.

Malnutrition and Beri Beri: Some were encountered before the war. Situation is probably aggravated since.

Worm Infestations: Widespread. Most common are: Round worms, hookworms, flat worms and whip worms. Other rare types found occasionally.

Plague: None has occurred in recent years but wartime conditions make its introduction a possibility.

#### 3. HOSPITALS:

There were only 2 hospitals before the war:

Hospital	Location	Type	Beds
Camilla Simpson	Olongapo (Zambales)	General	20
Coto	Masinloc (Zambales)	Special	10

#### 4. PESTS:

- a. Pest mosquitoes, flies, cockroaches and rats are common. Flies and rats constitute a medical hazard and steps should be taken to control or eliminate them.
  - b. Itch mites occur and may cause skin irritation.
- c. The red back spider occurs and can give a dangerous and painful bite.
  - d. Poisonous snakes are infrequent.

## SECTION 10

## METEOROLOGICAL CONDITIONS

(PHOTO 15).

#### 1. CLIMATE:

Two pronounced seasons, one dry in winter and spring, corresponding with period of NE monsoon from Nov to May, the other wet in summer and autumn, corresponding with period of SW monsoon from Jun to Nov. Temperature and humidity uniformly high with little seasonal variation.

#### 2. RAINFALL:

Wettest months during SW monsoon in Jun, Jul and Aug. Driest months during NE monsoon in Jan, Feb and Mar. In wet season mean monthly precipitation for Northern Luzon ranges from 7.7 to 17.1 inches from Jun through Oct with highest falls in Jul and Aug. In area under discussion these figures are slightly higher as indicated by following table.

Yearly and monthly rainfall averages in inches at principal stations are:

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ye- arly
Lamao (Bataan)	.39	.35	.35	.70	9.8	12.6	27.2	32.8	17	9.4	5.1	2.4	118
Fort Mills (Corregidor)	.47	.16	.16	.71	7.7	13.1	22.8	25.4	17.5	7.9	3.8	1.8	102
Olongapo (Zambales)	.34	.04	.17	1.3	10.1	18.6	29.5	30.6	22.6	7.8	3,1	1.4	12
Iba (Zambales)	. 27	. 27	.67	1.7	11.8	23	39.6	38.7	27.5	8.8	3.7	1.2	157

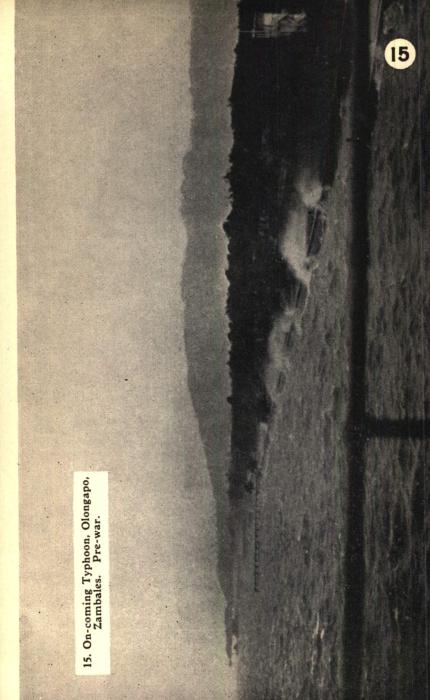
Rainy days are most frequent from Jul through Oct with 17 to 22 days a month; from Jan to Apr only 3 to 5 days have precipitation.

Serious floods at times caused by abnormally heavy rainfall associated with typhoons. Flash floods delay traffic at most stream crossings in Zambales Mts.

#### 3. WINDS:

NE (Winter) Monsoon: Nov till Mar or Apr. Direction mainly N and NE trending easterly toward end of season. Wind steady especially in Jan, aver 15-20 mph.

SW (Summer) Monsoon: Jun to Sep or Oct generally from westerly quarter. Intermittent and less steady than NE monsoon.



Follows transitional period of variable winds and calms. Steadiest in Jul and Aug with average speed at height of 10-15 mph.

Squalls (Collas): Accompanied by much rain; prevalent during

SW monsoon, especially near land.

Land and sea breezes well marked, especially where monsoon is

weak.

Typhoons (baguios): May occur in any month, but more prevalent from Sept through Nov. Least probable from Jan through Mar. Cause great damage, especially in unprotected harbors. Often accompanied by much rain persisting for days. Impossible for foot troops to march against force of wind.

#### 4. CLOUD AND VISIBILITY:

Cloudiness relatively high in all months with least in spring averaging from three to five-tenths. Maximum in summer, averaging 7/10 from Jun to Sep. Cloud amount normally follows seasonal distribution of rainfall. Maximum cloudiness is in late afternoons, and minimum in mid-morning and evening.

When SW winds blow uninterruptedly for several days, overcast

skies with low cloud bases (1000-2000ft) prevail.

Visibility is generally good; fog rare. Early ground mist rapidly dissipates. Low clouds in Zambales often mistaken for fog.

#### 5. TEMPERATURE:

Consistently high and uniform with minimum temperatures in winter (Dec-Feb).

Temperatures at sea level seldom exceed 95°F or fall below 65°F.

Above 3000ft cooler conditions prevail.

#### 6. HUMIDITY:

High, with seasonal variation amounting to 15%. Lowest values in Apr, usually below 75%, highest in summer and autumn, usually between 80 and 85%.

#### 7. OTHER PHENOMENA:

Small land tremors are frequent, severe earthquakes rare. Thunderstorms with squalls and heavy rains are frequent from May to Oct.

#### 8. EFFECTS OF CLIMATIC CONDITIONS:

i. Sea: Unloading operations hampered by typhoons and storms.

Ships endangered in most ports.

ii. Land: Operations difficult during rainy season. Highways blocked and rivers flooded during typhoons. Vitality of troops lowered by hot dry season. Construction of new airfields in rice country almost impossible when ground becomes saturated. Runways of most airfields, unless paved, unusable during rainy season.

iii. Air: Cloud cover and low visibility recordings highest during

rainy season. Typhoons and wet landing fields main hazards.

## APPENDIX "A"

# DIAGRAMS OF TIDES, SUNLIGHT & MOONLIGHT EXPLANATION OF FOLLOWING DIAGRAMS

#### AREA COVERED:

The astronomical data is for sea level and will not vary more than 5 minutes over a radius of 60 miles in the lower latitudes; in the higher latitudes the area covered is less.

A footnote is inserted below the diagram when both the tidal and astronomical data are applicable to places some distance from the one shown in the heading.

#### TIME USED:

Times on the diagram are for the time meridian indicated in the heading. When another time meridian is to be used in the field, it will be found convenient to change the figures representing hours on the left of the large diagram to conform to the new time. If the time meridian to be used is east of the one shown on the diagram, increase the figures by 1 hour for each 15°; if west, decrease the figures similarly.

