2.3.2 Port Facilities and Future Development Plans

(1) Province of Northern and Southern Leyte

1) Port of Tacloban

a) General Description

The Base Port of Tacloban is located at the capital city of Northern Leyte. The port is the primary shipping harbor in Eastern Visayas where Inter-island ships ply the Tacloban-Cebu-Tacloban and the Tacloban-Manila-Tacloban routes. It is situated at the south entrance of a narrow channel, San Juanico Strait, which limits vessels navigable such as draft (6.5m), over all length (110m) of vessels. Vessels passing through the channel are forced to turn 22 times to reach to the port. San Juanico Bridge, the longest bridge the Asia, limits the air draft of vessel as high as 109 feet or 33.22m. On the other hand, the channel through San Pedro Bay has no limitation. However, most of vessels calling the port pass San Juanico Strait because its navigation route is not facing to the ocean.

R.C deck of the port is generally deteriorated as some potholes are confirmed. New R.C. wharf, 138m long and 18m wide, project has started at the south corner of the port, where RORO facility is located. The RORO ramp shall be demolished and reconstruct upon the new wharf completed.

Present and future development plan of the port is shown in Fig. 2.3.2-1.

b) Present Port Facilities

Berthing facilities	Wharf	683.1m
	RORO Ramp	18m x 18m
Draft along side		-6m
Other facility		Passenger terminal
		Warehouse

- Passenger terminal building is no longer used
- New R.C wharf, 138m x 18m is now under construction

c) Future Development Plan

No further plan is scheduled other than the wharf mentioned above.

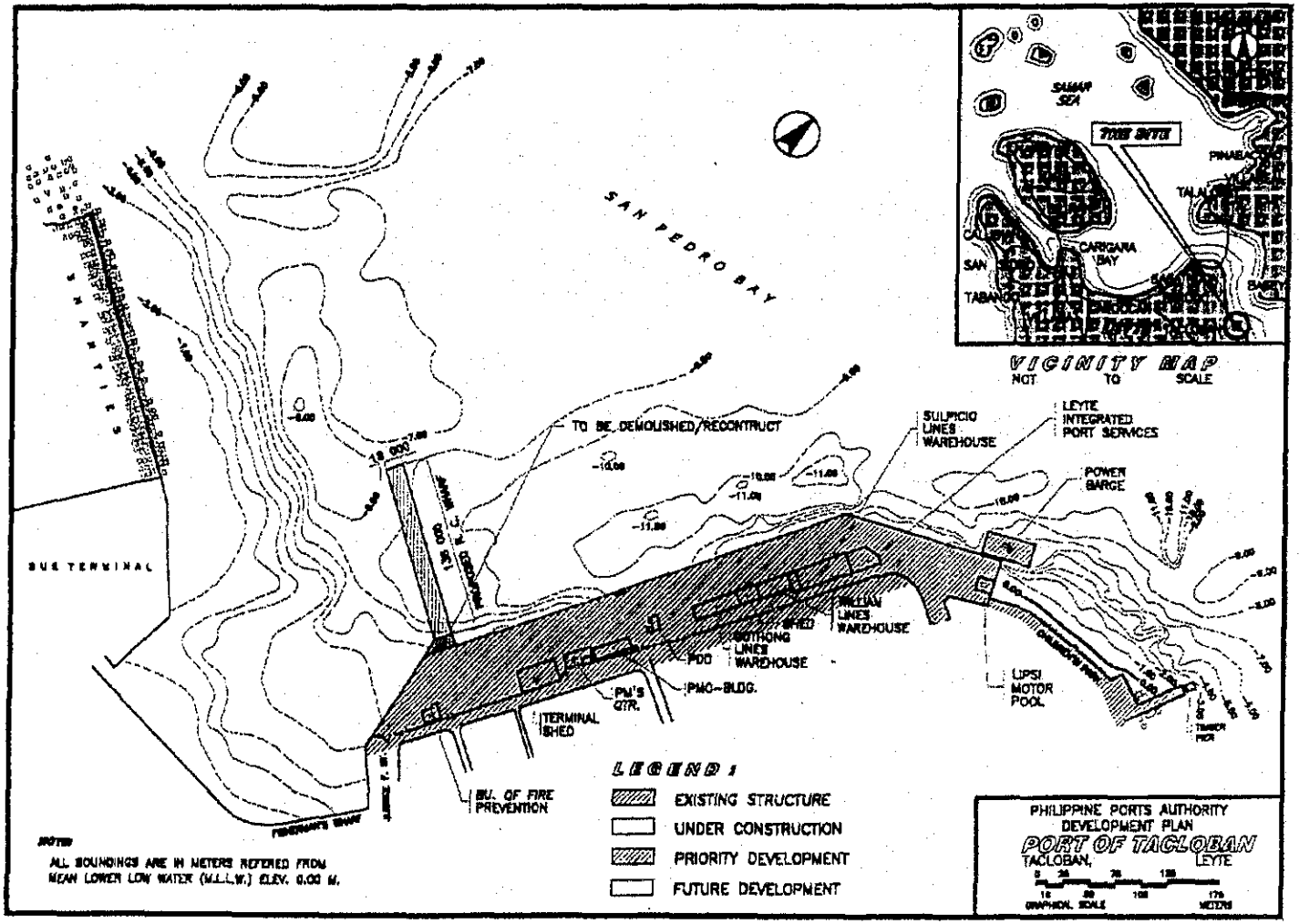

Fig. 2.3.2-1 Development Plan - Port of Tacloban

2) Port of Ormoc

a) General Description

The Terminal Port of Ormoc is located right at the heart of Ormoc City. It is a pier running southward, as extension of Bonifacio Street. The port is located an enclave fronting the Ormoc Bay and serving as an ideal jump off point for Cebu, the rest of the Visayas and the Northern portion of Mindanao.

Main pier has recently completed its widening and extension to improve cargo-handling capacity and increase the size of vessels to be accommodated. A pier especially use for fast craft has also completed and then the access from the passenger terminal to the vessel is improved. The port is located in Bonifacio Street, right at the heart of Ormoc City and it is very convenient place for passengers since surrounded by Ormoc public market, jeepney terminal, bus and terminal

Present and future development plan of the port is shown in Fig. 2.3.2-2.

b) Present Port Facilities

Berthing facility	Pier	Conventional: 282m
	Pier	Fast craft: 63m
	RORO Ramp	9m x 11m
Draft along side		-4m to -5m
Other facility		Passenger terminal

- Passenger terminal building for fast craft vessel
- New pier for fast craft vessel (63m x 9m), an extension of main R.C. pier (69m x 12m) and widening of existing R.C. pier (18m) is recently completed.

c) Future Development Plan

No further plan is scheduled other than the wharf mentioned above.

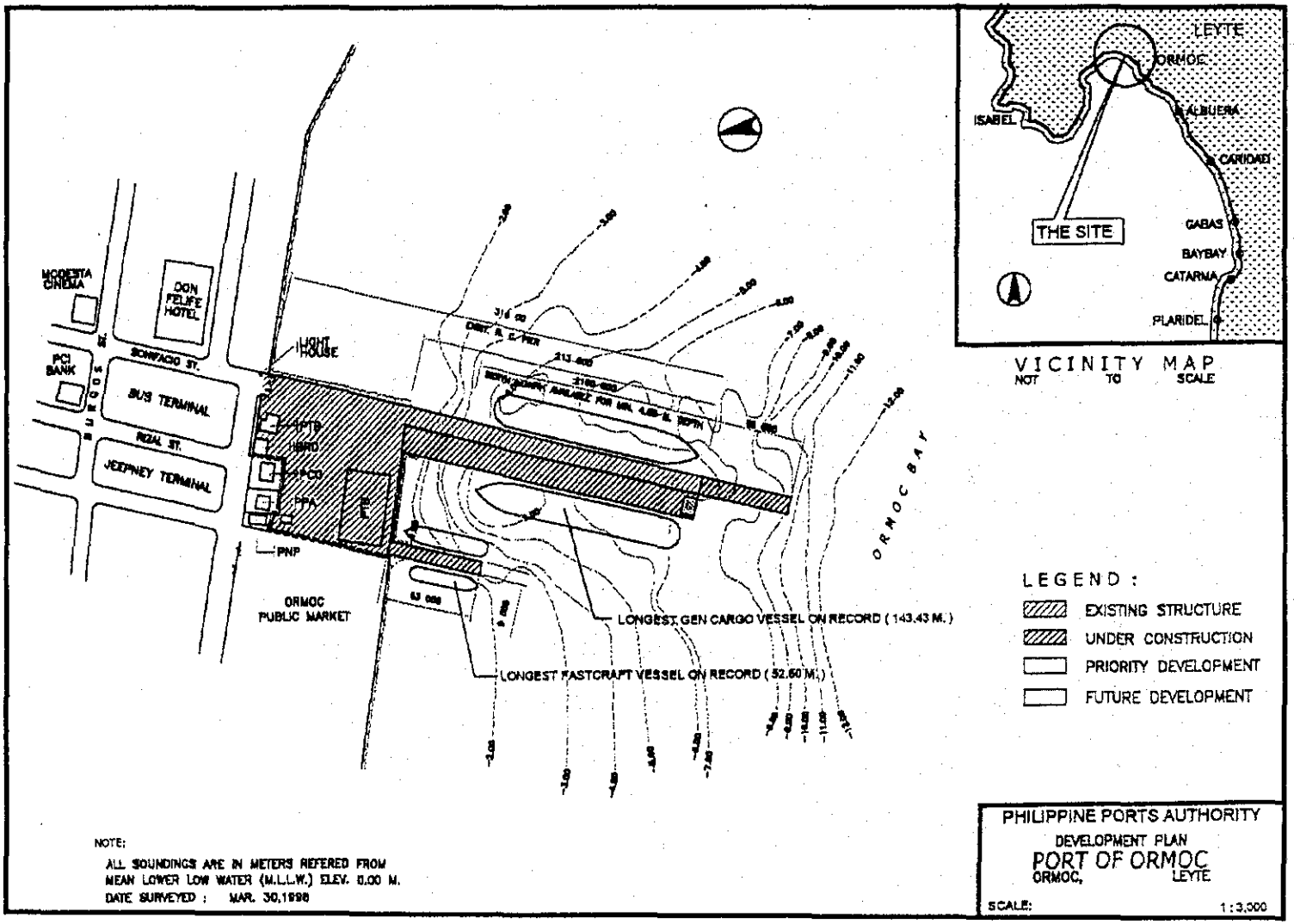

Fig. 2.3.2-2 Development Plan - Port of Ormoc

3) Port of Baybay

a) General Description

The Terminal Port of Baybay is located at the center of the western coast of the province of northern Leyte. Distance to Tacloban City is 105km northeast, Ormoc City 44km north and Maasin City 98km south. The port serves mainly vessels plying Cebu, and Manila and Southern Mindanao routes (Manila-Masbate-Calibian-Baybay-Maasin- Surigao). Main cargoes handled in this port are mainly agricultural crops such as copra and abaca; and other commercial industrial products coming from Manila, Cebu and Mindanao such as cement and steel.

Number of passenger using Baybay port reach to 90,000 per annum and 85,000 is between Baybay and Cebu port. Remaining 5,000 counted in the route of Manila-Masbate-Calubian-Baybay-Maasin-Surigao). Vessel from/to Cebu is 1 trip a day, 7 days a week.

Main commodity handled in Baybay are; Cement and consumables as in coming; hemp, copra and charcoal as out going. Volume of copra is reaching about 200 MT per month.

Proposed reclamation project will be started February 2001.

Present and future development plan of the port is shown in Fig. 2.3.2-3.

b) Present Port Facilities

Berthing facility	Pier	312m
	RORO Ramp	Nil
Draft along side		-6m
Other facilities		None

c) Future Development Plan

- Reclamation area for storage area and fast craft berth (60m x 40m)
- 2.5m widening of existing causeway

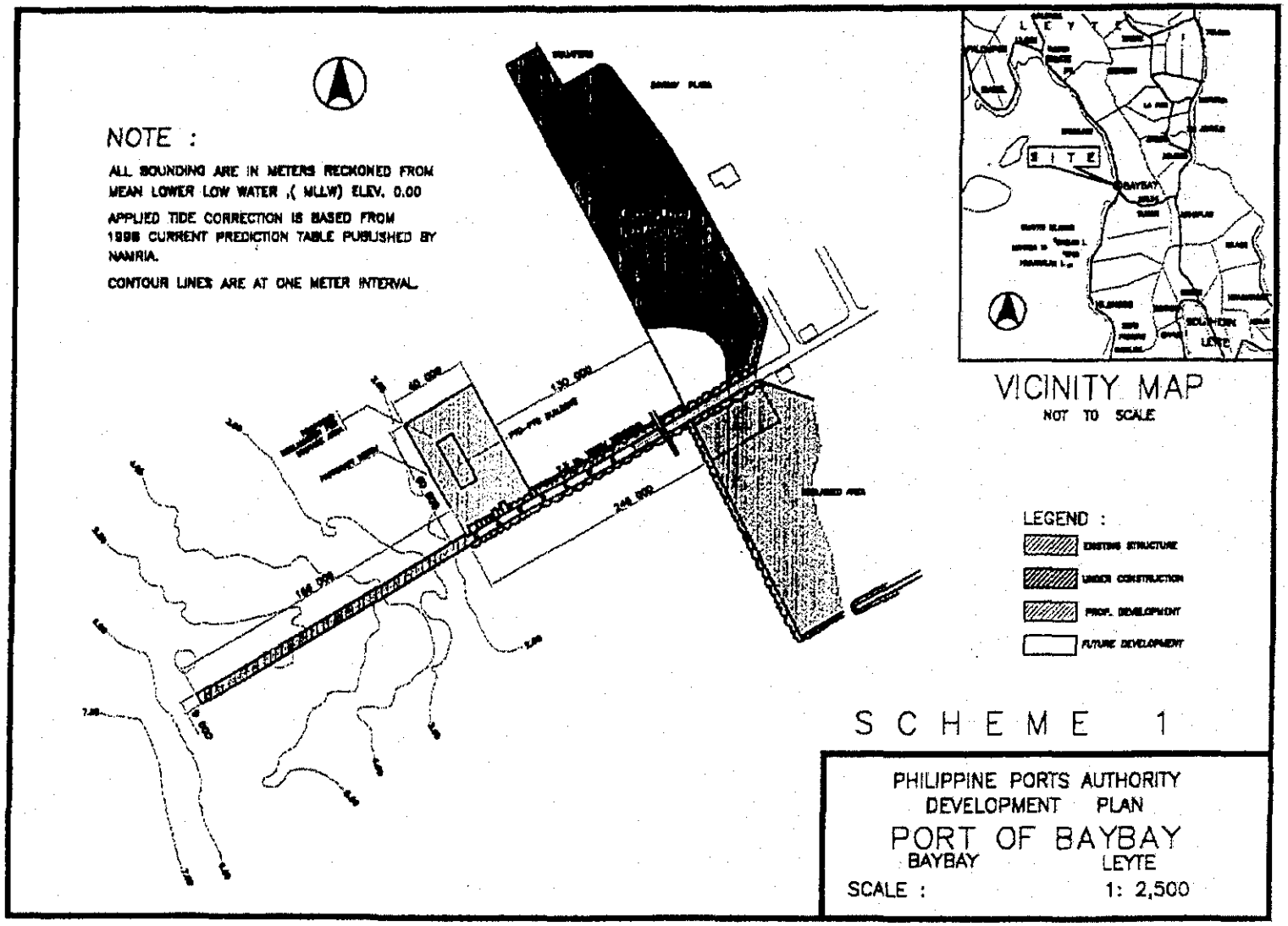

Fig. 2.3.2-3 Development Plan - Port of Baybay

4) Port of Maasin

a) General Description

The Terminal Port of Maasin, located at the capital city of Maasin, Southern Leyte, is situated east of Tuburan creek. The port faces Bohol Island and Canigao Channel in the northeast and opens up to the Mindanao Sea southward. The port serves mainly vessels plying Cebu, Manila and Southern Mindanao routes. Commercial exchange consists mainly of agricultural crops such as copra and abaca among others; and other commercial industrial products coming from Manila, Cebu and Mindanao such as cement and steel. Fast craft ferries were deployed to this port last 1996.

Conventional vessel and fast craft travels Cebu-Maasin-Surigao 1 trip a day, while Manila-Surigao is 1 trip a week via port of Baybay.

Reclamation work is on-going to develop 1.2ha backup area with 15m x 15m RORO ramp. The project is scheduled to complete on 12 February 2002.

