9.4 PORT AND SEA TRANSPORTATION

9.4.1 PORT MANAGING SYSTEM

The Philippine Port Authority (PPA) is the agency in charge of port development, management, operation, traffic and other relevant administrative matters. PPA has five Port District Offices (PDO) in the whole country and there are 19 Port Management Offices (PMO) under the PDOs. There are 19 base ports, 57 terminal ports, some five hundred other government ports and some three hundred private ports under the supervision of the PMOs in the Philippines.

In Central Visayas (Region VII), there are two PMOs, namely Cebu and Dumaguete under the PDO of Visayas. All the ports at Cebu Province are managed by PMO Cebu. As for the terminal ports, there are four under the PMO Cebu, namely: Mandaue, Ssnta Fe, Toledo and Argao. Besides the base and terminal ports, there are 14other government ports and 27private ports at operational in the Province. Other government ports and private ports are supervised by each terminal port. Figure 9.4.1 shows the organization of PPA, PDO Visayas and PMO Cebu.

PPA's administration and operational functions are implemented by PMOs. PMO Cebu has four divisions: Port Services Division, Resources Management Division, Engineering Services Division and Port Police Division. There are many port services such as arrastre, stevedoring, pilotage, tug assistance and so on. Such services are conducted by the private sector under the supervision of PMO Cebu. Main ports at Cebu Province are listed in Table 9.4.1.

9.4.2 PORT FACILITIES

(1) Cebu Port

The Port of Cebu is located along the sea lane between Cebu City and the Mactan Island, well protected and easily accessible to ocean-going vessels. It is considered as one of the biggest and busiest ports in the Philippines and the first domestic port to receive container service.

The port provides the water basin with depth of up to 10 m and the tidal variation amounts to about 1.4 m. Access for larger ships is from the south because of the bridge connecting Cebu with Mactan Island (clearance, 24 m). The port area is divided into three areas, that is, Cebu International Port (CIP), general purpose berth area and domestic terminal area (Figure 9.4.2).

CIP was constructed under the 3rd IBRD Port Project and became fully operational in 1985. CIP is used by international shipping and long distance Ro/Ro ships between Cebu and Manila. CIP handles all foreign cargoes (containers and breakbulk cargoes), domestic cargoes and passengers (Figure 9.4.3).

The general purpose berth area is characterized by a long marginal berth, 1,265m long. This berth was constructed in 1960s, but, now it can not be used partly because of the superannuation and the scouring caused by the disasters. The planned improvement of the berth is to widen and deepen along the whole length.

TABLE 9.4.1 LIST OF PORTS IN CEBU PROVINCE

Port	Port Type	Foreign Cargo	Domestic Cargo	Passenger	RO/RO/Ferry Service
Cebu	Base	O	O	O	O
Mandaue	Terminal		O	O	O
	Private	O	O		
Sta. Fe	Terminal		O	O	O
	Private	O	O		
Toledo	Terminal		O	O	O
	Private	O	O		
Argao	Terminal				
	Private		O	O	O
Dalaguete	Other Gov't		O		
Alcoy	Private	O	O		
Santander	Private			O	O
Samboan	Other Gov't		O		
	Private		O		
Dumanjug	Other Gov't			O	O
Balamban	Other Gov't		O		
Tururan	Other Gov't			O	O
Hagnaya	Other Gov't		O	O	O
Polanbatto	Other Gov't		O		
Bantayan	Other Gov't			O	O
Danao	Other Gov't			O	O
Carmen	Other Gov't		O	O	O
	Private		O		
San Francisco	Other Gov't			O	O
Poro	Other Gov't			O	O
Tudela	Other Gov't			O	O
Pilar	Other Gov't			O	O

Notes: "Port Type" is classified based on teh Annual Statistic Report."
There are other 19 private ports at operational in Cebu Province.
Each "Other Gov'e" and "private" are administrated by the terminal port.

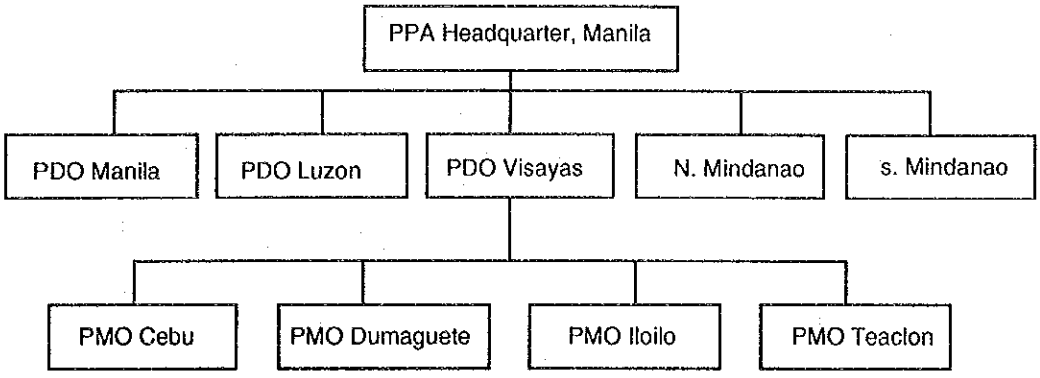
The berth is used exclusively for the domestic cargoes. Many kind of ships including some Ro/Ro ships are accommodated. The stacking area behind the berth is not paved yet, but used for the containers, breakbulk cargoes as well as passengers.

The domestic terminal has the berthing facilities, 2,798m long with sustained damages at some places. This terminal is used by many kind of ships among which inter-island ferry ships shares largely. This terminal area is very narrow and there is little back-up space available. Many vehicles are waiting for cargo deliveries. However, this terminal handles the containers, breakbulk cargoes as well as passengers.

The existing port zone of the Cebu Port has an area of only about 40 ha of land, and the effective port activities are difficult especially at the domestic port area. The total regular ferry services number average 42 departures per day totally. As one of the means to improve the situation, PPA submitted the proposed port zone to the mayor of the City of Cebu and the proposal is being discussed at the City Development Council.

The physical characteristics of the main port facilities are summarized in Table 9.4.2.

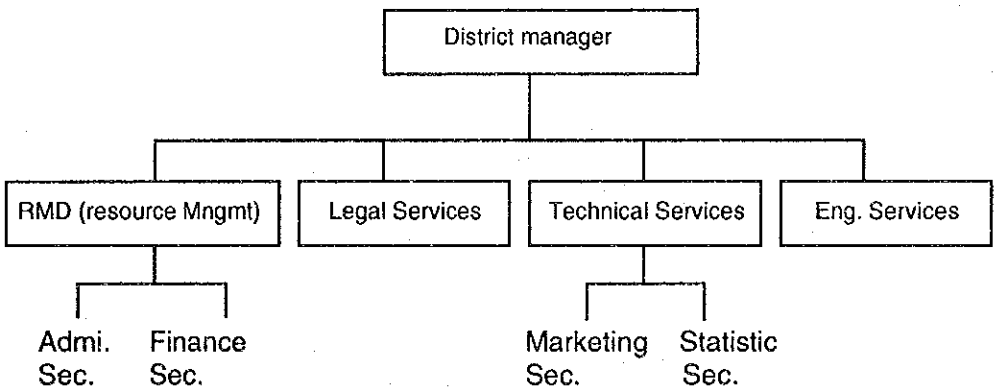
Philippine Port Autority (PPA)



Base Port: Cebu
Terminal Port:
Mandaue: Mandaue, Danao, Carmen
Sta Fe: Sta Fe, Bantayan, Hagnaya, Polambato
Toledo: Toledo, Balamban, Tuburan, Dumanjug
Argao: Argao, Dalaguete, Santander

Note: Each port is supervised by the terminal port.