#### DATES:

In the upper diagram, each day from midnight to midnight is represented by a space between two lines. In the lower diagram, where the days are represented by vertical lines covering the period from noon of one day to noon of the next, the dates at the bottom differ from those at the top because the date changes in passing through midnight.

#### TIDES:

The times of the tides are shown by curves in the lower diagram. By noting the sequence of the tides during a day, the height of any particular tide can be found from the upper diagram.

#### TWILIGHT:

Three types of twilight are shown. In the evening, civil twilight starts at sunset and ends when the sun is 6° below the horizon. Objects can be readily distinguished and a newspaper can be read. At the end of civil twilight, the brightness of the sky is still about 20 times as great as when the full moon is at zenith. Civil twilight is followed by nautical twilight, which ends when the sun is 12° below the horizon. All the brighter stars are visible, general outlines can be distinguished, but the horizon will usually be indistinct. The end of nautical twilight may appear to be the beginning of solar darkness, but a small amount of light from the sun may still be refracted or reflected until the end of astronomical twilight, when the sun is 18° below the horizon. In the morning the twilights occur in reverse order.

#### MOONLIGHT:

During astronomical twilight and solar darkness, periods of moonlight and dim moonlight are shown. During the period of moonlight, the intensity of light will vary between the brightness of the full

MANILA BAY\* DECEMBER, 1944 TIME MERIDIAN: 120°E. LAT. 14°35'N. LONG. 120°58'E. SUNLIGHT AND MOONLIGHT DATA COMPUTED FOR LAT. 14 35 N. LONG. 120 58 E. RISE AND FALL OF TIDE DATES 14 15 16 17 18 19 20 21 HEIGHT IN FEET CHART ZERO TIME OF TIDES, SUNLIGHT, MOONLIGHT AND DARKNESS DATES 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 NOON 12 Low Tide 13 14 15 P.M. SUNLIGHT 16 HOURS 17 18 P.M. 19 20 DIM MOON 21 LIGHT 22 23 MOONLIGHT DARKNESS MID NIGHT O MOONLIGHT DIM MOON LIGHT A.M. HOURS 7 8 A.M. SUNLIGHT 9 10 11 NOON 12E 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 DATES 1 LAST QUARTER FIRST QUARTER NEW MOON FULL MOON

MEAN TEMPERATURE: AIR 77° F., SEA 80° F.

0 10 20 30 40 50 60 70 80 90 100

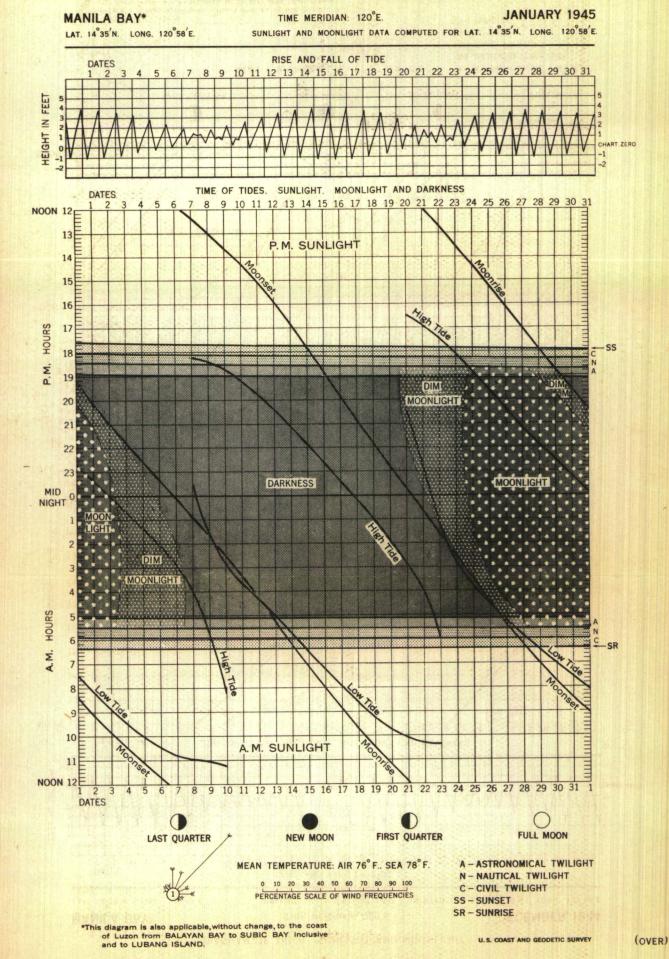
PERCENTAGE SCALE OF WIND FREQUENCIES

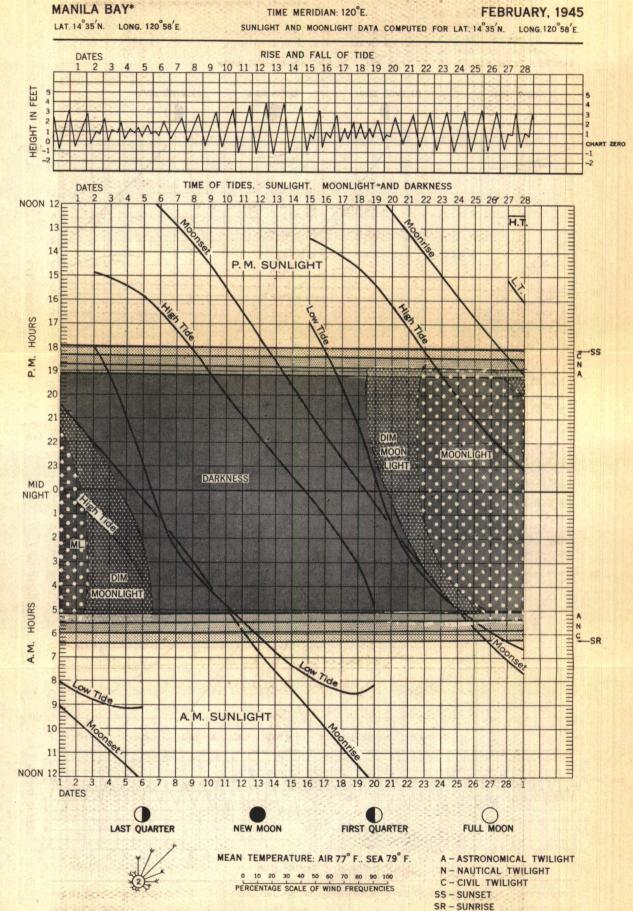
\*This diagram is also applicable, without change, to the coast of Luzon from BALAYAN BAY to SUBIC BAY inclusive and to LUBANG ISLAND.