Present and future development plan of the port is shown in Fig. 2.3.2-4.

b) Present Port Facilities

Berthing facility	Pier	77m + 77m
	RORO Ramp	Nil
Draft along side		-7m
Other facilities		Passenger terminal

- Passenger terminal building for fast craft vessel

c) Future Development Plan

- Reclamation area for open storage, parking area (A=1.2ha)
- New R.C. pier 102m x 18m
- New RORO ramp (15m x 15m)

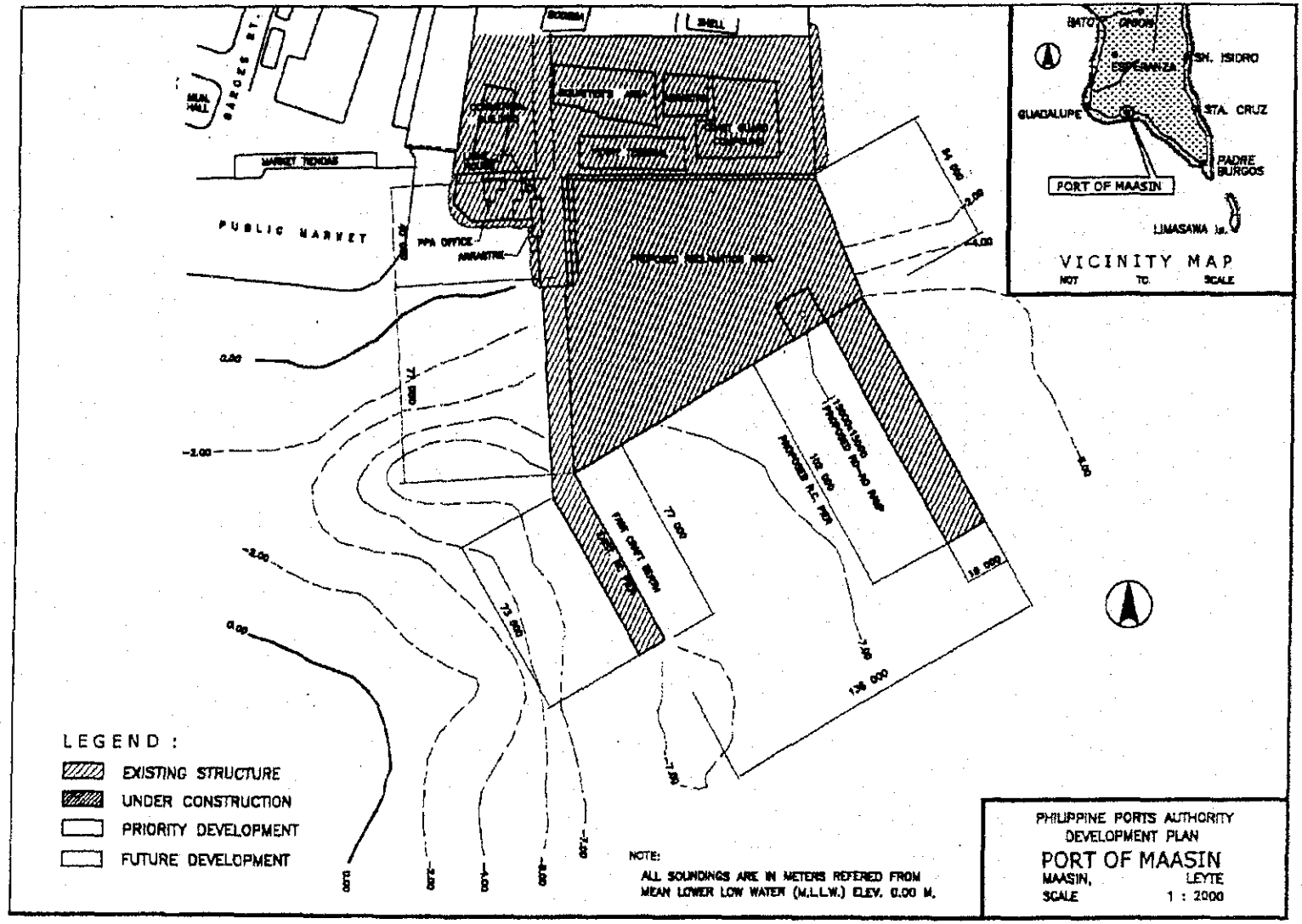

Fig. 2.3.2-4 Development Plan - Port of Maasin

(2) Province of Bohol

1) Port of Tagbilaran

a) General Description

The Baseport of Tagbilaran is located at the capital city of Tagbilaran, Bohol. The port is the biggest and main port of Bohol. It is situated specifically at the narrow channel formed by a cove on the southwestern end of Maribojoc Bay and Panglao Island; the latter providing a natural barrier that protects the port is a regular port of call for inter-island vessels plying between Cebu, Mindanao and Manila.

Tagbilaran port is not open to wave actions and the prevailing NE wind is approximately 3km/h only. It is usually warm and dry along the coast and cold and humid in the interior. The Maximum and minimum temperatures are 32 degree Centigrade and 22.6 degrees Centigrade respectively.

It is an L-shaped concrete wharf. At deck elevation, the wharf is +2.5m LW datum and a water depth of -8.0m LW datum. It is linked to the shore by a 405m long causeway.

Present and future development plan of the port is shown in Fig. 2.3.2-5.

b) Present Port Facilities

Berthing facility	Pier	180m
	RORO Ramps	4 nos.
Draft along side		-6m to –8m
Other facilities		Passenger terminal
		Cargo shed

- Reclamation for parking area is under now construction
- Widening of existing causeway (20m) is now under construction
- Pier (78m x 6m) at the northeast corner of existing pier is now under construction

c) Future Development Plan

- Extension of existing wharf (150m x 83m)
- Further widening of existing causeway (20m)

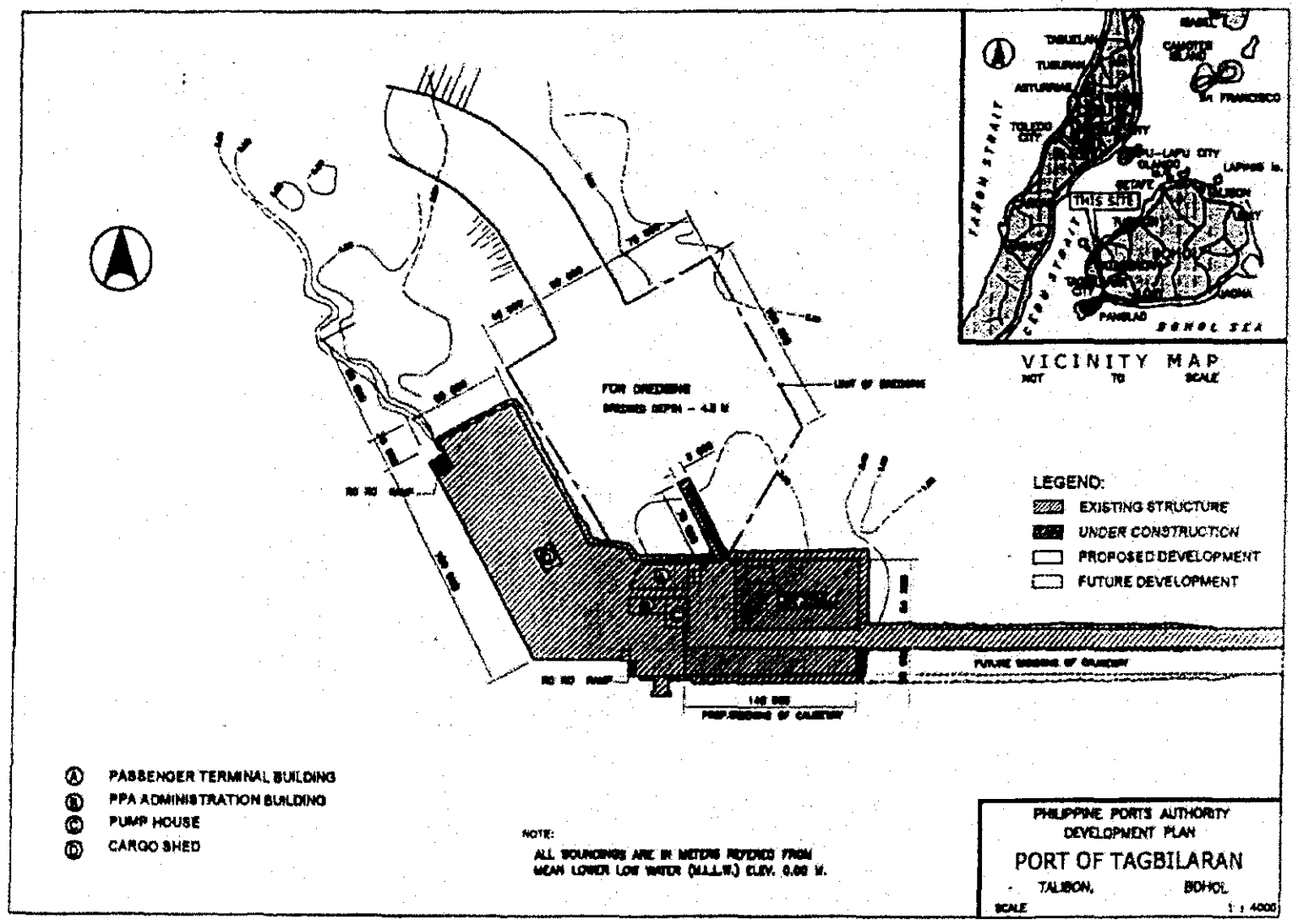

Fig. 2.3.2-5 Development Plan - Port of Tagbilaran

2) Port of Tubigon

a) Genral Description

The Terminal Port of Tubigon is located approximately 53.6km north of Tagbilaran City. It is an L-shaped RC finger pier with a riprap rock causeway. It has a RORO berth to accommodate LCTs and barges. The RC deck pier is 126m from the gate up to the tip and is 8m wide. The only 80m is actually utilized due to shallow draft. The RORO berth is constructed at the L-portion with a dimension of 9 x 9m.

The distance from Tubigon to Cebu followingthe sailing route is 21.5 nautical miles. Enroute to Tubigon from Cebu, a mariner has to keep watch of shallow portions like the one located 0.35 nautical miles east of Pangaspasan Island (2.3m deep) and another one, which is 3.4m deep, located 0.4 nautical miles west of Macabok Island.

The port of Tubigon can accommodate larger vessels coming from Cebu if another route is followed. There are two approaches, one going to the direction of Getafe changing course near Kabul-an Island before proceeding to Tubigon. Another course is going towards the direction of Catagbacan changing course at Inanoran Island, and then proceeding to Tubigon. However, these two approaches require daytime navigation only. Travel following these two routes takes longer than the route presently used by ferry vessels.

Present and future development plan of the port is shown in Fig. 2.3.2-6.

b) Present port Facilities

Berthing facility	Pier	123.0m
	RORO Ramps	9m x 9m
Draft along side		2.8m - 4.1m
Other facility		Cold storage
		Warehouse

c) Future Development Plan

- Reclamation along existing causeway (100m x 20m)

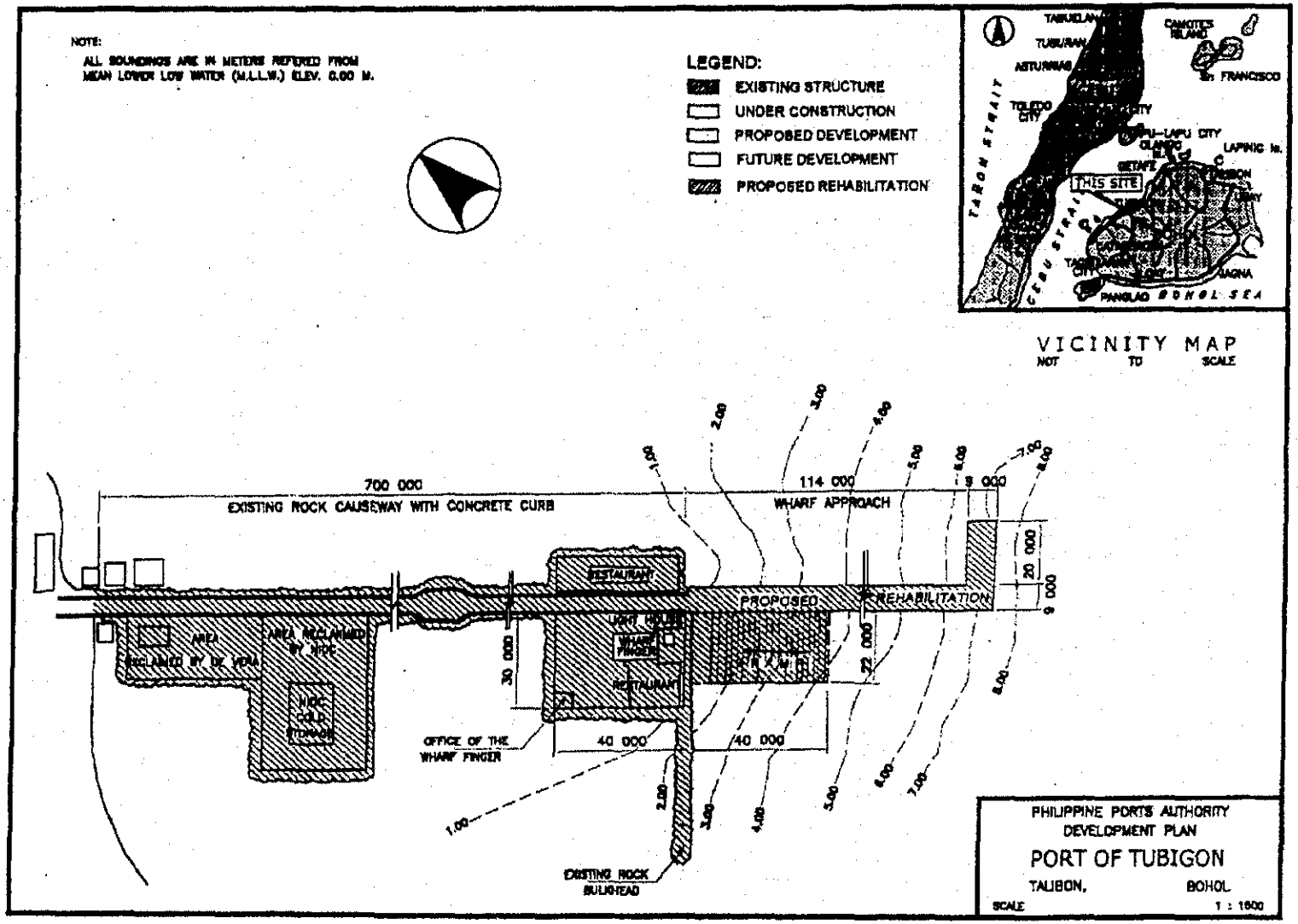

Fig. 2.3.2-6 Development Plan - Port of Tubigon

2) Port of Tubigon

a) Genral Description

The Terminal Port of Tubigon is located approximately 53.6km north of Tagbilaran City. It is an L-shaped RC finger pier with a riprap rock causeway. It has a RORO berth to accommodate LCTs and barges. The RC deck pier is 126m from the gate up to the tip and is 8m wide. The only 80m is actually utilized due to shallow draft. The RORO berth is constructed at the L-portion with a dimension of 9 x 9m.

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The port of Tubigon can accommodate larger vessels coming from Cebu if another route is followed. There are two approaches, one going to the direction of Getafe changing course near Kabul-an Island before proceeding to Tubigon. Another course is going towards the direction of Catagbacan changing course at Inanoran Island, and then proceeding to Tubigon. However, these two approaches require daytime navigation only. Travel following these two routes takes longer than the route presently used by ferry vessels.

Present and future development plan of the port is shown in Fig. 2.3.2-6.

b) Present port Facilities

Berthing facility	Pier	123.0m
	RORO Ramps	9m x 9m
Draft along side		2.8m - 4.1m
Other facility		Cold storage
		Warehouse

c) Future Development Plan

- Reclamation along existing causeway (100m x 20m)

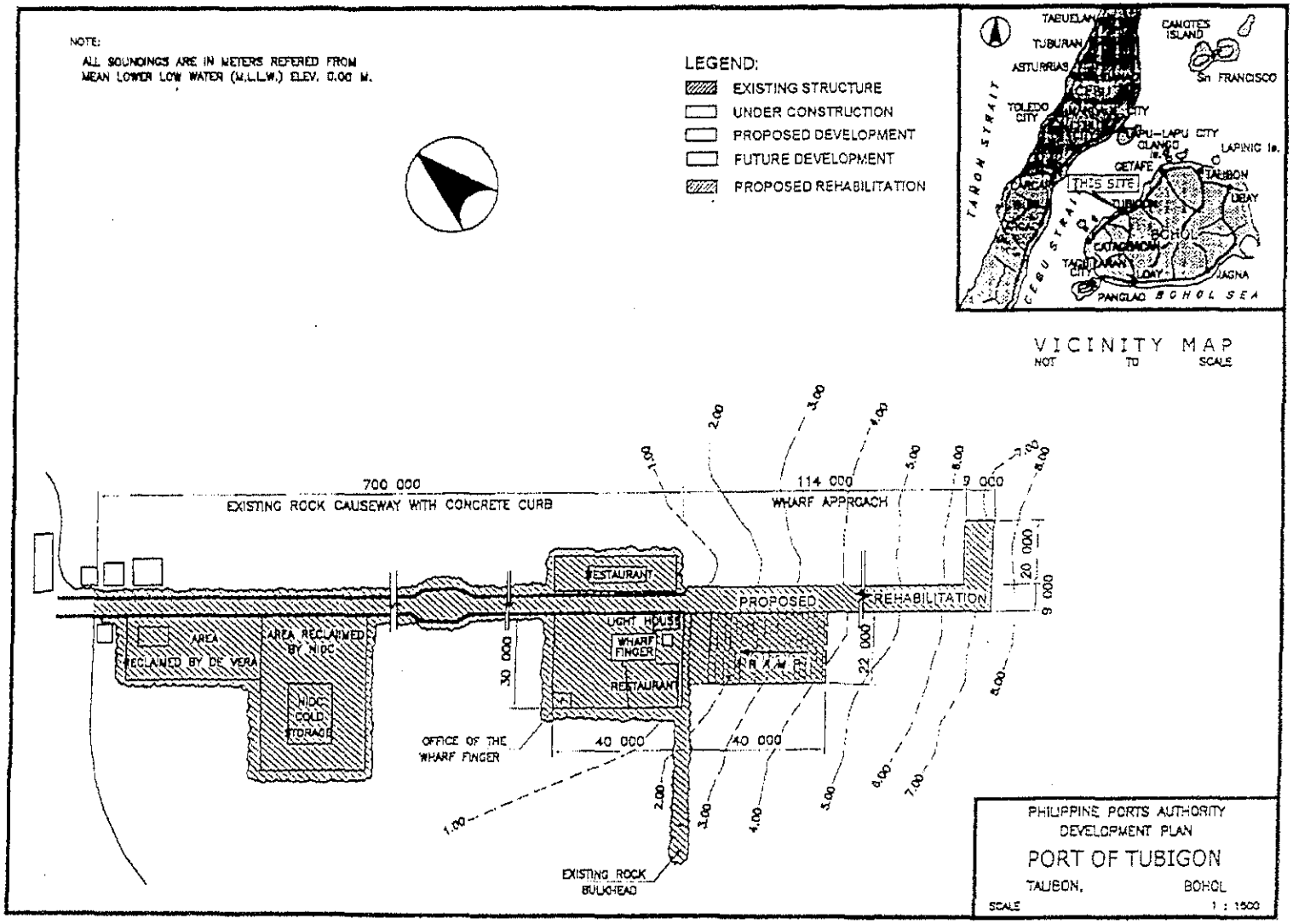


Fig. 2.3.2-6 Development Plan - Port of Tubigon

(3) Province of Negros Oriental

1) Port of Dumaguete

a) General Description

The port of Dumaguete is located at the capital city of Dumaguete, Negros Oriental.