Port District Office (PDO) Visayas



Port Management Office (PMO) Cebu

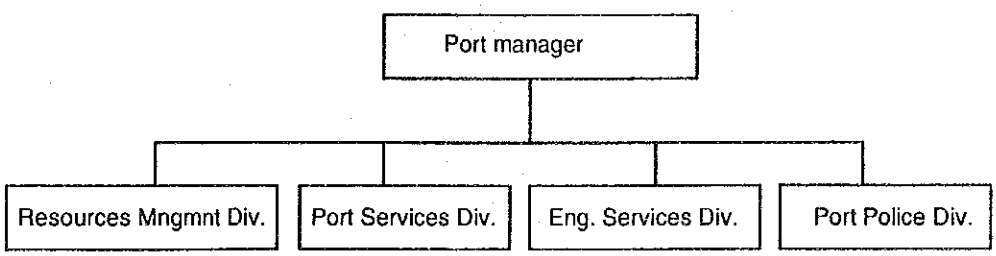


FIGURE 9.4.1 ORGANIZATION CHART OF PPA

TABLE 9.4.2 PHYSICAL CHARACTERISTICS OF CEBU PORT

Items	Unit	Total	Domestic Terminal		General Purpose Berth	CIP
			Pier1-3	B.18-33		
Berthing Facility:						
No.of Berth	No.	39	9	13	10	7
Length	m	4,753	1,029	1,769	1,265	690
Water depth	m	5-10	6.0	5.0	10.0	10.0
Structure Type			Finger, Concrete Pile	Marginal, Concrete Pile	Marginal, Concrete Pile	Marginal, Steel Pile
Water Basin:						
Area	m^2	985,174				
Water depth	m	5-10	9	5-9	9	10
Back-up Area:						
Port Area	m^2	423,245				
Open Yard	m^2	76,922	6,616	32,117	38,189	
Transit Shed	m^2	6,610	6,610			
Warehouse*	m^2	30,105				
Passenger Terminal	m^2	720				720
Container Yard	m^2	86,600				86,600
CFS (60 x 108)	m^2	6,480				6,480
Cargo Handling Equipment:						
Level-luffing Crane (35t, 25t)	No.	2				
Mobil Crane	No.	11				
Toplifter (25t)	No.	3				
Forklift	No.	128				
Ro/Ro Facility:		Available		Available		
Linkage:						
Access Road		Fully paved	Paved	Paved	Paved	Paved
Linkage to City Proper		Fully paved	Paved	Paved	Paved	Paved

Note: *Waterhouses are owned privately, and are located at the outside of the premises of PPA.

(2) Other Ports

The structural types of the local ports are either causeway only or causeway adding concrete slab with concrete pile. The water depth of the berthing facilities are mostly at a maximum of 3.0m only.

These facilities were constructed by national or local government before the establishment of PPA (1974), and at present maintained by PPA. Their physical conditions are not well maintained. In general, most of the local ports are short of facilities which could make passenger and cargo handling difficult. Pier and wharf need repair and improvement. Other port facilities such as passenger terminal, office, transit shed, warehouse as well as utilities should be considered.

A summary of the physical characteristics is given in Table 9.4.3.

TABLE 9.4.3 PHYSICAL CHARACTERISTICS OF OTHER PORT

Port	Berthing Facility				Water Basin		Back up Area					
	No. of Berth	Length (m)	Water depth (m)	Structure Type	Area (m2)	Water Depth (m)	Port Area (m2)	Open Yeard (m2)	Transit Shed (m2)	Passenger Terminal (m2)	Ro/Ro Facility	Access Road
Mandaue	1	18	3.0	Open Type, CN, Pile	NS		3,360	1,200		90	Avail.	C,P
Sta Fe	2	50	3.0	CW, CN, Pile	NS		2,280	565	96	42	N.A	C,P
Toledo	4	360	3.0	CW, CN, Pile	282,600	3	2,160	1,050		72	Avail.	C,P
Argao	1	9	1.5	CW, CN, Pile	NS		935				N.A	C,P
Dalaguete	2	49	2.0	CW	NS		345				N.A	C,P
Santander	1	6	3.0	CN, Pier	NS		1,028			60	N.A	C,P
Samboan	2	39	5.0	CW, CN, Pile	NS		N.A				N.A	C,P
Samboan*	1	20	2.0	CW, CN, Pile	NS		1,028				Avail.	G
Dumanjug	4	45	3.0	WD, Pile	NS		285				N.A	C,P
Tuburan	2	47	3.0	CW, CN, Pile	NS		30,000				Avail.	C,P
Bantayan	2	25	3.0	CW, CN, Pile	NS		2,260	565	96		N.A	C,P
Carmen	1	30	1-5	CW	NS		2,670					G
Carmen*	1	30	3.0	Pier, CN, Pile	NS		480	480			N.A	G

Notes: 1) * means private port.
2) For Structure Type: "CN" represents "concrete"; "CW" causeway, "WD" wooden
3) For Water Basin: "NS" denotes "Not specified"
4) For Access Road: C, "concrete, "P" paved, and "G" gravel
5) Linkage to City proper from each port is fully paved.
6) Cargo handling equipment is not available.

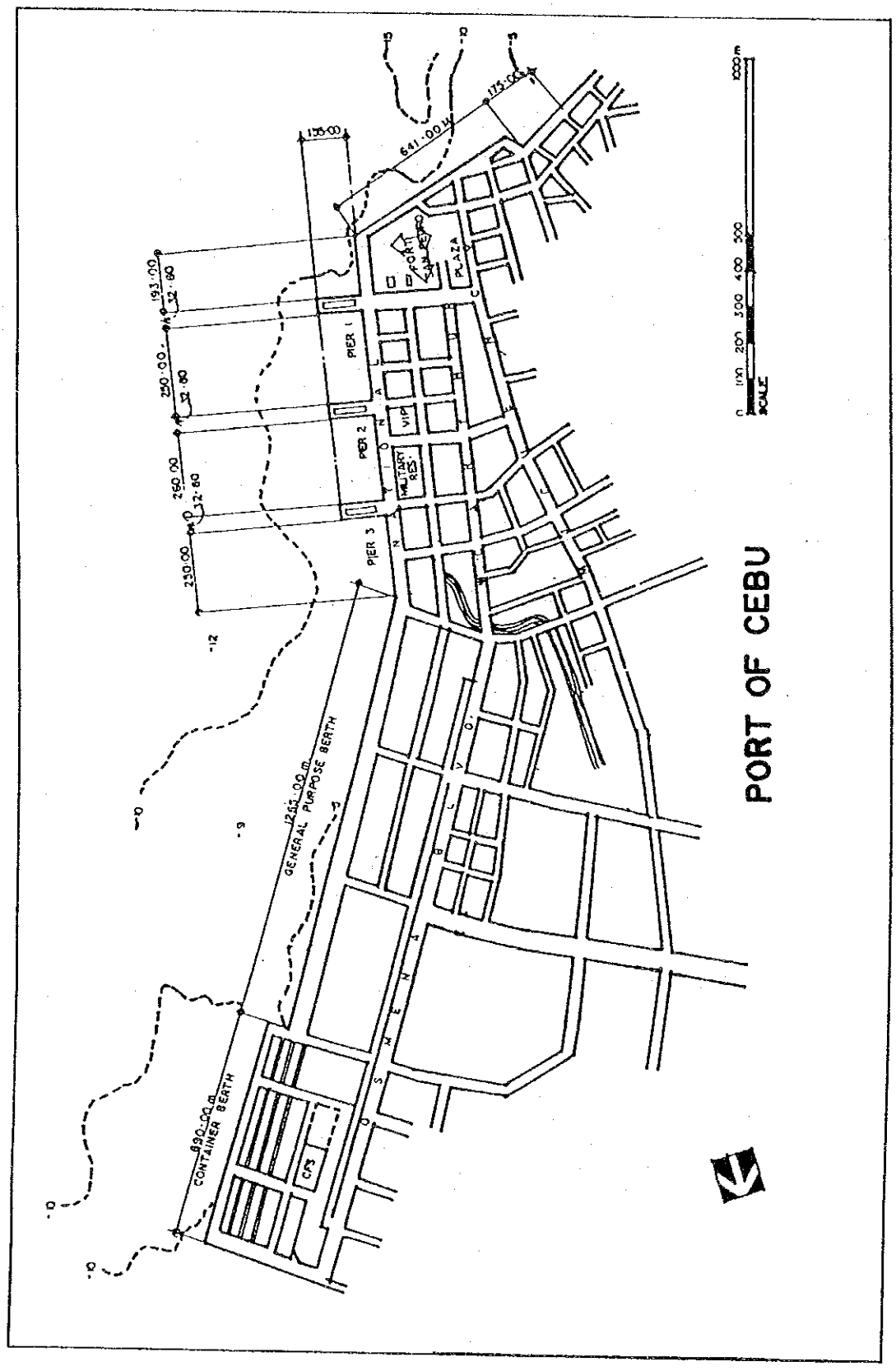


FIGURE 9.4.2 PLAN OF CEBU PORT (A)