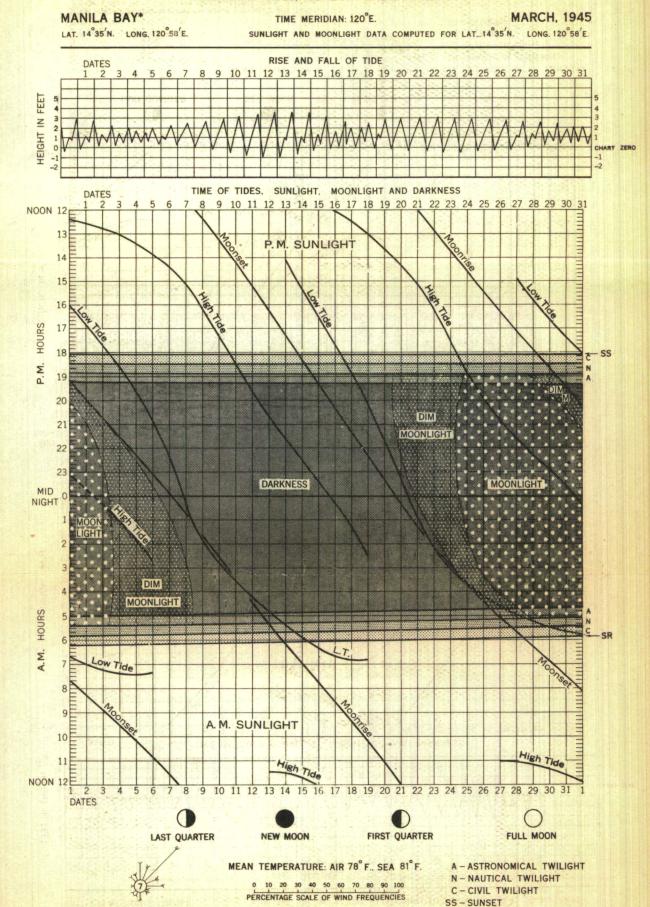
A - ASTRONOMICAL TWILIGHT N - NAUTICAL TWILIGHT

C - CIVIL TWILIGHT

SS - SUNSET SR - SUNRISE







\*This diagram is also applicable, without change, to the coast of Luzon from BALAYAN BAY to SUBIC BAY inclusive and to LUBANG ISLAND.

U.S. COAST AND GEODETIC SURVEY

SR - SUNRISE

moon at zenith and about one-third of this value. During the period of dim moonlight, the intensity varies from about one-third to one-tenth of the brightness of full moon at zenith.

#### MOON'S PHASES:

The phases of the moon are shown below the day on which they occur.

#### **TEMPERATURES:**

The average monthly temperatures of the air and sea water in the vicinity are shown below the diagram.

#### WINDS:

A wind rose is given showing for the month the average frequency and strength of the winds. The top of the rose is north. The length of the arrow, measured from the outside of the circle and compared to the scale to the right, shows the percentage of observations during which the wind has blown from the direction indicated. The number of feathers shows the average force of the wind on the Beaufort scale. The figure in the circle gives the percentage of calms.

#### SOURCES:

Tide predictions are from the annual or special tide tables issued by the US Coast and Geodetic Survey. Other data are obtained from publications of the US Navy Department, the British Admiralty, and other sources.

## APPENDIX "B"

## GAZETTEER OF PLACE NAMES

This Gazetteer includes all place names used in Terrain Study 94 (Central Luzon).

Place names within areas covered by this Handbook 42 (Bataan-Zambales) are indicated by †.

Distance and Direction

All mileages are air distances in statute miles.

Name		Distance and Direction
ABACA R		99 mls NNE of Manila
†ABO ABO (or Talisay) R		Adjacent to Balanga
†ABUCAY		3 mls N Balanga
†ACOJE A/F		28 mls N Iba
†AGLAO		28 mls NW Balanga
†AGLOLOMA B		18 mls SW Balanga
AGNO R		3 mls S Lingayen
AGOS R		39 mls E Manila
AGUANG (Dimanibung) R		82 mls NNE Manila
AKLE		31 mls S Cabanatuan
ALABANG		14 mls SE Manila
ALIAGA		8 mls W Cabanatuan
ALOU R		29 mls N Cabanatuan
†AMO R		14 mls S Balanga
+AMUNGAN		3 mls NW Iba
AMOT CR		30 mls NNE Cabanatuan
ANAO	::	16 mls N Tarlac
ANGAT		23 mls N Manila
ANGELES	::	24 mls S Tarlac
ANGELES SOUTH (Lara) A/I	F.	27 mls S Tarlac
ANGELO		32 mls NE Manila
ANGONO		14 mls E Manila
†ANONANG R		15 mls S Iba
ANTIPOLO		14 mls E Manila
APALIT		24 mls NE Balanga
ARAYAT		10 mls NNW of S Fernando
ARAYAT MT		13 mls N S Fernando
†ARENAS PT		21 mls N Iba
ADENIETA		15 mls N Manila
†ARINGUAY CREEK		27 mls NW Balanga
AYALA BRIDGE		Manila City
ATALA BRIDGE	• •	Waima City
†BABUYAN		18 mls S Balanga
BACATAN R		Tarlac-Pangasinan Prov Bdry
BACLARAN	::	5 mls S Manila
BACOLOR		23 mls NE Balanga
BADIO	٠.	28 mls NE Cabanatuan
†BAGAC	::	12 mls WSW Balanga
DACDAC D		23 mls N Manila
BAGONGILOG	٠.	7 mls E Manila
†BAGUMBAYAN	٠.	6 mls N Balanga
DATIAN DADE	٠.	30 mls N Manila
BAHAY PARE	• •	of this in Mainia