Port of Dumaguete has a short-term (on-going projects), medium-term (6-year) and long-term (25 year)-development plan stared from 1999. In a short-term plan, main projects are reclamation (0.55ha) and access road of the area adjacent to the PPA compound, and reclamation (1.3ha) for the fast craft terminal. Reclamation area adjacent to PPA compound is now temporarily suspended due to lack of fund from DPWH. DPWH suppose to complete the reclamation work and turnover to PPA. PPA is now evaluating 2 options: (i) waiting for the completion of the project under DPWH, or (ii) PPA allocated the necessary fund and complete under the PPA. While reclamation for Fast Craft terminal is not started yet since EIS is not yet approved.

In a medium-term plan, it is planned to implement that an additional reclamation of the area adjacent to the RORO ramp, and a widening and extension of Pier 3.

In a long-term plan, a comprehensive development/expansion of the port is considered. Proposed reclamation area is scheduled to the north side of existing port area. Total area is 12.6ha.

Present and future development plan of the port is shown in Fig. 2.3.2-7.

b) Present Port Facilities

Berthing facility	Pier One	30 x 166m
	Pier Two	16 x 80m
	Pier Three	12 x 162m
	RORO Ramps	9 x 11m
		12 x 12m
Draft along side		-4.00m to -7.00m
Other facility		Container yard
		Passenger shed

- Reclamation along side the squatters' area is under construction.

c) Future Development Plan

- Reclamation and passenger/fast craft ferry terminal building (A=1.3ha)
- Extension of Pier 1(100m x 30m)
- Widening/Extension of Pier 2 and 3
- Reclamation and construction of R.C. marginal wharf (A=12.6ha)

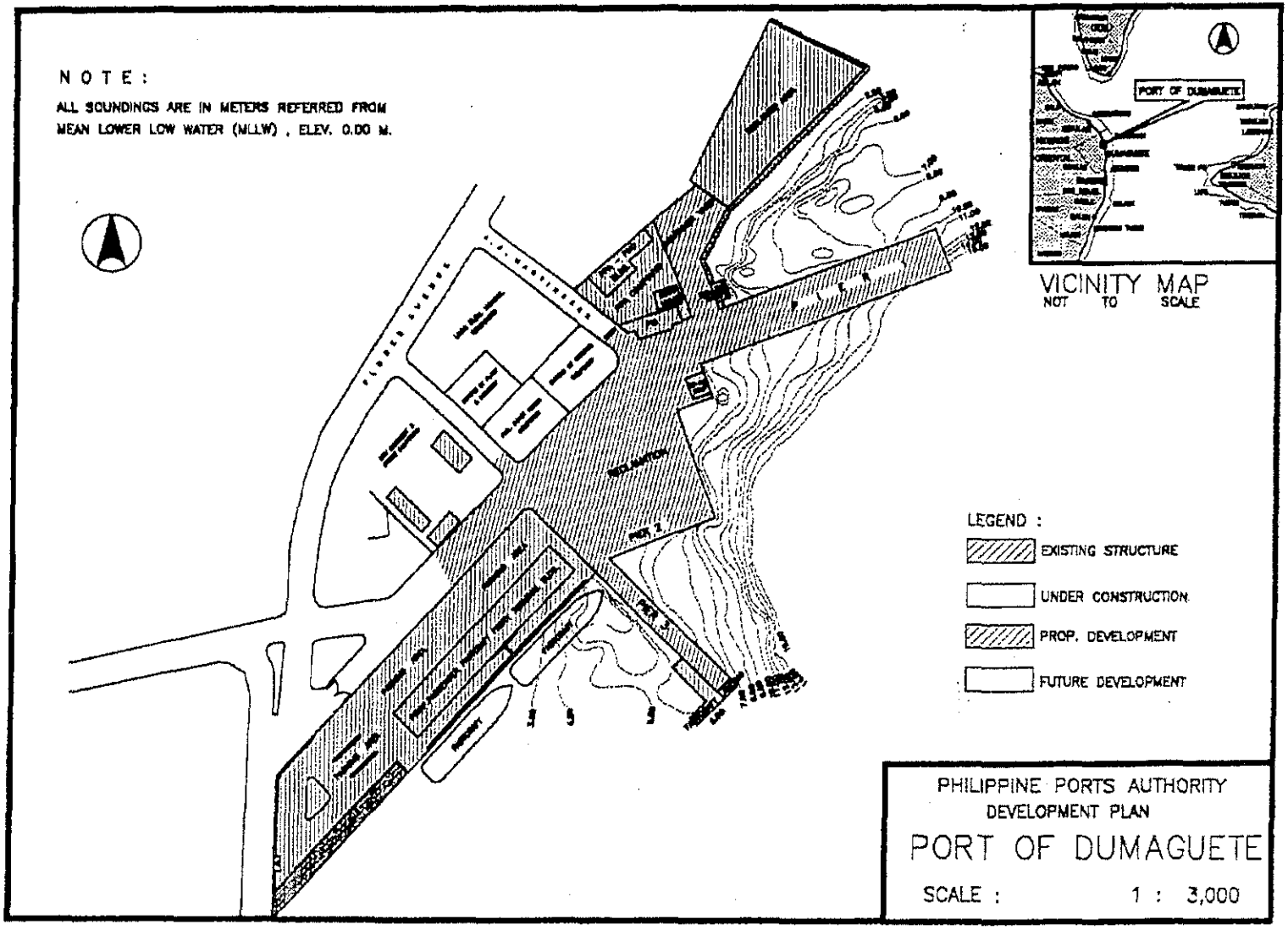


Fig. 2.3.2-7 Development Plan - Port of Dumaguete

2) Port of Tandayag

a) General Description

Existing port is composed of R.C pier, R.C. beach ramp. There is a proposed extension plan of 51m long R.C. pier and reclamation area with RORO ramp (9 x 11m). Water depth along the existing pier is about –12m because the seabed in this area is pretty steep (actually the meaning of Tampi is "steep").

Conventional ferryboat is bound for Santander. It takes approximately 30 minutes with a fare of Php30.00/oneway. Traveling from Dumaguete to Tandayag (Tampi) takes about 20 minutes, Php10.00/oneway.

Beside the port, there is CALTEX deposit with own pier for unloading petroleum product.

Present and future development plan of the port is shown in Fig. 2.3.2-8.

b) Present Port Facilities

Berthing facility	Pier	24m
	RORO Ramp	15m x 20m
Draft along side		-7.00m
Other facility		Passenger terminal

c) Future Development Plan

- Extension of existing R.C. pier (L=51m)
- Reclamation and RORO ramp (9m x 11m)

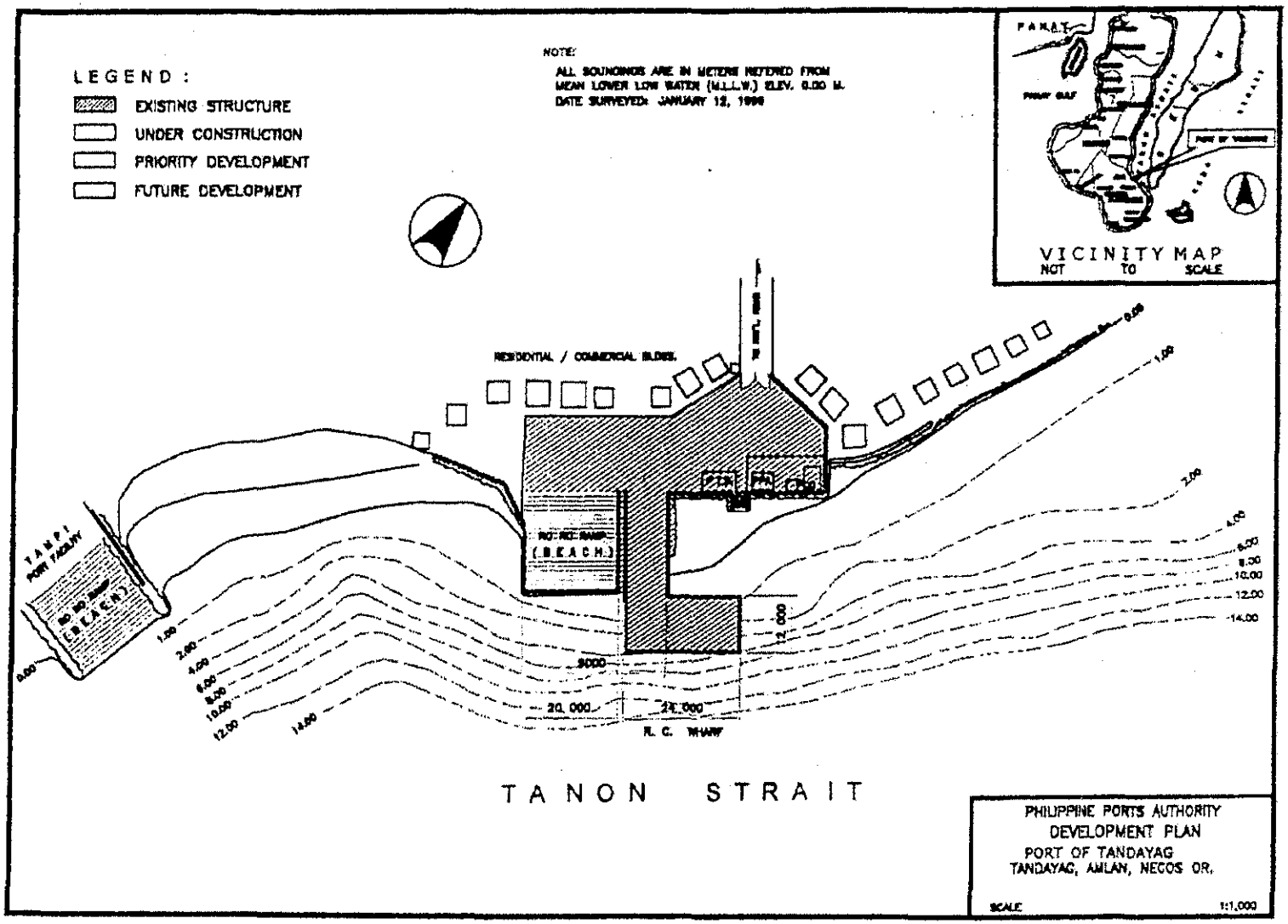


Fig. 2.3.2-8 Development Plan - Port of Tandayag

(4) Province of Misamis Oriental

1) Port of Cagayan de Oro

a) General Description

The port of Cagayan de Oro, the economic portal of Northern Mindanao, is the largest and busiest in the region. It is serving the cities of Cagayan de Oro, Gingoog and provinces of Misamis Oriental, Bukidonon, Camiguin and part of Lanao Sur. Except for Camiguin, these areas are the food baskets of the region. The port's strategic location and large open bay has made it the principal distribution center in Northern Mindanao.

In 2000, Cargo handling volume of CDO Port reached to 1,400,000 TEU and most of them were handled by ship gear.

R.C deck of the port is generally deteriorated as some potholes are confirmed; therefore rehabilitation of existing berth 1-5 is schedule to implement.

Present and future development plan of the port is shown in Fig. 2.3.2-9 and 2.3.2-10.

b) Present Port Facilities

Berthing facility	Quay	983m
	RORO Ramp	1 unit
Draft along side		-8.5m to –11.0m
Other facility		Transit shed
		Passenger terminal
		Weighbridge

c) Future Development Plan

- Bulk fertilizer facility
- Rehabilitation of berth 1-5
- Integrated passenger terminal/Vehicle holding area
- Fast craft terminal
- Bulk grains facility
- Port extension (L=625m)

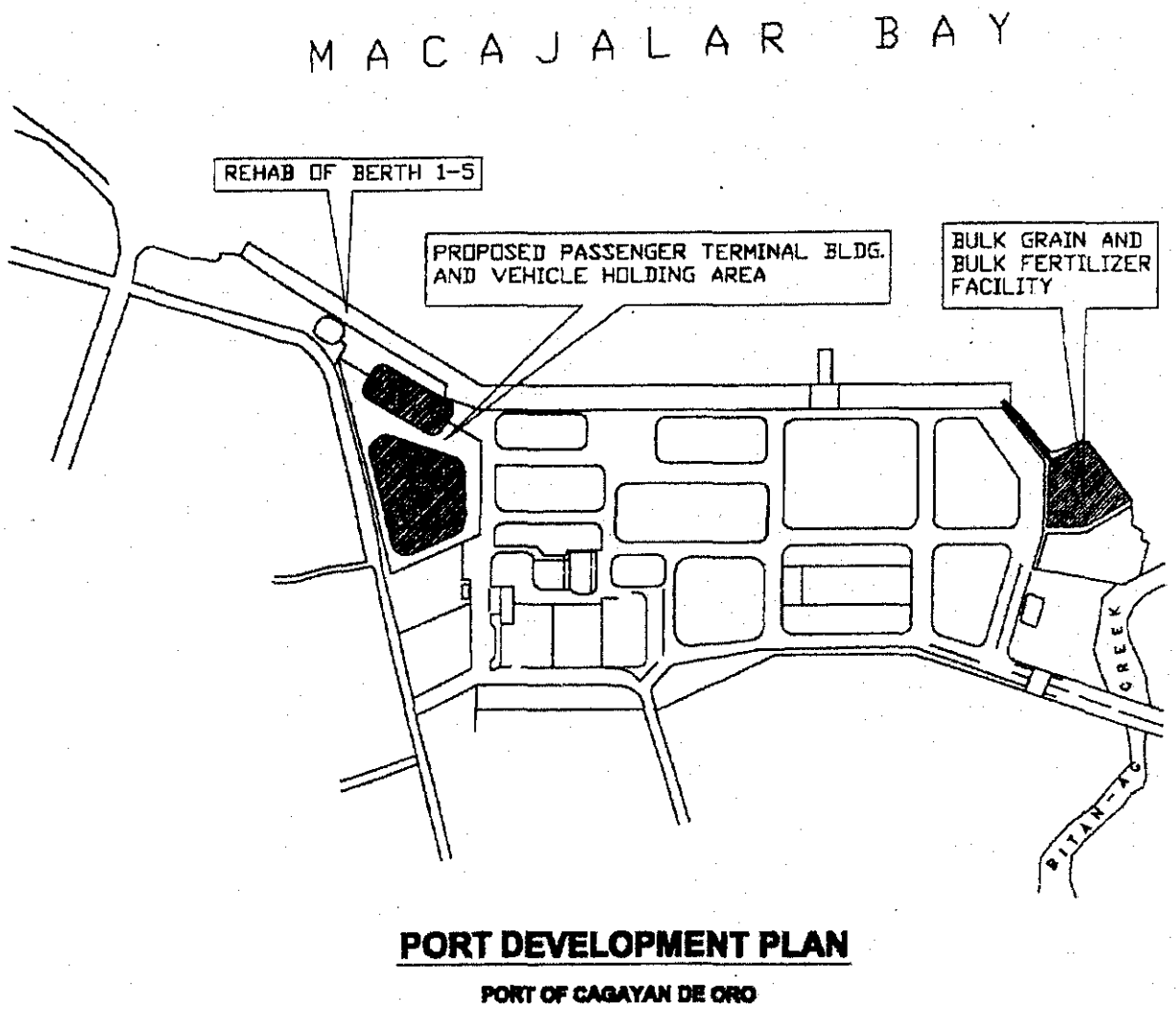
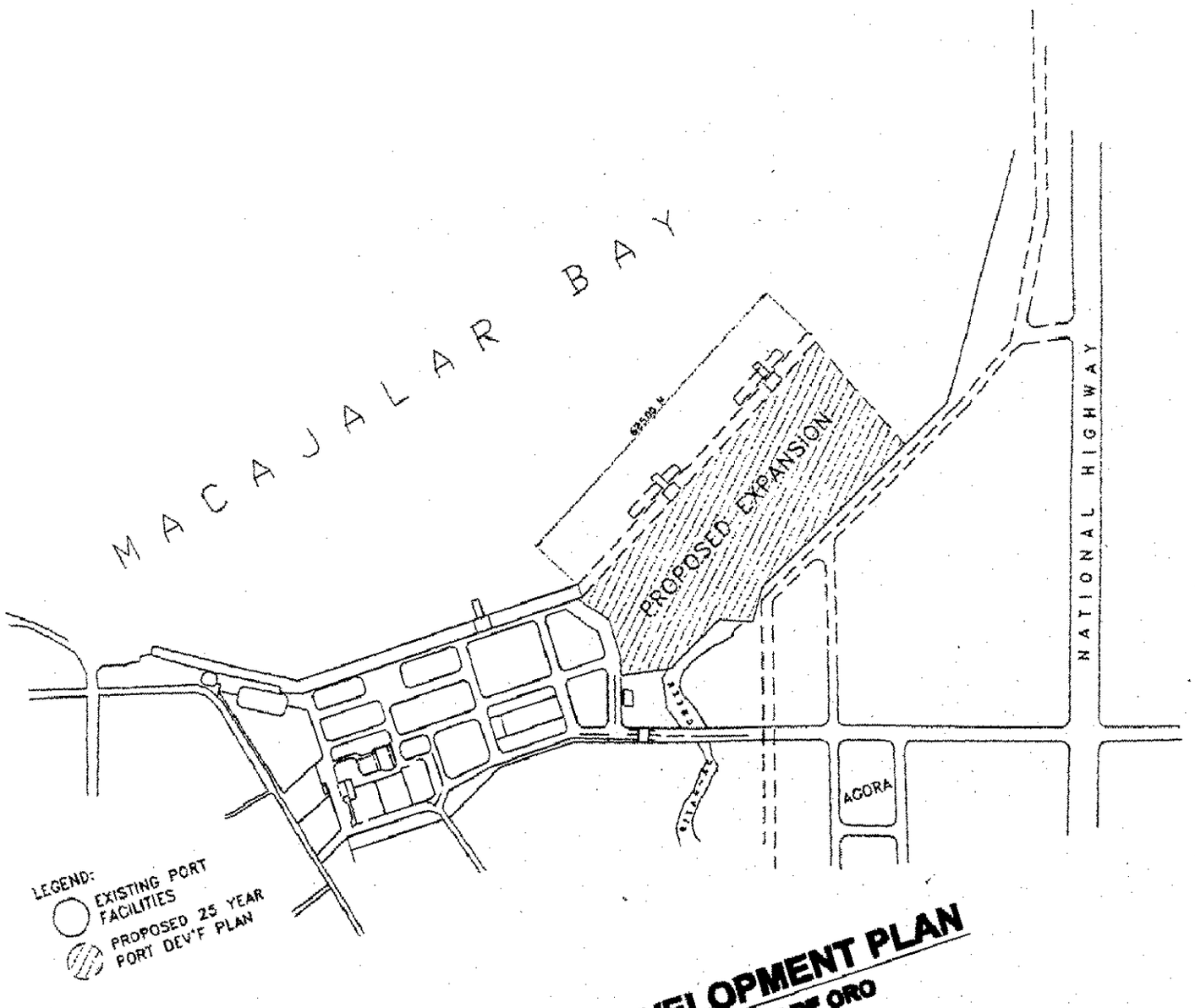


Fig. 2.3.2-9 Development Plan - Port of Cagayan de Oro (1)



PORT DEVELOPMENT PLAN
PORT OF CAGAYAN DE ORO

Fig. 2.3.2-10 Development Plan - Port of Cagayan de Oro (2)

2) Mindanao Container Terminal Project

a) General Description

The limited capacity of the Cagayan de Oro Base Port limits the economic growth potential of Mindanao and the provincial/city government of Misamis Oriental has recognized the urgent need of constructing a new modern seaport to complement the existing facilities.