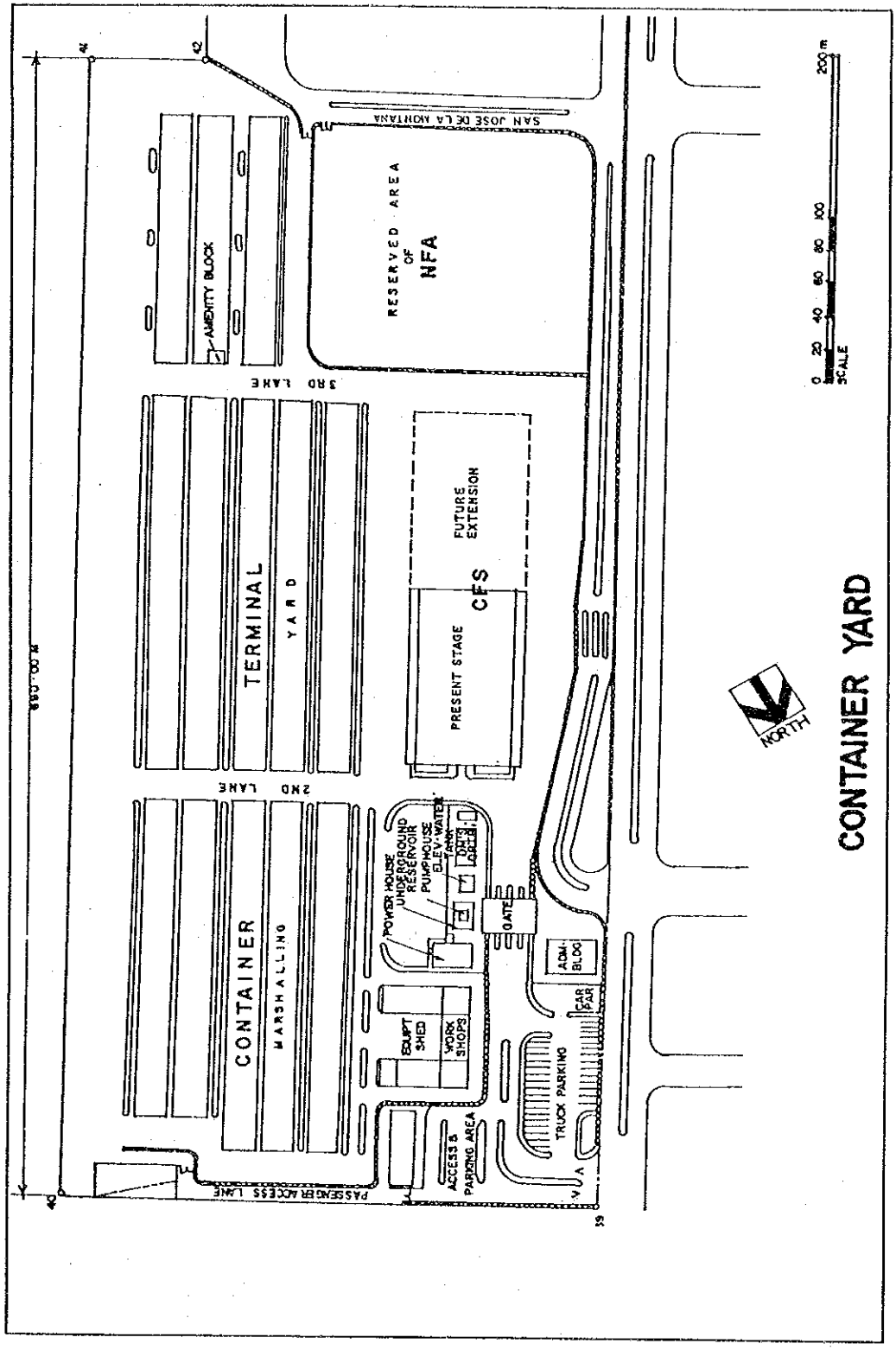


FIGURE 9.4.3 PLAN OF CEBU PORT (B)

9.4.3 CURRENT SITUATION OF THE PORTS IN CEBU PROVINCE

(1) Coastal Area Development in Metro Cebu

Along the coastal area of the Metro Cebu, population density is high, many industries are located, and infrastructures have been constructed with a comparatively higher level. This area has good marine conditions, and has some appropriate sites for the reclamation which make the land acquisition feasible. So, this area has high potential for the development.

However, urban sprawl is in progress and there are many problems to be addressed. Therefore, many development projects are proposed, some of them are already under construction, some are at the conceptual plan stages.

The major infrastructure projects at the coastal areas are summarized as follows (except Cebu Port).

TABLE 9.4.4 MAJOR INFRASTRUCTURE PROJECTS

Project	Project Period	Main Infrastructure
Mandaue Reclamation Project	1988-1995	Roads, Marina, Sewage, Power Plant
Mandaue North Reclamation Project (The First Stage)	1990-1997	Roads, Industrial Port
Transit Cargo Port Construction Project	Conceptual Stage	Port
Pasil Fishing Port Project	1988-1991	Fishing Port
Kawit Fishing Port Complex Project	F.S.Stage	Fishing Port
Cebu South Reclamation Project	F.S.Stage	Industrial Area, Residential Area, Causeway

(a) Mandaue Reclamation Project

The project is a 192 hectares reclamation to be created at the bay adjacent to the Cebu International Port (CIP). Hotels, a conventional center, residential areas, and the new business and commercial zones are proposed at the reclamed land.

This project promotes the urban renewal of Mandaue City, and contributes to the smooth traffic between Cebu City-Mandaue City-Mactan International Airport.

The project period is scheduled between 1988-1995, and the reclamation is 70% complete. The planned main road is being laid out in the area already.

(b) Mandaue North Reclamation Project

This project is planned with the aim to help renew and improve Mandaue City, the same as the above project. The west side of Cansaga Bay is to be reclaimed and some 100 ha land is to be realized. The reclaimed land is to be used for the relocation of the existing manufacturing factories, and also to be used for newly industrial factories. This area will become the industrial zone of Mandaue City.

An industrial port is planned to be constructed and is to be used for the sea transport of the raw materials and finished products. Presently, these materials and products have been transported by the road between the existing factories and Cebu Port passing through the commercial and residential areas, but in the future, the road transportation will be cut. This project will generate the economic benefit and contribute to the smooth traffic flow. The reclamation activities undertaken by private construction firms are on-going. At the west end of the reclaimed land, the fishing port is also planned.

At the first stage, this project aims to construct the industrial zone and the fishing port of Mandaue, but finally the cause way connecting Mandaue City with Consolacion City will be constructed and all the bay will be reclaimed. This is the conceptual plan.

(c) Transit Port Construction Project

Cebu Port is the base port of the Visayas and its handling cargo and number of calling ships is increasing every year. Given the trend, therefore, a more effective cargo handling is needed and its functional split will become necessary because of its spatial restriction.

This project is proposing to construct of the port for the transit cargo at the opposite side of Cebu Port. (Mactan Island Side) At present, this project is at the conceptual planning stage. Therefore, the field survey is not carried out yet and its site are not planned definitely. More detailed field survey will become necessary when the coordination between the concerned parties is done. It is noted that Mactan Island is surrounded by coral reefs and the said opposite side is composed of the coral reef also.

(d) Pasil Fishing Port Project

This project was funded by the Belgian fund and the fishing port was constructed near the existing Pasil Fish Market which is located at the west of Cebu City.

The project was aimed to facilitate the base port for the fishing boats which landed the fish catches, idled and outfitted inappropriately. It also aimed to develop the fishing and to heighten the security of the ship navigation at the sea lane between the main land and Mactan Island.

This project is composed of the landing berth, idling berth, outfitting berth with apron. (water depth is around 3m) Many fishing boats are observed to use the facilities.