Name		Distance and Direction	
†BAJACBOJAC R		20 mls NW Balanga	
DATEA		14 mls NW Tarlac	
DAY AT TIC D		3 mls W Cabanatuan	
IDAT ATTOA		14°41′N, 120°30′E	
†BALANGA R		Adjacent to Balanga	
		12 mls NE Manila	
BALAYAN BAY		55 mls S Manila	
IDAY ATTOTT D		18 mls W Balanga	
		45 mls NE Cabanatuan	
DAY FIFT DAGG		44 mls N Cabanatuan	
		22 mls S Tarlac	
BALIBAGO	٠.	37 mls N Manila	
	٠.	13 mls SSE Manila	
		25 mls N Manila	
BALINAG		4 mls N Iba	
		6 mls E Tarlac	
BALINGCANAWAY	• •	5 mls NE Manila	
BALINTAWAK	• •	11 mls NW Cabanatuan	
BALOC	• •	73 N by W Manila	
BALOY R			
†BALSIC R	• •	13 NNW Balanga 25 mls N Manila	
BALUIAG		30 mls N Iba	
†BALUARTE PT	• •		
BAMBAN		15 mls S Tarlac	
BAMBAN R		15.5 mls S Tarlac	
BAMBANG	• •	9 mls SE Manila	
BANABA		26 mls S Tarlac	
†BANCAL R		3.5 mls NW Iba	
BANGANTALINGA R	• •	2 mls N Iba 11 mls SSW Tarlac	
BANGAT R			
†BANI PT		17 mls N Iba	
BANTUG	• •	17 mls NE Cabanatuan 6 mls SE Manila	
BARANKA	• •	21 mls E Manila	
BARAS †BATALAN R	• •	18 mls W Balanga	
†BATALAN R	• •	24 mls NW Tarlac	
BAYAMBANG	• •		
†BAYANDATE R	• •	18 mls W Balanga 16.3 mls NW Tarlac	
BYANTIG R	• •	23 mls NW Manila	
BAYBAY R	• •	27 ml N Iba	
†BAYTO (Cabaluan) R	• •	5 mls SW S Fernando	
BETIS BIAK-NA-BATO	• •	36 NNW Manila	
	• •	12 mls E Iba	
BIANGUE	٠.	29 mls N Iba	
†BIAY CR		16 mls N Manila	
BIGAA		18 mls WNW Balanga	
		18 mls WNW Balanga	
†BINANGA R BINANGONAN	::	18 mls SE Manila	
		Prov of Zambales 17 ml	s NW
†BINASA R		Balanga	
†BINAUANGAN R		13 mls SW Balanga	
†BINIPTICAN (Binictican) PT		25 mls WNW Balanga	
BINIP I ICAIN (Binicucan) P I		25 min Will W Datailga	

Name			Distance and Direction
BINONDO CANAL			Manila City
BINUANGAN R			15 mls SW Balanga
BITAS R			3 mls N Manila
LDITTETTETO TECH		٠.	
BOCAUE		٠.	33 mls SE Iba
BOCROC (on Minatula	CDET		14 mls N Manila
BOCBOC (or Minatula BOLINAO		LK	3 mls S Cabanatuan
DONICADON		٠.	34 mls NW Lingayen
BONGABON			15 mls NE Cabanatuan
BOSOBOSO			19 mls E Manila
†BOTOLAN		٠.	4 mls SE Iba
†BUCAO R			5 mls SE Iba
BUCOT			7 mls W Cabanatuan
BUED		٠,	23 mls N Tarlac
†BUIONG PT			19 mls WNW Balanga
BULACAN			15 mls NW Manila
BULACAN R			10 mls NW Manila
BULSA RIVER (Orion	nes R)		3 mls SW Tarlac
BULU R			40 mls N Manila
BULUALTO			18 mls S Cabanatuan
BUNDOC			11 mls SE Tarlac
BUNLO R			13 mls N Manila
BURGOS			16 mls NW Tarlac
BUSTOS	-::		25 mls N Manila
BYANTIG R			12 mls NW Tarlac
		• •	12 mis IVW Tarrac
CAAROSIPAN R			28 mls S Iba
†CABANGAN		٠.	12 mls SE Iba
†CABCABEN		٠.	16 mls S Balanga
†CABALLO IS			22 mls S Balanga
†CABALUAN (or Bayto	) R		27 mls N Iba
CABANATUAN			15°29′N, 120°58′E
CABATAGON			26 mls NE Cabanatuan
†CABATUAN			16 mls E Iba
CABAYOC PT			12 mls WSW Balanga
CABIAO			18 mls SW Cabanatuan
CABUCBUCAN			16 mls NE Cabanatuan
CABU CREEK			6 mls ENE Cabanatuan
†CABUSILAN MTS			20 mls E Iba
†CAIBOBO (Kaybobo)	PT		16 mls SW Balanga
CAINTA			11 mls E Manila
†CALAGUIMAN R			5 mls N Balanga
†CALAGUAGUIN B			34 mls S Iba
CALAMBA			21 mls SE Manila
CALAMATA			21 mls NW Manila
CALIPAHAN			8 mls NW Cabanatuan
CALOOCAN			4 mls N Manila
CALULUT R			5 mls NW San Fernando
CALUMPANG			23 mls NW Manila
CALUMPIT			25 mls NW Manila
†CAMAYA PT		• •	17 mls S Balanga
†CAMAYAN PT		••.	21 mls WNW Balanga
Tomation II			

Gazetteel of File	ace Haines continued.
Name	Distance and Direction
	10 mls NIVI Tarles
CAMILING	
CAMP CLAUDIO	6 mls S Manila
CAMP MURPHY	4 mls E Manila
CANACAO	8 mls S Manila
CANARIN LAKE	11 mls NE Tarlac
CANDABA	10 1 CIVI C-1
CANDADA CIVIAND	
CANDABA SWAMP	25 mls NNW Manila
CANDELARIA	21 mls N Iba
CAPAS	10 mls S Tarlac
†CAPITANGAN	2 mls N Balanga
†CAPONES IS	28 mls S Iba
	00 -1- C D-1
CARABAO IS	
CARDONA	20 mls E Manila
CARMEN	27 mls N Tarlac
CARRANGLAN	33 mls N Cabanatuan
†CASTILLEJOS	29 mls NW Balanga
	16 1 TT TT '1
CATNON R	
CAUT	10 mls E Tarlac
CAWAYANKILING R	12 mls S Iba
CAVITE	8 mls SW Manila
†CAYUAG	27 mls NW Balanga
CONTRACTOR A TOT TOT	an I IVI D I
	a 1 TVI CL1
CINCO CINCO R	3 mls W Cabanatuan
CINCO PICOS	39 mls SSE Iba
CLARK A/F	50 mls NW Manila
†COCHINOS PT	19 mls S Balanga
CONCEPCION	12 mls SE Tarlac
CONTINUEDCION	00 1- BIE Calemature
CORONEL (Santor) R	16 mls NE Cabanatuan
†CORREGIDOR ISLAND	20 mls S Balanga
CUBAO	6 mls E Manila
†CUBI PT	20 mls NW Balanga
OTT TOTT T	F 1. CT XX11-
LOTIT TO	10 1 KT D 1
†CULIS	
CUTCUT R	1 ml S Tarlac
CUYAPO	21 mls N Tarlac
A Commission of the Commission	
DAGUPAN	7 mls E Lingayen
†DALANAOAN	30 mls SE Iba
DAPDAP R	12 mls S Tarlac
	10 1 TYPETTY D.1
†DAPUA PT	
DARANGAN R	15 mls E Manila
†DASOL B	38 mls N Iba
DAU	21 mls S Tarlac
DAU EAST A/F	22 mls S Tarlac
†DAUANA R	11 mls SW Balanga
DE LA DINIA CANIAI	
DE LA RINA CANAL	Manila City
DEL CARMEN	39 mls NW Manila
DEWEY BOULEVARD	City of Manila
DIAMMAN R	30 mls NNE Cabanatuan
DIGMALA R	15 mls NE Cabanatuan
DILADILA CREEK	7 mls W S Fernando
DILADILA CREEK	7 mis w 5 remando