The shoreline facing PHIVIDEC Industrial Estate-Misamis Oriental (PIE-M) was selected as the preferred site for the new port as Mindanao Container Terminal. The place which represent an ideal deep sea shoreline, is closed to an industrial park, has good access to the roads leading to Bukdnon, Davao, and Cotabato provinces, has an adequate back up area for future expansion and benefits from existing infrastructures including telecommunications, and water facilities.

Present and future development plan of the port is shown in Fig. 2.3.2-11 and 2.3.2-12.

b) Present Status

The project is financed by Japan Bank for International Cooperation (JBIC) with estimated total project cost of US$ 92.6 million. The interim report has submitted to JBIC, which reviews and updates the scope of the project for the development of the Mindanao Container Terminal as outlined in August 1999 "Feasibility Study for Mindanao International Container Port". The project will be implemented phase by phase and it is planned that start of operation for Phase I, Stage I in January 2004.

c) Development Plan

Presently the scope of work for Phase I (Stage 1 and Stage 2) and Long-Term Development Plan is itemized as below.

Phase I, Stage 1

- Construction of a wharf, 300m long with berthing depth of 12m below MLLW. The wharf will be provided with two (2) gantry cranes for the loading and unloading of containerized cargoes
- Dredging of about 350,000cu.m. of spoils and filling/reclamation of about 500,000cu.m.
- Back-up facilities and equipment including container yard, road networks, truck holding areas, weighing bridges, greeneries and provision of four (4) yard cranes
- Building facilities including administration building, terminal operations building, workshop, gate house, control tower among others
- Utility works including drainage system, water supply system, electrical supply system, sewerage system and etc
- Perimeter fence, deck gate, security gate and others

Phase I, Stage 2

- Expansion of container yard
- Provision of additional two (2) gantry cranes and four (4) yard cranes

Long-Term Development Plan

- Expansion of container terminal facilities
- Construction of general cargo, bulk and food terminal with unloading and silo facilities
- Provision of related on-land facilities such as, refrigeration and cold store facilities
- Provision of cargo freight station

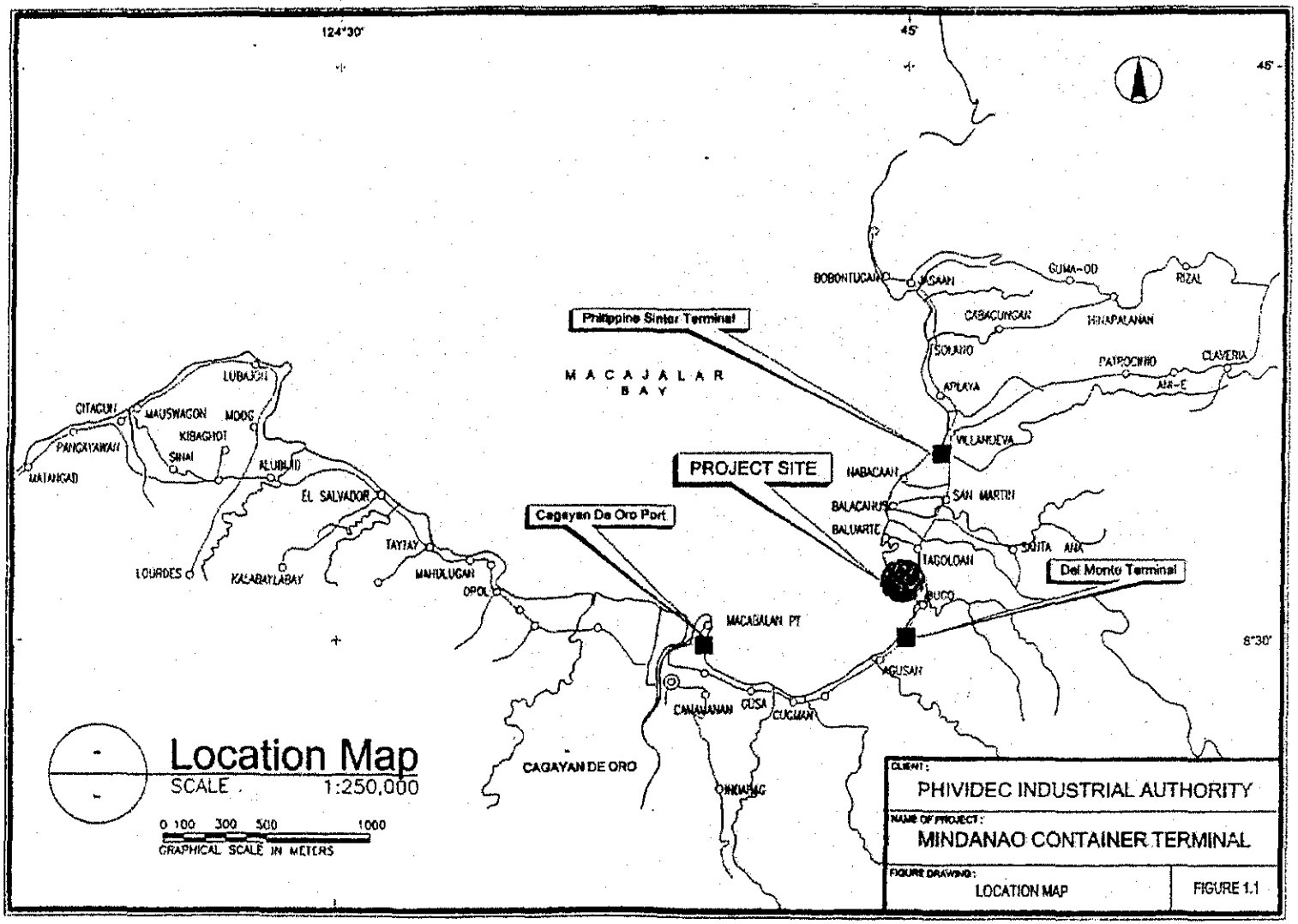


Fig. 2.3.2-11 Location Map - Mindanao Container Terminal Project

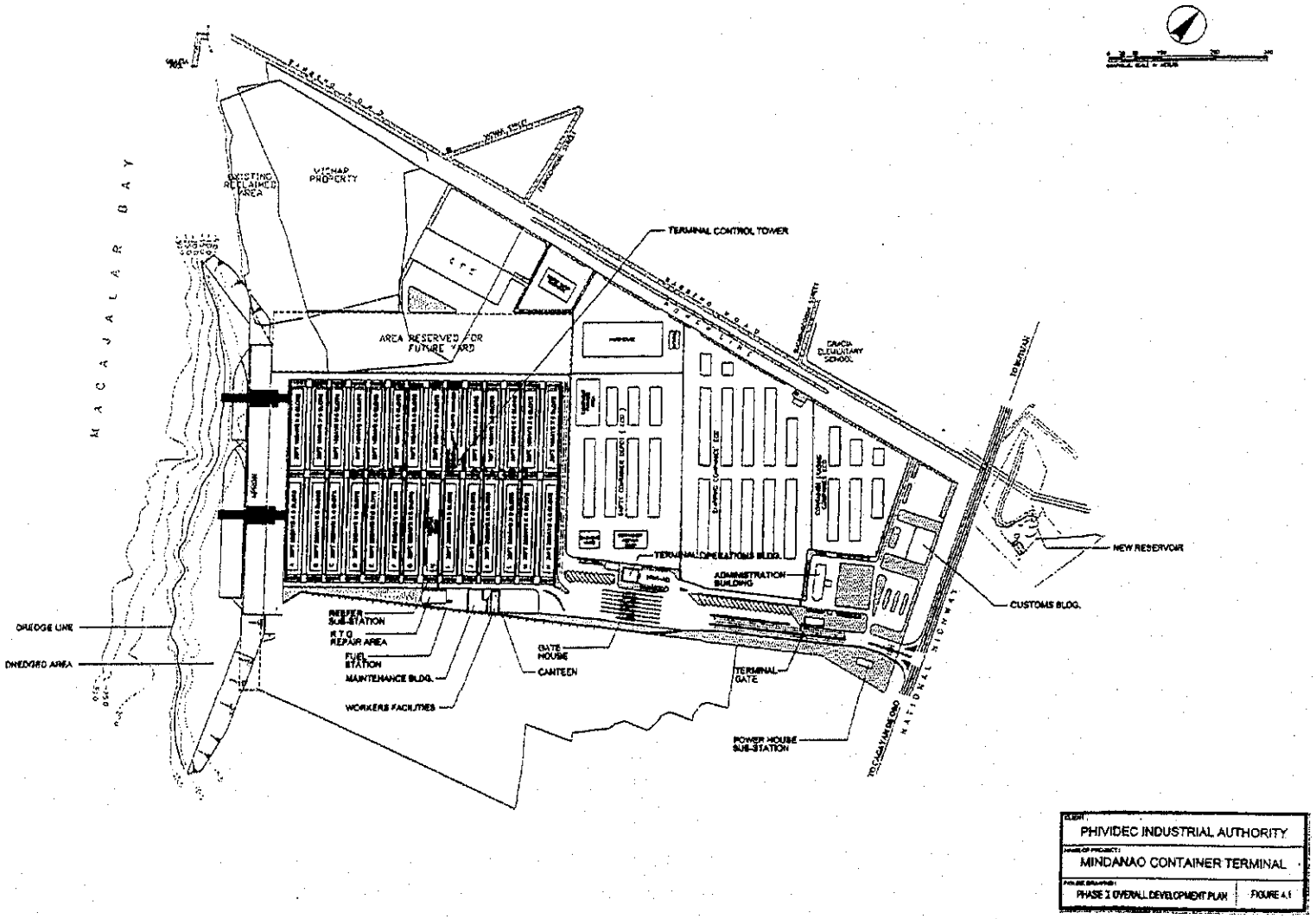


Fig. 2.3.2-12 Layout Plan - Mindanao Container Terminal `Port

(5) Province of Iloilo

1) Port of Iloilo

a) General Description

The Baseport of Iloilo is situated on the eastern shore of Panay Island. It is located on the eastern side by Guimaras Island which shelters Iloilo against winds from the northeast through southeast. Access for vessels is from north or south. Tides are mixed with a range from mean higher high water to mean lower low water of 1.77m.

Present and future development plan of the port is shown in Fig. 2.3.2-13, 2.3.2-14 and 2.3.2-15.

b) Present Port Facilities

b-1) Iloilo Commercial Port Complex

Berthing facility	Quay	26.26m x 400m
	RORO Ramp	15m x 15m
Draft along side		-10.5m
Other facility		CFS
		Warehouse

b-2) Old Foreign Pier

Berthing facility	Quay	513m
	RORO Ramp	Nil
Draft along side		-6.1m
Other facility		Passenger terminal

- Extension of existing quay (L=39m) is on-going

b-3) Iloilo River Wharf

Berthing facility	Quay	2,175m x 12m
	RORO Ramp	Nil
Draft along side		-5.0m
Other facility		Passenger terminal

c) Future Development Plan

c-1) Iloilo Commercial Port Complex

- Quay extension (L=750m)
- Future extension (L=900m)

c-2) Old Foreign Pier

- Quay extension (L=72m)