(e) Kawit Fishing Port Complex Project

This project aims to improve fish production and provision of efficien unloading operations and improved shelter for fishing boats. Additionally, the project includes the installation of the fish storage such as cold storage, blast freezer as well as the berthing facility. The site of this project is adjacent to the above completed fishing port. This project is at the stage of the feasible study, and it needs the coordination between the concerned parties in view of the long term development of the water area.

(f) Cebu South Reclamation Project

This project is to create land area by the reclamation of the shallow water off the southern part of Cebu City. Reclaimed land is around 330 hectares, and is planned to be used for industrial area, residntial area and public facilities etc. The project is closely linked to the Cebu South Express Project which is proposed to run along the water perimeter of the above reclamation connecting the south and north of Metro cebu. The project period is scheduled to be three years.

(2) Current Situation of The Ports

There are many ports at the Cebu Province and they are owned, operated and managed either by the PPA, Municipality or private sector. Functionally, they are classified into one base port- Cebu, several local ports, and several industrial ports which are owned by private sector. Mandaue Port is one of the local ports, but is planned to be developed having the functional split with Cebu Port.

Many local ports have interisland ferry services and function as the fishing boats bases as well. Additionally, some local ports such as Toledo and Carmen, serve as alternative to the industrial port. Industrial ports owned by private companies such as mining, milling, and petroleum etc., have their own port facilities at Alcoy, Toledo, and Mandaue etc. They are used for the transport of the raw materials and their products. Their total cargo volume accounts to around 5 million metric tons (1992).

9.4.4 CHARACTERISTICS OF THE SEA TRANSPORTATION

(1) Trend of the Container Ships at Inter-Asian Route

Many changes have occurred in the technology of ships and cargo handling, and this development is likely to continue. A key principle in planning port facilities, therefore, is that development planns should be as flexible as possible to allow a prompt response.

According to the Study conducted by Overseas Coastal Area Development Institute of Japan, the current trend of container ships at Inter-Asian route is summarized below:

The following table and figure show the historical change of the full container ships engaged in the Inter-Asian route. Numbers of container ships and total TEU (twenty-footer equivalent unit) are increasing sharply, and the average ship sizes become larger every year.

TABLE 9.4.5 CONTAINER SHIP AT INTER-ASIAN ROUTE

Year	1984	1985	1986	1987	1988	1989	1990	1991
Ships No.	99	98	110	113	131	149	160	228
Total TEU	44,925	45,954	53,352	54,801	67,134	79,808	92,273	137,511
Ave.TEU	454	469	485	485	512	536	577	603

Maximum ship size exceeds 1,500 TEU in the year 1988, and 2,000 TEU in 1991. In 1991, Ships over 1,000 TEU share around 16% of the total. The container ships over 1,500 TEU called to Manila from 1988.

As for the container ships over 700 TEU, it is clear that their sizes become larger gradually. Consequently, their draft also become larger and number of ship over 8m draft share around 38% of the total as of 1991. The following figures show the ship size distribution represented by TEU, and the draft distribution pattern.

(2) Role of the Port of Cebu

(a) Foreign cargo

The role of the Port of Cebu on the foreign cargo is summarized as follows:

Singapore, Hong Kong, Kaohshiung etc. are the mother ports aswell as hub ports on the USA-Far East route. The foreign cargo on this route outbound from/inbound to Philippines are transported by the feeder services from/to the above mother ports or hub ports. The Port of Cebu as well as Manila is the feeder port on this route.

As for the Inter-Asian route, Manila is used as one of the hub ports by a number of shipping lines, and Cebu Port is the only one port in Visayas which serves as the feederport. So, Cebu Port plays the role of distribution center of the foreign cargo in Visayas.

TABLE 9.4.6 PORT FUNCTION OF MANILA AND CEBU PORTS

	Mother Port		Hub Port		Feeder Port	
Port	Manila	Cebu	Manila	Cebu	Manila	Cebu
USA-Far East Route	-	-	-	-	x	x
Inter-Asian Route	x	-	x	-	-	x

(b) Domestic cargo

With regard to the domestic cargo, there are some main routes connecting Luzon, Visayas and Mindanao. In Visayas, there are three base ports connecting Visayas with the Luzon and Mindanao; namely, Cebu, Dumaguete and Iloilo. Among this, Cebu Port occupies Leyte, Northern Mindanao as well as Region VII as its hinterland, and Cebu Port functions as the distribution center for these areas on the domestic sea transportation.

(3) Inter-Island Traffic Movement

(a) Data source

There are currently four data sources from which passenger and /or cargo traffic information can be obtained:

1. Philippine Ports Authority (PPA)
2. National Statistics Office (NSO)
3. Philippine Coast Guard (PCG)
4. Operation Records submitted by Shipping Operators

Among the four, the NSO statistics which are based on the coast-wide manifest submitted by PPA are helpful for the cargo/passenger flow analysis.

The precedent JICA studies concerning sea transport such as "Master Plan Study on Maritime Safety, 1992" or MAPMAS and "National Roll-on Roll-off Transport System Development Study, 1992" or Ro/Ro study made database from the NSO statistics for their purposes. To analyze the traffic flow of Central Visayas, the database of the series of JICA studies are utilized in this section.

(b) Cargo traffic

1) Nationwide movement

The movement of the inter-island shipping can be roughly analyzed in the context of the three geographic divisions of the Philippines, that is, Luzon, Visayas and Mindanao. Figure 9.4.5 indicates that the three major connections of cargo traffic are between Luzon-Visayas (37.8%), Visayas-Mindanao (18.0%) and within the Visayas area (17.1%). Accordingly, all are connected with the Visayas which means that Visayas is the core of cargo traffic.

2) Distribution pattern in connection with Cebu

Figure 9.4.6 shows the distribution pattern of the cargo traffic which centers on Cebu. It is clear that the total inward traffic greatly surpasses outward one. In particular, Luzon-Cebu and Cebu-Mindanao are very much unbalanced in terms of cargo tonnage. It is also noted that Cebu deals with 15.5% of domestic cargo although it has only 4.4% of national population as of 1992.

3) Inter-island cargo flow by commodity item

Cebu is noted for the attraction area of agricultural products such as rice, corn and fruit as well as for the production area of beer and iron as shown in Table 9.4.7.

The inter-island commodity flow of Visayas as shown in Table 9.4.8 reveals that Cebu is a large consuming island with the following characteristics:

- from Luzon to Cebu: pulp, iron, mineral and the rest
- from Mindanao to Cebu: corn, woods, pulp, cement, fruit and the rest
- from Panay to Cebu: rice
- from Samar-Leyte to Cebu: fertilizer
- from Negros to Cebu: sugar

(c) Passenger traffic

Figure 9.4.6 shows the nationwide movement of passengers by sea transport. The volume of passengers traveling within Visayas account for about 1/4 of the total traffic.

Passengers prefer short distance trips as compared with cargo movement due to the competition with air transport. For instance, the average trip distances are 538km for cargo and 253km for passengers by sea. It is for the reason that the number of passengers traveling within the three divisions have an aggregate share of 60.0% while the longest connection between Luzon and Mindanao has the smallest share of 3.0% of the total passengers.

Cebu is located as the hub of passenger traffic because PMO (Port Management Office) Cebu has 6.2 million passengers or the largest share of 18.4% of the total among 19 PMOs. It is almost double of Manila (3.3 millions).