Name	Distance and Direction
†DILAYUPING I	9 mls N Balanga
DIL TITALE DIGERRICH	5 mls NE Manila
TO THE A STITUTE TO A A A A A A A A A A A A A A A A A A	82 mls NE Manila
I	
†DINALUPIHAN	14 mls NW Balanga
DINAMAGAT R	Zambales Prov
DINGALAN B	55 mls NE Manila
†DIRITA R	25 mls S Iba
DITALI	52 mls NE Cabanatuan
DIZON DOLORES	30 mls SE Tarlac
DOLORES	26 mls NE Balanga
EL FRAILE IS	26 mls S Balanga
	16 mls W Balanga
	17 mls NW Manila
	City of Manila
ESTERO De VITAS	City of Ivialilia
FAROLA LIGHTHOUSE	Manila Harbor
FLORIDABLANCA	12 mls WSW S Fernando (Pam-
	panga)
FORT DRUM (El Fraile I)	26 mls S Balanga
FORT FRANK (Carabao I)	29 mls S Balanga
FORT HUGHES (Caballo I)	22 mls S Balanga
FORT McKINLEY	4 mls SE Manila
tFORT MILLS (Corregidor I)	20 mls S Balanga
†FORT MILLS (Corregidor I) FORT STOTSENBURG	21 mls S Tarlac
†FORT WENT (Grande Island)	22 mls W Balanga
GANADO CANAL	Manila City
GAPAN	12 mls S Cabanatuan
GERONA	8 mls Tarlac
GERONA	8 mls WSW Balanga
GRACE PARK	4 mls NE Manila
†GRANDE I	22 mls WNW Balanga
GRULLO R	24 mls S Iba
GRULLO R	6 mls E Manila
TGUAGADI R	20 mls WNW Balanga
GUAGUA	6 mls SE S Fernando
GUIGUINTO	17 mls NW Manila
GUIGUINTO R	17 mls NW Manila
GUIMBA	17 mls NE Tarlac
GUMAIN R	15 mls W S Fernando
GUMI R	12 mls SW S Fernando
GUTAD	15 mls WSW S Fernando
GUITEB	12 mls N Tarlac
HAGONOY	23 mls NW Manila
1	30 mls NNW Iba
I TENDETOGA	11 mls N Balanga
†HERMOSA	II mis IV Datanga
IBA	15°20′N, 119°59′E
ILOG BALIWAG	11 mls NW Cabanatuan
	11 min 1111 Cabanatuan

Gazetteel of Flace	THE CONTINUES
Name	Distance and Direction
†INAIRAN R	9 mls N Iba
†INFANTA	34 mls N Iba
INFANTA	50 mls E Manila
	23 mls NE Manila
IPO	23 mls NE Manila
IPO DAM	25 mis NE Maina
JAEN	10 mls S Cabanatuan
†JALAKAK (Cabangan) R	12 mls S Iba
JALAJALA	29 mls SE Manila
JALAJALA	2) 1113 52 1144114
†KABAYO R	15 mls W Balanga
†KALAKLAN PT	21 mls NW Balanga
KAPINTALAN	42 mls N Cabanatuan
KARAYAN R	23 mls S Iba
†KAYBOBO (Caibobo) PT	16 mls SW Balanga
+KILANG R	9 mls SSE Balanga
KINABAKBAGAN REEF	Off Iba, Zambales
†KITANG (Quitang) PT	10 mls SSE Balanga
†KUYAKUŸ R	23 mls S Iba
LABANGAN	6 mls W Lingayen
	22 mls NW Manila
	22 mls NW Tarlac
LADIAOAN (lake)	10 mls SE Manila
LAGUNA DE BAY	10 mis SE Maina
LAGUNDI	35 mls NW Manila
LAKE LOOC	32 mls SSW Iba
LA LOMA	4 mls N Manila
†LAMAO	12 mls S Balanga
LA MONJA I	21 mls S Balanga
†LA PAZ	22 mls S Iba
LARA	27 mls S Tarlac
LAS PINAS	8 mls S Manila
†LAUIS R	18 mls N Iba
T ATTE	16 mls NE Cabanatuan
	17 mls N Manila
EHWIHIODIIIO	13 mls NNW Balanga
†LAYAC	28 mls E Manila
LENATIN R	
LEYBAN	31 mls E Manila
LIBERTADOR	21 mls N Iba
LICAB	14 mls WNW Cabanatuan
LICAB R	14 mls WNW Cabanatuan
†LILIMBON COVE	18 mls S Balanga
†LIMAY	9 mls S Balanga
†LIMUTAN R	12 mls W Balanga
LINGAYEN G	16°10′N, 120°10′E
†LIPAY (Masinloc) R	15 mls N Iba
LOKANIN PT	14 mls SSE Balanga
LOLUMBOY	11 mls N Manila
TOOC TAKE	32 mls SSE Iba
LOOC LAKE	19½ mls S Balanga
†LOS COCHINOS	21 mls W Balanga
†LOS FRAILES I	21 IIIIS W Dalaliga

Name		Distance and Direction
†LUACAN		14 mls NW Balanga
LUBAO		4 mls S Manila
LUBLUB		31 mls NE Cabanatuan
TYTGAROUS		25 mls N Iba
TITOGETANT		Batangas Prov
LUCSUAN		12 mls W S Fernando (Pampanga)
LUISITA		6 mls SE Tarlac
LUNETA		Manila City
LUNETA LUPAO	• •	27 mls N Cabanatuan
MAASIM		27 mls N Manila
MAASIM MABALACAT		18 mls S Tarlac
		18 mls SW Tarlac
†MABATANG		4 mls N Balanga
*********		17 mls NE Cabanatuan
MACABEBE		27 mls NW Manila
TTACARCTTC		17 mls NE Cabanatuan
MACAPSING MADLUM (or San Miguel)	ъ	39 mls N Manila
MADEONI (or San Miguel)	K	19 mls S Tarlac
MAGALANG		
**********		13 mls NW Iba
MAGUMBALI		24 mls S Cabanatuan
MAKATI		
MALABON		4 mls N Manila
MALALAN R		31 mls NW Iv anila
MALINING		22 mls N Tarlac
MALIMBA R		27 mls N Manila
MALINIA		7 mls N Manila
MALIS		19 mls NW Manila
MALOLOS		20 mls NW Manila
†MALOMA R		20 mls SE Iba
		21 mls S Cabanatuan
MAMATAD MANDALUYONG		4 mls E Manila
†MANGALINIQUEN PT		24 mls NW Balanga
MANGATAREM		29 mls NW Tarlac
MANGUNI R		50 mls N Manila
MANILA		14°36′N, 120°58′E
THADAT AD		9 mls E Sta Cruz, Zambales
INTADA WITTENDED TO	• •	28 mls SE Iba
TADADA D	• •	
TRANDET I A D	• •	33 mls NW Manila
†MARELLA R		28.5 mls SE Iba
MARIKINA		9 mls NE Manila
MARIKIT		29 mls NE Cabanatuan
MARILAO		11 mls N Manila
MARILAO R		11 mls N Manila
MARINGALU R		30 mls NNE Cabanatuan
†MARIVELES		
MARGOT		Stone quarry near Ft Stotsenburg
MASANTOL		27 mls NW Manila
†MASINLOC		15 mls N Iba
†MATAGAN R		35 mls SSE Iba
†MATAIN		OO I WYYNY TO I
	00	