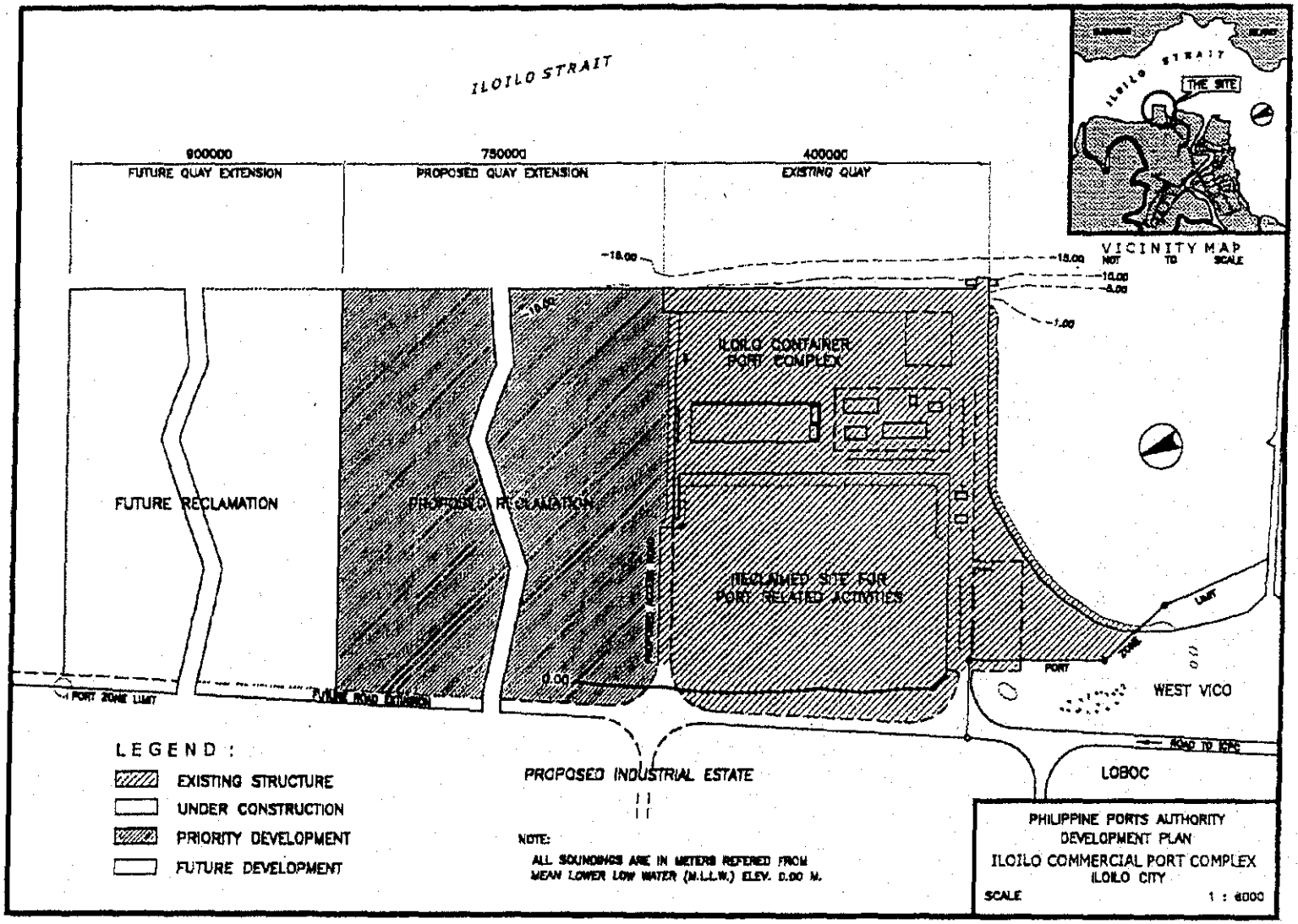


Fig. 2.3.2-13 Development Plan - Port of Iloilo-Commercial Port Complex

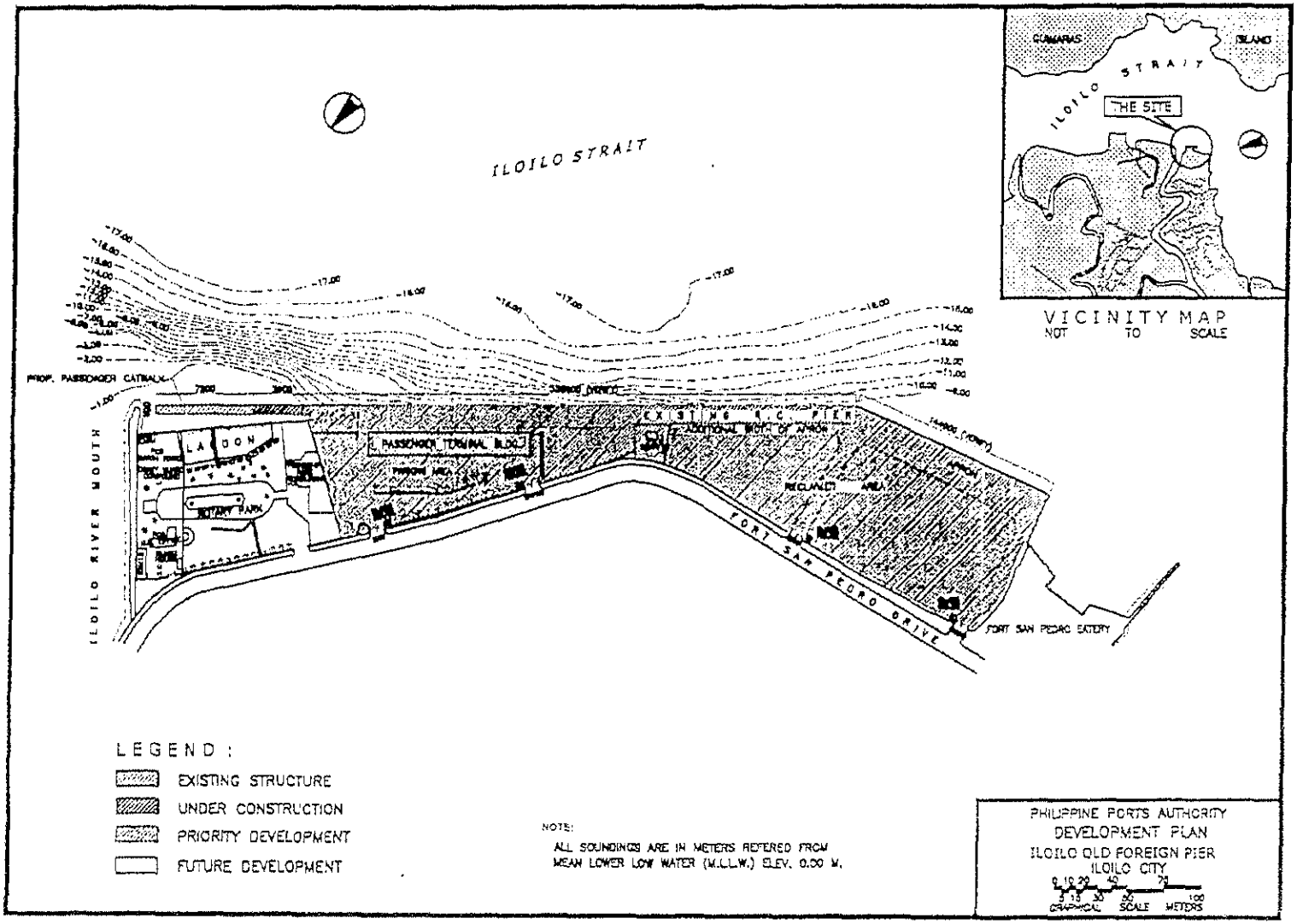


Fig. 2.3.2-14 Development Plan - Port of Iloilo-Old Foreign Pier

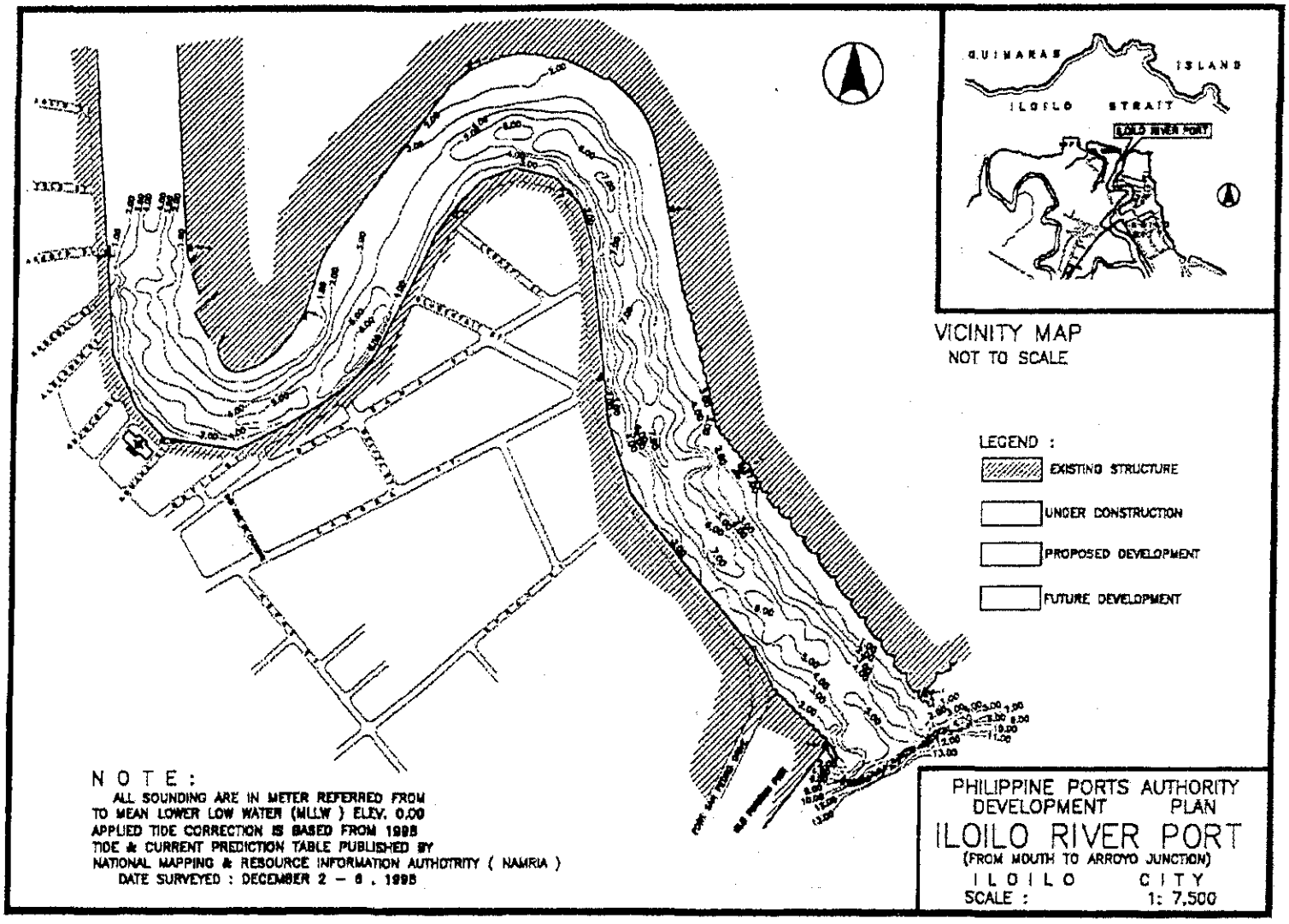


Fig. 2.3.2-15 Development Plan - Port of Iloilo-Iloilo River Wharf

2.3.3 Cargo and Passenger Movement Through Cebu Province

(1) Cargo Movement

1) Origin and Destination

Fig. 2.3.3-1, Fig. 2.3.3-2 and Table 2.3.3-1 show cargo movement from Cebu Baseport to other regions by sea transport. The data was made by origin and destination survey of cargo movement by National Statistics Office. Using the total average number for 4 years from 1995 to 1998 based upon the analysis. Region 7 consists of Cebu Island, Bohol Island and Negros Oriental. More details are in Appendix Table A 2.3.3-1 and Appendix Table A 2.3.3-2.

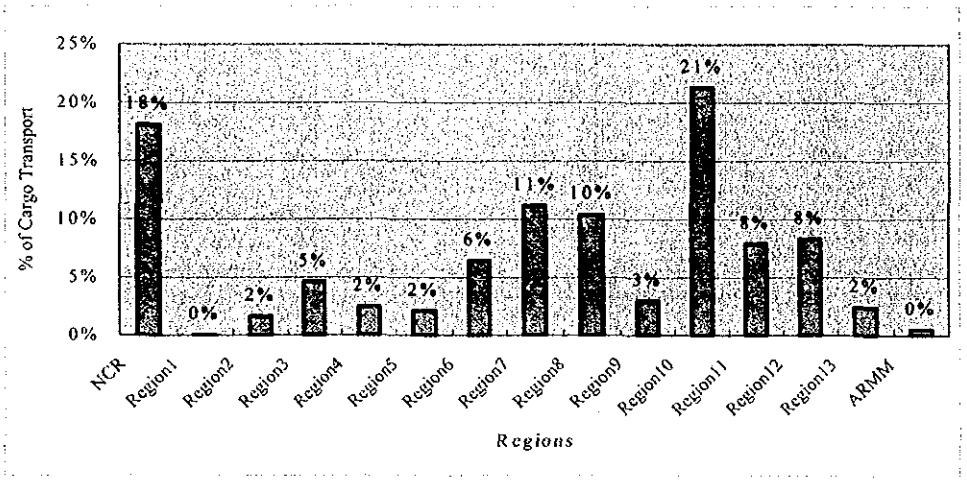


Fig. 2.3.3-1 Commodity Flow Ratio between Region 7 and Other Regions, 1995-1998

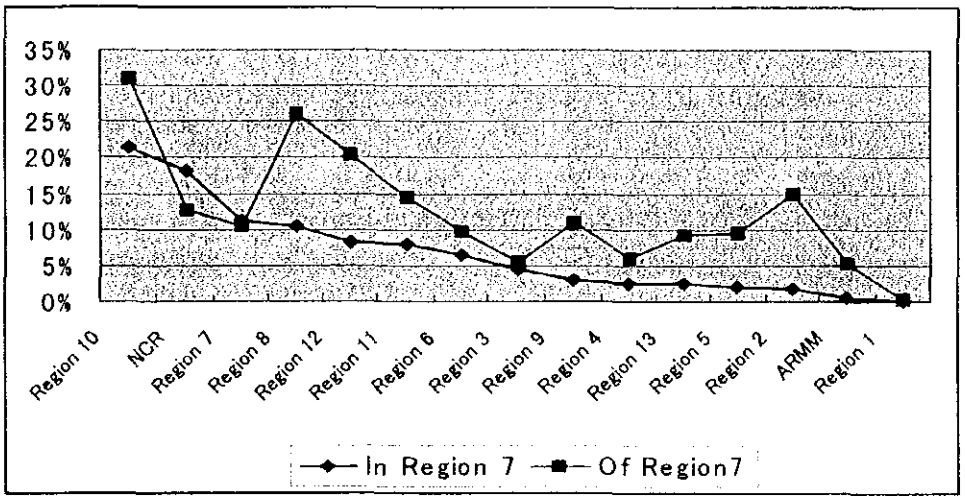


Fig. 2.3.3-2 Share of Cargo Volume in Region 7 and in Other Regions

Table 2.3.3-1 Share of Cargo Movement in Each Region To and From Cebu Baseport In 1999

Cargo (1000kg)

Name	Region	O-D Cargo	Share of Region 7		Share from Region7	
		Volume	Order	%	Order	%
Region 10	N. Mindanao	1,397	1	21%	1	31%
NCR	National Capital R.	1,187	2	18%	6	13%
Region 7	C. Visaya	732	3	11%	8	11%
Region 8	E. Visaya	681	4	10%	2	26%
Region 12	C. Mindanao	543	5	8%	3	20%
Region 11	S. Mindanao	516	6	8%	5	14%
Region 6	W. Visaya	422	7	6%	9	10%
Region 3	C. Luzon	301	8	5%	12	5%
Region 9	W. Mindanao	195	9	3%	7	11%
Region 4	S. Tagalog	159	10	2%	12	6%
Region 13	Caraga	157	11	2%	11	9%
Region 5	Bicol	136	12	2%	10	9%
Region 2	Cagayan Valley	106	13	2%	4	15%
ARMM	ARMM	32	14	0%	14	5%
Region 1	Ilocos	3	15	0%	15	0%
Total		6,567		100%		

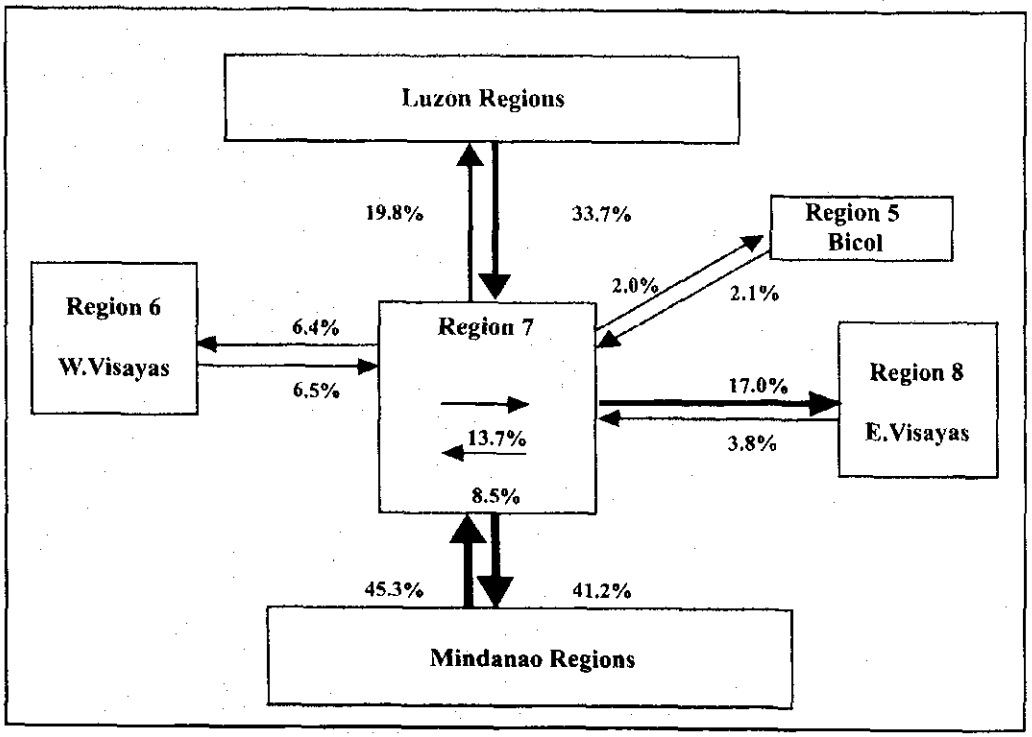
Note: Estimation by Study Team based on the O-D Data of National Statistics Office.

2) Summary of Cargo Movement by O-D Analysis

Main points of cargo movement by demand forecast for Cebu Baseport planning are summarized as follows:

a. Mindanao, region 10 and National Capital Region (NCR) have a large share around 40% of the total cargo movement of Region 7.
b. 21% of cargo is from Cebu incoming and outgoing to Region 10, North Mindanao.
c. Cargo movement within Region 7, which is 11% of the total, is transported to Bohol, Negros Oriental, Bantayan Island, Camotes Island and to Siquijor Island.
d. Almost the same amount as within Region 7 is transported to Region 8, Leyte and Samar.
e. Cargo originated from Cebu Baseport is transported to all 15 Regions in the Philippians.
f. Cargo originated from Region 7 have larger share in other regions.

Fig. 2.3.3-3 shows the incoming and outgoing cargo movement separately between regions.



Source: Philippine Statistical Year Book,1998,1999,2000(p13-26,29)
Result of origin & distination survey of comodity flow by water transportation

Fig. 2.3.3-3 Cargo Flow between Region 7 and other Regions

Main points of incoming and outgoing cargo movement from region 7 are summarized as follows:

a. Average 43% of Cargo from region 7 is transported to Mindanao Island.
b. Incoming and outgoing cargo volume is the same except Luzon and East Visaya regions.
c. In region 8, East Visaya, outgoing cargo from Cebu is 17% against 4% for incoming cargo.
d. Cebu region has 20% outgoing cargo, while incoming cargo to Cebu amounts to 34% of the total outgoing cargo from Luzon.

(2)Passenger Movement

1) Origin and Destination Analysis

Table 2.3.3-2 and Fig. 2.3.3-4 shows passenger travel by boat to other regions.