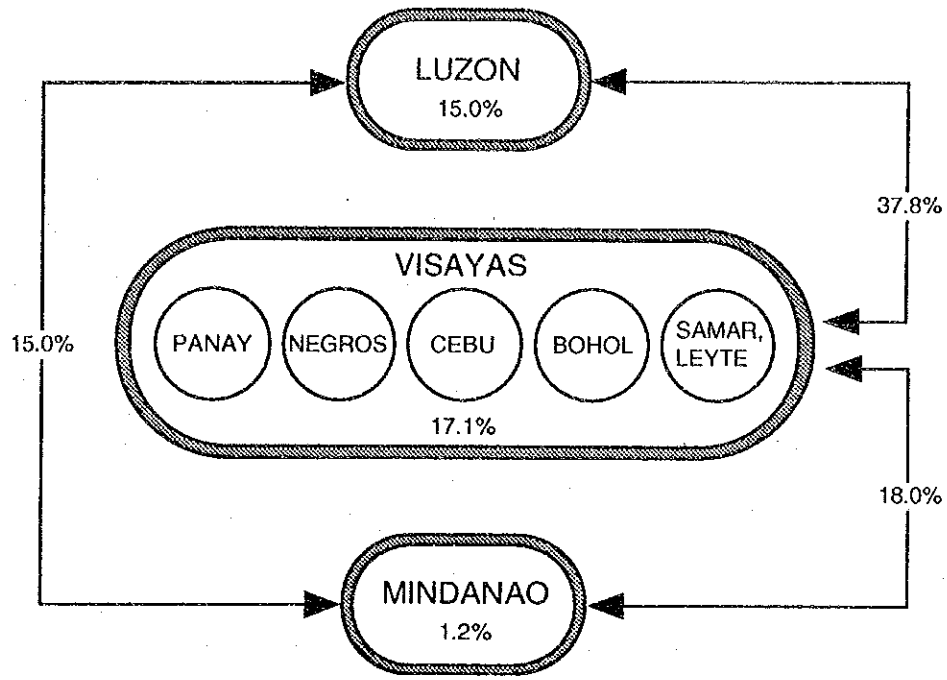
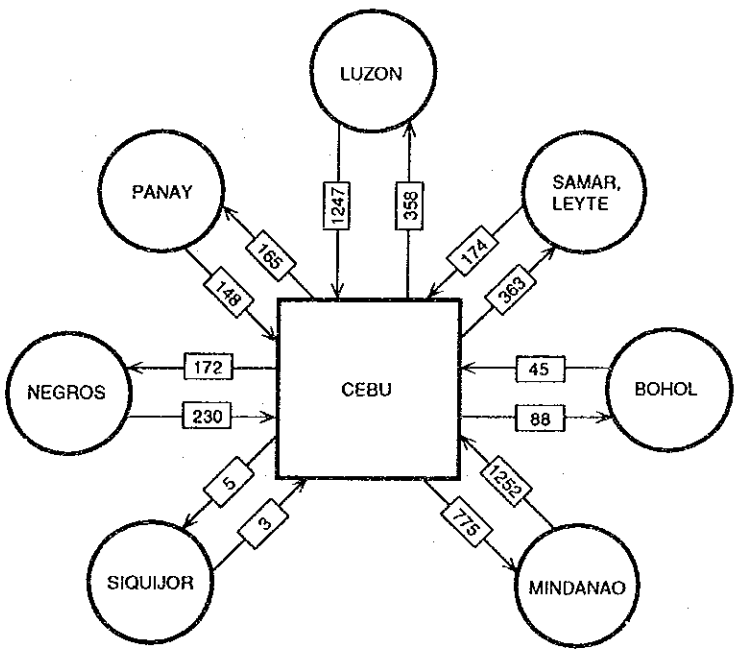


FIGURE 9.4.4 CARGO MOVEMENT SHARE IN 1989



Traffic Volume (Unit : Thousand MT)
Inward - 3,099
Outward - 1,926
Within Cebu - 81

FIGURE 9.4.5 DISTRIBUTION PATTERN OF TRAFFIC FROM/TO CEBU

TABLE 9.4.7 INTER-ISLAND PRODUCTION AND ATRACTION BY ITEMS (1989)

Commodity Item	Production				Attraction			
	1st		2nd		1st		2nd	
1 Rice	PNY	46.1%	LZN	15.2%	CEB	24.7%	MND	18.0%
2 Corn	MND	90.6	PNY	2.5	LZN	58.4	CEB	36.0
3 Sugar	NGR	87.5	PNY	5.2	LZN	76.9	PNY	8.2
4 Copra	MND	25.8	SMR	21.2	MND	67.6	LZN	21.6
5 Wood	MND	81.8	LZN	8.6	MND	51.8	LZN	33.6
6 Beer	CEB	72.7	LZN	20.2	MND	38.9	PNY	13.7
7 Pulp	MND	56.9	LZN	39.1	LZN	54.9	MND	29.8
8 Iron	MND	37.7	CEB	29.3	LZN	34.0	MND	24.1
9 Fertilizer	SMR	60.5	PNY	15.2	LZN	27.7	NGR	22.5
10 Cement	MND	89.3	LZN	5.9	LZN	25.5	CEB	14.7
11 Fruit	MND	66.3	LZN	11.1	LZN	67.5	CEB	18.2
12 Mineral	LZN	95.1	PNY	0.7	LZN	42.9	MND	20.7
13 Rest	LZN	36.9	MND	23.4	MND	25.2	CEB	24.3

TABLE 9.4.8 INTER-ISLAND COMMODITY FLOW IN VISAYAS

Commodity Item	1st		2nd		3rd	
	From	To	From	To	From	To
1 Rice	PNY	CEB	PNY	MND	PNY	NGR
2 Corn	MND	CEB	PNY	LZN	MND	BHL
3 Sugar	NGR	LZN	NGR	PNY	-	
4 Copra	SMR	MND	NGR	MND	SMR	LZN
5 Wood	MND	CEB	SMR	LZN	-	
6 Beer	CEB	MND	CEB	PNY	CEB	NGR
7 Pulp	LZN	CEB	MND	CEB	LZN	NGR
8 Iron	CEB	SMR	LZN	CEB	CEB	MND
9 Fertilizer	SMR	LZN	PNY	NGR	SMR	CEB
10 Cement	MND	CEB	MND	NGR	MND	PNY
11 Fruit	MND	CEB	PNY	LZN	NGR	LZN
12 Mineral	LZN	CEB	LZN	NGR	LZN	PNY
13 Rest	MND	CEB	LZN	CEB	LZN	SMR

Notes: LZN-Luzon PNY-Panay NGR-Negros CEB-Cebu
BHL-Bohol SMR-Samar-Leyte MND-Mindanao
Source: JICA Ro/Ro study

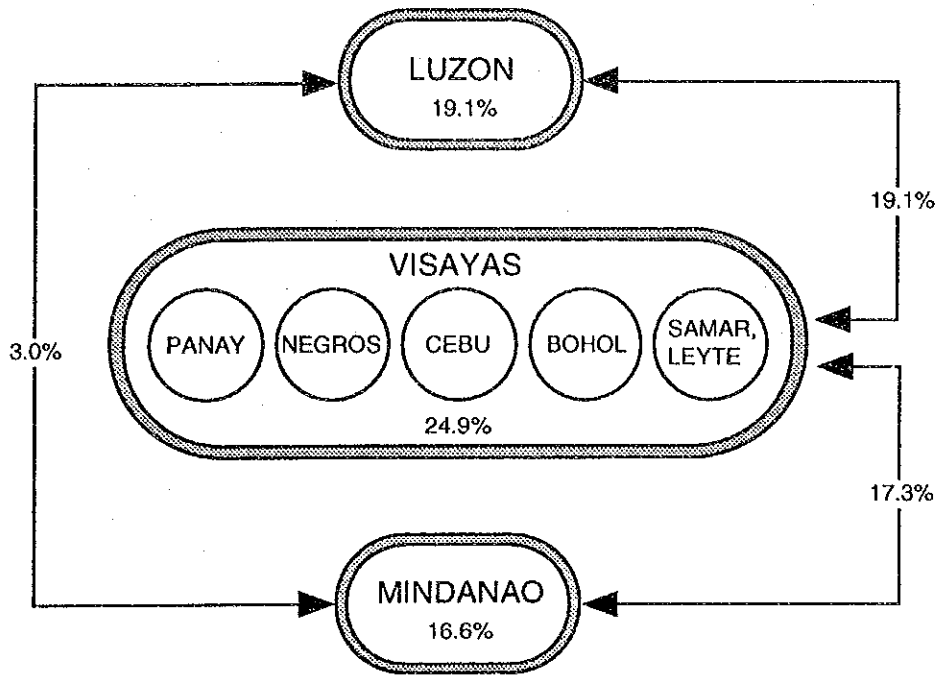


FIGURE 9.4.6 PASSENGER MOVEMENT SHARE IN 1989

9.4.5 PORT TRAFFIC IN CEBU PROVINCE

(1) Cargo Transport

Table 9.4.11 shows the yearly change of cargo volume at Cebu Province between 1983 and 1992 excluding the private ports. The total cargo volume has increased by 183.3% over the period from 1983 to 1992. This means the average annual growth rate 6.25%. Among this, the increase rate of the import shows 10.5% annually while the increase rate of the export only 4.3%. Until 1989, the export increased as same as the import but recently, the export is rather sluggish.