Gazetteer of Place	Names—continued.
Name	Distance and Direction
†MATALVI	14 mls N Iba
MATAPAONA BATO	Manila City
MATULID R	31 mls NE Manila
	Bataan Prov 12 mls N Balanga
MATUNAS R	Bataan Prov
MAUBAN R	17 mls NW Tarlac
MAYANTOC	19 mls W Balanga
†MAYAGAO PT	23 mls NW Balanga
†MAYANGA I	
MAYBANCAL	20 mls E Manila
MAYPAJO	Manila City
MEYCAUAYAN	9 mls N Manila
MEXICO	3 mls NNE S Fernando (Pam-
	panga)
MINALIN	4 mls S S Fernando (Pampanga)
MONCADA	17 mls N Tarlac
MONGO R	15 mls NE Manila
MONTALBAN	16 mls NE Manila
†MORON	18 mls W Balanga
MORONG	19 mls E Manila
MT ANGELO	29 mls NE Manila
+MOUNT BITNUNG	33 mls SE Iba
MOUNT DOME PEAK	14 mls E Iba
MOUNT GATAS	23 mls E Iba
MOUNT MABOLINOC	33 mls SE Iba
THOUNT NATIB	10 mls WNW Balanga
MOUNT PINATUBO	28 mls ESE Iba
MOUNT PURRO	18 mls NE Manila
ITTOTTETT CARTAT	6 mls S Balanga
TMOUNT SAMAT	28 mls SE Iba
†MUERTO R	15 mls N Cabanatuan
MUNOZ	15 mls SE Manila
MUNTINGLUPA	6 mls S Tarlac
MURCIA	o mis S Tariac
†NABUNGA	29 mls SE Iba
NAIC	23 mls SW Manila
NANCA R	12 mls NE Manila
NANGKA	12 mls NE Manila
NAMPICUAN	17 mls N Tarlac
†NATIB MOUNT	10 mls W Balanga
†NAULO PT	25 mls N Iba
TITLE	4 mls N Manila
TIATIOTE D	Zambales-Pangasinan boundary
I T A T A C A T A T T	36 mls S Iba
TNAZASA BAY	20 mls NW Balanga
†NIBANGAN R	5 mls S Manila
NICHOLS A/F NIELSON A/F	5 mls SE Manila
	22 mls N Manila
NORZAGARAY	10 mls NE Manila
NOVALICHES	8 mls N Manila
OBANDO	13 mls SW Tarlac
O'DONNELL	
†OLONGAPO	19 mls NW Balanga
†ORANI	8 mls N Balanga

Name			Distance and Direction
†ORANI CHANNEL	The state of		8 mls N Balanga
ORION			5 mls S Balanga
ORIONES (Bulsa) R			3 mls SW Tarlac
	•		16 mls N Iba
†OYON BAY		• •	TO HIIS IN TOA
PABANLAG			21 mls N Balanga
PACO			2 mls SE Manila
PAGSANJAN			40 mls SE Manila
PAITAN			25 mls NE Tarlac
†PALANGINAN PT			1 ml W Iba
†PALASAN PT			18 mls S Balanga
†PALAUIG			9 mls NW Iba
†PALAUIG REEF			8 mls NW Iba
†PAMATUAN R			27 mls SE Iba
†PAMPANGA B			25 mls NW Manila
PAMPANGA R			25 mls NW Manila
PANDACAN			2 mls E Manila
†PANDAN R			6 mls S Balanga
TPANDAN PT			6 mls S Balanga
PANDI			19 mls N Manila
†PANDIL I			16 mls W Balanga
TPANGOLISANAN R		::	16 mls S Balanga
†PANIBATUJAN (Panith	atuhan	DT	16 mls W Ralanga
PANTABANGAN			27 mls NE Cabanatuan
†PANIKIAN R		::	17 mls S Balanga
PANIQUI			13 mls N Tarlac
PAOMBONG	::	::	20 mls NW Manila
	• •		7 mls S Manila
PARANAQUE R	• •	• •	28 mls N Manila
PASAG R PASAY	• •	• •	4 mls SE Manila
DIGTO		٠.	8 mls SE Manila
	• •	• •	Manila City
PASIG R		• •	8 mls SE Manila
PATEROS	1\ D	• •	12 mls SW Tarlac
PATLIN (or O'Donnel		• •	14 mls SW Balanga
†PAYSAWAN B			
†PAYSAWAN R		• •	14 mls SW Balanga
PAYUGBUG TRAIL		• •	SE Iba 9 mls S Cabanatuan
PENARANDA	• •	• •	
PENARANDA R		• •	9 mls S Cabanatuan
†PEQUENA I			24 mls NW Balanga
PETAMBU PT			25 mls NW Balanga
PICO LEON			11 mls NE Cabanatuan
†PILAR			1½ mls SE Balanga
PILILLA			25 mls E Manila
†PINA R			10 mls N Balanga
PINAMBARAN			20 mls S Cabanatuan
PINAOD			28 mls S Cabanatuan
PINEDA			7 mls E Manila
PINTO			18 mls NE Cabanatuan
†PINULOT			16 mls NW Balanga
PLANAS R			25 mls N Balanga