Table 2.3.3-2 Trip Destination to Other Regions by Ship From Region 7, 1998

Unit: Passenger

Name	Region	O-D Passenger	Share
C. Visayas	Region 7	829,857	31.4 %
E. Visayas	Region 8	659,521	25.0 %
N. Mindanao	Region 10	325,775	12.3 %
National Capital Region	NCR	232,909	8.8 %
C. Mindanao	Region 12	223,022	8.4 %
Caraga	Region 13	182,042	6.9 %
W. Visayas	Region 6	115,683	4.4 %
Bicol	Region 5	47,026	1.8 %
W. Mindanao	Region 9	18,816	0.7 %
S. Mindanao	Region 11	7,013	0.3 %
Total		2,639,664	100.0%

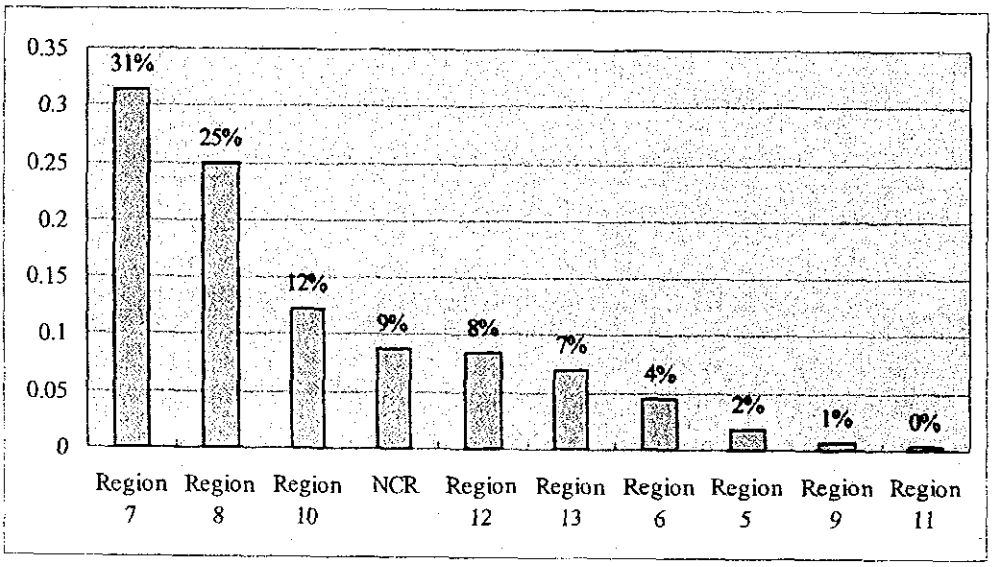


Fig. 2.3.3-4 Ratio of Passengers using Boats for travel to Neighbor Regions

The total number of passenger that originated in Cebu City is destined to 52 places monthly. Details are shown in Appendix Table A 2.3.3-3. Data was made by origin and destination survey of passenger movement by National Statistics Office in 1998

2) Summary of Passenger Movement by O-D survey

Main points as to demand forecast for Cebu port planning are summarized as follows:

a. Traveling destinations of passenger are limited to10 regions instead 15 regions of cargo.
b. Share of trip within region 7 is 31%, which is larger than 11% in the case of cargo.
c. Total share of Region 7 and Region 8 is 55% of the total passenger trip.
d. Generally, traveling distance of passenger is limited shorter than that of cargo.

Table 2.3.3-3 and Fig. 2.3.3-5 show passenger trip to neighboring islands.

Table 2.3.3-3 Passengers Transported by Ship Between Islands, 1999

Area	O-D Passengers	%
Origin : Cebu City	2,639,664	100 %
Destination		
Mindanao Island	754,668	28.6 %
Bohol Island	651,979	24.7 %
Southern Leyte Island	338,407	12.8 %
Northern Leyte Island	281,882	10.7 %
NCR	232,909	8.8 %
Dumaguete	110,792	4.2 %
Panay Island	107,477	4.1 %
Masbate Island	47,026	1.8 %
Western Samar	39,232	1.5 %
Camotes Island	26,535	1.0 %
Bantayan Island	24,825	0.9 %
Siquijor Island	15,726	0.6 %
Negros Occidental	8,206	0.3 %
Total	2,639,664	100.0 %

Source: National Statistics Office

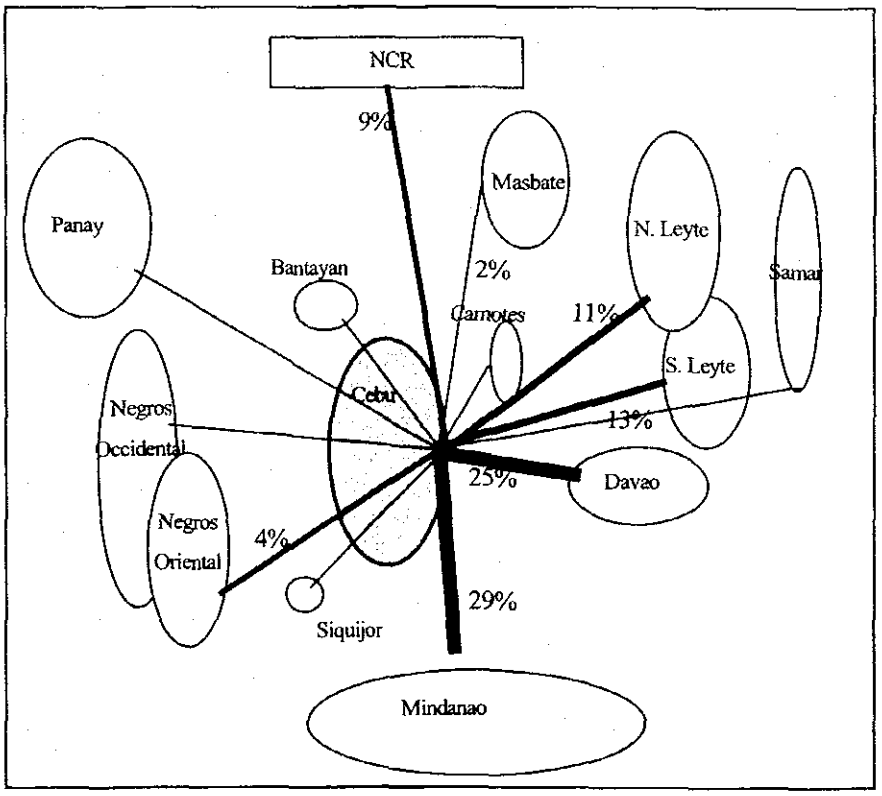


Fig. 2.3.3-5 Passenger Movement from Cebu to Neighboring Islands, 1999

Main points as to demand forecast for Cebu port planning is summarized as follows:

a. Breakdown of local trip of 31.4% within Region 7 are as follows:

Bohol (East of Cebu Island)	24.7 %
Dumaguete (Negros Occidental)	4.2 %
Camotes Island (East of Cebu Island)	1.0 %
Bantayan Island (North of Cebu Island)	0.9 %
Siquijor Island (South of Cebu Island)	0.6 %

b. Breakdown of trips of 28.6% to Mindanao Island is as follows:

N. Mindanao (Region 10)	12.3 %
C. Mindanao (Region 12)	8.4 %
Caraga (Region 13)	6.9 %
W. Mindanao (Region 9)	0.7 %
S. Mindanao (Region 11)	0.3 %

(3) Cargo and Passenger Movement to Hinterland of Surrounding Islands

1) Important Hinterland for Cebu Province

According to origin and destination analysis, following five regions are important hinterland for cargo transport at Cebu Baseport.

a. About 68% of cargo from Cebu Baseport are transported to these regions.

North Mindanao	18 %
National Capital Region	18 %
Central Visayas	11 %
East Visayas	10 %
Central Mindanao	8 %

b. For passenger transport, following five regions is important hinterland.
85% passenger who embarks Cebu Baseport goes to these regions.

Central Visayas	31 %
East Visayas	25 %
North Mindanao	12 %
National Capital Region	9 %
Central Mindanao	8.5 %

c. For incoming cargo from Cebu Baseport,
Following five regions have weight showing cargo volume ratio in percentage of the total cargo transport of each region.

North Mindanao	31 %
East Visayas	26 %
Central Mindanao	20 %
South Mindanao	14 %
Central Visayas	11 %

3. Natural and Environmental Conditions around Cebu Baseport and Major Outports in Cebu Province

3.1 Natural Conditions

3.1.1 Overview

Cebu Island is located in approximately Lat. 11°N, Longit. 124°E, in the central part of the Philippines Archipelago. It belongs to typical monsoon region in climate and occasionally typhoons approach it.

Geomorphological base of the island is upheaved coral reef, therefore limestone layer crop out in the whole island. Topography of coast shows variations in which shoal of marsh origin and shallow estuary are representative

Natural conditions are investigated basically by way of field observation and analysis of topographical maps and charts. And in order to complement the field investigations, data are collected in the relevant offices/institutions.

List of collected data are shown as follows:

Table 3.1.1-1 List of Collected Data

DATA	RELEVANT OFFICE/INSTITUTION
1. Chart	National Mapping Resource Information Authority (**NAMRIA**)
2. Topographical Map	National mapping Resource Information Authority (**NAMRIA**)
3. Meteorology Typhoon	Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA)
4. Geological Map	Department of Environment and Natural Resources (**DENR**)
5. Seismic Data	**PAGASA**, Philippine Institute of Volcanology and Seismology (**PHILVOLCS**)

3.1.2 Meteorology

Relevant data since 1948 to 2000 were given by the Cebu office of PAGASA (Philippine Atmospheric Geophysical Astronomical Services Administration), refer to Table 3.1.2-1 and 2

(1) Weather

There are a few rainy days between March and May in which number of rainy days by month are recorded around 5 to 6 days only. On the other hand, between June and December, weather becomes rainy in which more than 1/3 of the month are rainy days.

(2) Temperature

Through the year, monthly average temperature is higher than 30 °C. The lowest temperatures are in January and February at around 30 °C and the highest are in May, June and July at around 33 °C. In the past 28 year record, the lowest record was 19.2 °C and highest record was 36.4 °C.

(3) Humidity

This is almost constant throughout the year, the value represents nearly 80 %.

(4) Rainfall

The annual average rainfall is 1503 mm, which shows that this area belongs to the typical monsoon region. According to monthly record, February to May is relatively dry (40 to 70 mm in rainfall quantity).

One-day greatest rainfall record in the past was 276.1 mm at the time of Typhoon Ruping which occurred on November 13, 1990.

(5) Wind

Two typical monsoons blow in the whole Cebu except for typhoon time, those are North-East (bearing 40°) wind of October to May and South-West (bearing 220°) wind of June to September. Wind speed is generally gentle, nearly 3 meters per second.

On the other hand regarding the wind of typhoon, the biggest speed 240 km. per hour (67 m/s) was recorded at the time of Typhoon Amy on December 10, 1951.

(6) Tropical Cyclones/Typhoons

In the Philippines, disastrous tropical cyclone is classified into 3 types, by the wind speed. These are:

1) Typhoon : maximum wind speed 110 kph or more
2) Storm : maximum wind speed 65 to 109 kph
3) Depression : maximum wind speed not more than 64 kph

As well known, the Philippine sea is known for the occurrence of tropical cyclone. The number of cyclone which affected Cebu Island were 56 in total and the numbers of typhoon were 29 (refer to table 3.1.2-2). Two typhoons i.e. Ruping (max wind speed 205 kmh, lowest pressure 971 hpa) and Puring (max wind speed 120 kmh, minimum pressure 984 hpa) were remarkable in the recent ten years. Fig. 3.1.2-1 shows the course of the typhoons which have affected Cebu.

Table 3.1.2-1 Climatological Data between 1973 and 2000 (28 years)

Month	Temperature in Celsius (°C)					Mean Relative Humidity (%)	Mean Cloudy (Days)	No. of Tropical Cyclones that passed 100 kms radius from the station			Mean Thunder Storms
	Mean	Mean Max	Mean Min	Highest Recorded	Lowest recorded			T	S	D	
JAN	26.8	30.0	23.7	34.5	19.2	80	6	2	0	0	1.0
FEB	27.0	30.2	23.8	33.4	20.0	79	6	0	0	2	0.4
MAR	27.7	31.2	24.3	33.6	21.5	77	5	2	1	1	0.4
APR	28.8	32.2	25.3	35.4	22.2	76	5	0	1	1	2.0
MAY	29.4	32.9	26.1	36.4	22.3	75	5	1	1	0	8.0
JUN	28.8	32.3	25.2	35.7	21.4	79	7	3	2	1	12.0
JUL	28.2	31.6	31.6	35.3	22.0	80	7	0	1	0	12.0
AUG	28.5	31.9	31.9	34.8	21.1	79	7	1	0	0	10.0
SEP	28.3	31.7	31.7	34.6	21.8	80	7	1	0	1	14.0
OCT	28.1	31.4	31.4	34.2	21.6	81	7	3	1	1	13.0
NOV	27.8	31.1	31.1	33.8	22.4	81	6	7	4	5	6.0
DEC	27.3	30.2	30.2	33.1	20.5	82	6	9	2	2	2.0
Annual	28.1	31.4	24.7	36.4	19.2	79	6	29	13	14	80.0

T = Typhoon - maximum wind speed 110 kph or more
D = Depression - maximum wind peed not more than 64 kph
S = Storm - maximum wind peed 65-109 kph

Month	Rainfall in Millimeters (mm)			Number of Rainy Days		WIND		Dew Point (°C)
	Average	Greatest	Greatest fall in one day	Average	Greatest	Direction (16 -pts.)	Speed (m/sec)	
JAN	102.1	304.3	126.6	10	27	040	03	22.7
FEB	71.5	173.8	61.8	8	17	040	03	23.1
MAR	53.0	243.5	141.3	6	17	040	03	22.9
APR	41.9	251.7	174.0	5	10	040	03	25.1
MAY	67.6	206.2	88.6	6	14	040	03	24.5
JUN	185.7	360.3	87.8	13	22	220	02	24.5
JUL	186.9	391.3	99.6	14	20	220	02	24.3
AUG	151.7	358.6	96.6	12	18	220	03	24.2
SEP	185.7	375.5	97.3	14	21	220	02	24.4
OCT	179.8	373.8	166.1	14	21	040	02	24.4
NOV	158.8	493.7	276.1	12	20	040	02	24.2
DEC	118.3	328.8	105.0	12	23	040	03	23.6
Annual	1,503.5	493.7	276.1	Total = 125	27	220 / 040	03	24.0

Source: PAGASA
Engr. Oscar C. Tabada
Sr. Weather Specialist

1 m/sec = 3.6 kph

Table 3.1.2-2 Most Disastrous Tropical Cyclones affecting Cebu Province, between 1948 and 1999

Name of Disturbance	Date of Occurrence	Date of Passage	Max. Wind Recorded	Duration of rainfall and Gustiness (hrs)	24 – Hour Rainfall (mm)	Pressure (hpa)
AMY	Dec. 5-9, 1951	Dec. 10	240 kph	12	195.3	971
NITANG	Aug. 31-Sept. 4, 1984	Sept. 2	176 kph	6	42.2	982
UNDANG	Nov. 3-6, 1984	Nov. 5	90 kph	12	70.6	1003
RUPING	Nov. 10-14, 1990	Nov. 13	205 kph	21	276.1	971
PURING	Dec. 23-27,1993	Dec. 26	120 kph	21	105.0	984
BISING	Apr. 1-6, 1994	Apr. 4	120.kph	16	174.0	998
PEPANG	Oct. 26-30, 1995	Oct. 28	90 kph	16	166.1	995

The province of Cebu is part of a geographical zone, which is ranked third among the least visited by tropical cyclones. The average of 0.98 cyclone center crosses the zone. The probability that one or more cyclone centers will cross the zone in a year is 65 %. Most of the typhoons have occurred in November and December.

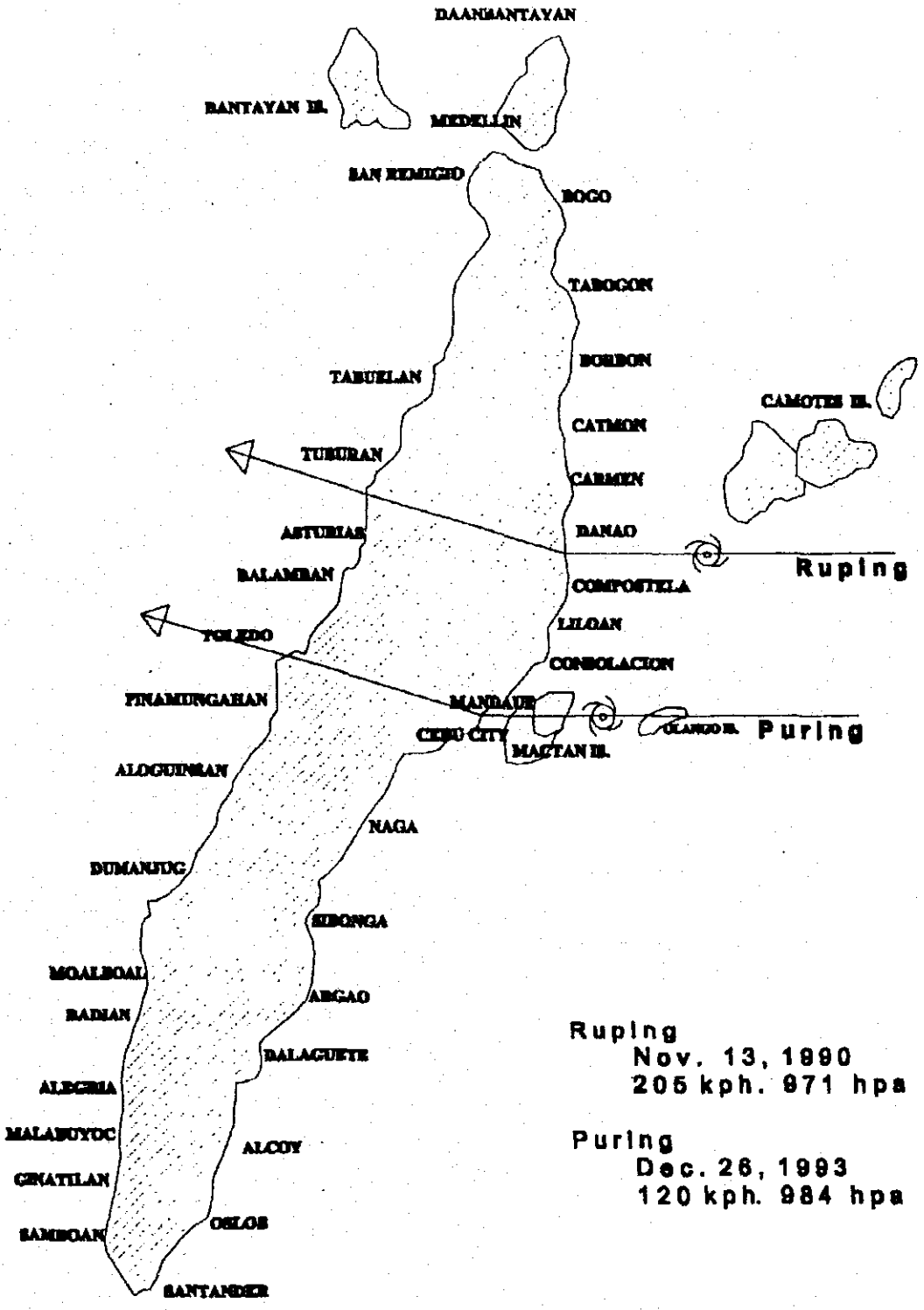


Fig. 3.1.2-1 Typhoon Course Which Approached Cebu

3.1.3 Topography

(1) General Condition

As a result of field investigations, following topographic forms are found with regard to coastal morphology. These are strait/channel, gulf, bay, coral reef, shoal and estuary. On the other hand, terrace, lagoon and back marsh are shown as a remarkable morphology in the hinterland area.