Table 9.4.9 shows international trade of the Cebu Port. The Port of Cebu shares 94% of the total cargo volume of Cebu Province, and handles all the foreign trade cargo except the private ports. As for the domestic trade, each Region has its own base port as the collection and distribution center of the cargo. However, as for the international trade, it can be assumed that the Cebu Port occupies all the Visayas as its hinterland.

Table 9.4.10 present domestic trade of Cebu and other ports. The domestic cargo shares 88.5% of the total cargo volume. The cargo items of Cebu Port consist of the same commodities in the inward cargo as well as in the outward cargo, and it indicates that the Cebu Port functions as the collection and distribution center of the sea transportation. On the contrary, the other ports handle the products of the local industries and transport equipment mainly except daily necessities.

TABLE 9.4.9 INTERNATIONAL TRADE OF CEBU PORT

Commodities	Cargo Volume(ton)	(%)
Import		
Cement	79,874	(19.9%)
Transport Equip.	35,286	(8.8)
Mach. & Electric Equipment	29,376	(7.3)
Fertilizer	22,593	(5.6)
Others	234,111	(58.4)
Total	401,240	(100.0)
Export		
Furniture	34,457	(39.8%)
Mach. & Electric Equip.	10,190	(11.8)
Chemicals	7,280	(8.4)
Fruits & Vegetables	1,795	(2.0)
Others	32,881	(38.0)
Total	86,603	(100.0)

TABLE 9.4.10 DOMESTIC TRADE OF CEBU PORT AND OTHER PORTS

Commodities	Cargo Volume(ton)	(%)
Inward (Cebu Port)	2,455,785	(100.0)
Corn	278,122	(11.3%)
Palay & Rice	245,917	(10.0)
Animal Feeds	139,092	(5.7)
Iron & Steel	121,464	(5.0)
Others	1,671,190	(68.0)
Outward (Cebu Port)	1,704,639	(100.0)
Bottled Cargo	155,932	(9.2%)
Animal Feeds	128,511	(7.5)
Corn	102,428	(6.0)
Wheat	73,616	(4.3)
Others	1,244,152	(73.0)
Inward(Other Ports)	148,610	(100.0)
Crude Minerals	33,108	(22.3%)
Transport Equip.	30,803	(20.7)
Copra	16,250	(10.9)
Fertilizer	9,272	(6.3)
Others	59,177	(39.8)
Outward(Other Ports)	176,095	(100.0)
Transport Equip.	68,196	(38.7%)
Fertilizer	31,444	(17.9)
Mineral Fuel	11,979	(6.8)
Cement	8,803	(5.0)
Others	55,673	(31.6)

TABLE 9.4.11 PORT CARGO VOLUME IN CEBU PROVINCE

	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
FOREIGN										
Import										
Cebu	138,197	122,397	179,484	129,022	211,152	265,730	374,647	445,732	171,296	401,240
Index	(100.0)	(88.6)	(129.9)	(93.4)	(152.8)	(192.3)	(271.1)	(322.5)	(124.0)	(290.3)
Export										
Cebu	56,650	62,855	58,295	75,196	109,273	130,271	155,142	105,140	91,625	86,603
Index	(100.0)	(111.0)	(102.9)	(132.7)	(192.9)	(230.0)	(273.9)	(185.6)	(161.7)	(152.9)
DEMESTIC										
Inward:										
Cebu	1,600,098	1,480,504	1,255,653	1,531,027	1,795,746	2,690,563	2,701,371	2,126,260	2,531,126	2,455,785
Mandaue	8,784	15,248	N.A	15,462	14,438	18,224	23,027	22,315	34,023	43,469
Sta Fe				11,166	9,855	8,642	29,113	19,749	10,095	15,658
Toledo	4,145	6,660	10,591	7,670	14,475	22,741	17,151	14,994	17,489	24,136
Tuburan								52,269	26,085	29,327
Carmen								13,417	4,033	24,550
Others								14,387	11,074	11,470
Total	1,613,027	1,502,412	1,266,244	1,565,325	1,834,514	2,740,170	2,770,662	2,263,391	2,633,925	2,604,395
Index	(100.0)	(93.1)	(78.5)	(97.0)	(113.7)	(169.9)	(171.8)	(140.3)	(163.3)	(161.5)
Outward:										
Cebu	916,961	881,579	749,874	750,263	1,226,495	1,651,830	1,801,229	1,446,436	1,683,621	1,704,639
Mandaue	8,649	8,017	N.A	6,513	5,161	10,307	11,071	10,149	10,365	10,016
Sta Fe				3,588	3,902	3,531	18,989	9,073	2,974	7,384
Toledo	32,497	31,658	20,138	11,973	27,573	24,516	26,811	16,929	46,598	39,143
Tuburan								26438	26172	29641
Carmen								10248	7768	61290
Others								16859	17783	28621
Total	958,107	921,254	770,012	772,337	1,263,131	1,690,184	1,858,100	1,536,132	1,795,281	1,880,734
Index	(100.0)	(96.2)	(80.4)	(80.6)	(131.8)	(176.4)	(193.9)	(160.3)	(187.4)	(196.3)
TRANSIT										
Foreign										
Cebu								122,683	171,494	97,586
Domestic										
Cebu								11,812	0	0
Total								134,495	171,494	97,586
TOTAL										
Cebu	2,711,906	2,547,335	2,243,306	2,485,508	3,342,666	4,738,394	5,032,389	4,258,063	4,649,162	4,745,853
Mandaue	17,433	23,265	N.A	21,975	19,599	28,531	34,098	32,464	44,388	53,485
Sta Fe				14,754	13,757	12,173	48,102	28,822	13,069	23,042
Toledo	36,642	38,318	30,729	19,643	42,048	47,257	43,962	31,923	64,087	63,279
Tuburan								78,707	52,257	58,968
Carmen								23,665	11,801	85,840
Others								31,246	28,857	40,091
Total	2,765,981	2,608,918	2,274,035	2,541,880	3,418,070	4,826,355	5,158,551	4,484,890	4,863,621	5,070,558
Index	(100.0)	(94.3)	(82.2)	(91.9)	(123.6)	(174.5)	(186.5)	(162.1)	(175.8)	(183.3)

Notes: 1) Others include Dalaguete, Balamban, Bantayan, Hagnaya and Polambato
2) Transit cargo between 1983 and 1989 is included in domestic cargo.
3) "Index" indicates the increasing rate with 1983 as 100.

Source: Annual Statistic Report, 1983-1992, PPA.

(2) Passenger Traffic

Figure 9.4.7 illustrates the regular shipping network of Central Visayas conceptually. It is noted that Cebu Island is connected with neighboring islands by a lot of shipping routes.

According to the Certificate of Public Convenience (CPC) issued by MARINA, there are 89 vessels/boats which are plying between Cebu Island and elsewhere in Central Visayas. Table 9.4.12 indicates that Cebu Port operates as a hub of short shipping service. The deployed vessels in the routes with Cebu Port are many motor vessels such as passenger/cargo and Ro/Ro types and a few motor bancas. Danao has many shipping routes mainly to Camotes Island. In fact, 21 vessels are deployed in these routes. However, they are all small types such as motor bancas and motor launches due to lack of port facilities of both Danao and Camotes Island.

Table 9.4.13 shows the yearly change of passenger numbers by port. Many data are not available and estimation is included.