Name	Distance and Direction
PLARIDEL	21 mls NW Manila
POLO	7 mls N Manila
POONBATO	14 mls E Iba
POPONTO	20 mls N Tarlac
DODAG	28 mls S Tarlac
PORAC WEST A/F	27 mls S Tarlac
PORAC (Pampanga) R	25 mls NW Manila
†PORT BINANGA	18 mls W Balanga
†PORT MASINLOC	14 mls N Iba
†PORT MATALVI	12 mls N Iba
	19 mls NW Balanga
PORT CHANCHIN	28 mls W Balanga
PROVISOR ISLAND	Manila City
PROVISOR ISLAND	17 mls S Balanga
†PUCOT R	19 mls S Cabanatuan
PULANG BULI	22 mls NW Manila
PULILAN	7 mls SSW Balanga
†PULONG BATO PT	
PUNCAN	29 mls N Cabanatuan
†PUNDAGUIT (Pundaquit) R	29 mls S Iba
PURA	10 mls N Tarlac
†PULIPO I	25 mls N Iba
OVERTA DATA EL	29 mls SE Tarlac
QUENABUAN	
QUEZON	5 mls NE Manila
QUINGUIA (Plaridel)	21 mls NW Manila
QUISAO	27 mls SE Manila
†QUITANG (Kitang) PT	10 mls SSE Balanga
QUITANGUIL R	16 mls N San Fernando
DATEC	12 mls N Tarlac
RAMOS	34 mls N Iba
RATON ISLET	16 mls NW Cabanatuan
RIO CHICO	
†RIVERA PT	19 mls NW Balanga
RIZAL	18 mls NE Cabanatuan
ROSALES	28 mls E Lingayen 8 mls E Manila
ROSARIO	8 mls E Manila
GAGORIA (an Bandan) B	17 mls N San Fernando
SACOBIA (or Bamban) R	22 mls N Iba
†SABALAY REEF	
†SALASA (Salaza) R	10 mls NNW Iba
†SALIAN	3 mls N Balanga
SALUPAGUI R	80 mls N Manila
†SALVADOR I	14 mls NW Iba
†SAMAL	6 mls N Balanga
†SAMAT MT	5 mls SW Balanga
SAMPALOC	27 mls E Manila
†SAMPALOC PT	42 mls S Iba
SAN AGUSTIN	13 mls N San Fernando
†SAN ANTONIO	27 mls S Iba
SANTIBANES CANAL	Manila City
SAN CLEMENTE	22 mls NW Tarlac
	91

Name		Distance and Direction
†SAN FELIPE		19 mls S Iba
SAN FELIPE NERI		4 mls E Manila
SAN FERNANDO (Pampanga		15°02′N, 120°41′E
SANGLEY PT	1)	
SANGLEY PT SAN ILDEFONSO	٠.	7 mls SW Manila
SAN ILDEFONSO		28 mls S Cabanatuan
SAN ISIDRO	٠.	12 mls SW Cabanatuan
SAN JOSE		18 mls S Balanga
SAN JOSE DEL MONTE		16 mls NE Manila
SAN JUAN SAN JUAN DEL MONTE		7 mls SW San Fernando
SAN JUAN DEL MONTE		4 mls E Manila
SAN JUAN DE MATA		5 mls NW Tarlac
SAN IULIAN		16 mls N Tarlac
SAN LAZARO		
SAN LEONARDO		
SAN LUIS SAN MARCOS		7 mls E San Fernando
SAN MARCOS		
TSAN MARCELINO A/E		27 mls SE Tha
SAN MANUEL SAN MATEO		21 mls N. Torles
SAN MATEO		12 mls N Tarrac
SAN MIGUEL		15 mis NE ivianila
SAN MIGUEL		4 mls S Tarlac
SAN MIGUEL (or Madlum)	K	39 mls N Manila
SAN MIGUEL DE MAYUM	A	37 mls N Manila
SANTA MONICA		8 mls SW San Fernando
ISAN NARCISO		ZZ IIIIS S IDa
SAN NICOLAS		13 W San Fernando
SAN PEDRO	٠.	17 mls SE Manila
SAN RAFAEL		25 mls N Manila
SAN ROQUE		6 mls SE San Fernando
		7 mls E San Fernando
		6 mls SE San Fernando
†SAN VICENTE R		22 mls N Iba
SANTA ANA		7 mls NE San Fernando
†SANTA CRUZ		30 mls N Iba
†SANTA (Baluarte) CRUZ PT		29 mls N Iba
†SANTA CRUZ Ŕ		
†SANTA FE		27 mls SE Iba
		13 mls NW Tarlac
		26 mls E Manila
SANTA ISABEL		19 mls NW Manila
C		24 mls N Manila
CATTER A TEATH		16 mls N Manila
		City of Manila
		6 mls SE San Fernando
		6 mis SE San Fernando
		5 mls S Cabanatuan
SANTIAGO		11 mls S Tarlac
SANTO CRISTO		16 mls S Cabanatuan
SANTO DOMINGO		4 mls SE San Fernando
†SANTO NINO		19 mls SSE Iba
	• •	16 mls NE Cabanatuan
ICATERO POPERO		13 mls NW Cabanatuan
†SANTO TOMAS		22 mls SSE Iba

Name	Distance and Direction
SAN YSIDRO VALLEY	23 mls E Manila
	13 mls SW Balanga
	8 mls SW San Fernando
SEXMOAN	
SIBUL SPRINGS	40 mls N Manila
SIBUYAN SEA	South of Luzon
SIKSIKAN	9 mls N Cabanatuan
†SILANGANAN MT	10 mls W Balanga
†SILANGUIN I	39 mls S Iba
†SINABACAN	23 mls N Iba
	17 mls S Balanga
†SISIMAN B	17 mls S Balanga
	15 mls NW San Fernando
STOTSENBURG FORT	35 mls SE Iba
†SUBIC	Bataan-Zambales 20 mls NW
†SUBIC B	
	Balanga
SUCAT	11 mls SE Manila
†SUESTE PT	24 mls WNW Balanga
	10 1 777 01
TABLANG	12 mls NE Cabanatuan
†TABONES IS	35 mls S Iba
TABUATING R	6 mls S Cabanatuan
TAGIG TAGUDIN	9 mls SE Manila
TAGUDIN	La Union Prov 16°55'N, 120°25'E
TAGUMBAO	8 mls N Tarlac
TALAVERA	7 mls NW Cabanatuan
	Laguna de Bay 25 mls SE Manila
	12 mls NW Manila
TALIPTIP R	
†TALISAIN B	33 mls S Iba
†TALISAY (Abo Abo) R	Adjacent to Balanga
†TALUGTUG	30 mls SE Iba
TAMBO R	7 mls S Cabanatuan
TAMBOVE ROADS	25 mls W Lingayen
TANAY	23 mls E Manila
†TAPULAO R	8 mls N Balanga
TARLAC	15°29′N, 120°35′E
TAWIRAN	11 mls NW Manila
TAYTAY	11 mls E Manila
	15 mls SE Manila
TAYUMAN TAYUMAN JCT TELABASTAGAN	Manila
TAYUMAN JCT	
I DDI ID I I I DI II I	8 mls NW San Fernando
TERESA	17 mls E Manila
†TIAWIR R	4 mls SW Balanga
†TICTIC	18 mls S Balanga
TINAJEROS	5 mls N Manila
TIPAS	9 mls SE Manila
TONDO	Manila City
†TORTUGA REEF	22 mls N Iba
TORTUGA I	2 mls NE Balanga
TIDANG	1 ml W Tarlac
TUBANG	8 mls N Balanga
PUTTE TATTANT	7 mls NE Manila
TULIAHAN	I IIIS INE IVIAIIIIA

Name			Distance and Direction
TULIAHAN R		- J.	10 mls E Manila
TUNASANCILLO			16 mls SE Manila
TUNASANCILLO R		• •	16 mls SE Manila
tUACON R			24 mls N Iba
†UMAGO R			11 mls SW Balanga
UMINGAN			41 mls E Lingayen
VEGA GRANDE			26 mls NE Cabanatuan
†VIAY			28 mls N Iba
VICTORIA			8 mls NE Tarlac
†VILLAR			20 mls SE Iba
VILLASIS BGDE			25 mls SE Lingayen
VISAYAN SEA			South of Luzon
VISORIA	• •		8 mls NW Cabanatuan
WAWA			17 mls NE Manila
ZABLAN A/F			7 mls E Manila
ZAPOTE			10 mls S Manila
ZAPOTE R			9 mls S Manila
ZARAGOZA			12 mls W Cabanatuan

## APPENDIX "C"

## JAPANESE EQUIVALENTS OF PLACE NAMES

The following Japanese equivalents for the more important place names in Zambales-Bataan area are supplied by Allied Translator and Interpreter Section SWPA, and are arranged alphabetically by provinces.