(2) Topographical Condition in Each Port Site

Topographical condition in each port site is summarized in Table 3.1.3-1

Table 3.1.3-1 Summary of Topographic Condition

Port Name	Topographic Forms	Remarks
1. Cebu Baseport	Channel	Narrow channel between Mactan island. Original hinterland is marsh surrounded by the rivers; Guadalupe and Jose
2. Consolacion	Bay/shoal	Small bay in the north of Cansaga Bay. One sand shoal appears.
3. North Mactan	Bay	West side of Magellan bay. Shoreline is nearly straight. Back marsh spreads widely.
4. South Mactan	Shoal	Shallow coral bed extends to off shore and small islands are dotted.
5. Cebu South	Estuary	Gentle curve shoreline. Wide back marsh extends. Hinterland is a swamp formed by Linao river.
6. Minglanilla	Bay	Bay with gentle curve/ Sand beach extends along the coast/ Small back marsh exists.
7. Bantayan	Coral Reef/Bay	Extending sand bar which juts out on front of bay. Narrow estuary is formed inside. Coral reef spreads toward off shore.
8. Santa Fe	Coral Reef/ Beach	Coral origin sand beach which faces to open sea. There is a cape point (name Booc Pt.) in the east.
9. San Remigio	Beach/Bay	Small beach located in the north entrance of Hagnaya Bay close to Sabit point which faces to Tanon Strait. Hinterland is coastal terrace.
10. Tabuelan	Bay/Gulf	Narrow entrance and wide inside terraces jut out in the entrance and shut out wind and wave.
11. Tuburan	Bay	South part of Tuburan Bay, wide and open. Faces to outer sea directly.
12. Balamban	Bay	Gravel beach in the west end of Balamban Bay. Wide and directly faces to outer sea. Small marsh appears in the hinterland.
13. Toledo	Shoal/strait	Sandy shoal directly facing to outer sea (Tanon Strait). Hinterland is alluvial fan of Daku River.
14. Carmen	Estuary/ shoal	Very shallow estuary with stretching sand bar in the entrance. Wide back marsh extents in the hinterland.

Port Name	Topographic Forms	Remarks
15. Danao	Bay	Small open bay directly faces to outer sea. Back marsh appears along the Danao River.
16. Argao	Shoal/Beach strait	Sand beach located in the north of Argao Point (small cape). Shoreline is straight and directly faces to outer sea (Bohol Strait).
17. Oslob	Strait	Gravel beach directly faces to outer sea. Shoreline is straight and no protection against wind and wave.
18. Santander	Strait	Gravel beach of coral origin. Faces directly to outer sea (Tanon Strait). Straight and open coast and no protection against wind/wave.
19. Poro	Shoal/beach	Sandy beach of coral origin. Directly faces outer sea (Camotes Sea).

3.1.4 Bathymetry

(1) General Condition

Bathymetric conditions are investigated by way of site observation and hearings from the local residents in comparison with chart. As a result of investigation, following facts are made clear.

1) The coasts of Cebu Island and other adjacent islands are surrounded by the upheaved coral reef, as a result shoal zone less than 3 m. deep, 100 to 200 m. wide is extended towards the off shore.
2) Marsh and swamps are widely distributed close to the hinterland of bay and estuary in which shoal zone 1 to 2 m. deep becomes wider (Example: Carmen Port)
3) In the place where river drains in the hinterland shallow mud flat less than 1 m. deep is formed widely (Example: Cebu South Area)
4) In the straight coast except for bay/estuary which directly faces to outer sea, width of shallow zone less than 3 m. deep is 50 to 100 m. (Example: Tuburan Port and Oslob Port)

(2) Bathymetric condition in each Port Site

Bathymetric condition at each port site is summarized in Table 3.1.4-1.

Table 3.1.4-1 Bathymetric Conditions

Port Name	Width of shallow zone (depth less than 3 m)	Depth in (m) at Berth and Navigation Channel	Distance (m) between 10m depth contour and land	Remarks
1.Cebu Base Port	Reclamation	6 - 8	500	Narrow channel.
2. Consolacion	500	10	500	Sandy shoal, 500m. in width.
3. North Mactan	700	4 - 7	1,200	Coral bed covered by mud in surface.
4. South Mactan	3 km.	4 - 6	3.5 km.	Extensive shoal of coral bed covered by sand/mud.
5. Cebu South	500	4 - 9	1.5 km.	Wide march of mud in hinterland.
6. Minglanilla	200	4 - 5	500	Sporadic shoals of coral bed.
7. Bantayan	5 km	3 - 4	5 km.	Sand bar extends Navigation channel dredge. Coral reef in surroundings.
8. Santa Fe	1 km	3 - 4	1 km.	Coral reef shoal.
9. San Remegio/Hagnaya	500	7 - 8	700	Shoal of gravels.
10. Tabuelan	10	4 - 5	500	Small gulf.
11. Tuburan	500	3 - 7	2 km.	Gravel shoal of coral origin. Hinterland is marsh.
12. Balamban	100	4 - 5	500	Gravel shoal with back marsh.
13. Toledo	100	4 - 5	500	Sandy bed of alluvial deposit of Dabu River.
14. Carmen	1 km	4 - 7	2 km.	Coral bed covered by mud of back march origin. Dredged navigation channel.
15. Danao	100	6 - 10	200	Sandy bed of coral origin. Hinterland is marsh of Danao River.
16. Argao	150	4 - 8	200	Sandy shoal from alluvial deposit of Argao River.
17. Oslob	20	4 - 10	100	Very little shallow zone. Directly faces to outer sea.
18. Santander	50	4 - 10	100	Shallow zone is few, directly faces to outer sea.
19. Poro	100	8 - 10	200	Gravel bed of coral origin

3.1.5 Oceanography

(1) Wave

1) General Condition

There are two dominant waves which are caused by two tropical monsoons, i.e. N-E monsoon (October to May) and S-W monsoon (June to September).

With regards to wave height, high wave is scarcely caused, considering the wind speed 2 m. per second.

2) Wave Condition in each Port Site.

Actual wave movement is influenced deeply by topographic morphology (existence of natural shutter). As a result of site investigation (observation and hearing from local residents), wave conditions in each site are summarized as follows

- Cebu Baseport
  It is located in the narrow channel between Cebu and Mactan Island, which become natural protector against wave, therefore condition is calm.

- Consolacion
  Only one direction (North-East) faces to the open sea, consequently, high wave occurs in NE wind condition.

- North Mactan
  North half area is open to outer sea and occasionally white waves are observed. Its height is estimated at 1.5 m. which is equivalent to the height of the eroded part of coastal cliff.

- South Mactan, Cebu South
  South area faces widely to the open sea, however shoal extends widely which breaks the wave, consequently high wave hardly occurs.

- Minglanilla
  South area is open to outer sea, therefore white wave (height 1m.) occurs occasionally between June and September.

- Bantayan, Santa Fe, San Remigio/Hagnaya
  These sites face directly to open outer sea, as a consequence, relatively higher wave (1.5m. high) stand occasionally. Height 1.5m is equivalent to erosion height of coastal cliff.

- Carmen, Tabuelan
  Entrance of bay/estuary is shut out by sand bar and small peninsula, consequently, the sea is kept always calm.

- Tuburan, Balamban, Toledo, Danao, Argao Oslob and Santander
  These port sites are widely open to outer sea, directly face to off shore, therefore sites are influenced immediately by the wind and rough wave. 1.5 m high swells occur sometimes. It's height 1.5m is assumed by the erosion height of coastal cliff.

- Poro
  South half area faces to outer sea (Camotes Sea), therefore in the S-W monsoon season (June to September) relatively high wave (height 1.5m) is supposed to stand.

(2) Ocean Current

At present, wider regional ocean current adjacent to Cebu Island is not surveyed in the scale of ocean level. Practically speaking, two littoral currents are observed at Cebu Baseport (flood flow direction S to N, ebb flow N to S and speed is 0.7 m per second). The other is the current which is observed in the North of Santander (flood flow direction SE to NW, ebb flow direction NW to SE, and speed is 0.5 to 1 m. per second).

3.1.6 Geotechnical Conditions

(1) General Conditions

Cebu Island and its surroundings are basically uplifted coral island. Supposedly the upheaval started late Tertiary of geo-age and stopped recently. Limestone crops out generally in the whole region of the island, however, if observed locally in detail, geological type represents variations in accordance with each geomorphology. For example, in case that marsh exist in the hinterland, mud sediments are thick and, in case where there is a river, similarly thick sediments are found.

As a result of present field investigation, geological type is classified as follows:

- Coral Reef: It consists of mainly corals and hard rock and it is shallow with dotted live corals.
- Sand/Gravel Beach: Relatively long and wide beach usually consists of coral origin sand and gravel.
- Shoal: It is shallow and is less than 3m deep, geological type of bed is sand and/or gravel.
- Coral Bed: Basically corals distribute, but surface is covered by sand and /or mud.
- Mud Flat: Thick muddy sediment overlies the bed which originated from back marsh and/or river deposit of hinterland.

(2) Geotechnical Conditions of the Ports

The geotechnical conditions at Cebu Baseport and the outports are summarized in Table 3.1.6-1.

Table 3.1.6-1 Geological Conditions at Cebu Baseport and Outports

Port Name	Geomor-Phology	Geological Type of Sea Bed	Thickness Soft Soil (m)	Remarks
1. Cebu Base Port	Channel (Originally shoal)	Sand/clay	25	Mainly reclaimed dredged along the berth. Siltation and drift are considered
2. Consolacion	Shoal	Sand/clay	10	Sandy shoal of marsh origin. Siltation and drift are a little.
3. North Mactan	Shoal Coral bed	Sand Gravel Boulder	< 1m	Shoal of coral origin. Scattering coral boulders and coral rock siltation and drift are a little.
4. South Mactan		Sand/clay, coral boulder	15	Backmarsh origin shoal. Coral bed is covered by mud. Siltation and drift are a little.
5. Cebu South	Shoal	Clay	17	Hinterland is wide marsh of mud. Siltation and drift are to be considered.
6. Minglanilla	Sand Beach	Sand	< 1m	Scattering coral origin gravels and boulders/Siltation and drift are a little.
7. Bantayan	Coral Reef	Coral, rock and gravel	< 1m	Typical coral reef. Siltation and drift are a little.
8. Santa Fe	Sand Beach	Sand, gravel	< 1m	Coral reef origin. Siltation and drift are a little.
9. San Remigio (Hagnaya)	Sand Beach	Sand gravel	< 1m	Scattering coral origin boulders. Siltation and drift are a little.
10. Tabuelan	Beach/Coral bed	Sand gravel	< 1m	Coral origin boulders are dotted. Partially coral bed covered by sand/clay. Siltation and drift are a little.
11. Tuburan	Gravel Beach	Gravel	< 1m	Gravel rich in the bed/ Siltation and drift are to be considered which are drained from Suba River.
12. Balamban	Beach	Sand gravel with clay	5	Small marsh in hinterland/ Siltation and drift from Combado/Baliuagan Rivers are to be considered.
13. Toledo	Shoal	Sand gravel with clay	5	Location is south part of alluvial fan. Siltation and drift from Daku River are to be considered.
14. Carmen	Shoal Coral bed	Clay Coral rock	20	Hinterland is wide marsh. Coral bed is covered by mud. Siltation and drift are a little.
15. Danao	Sand Beach	Sand	< 1m	Consist of coral origin sand/Siltation and drift are little.
16. Argao	Sand Beach	Sand	< 1m	Located in the alluvial fan of Argao River. Siltation and drift from Argao River are to be considered.
17. Oslob	Gravel Beach	Gravel	< 1m	Coral boulders are scattered/Siltation and drift are to be considered.
18. Santander	Gravel Beach	Gravel	< 1m	
19. Poro	Shoal	Sand gravel	< 1m	Coral origin shoal. Siltation and drift are a little.

3.1.7 Seismology

Regarding seismology, epicenter distribution map was collected through PHILVOCS (Philippine Institute of Volcanology and Seismology). It is shown in Fig. 3.1.7-1.

As shown on this figure, if we look over the whole Philippine region, frequency of large earthquake (magnitude ≥ 6) is high, however, in the vicinity of Cebu island, including Negros and Bohol, large earthquake rarely occurs. Occasionally low intensity (2-3) earthquakes are recorded.

As a consequence, currently in the Cebu region, seismic coefficient kh = 0.15 is applied for civil engineering design.

The regional seismic coefficient (Kh 1) of the Philippines is shown in Fig. 3.1.2-2.