TABLE 9.4.12 NUMBER OF VESSELS ENGAGED IN REGULAR SHIPPING SERVICE (1993)

Trip End in Cebu Island	MV (Motor Vessel)	Other Small Boat	Total
Cebu	20	26	46
Danao	0	21	21
Others	4	18	22
Total	24	65	89

Source: MARINA

9.4.6 DEMAND FORECAST

(1) Preconditions

(a) Socioeconomic framework

The following socioeconomic framework is set in this study:

	Planned GRDP Growth(%)		
Period	Case I	Case II	Case III
1980-1990	5.5	5.5	5.5
1990-2000	7.2	5.1	8.1
2000-2010	7.5	5.3	8.6

TABLE 9.4.13 PASSENGER NUMBER AT THE PORTS OF PROVINCE

	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Cebu:	3,692,595	3,091,518	2,539,707	2,939,975	3,207,289	4,095,329	4,247,385	4,098,854	3,890,632	4,142,362
Disembark	1,827,972	1,543,494	1,277,304	1,450,562	1,598,439	1,995,703	2,148,557	2,058,568	1,975,719	2,099,733
Embark.	1,864,623	1,548,024	1,262,403	1,489,413	1,608,850	2,099,626	2,098,828	2,040,286	1,914,913	2,042,629
Mandaue:	13405	8715	N.A	N.A	N.A	N.A	N.A	14103	7418	594
Disembark	6655	4224	N.A	N.A	N.A	N.A	N.A	9002	4304	309
Embark.	6750	4491	N.A	N.A	N.A	N.A	N.A	5101	3114	285
Santa Fe:				79,571	106,783	117,295	138,638	124,460	127,683	137,505
Disembark				40,638	56,624	60,381	71,930	64,684	66,604	69,720
Embark.				38,933	50,159	56,914	66,708	59,776	61,079	67,785
Toledo:	314,497	224,647	214,366	209,245	203,256	192,944	215,645	214,954	225,388	237,544
Disembark	157,331	112,098	91,793	104,267	98,280	96,392	110,893	107,477	112,108	116,004
Embark.	157,163	112,549	122,573	104,978	104,976	96,552	104,752	107,477	113,280	121,540
Dalaguete:								0	0	0
Disembark								0	0	0
Embark								0	0	0
Argao:								11,074	N.A	N.A
Disembark								5,537	N.A	N.A
Embark								5,537	N.A	N.A
Santander:								92,547	N.A	N.A
Disembark								46,274	N.A	N.A
Embark.								46,273	N.A	N.A
Dumanjug:								24,985	N.A	N.A
Disembark								12,493	N.A	N.A
Embark								12,492	N.A	N.A
Balamban:								0	0	0
Disembark								0	0	0
Embark								0	0	0
Tuburan:								74,166	134,870	136,071
Disembark								37,083	67,929	68,165
Embark								37,083	66,941	67,906
Bantayan:								24,176	24,232	29,464
Disembark								12,428	12,569	14,974
Embark.								11,748	11,663	14,490
Hagnaya:								149,608	157,034	165,531
Disembark								72,308	75,939	81,907
Embark.								77,300	81,095	83,624
Polambato:								0	0	0
Disembark								0	0	0
Embark.								0	0	0
Danao:								N.A	N.A	54,750
Disembark								N.A	N.A	27,375
Embark.								N.A	N.A	27,375
Carmen:								5,829	N.A	N.A
Disembark								2,915	N.A	N.A
Embark.								2,914	N.A	N.A

Note: * means private port.
Source: PPA "Annual Statistic Report, 1983-1992," and JICA, "Nationwide Ro/Ro Transport System Development Study."

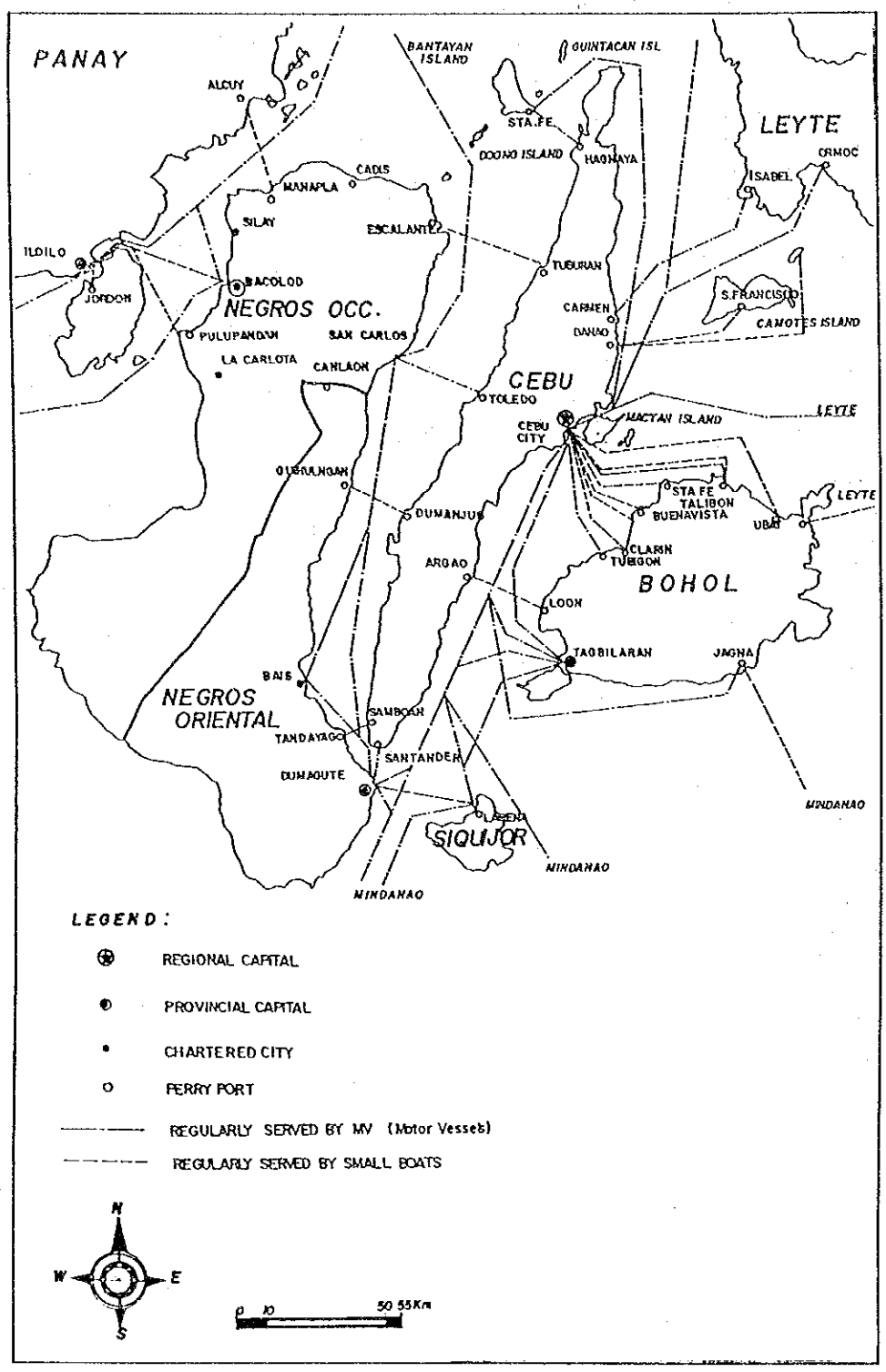


FIGURE 9.4.7 REGULAR SHIPPING NETWORT OF CENTRAL VISAYAS

(b) Containerization

The containerization at Cebu Port is different between foreign trade and domestic trade. As concerns exports, the ratio of containerization has reached nearly 99%, which seems to be the maximum. But, as for the inward transport, the ratio is only 43% at most. In this forecast, the average ratio expressed by the following equation is adopted for all the cargo and the maximum limit of the ratio is assumed to be 60% during the planned period.

$$Y = 2.714 X - 5360 \quad (r = 0.92869)$$

Where, Y: Ratio of containerization for the total cargo (%)
X: Year

(c) Average weight per TEU

The average weight per TEU (including empty containers) is calculated to be 9.74 tons based on the last three years data. For planning purposes, average weight per TEU of 9.74 is used.