Name BATAAN PROVI	Romaji NCE	Character
ABUCAY	ABUKAI	すつ"カイ
BAGAC	BAGAKKU	ノ、カッツク
BALANGA	BARANGA	バランガ
CABCABEN	KABUKABEN	カプカベン
DINALUPIHAN	DEINARUPIHAN	デイナルピハソ
HERMOSA	HERUMOSA	ヘルモナ
LIMAY	RIMAI	1) マイ
MARIVELES	MARIHERESU	マリヘレス
MORON	MORON	モロン
ORANI	ORANI	オラニ
ORION	ORION	オリオン
PILAR	PIRARU	ピラル
SAMAL	SAMARU	サマル
TAMBALES DD	WINCE	

## ZAMBALES PROVINCE

ACOJE (S CRUZ)	AKUJE (S KURUZO)	アクシ (サンタクルス")飛行場
BIANGUE	BIANGUE	ピ"ヲンク"エ
BOTOLAN	BOTORAN	ホ"トラ ン
CABANGAN	KABANGAN	カバンがン
CANDELARIA	KANDERARIA	カンテ"ラリア

## JAPANESE EQUIVALENTS OF PLACE NAMES—Continued.

Name	Romaji	Character
ZAMBALES PRO	OVINCE.	
CASTILLEJOS	KASUTEREYOSU	カステレヨス
IBA	IBA	イバ
MASINLOC	MACHINROKKU	マシンロック
PALAUIG	PARAUIGGU	ノップラウィック"
SAN ANTONIO	SAN ANTONIO	サンアントニオ
SAN FELIPE	SAN FUERIPPE	サンフエリッへ
S MARCELINO	SAN MARUSERINO	サンマルセリノ
SAN NARCISO	SAN NARUSHISO	サンナルシソ
SANTA CRUZ	SANTA KURUZU	サンタクルス。
SUBIC	SUBIKKU	スピック

## APPENDIX "D"

## GLOSSARY OF TAGALOG WORDS

Many Tagalog and Spanish words, describing vehicles, methods, fruits, etc., have been adopted by the white population, resulting in little use of the English equivalent. Some of these words are:

Adobe ... .. Consolidated volcanic ash, used for building stone.

Bangas ... Fresh or salt water fish maturing in 3 months, generally in artificial ponds.

Baguio .. .. Typhoon.

Bodega .. .. Warehouse,

Banca ... .. Canoe made by hollowing out a log; with or without

outriggers.

Batil .. . A small sailing boat with decking but no cabin—10

to 50 tons.

Carramatta . . A high 2-wheel horse-drawn carriage, for 2 passengers. Generally with upholstered seat and highly decorated.

Calesa . . . A high 2-wheel horse-drawn carriage, for 4 passengers. About same size as a carramatta, but has 2 wooden seats along the side.

Colla .. .. Local squall.

Cogon .. . . Native grass similar to kunai grass.

Estero .. . A navigable canal.

Kaingan .. . . Farmland prepared by burning off grass or forest.

Mestizo ... Person whose father and mother belong to different races.

Muscovado .. Crude raw sugar with high molasses content, manufactured in old type sugar mills.

Palay .... Unhusked rice.

Poto .. . A native sweetened rice cake.

Sawalli ... Mats woven from split and shaved bamboo, used for drying palay, carpets, flooring, walls of houses and baskets.

Sitio .. . A small group of houses within a barrio.

#### APPENDIX "E"

## WEIGHTS AND MEASURES

Metric system was official in Philippines. As scales and standard volume measures are not available in agriculture areas, standard condensed milk cans, kerosene tins and beer bottles are used as substitutes. Outside of large industries, most products are sold by volume with the ganta or salop (3000 cc-3.17 liquid quarts) as basic measure.

1 chupa = 1 ganta = 375 cubic centimeters. 1 ganta = 8 chupa = 3 liters = 3000 cc.

I ganta = 8 cntpa = 5 inters = 3000 cc.
In some areas 9 chupa = 1 ganta or 3 chupas = 1 liter.
A chupa of uncooked rice is considered \(\frac{1}{2}\) of a rice ration or sufficient for one meal.
1 kilo = 1000 grams = 2.2051b. = 35.274oz.

1 M ton = 1000 Ko = 2204.62lb.=1.102 short ton = .984 long ton.
1 S ton = 2000b. = .89 long tons = .907 metric tons.

1 L ton = 2240lb. = 1.12 short tons = 1.106 metric tons.

1 Sq yd. -836 sq meter.

1 Acre = 4046.873 sq. meter = 0.404 hectares.

1 Sq mile = 640 acres = 258.9 hectares.

1 Sq mile = 640 acres = 258.9 hectares.

1 Sq meter = 10.76 sq feet.

1 Hectare = 11959.8 sq yards = 10,000 sq. meter = 2,47 acres.

Item	Volume			We	Weight	
	Met	ric at 30 y	US	ко	lbs	
palay	31	iters 0.	084 km	1.72	3.784	
rice	3 1			2.30	5.06	
ed corn					5.148	
shelled peanuts	3 1				2.42	
mungos					5.148	
					26.97	
					94.60	
					126.5	
shelled corn	25	ganta 2	2.13 kn	58.5	128.7	
	palay riceed corn shelled peanuts mungos rice - Palay	palay 3 1 rice 3 1 rice 16 1 Palay 25 g rice 2	Metric   palay   3 liters   0.	Metric US	Metric US KO   Palay   3 liters   0.084 km   1.72	

- 10 leche (condensed milk can) = 1 ganta.
- 10 leche (condensed miss can) = 1 ganta.

  1 kerosene (5 gallons square can) = 6 ganta.

  1 Fresco (square face gin bottle) = 1400 cc.

  4 beer bottles = 1 fresco.

  1 Dango = span from finger to thumb, approx 8in.

  1 Depa = span of outstretched arms, approx 6ft.

'de most dome tel