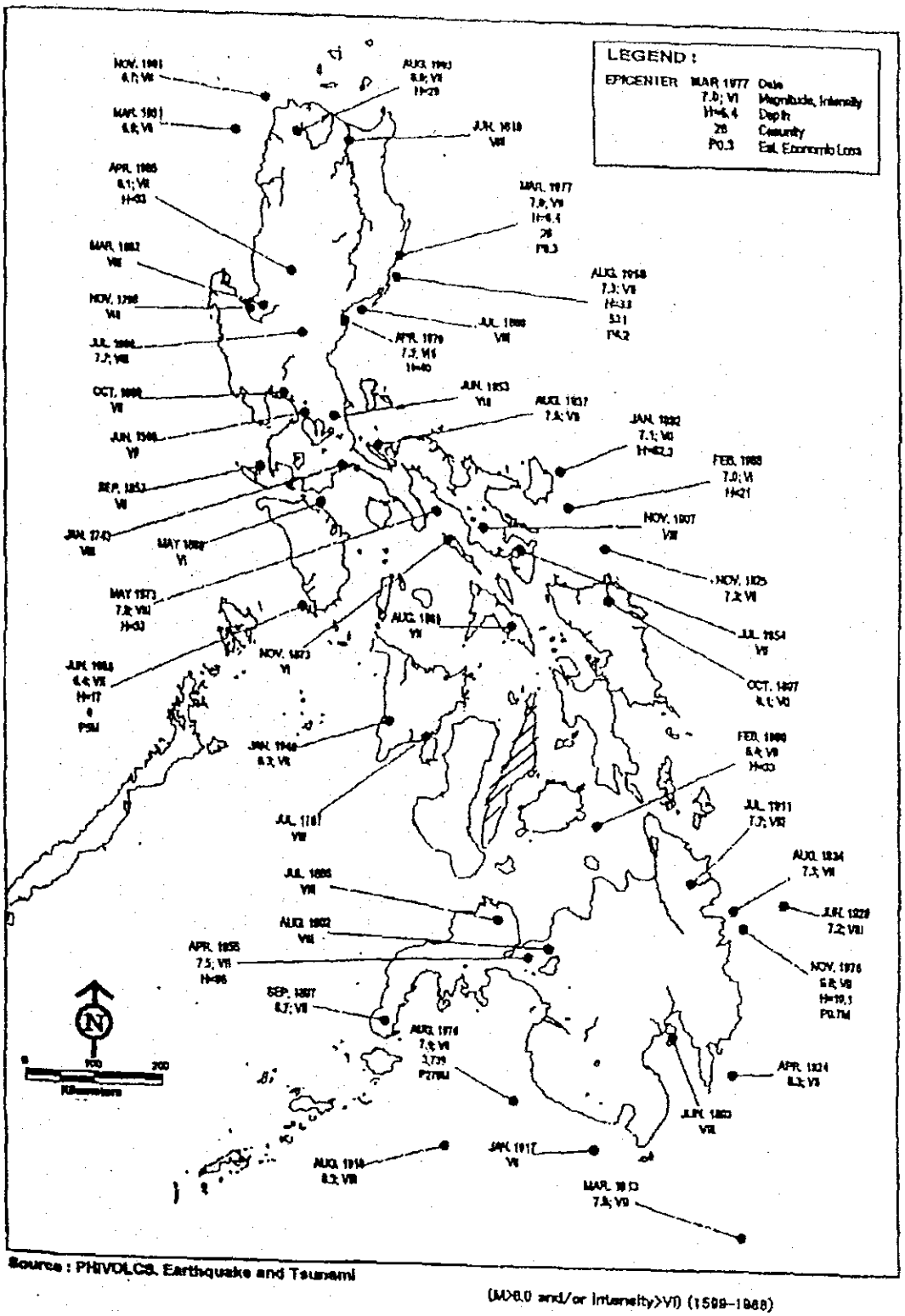


Fig. 3.1.7-1 Epicenter Distribution Map in the Philippines

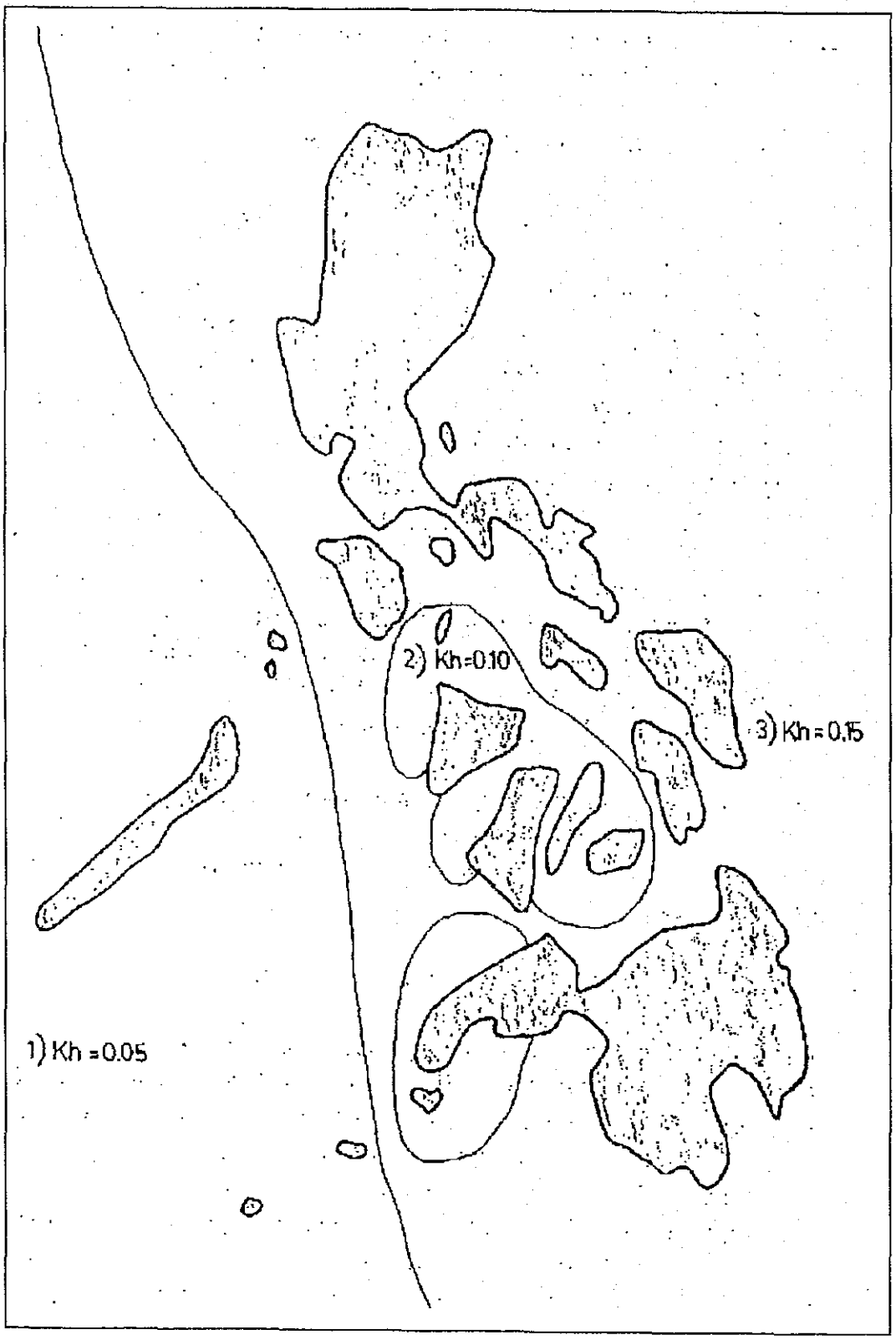


Fig. 3.1.7-2 Seismic Zoning in the Philippines (ASEP Committee, 1966)

3.2 Environmental Condition

3.2.1 Natural Environmental Conditions

(1) General

The objective of the JICA study is to formulate the master plan of Cebu Baseport, major outports in city and province of Cebu; proposed alternative plan is considerable as a large scale of construction activities. Therefore Initial Environmental Examination (IEE) and Environmental Impact Assessment in the feasibility study phase may be conducted to conform to the Philippine Environmental Law and Regulation. In the first phase study from January to February 2001, latest environmental law, regulation and present situation of the Cebu Baseport and Major Outports in the City and Province of Cebu should be collected, analyzed and evaluated in this section.

(2) Study area

The environmental study areas are as follows:
Proposed New International Cebu Port alternative areas are from the north:

1) Consolacion
2) North Mactan
3) South Mactan
4) Cebu city south (reclaimed area)
5) Minglanilla

Major outports

1)	Sta. Fe	7)	Argao
2)	San Remigio	8)	Oslob
3)	Carmen	9)	Poro
4)	Danao	10)	Tabuelan
5)	Balamban	11)	Tuburan
6)	Toledo	12)	Santander

(3) Present situation of Environmental Aspect in the study areas

1) Cebu Baseport and surrounding area
a) Water Quality
According to Metro Cebu Development Project III report, Marine/Coastal Water Quality analyzed in November 1999 is shown in Table 3.2.1-1.

Table 3.2.1-1 Marine/Coastal Water Quality in Cebu City (2 sampling stations)

Selected Parameter	Criteria Class SC DENR	Laboratory Results
1. Conductivity (m/S)	-	41.2
2. pH	6.0 - 8.5	8.1
3. Turbidity	-	1.69
4. Total Dissolved Solid	1,000	38144.80
5. Total Suspended Solid	Not more than 30mg/l	25.7
6. Total Solids	-	38,170.0
7. Settleable solids	-	<0.2
8. Cyanide	0.05	036
9. Ammonia	-	<DL
10. Biochemical Oxygen	7 (10)	43.5
11. Chemical Oxygen Demand	-	405.5
12. Dissolved Oxygen	5	6.0
13. Oil and Grease	3	-
14. Phosphate	-	032
15. Fecal Coliforms	-	130
16. Total Coliforms	-	290

The pH is a little higher, but it is in between pH criteria. Total Dissolved Solids exceeded the criteria. BOD is higher six time than criteria. Oil and Grease levels were alarmingly high Fecal Coliforms and Total Coliforms indicate high level. From the results of the water quality analysis, the water quality of Marin/Coastal area in Cebu city is processing turbid and eutrophication.

b) Air Quality

More recent air quality measurement were conducted by DENR –EMPAS VII in October 1999. The measurements were limited to one parameter, that is suspended particulate(SPM) matter only.

SPM : Suspended particulate matter (SPM) is in the air including dust, carbon compounds, smoke and salt lacted near the sea. SPM is a major air pollution problems in Metro Manila. It is especially seen near streets and industrial area especially during dry season. Source of particulate in urban areas include motor vehicle exhaust emissions, combustion of fuels, fires and construction activities.

Air quality as measured in terms of SPM has likewise deteriorated. Blamed for this condition is the increasing number of motor vehicles major of which are diesel-fed. Also responsible are stationary sources of air pollutants that is power plants, industries, and manufacturing firms, Attendant to air pollution is noise and traffic nuisance.

Not only in the center of Cebu city but also along the South Cebu city Coastal road in Talisay city, the dust and noise nuisances together with the traffic congestion already prove to be burdensome.

c) Coastal Zone in study areas

Cebu's coastline has an estimated length of 827 km. The Coastlines have several opening from river mouths of more or less 47 identified watershed rivers originated from uplands. While the coastal area are affected by the degradation of upland resources, environmental issues arising from the increased human activities along the coast are also a major cause of the degradation of the coastal areas. Among the critical issues in the coastal zone as follows :

- Biodegradable, non-biodegradable and toxic waste upland resources, manufactures and settlements are dumped into rivers, creeks, canals and drainage, thereby destroying the natural marine habitats.
- Cutting of mangrove for fuelwood and conversion of mangrove area to other purposes like fishpond and reclamation projects likewise destroy habitat and breeding grounds of marine species.
- Siltation in coastal areas particularly along ports ; and
- Coastal zone areas are subject to erosion and frequently deteriorated by extraction of beach and removal of corals.

a) Consolacion area

- There are some ship repair docks in Cansaga Bay facing Consolacion area. Water and sea bed pollution may be expected with heavy metals and draining.
- Sea bed surface in the area are mostly sandy and clay. When it is low tide large sand dune emerges in the area.
- Some kinds of mangrove species scatted in the proposed reclaimed areas, that is *Sonneratia alba, Avicennia marina, Rhizophora apiculata.* But all of Sonneratia trees were already cut for fuel wood. And sea grass of family Zosteracaea and sea urchins in habits in the area.
- Residents scattered in the study area in Consolacion, there is a monastery.

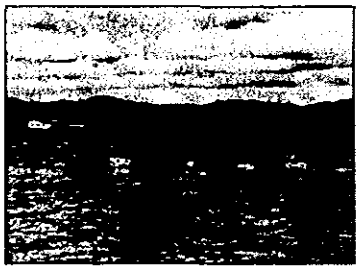


Photo-1
Sonnratia species

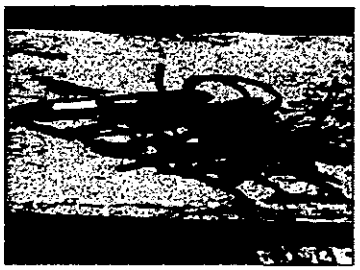


Photo-2
Sea grass (Zosteracaea)

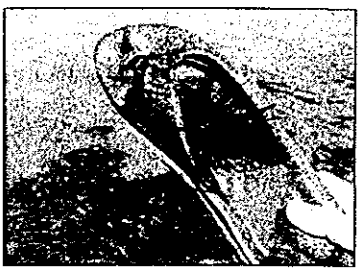


Photo-3
Sea urchin

b) North Mactan area

- Coral reef and mangrove communities occur on the reef edge in Magellan Bay North Mactan.
- Squatter's houses occur on the coastline north Mactan, so project activities must be attentive to treat the squatters living around proposed area.

Photo-4
Small mangrove in north Mactan

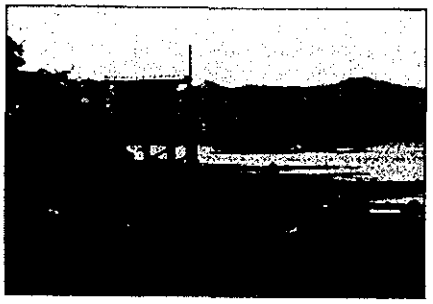


Photo-5
Squatter's houses in north Mactan

- Sea bed off the shore of north Mactan is covered with sea grass and scattered small corals. Be attentive to treat the corals and sea grass.

Photo-6
Small corals and sea grass in north Mactan
Transparency was too bad due to the area near ship navigation channel.

c) South Mactan area

- Small mangrove community occurs coastline and lagoon off the shore. Mangrove species : *Avicennia marina, Sesuvium portulacastrum Rhizophora apiculata.*
- Coral reef occurs on the lagoon and on the reef edge.
- There are swimming beach and diving spots east and south Mactan. Pay attention to contamination of replacement from ships.
- There are fish ponds in the south Mactan. Environmental impacts will be expected to the fish ponds while the road is under construction.

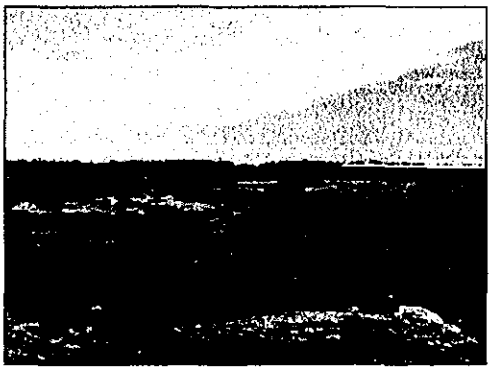


Photo-7
Fish pond in south Mactan, Base Rock exposures.

Photo-8
Corals off the shore in south Mactan.

d) Cebu city south

- Large reclaimed land filled up on the swamp area by the Cebu South Coastal Road Project, back mangrove species are remaining along the channel.
- Proposed project activities shall be carried out in the front of existing reclaimed area Seaward, corals and mangroves do not occur on the area in front of existing reclaimed area. Thick siltation must be expected on the sea bed rather than corals from the result of field survey.
- Planned new hotel and resort facilities on the fill up area by Cebu city. The plans and proposed port development should be harmonized with landscape and aesthetics.
- Residences and fishery activities do not occur in the front of reclaimed land.

e) *Minglanilla area*

- Mangroves and coral reef are not seen in the relevant area. It is not considered to raise significant environmental impacts for fauna and flora.
- Small fishery village occurs Minglanilla area. They are using the coastline for swimming and gathering shellfish.
- Coastal erosion will be expected after reclamation in the vicinity area.

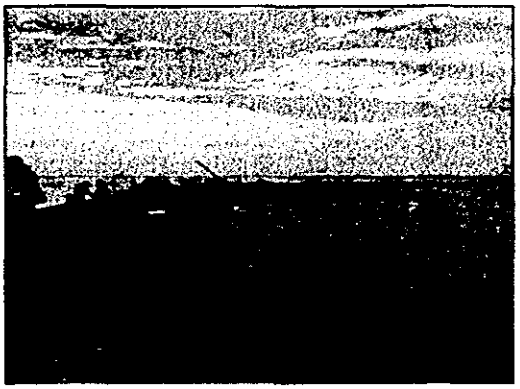


Photo-9
Existing causeway under rehabiritation

Photo-10
Fishery village by the causeway

Table 3.2.1-2 Summary of Environmental Evaluation Matrix of Candidate New Cebu Port

New Port Candidate Areas	Environmental Description	Evaluation/Mitigation Measures
1. Consolacion Area	Some kinds of mangrove species scatted in the proposed reclaimed areas that are *Sonneratia alba, Avicennia marina, Rhizophora apiculata.* But all of Sonneratia trees were already cut for fuel wood. And sea grass of family Zosteracaea and sea urchins habits in the area.	Mangrove planting plan should be formulated on the substitution areas surrounding the port development area. The planting cost will be included in port construction cost.
2. North Mactan Area	Coral reef and mangrove communities occur on the reef edge in Magellan Bay North Mactan. Squatter's houses occur on the coastline north Mactan, so project activities must be attentive to treat the squatters living around proposed area. Seabed off the shore of north Mactan is covered with sea grass and scattered small corals. Be attentive to treat the corals and sea grass	Coral reef and marine ecosystem is the precious resources in resort island Mactan. Port development project is not recommended from the view point of environmental aspect.
3. South Mactan Area	Small Mangrove community occurs coastline and lagoon off the shore. Mangrove species : *Avicennia marina, Sesuvium portulacastrum Rhizophora apiculata.* Coral reef occurs on the lagoon and on the reef edge. There are swimming beach and diving spots on the east and south Mactan. Pay attention to contamination of replacement from ships. There are fish ponds in the south Mactan. Environmental impacts will be expected to the fish ponds while access road are constructed	Lagoon in south Mactan is precious resources in resort island Mactan and fishery resources. Port development project is not recommended from the view point of environmental aspect.
4. Cebu South Area	Large reclaimed land filled up on the swamp area by the Cebu South Coastal Road Project. Back mangrove species are remaining along the channel. Proposed project activities shall be carried out in the front of existing reclaimed area Seaward, corals and mangroves do not occur on the area in front of existing reclaimed area. Thick siltation must be expected on the sea bed rather than corals from the result of field survey.	No mangroves and coral reefs occurs in front of existing reclamation area. The area has been already covered with the soil from catchments area through the river. The sedimentation with siltation are anticipated in future.
5. Minglanilla Area	Mangroves and coral reef are not seen the relevant area. It is not considered to raise significant environmental impacts for fauna and flora. Small fishery village occurs Minglanilla area. They are using the coastline for swimming and gathering shellfish Coastal erosion will be expected after reclamation in the vicinity area	Predicted natural environmental impacts may be negligible.

(4) Environmental Preliminary Study of Major Outports in Cebu Province

Environmental preliminary study has been done from January to February 2001. Environmental description summarized in following Table 3.2.1-3.

Table 3.2.1-3 Environmental Description of Ports in Cebu

Major Outports	Environmental Description
1. Santa Fe	Santa Fe port locates in Bantayan the north remote island of the Province. So few residence are surrounding the port, Water quality seems to be good, coral reefs occur off shore, soil erosion and siltation are not predicted at present.
2. San. Remigio	Proposed port construction area is located on lifted coral at the mouth of canal. Water and air quality seems to be good. Few residences are in the relevant area. North wind in rainy season will be predicted strong. On the abandon cultivated area.
3. Carmen	The port Carmen forms an inlet, shallow bay. Small mangrove and fish ponds occur at the base of causeway.
4. Danao	Some stores and restaurants operate on the causeway. Dumped trash is the environmental issues. No residence, mangrove and corals occur surrounding the port.
5. Balamban	Balamban port locates north of West Industry Complex. There are few residents surrounding the causeway. Sand beach occur along the shore, so corals is not expected near the causeway.
6. Toledo	Causeway locates adjoining public market, so traffic congestion and accident will be predicted during construction phase. Squatters houses situate at the base of the causeway. Resettlement of resident will be expected during construction phase.
7. Argao	Argao locates in the south west of Cebu city, Few residence s surrounding the port. Water right issues is not expected. Water quality is good, but soil erosion, topography and current change and siltation are predicted while and after the port development construction.
8. Oslob	Resettlement of residences and water right issues are not anticipated surrounding the Oslob port. Topographical change and soil erosion is expected while the port is constructed.
9. Poro	Poro port is located in the east remote island. No resettlement and water right of residence is anticipated. Topographical, current, change and soil erosion will be expected while construction will be done.
10. Tabuelan	Relocation of residence and compensation of water right will not be predicted, and also water pollution does not occur at present. Topographical and current change will not be anticipated.
11. Tuburan	Water is muddy at present. Soil erosion is anticipated while the port is constructed. Other environmentally checking items meet to be negligible.
12. Santander	Water quality at present is turbid, resettlement of residence and topographical and current change is not expected. Soil erosion is seems to be negligible
Overall Evaluation:	All of outports in Cebu province is quite smaller compared with the Cebu baseport, so few squatters occupied the area surrounding each port. Also water right issues between the project and fisherman is not predicted to cause significant environmental impacts. Regarding other environmental screening items such as soil erosion, topographical and current change by the project activities should be negligible. But coral reefs occur in front of proposed development area of San Remigio and existing Santa Fe port.