TABLE 9.4.14 AVERAGE WEIGHT PER TEU

Year	Containerized Cargo(MT)	No.of Containers (TEU)	MT/TEU
1990	1,622,293	177,584	9.14
1991	2,148,938	205,357	10.46
1992	2,040,782	213,521	9.56
Total	5,821,013	596,462	9.74

Source: Annual Statistic Report, 1990-1992, PPA

(2) Methodology for Demand Forecast

In the past 10 years, port cargo volume at the Cebu Port and GRDP at Region VII are correlated well. But, the estimated cargo volume based on this correlation and the planned GRDP is seemed to be excessive comparing to Manila's port cargo. So, in this study, the following methodology for demand forecast are adopted.

The port cargo volume in the year 2010 consist of the following two categories:

The port cargo volume by trend.....(Base Demand)
The port cargo volume by project.....(Project Demand)

The base demand is derived from Cebu Port and other ports. The base demand of the other ports is supposed to increase only proportionate to the population, because the hinterlands of the other ports are sparsely populated and their hinterlands are limited within small areas.

While, the port cargo volume of Cebu Port shares 94% of the totaland its hinterland includes the whole Visayas. The role of Cebu Port as the distribution center of the Visayas will continue in the future.

The project demand is defined as the port cargo volume generated by the industries location planned in this study. But, it does not include the cargo volume handled at the private ports. Each demand is estimated by the following methods.

(a) Cebu Port

The base demand of Cebu Port is estimated by applying the trend line analysis covering the last 10 years.

$Y = 4{,}746 \times 1.06415^{n}$
where, Y: Total cargo volume at Cebu Port (Thousand MT)
n: Year, base year..1992 = 0
1.06415: Average growth rate in the past 10 years

(b) Other ports

Similarly, the base demand of Other Ports is estimated as follows.

$Y = 325 \times 1.06966^{n}$
where, Y: Total cargo volume of Other Ports (Thousand MT)
n: Year, base year..1992 = 0
1.06966: Average growth rate of all the ports in the past 10 years

(c) Toledo industrial base

Toledo industrial base is proposed in this study. Project demand is estimated roughly based on this industrial base plan.

(3) Estimation of Cargo Volume in 2010

(a) Base demand

The cargo volume by the base demand is estimated using the above methods. The results are shown below.

TABLE 9.4.15 CARGO VOLUME IN 2010

(Unit:Thousand MT)

Year	1992	2000	2010
Cebu	4,746	7,804	14,533
Other Ports	325	557	1,092
Total	5,071	8,361	15,625

(b) Project demand

Among the port cargo volume generated by the planned indutries, port cargo volume which uses the public berthing facilities is estimated as follows from the existing Toledo private port case.

General Cargo: 200,000 MT/year

(4) Forecast of Passenger Traffic in 2010

Passenger traffic using ferry boats (Sta Fe, Bantayan, Hagnaya, Danao) is estimated based on the average annual growth rate for the past three years (5.5%).

As for the passenger traffic by Ro/Ro ferry, the estimated figures according to the precedent JICA study "National Roll-on Roll-off Transport System Development Study" are adopted in this study. Passenger traffic in the target year 2010 is shown in the following table:

TABLE 9.4.16 PASSENGER NUMBER ESTIMATION

Link		Population (1990)		Passenger	
Origin	Destination	Origin	Destination	Origin	Destination
*Cebu	Ormoc(Leyte)	604,630	129,456	184,323	877,833
*Cebu	Talibon(Bohol)	604,630	41,873	53,445	229,529
*Cebu	Tubigon(Bohol)	604,630	34,302	194,878	836,952
*Cebu	Tagbilaran(Bohol)	604,630	55,363	154,459	663,363
Sta Fe	Hagnaya	20,827	36,115	62,230	181,572
*Toledo	San Carlos(Negros Occ.)	119,774	105,667	107137	1,028,960
*Argao	Loon(Bohol)	52,061	34,358	11,074	47,562
*Santander	Dumaguete(Negros Or.)	11,825	80,202	92,215	390,552
*Samboan	Tandayag(Negros Or.)	14,998	12,855	107,922	457,077
*Dumanjug	Guihulngan(Negros Or.)	31,917	74,493	24,985	105,817
*Tuburan	Escalante(Negros Oc.)	43,068	72,685	74,166	355,023
Bantayan	Cadiz(Negros Or.)	59,971	36,115	12,088	35,270
Danao	San Francisco	73,185	76,703	27,372	79,870
*Carmen	Isabel(Leyte)	29,234	33,389	6,010	28,623

Notes: * indicates Ro/Ro ferry.
Passenger numbers represent one way traffic only.
Source: Nationwide Ro/Ro Transport System Development Study, JICA

9.4.7 PORT FACILITY REQUIREMENTS IN CEBU PROVINCE

The port facilities should be developed in accordance with the future port demand. In this Master Plan, the required land areas represented by SA and CY, and the required berths are examined as follows:

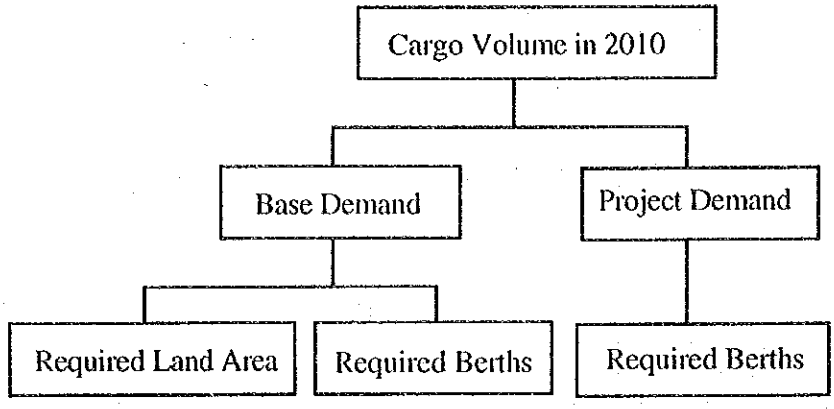


FIGURE 9.4.8 PORT FACILITIES REQUIREMENT ESTIMATION

(1) Facility Requirements in the Port of Cebu

(a) Preconditions

1) Planned cargo volume

The base demand to be dealt with the facilities of the Port of Cebu is classified by the cargo handling mode shown below considering the future containerization mentioned before.

TABLE 9.4.17 BASE DEMAND BY CARGO HANDLING MODE

(Unit: Thousand Metric Ton)

Year	1992	2000	2010
Total:	4,746	7,804	14,533
Container	2,140	5,068	10,179
	(220)	(520)	(1,045)
Breakbulk	2,606	2,736	4,354
Foreign:	586	1,030	2,035
Container	277	662	1,430
	(29)	(68)	(147)
Breakbulk	309	368	604
Domestic:	4,160	6,774	12,498
Container	1,863	4,406	8,749
	(191)	(452)	(898)
Breakbulk	2,297	2,368	3,749

Note: Parentheses indicate thousand TEUs.

2) Planned ship type

Foreign containers are transported largely by feeder ships services, but some containers are carried by domestic and foreign ships with a mix of breakbulk cargo and containers. For planning purposes, the following ship types are planned by cargo in the future.

TABLE 9.4.18 PLANNED SHIP TYPE

Cargo	Ship Type	DWT	LOA(m)	Draft(m)
Foreign:				
Container	Container ship	8,700	130	8.3
Mixed Cargo	Traditional cargo ship	5,000	110	6.8
Domestic:				
Mixed Cargo	Many kinds of ships including some Ro/Ro ships	770	60	3.6

Average cargoes per ship are assumed to be 1,500 tones/ship for foreign cargo and 300 tones/ship for domestic cargo respectively based on the Annual Statistic Report, PPA.

3) Productivity

At present, the average productivities are different by terminal. The productivities change largely from 5 tones/gang hour at domestic terminal to 32 tones/gang hour at CIP. The reasons are:

1. The ratios of the mix of cargoes handled are different by terminal.
2. The conditions (areas) of the available backup space are different by terminal, and the operational conditions vary considerably.

In the future, containerization will grow as mentioned before, and will reach around 60% as a whole. On the other hand, the extension of the existing backup space especially at the domestic terminal is difficult due to the confinement by the buildings nearby. Therefore, for planning purposes, it is assumed that the average productivity would be of the order of 18 tones/gang hour as a total.

For assessing the future productivity of the container handling, the following two cases are considered.

1. One case is 200 tones/berth hour the same as the existing one using the ship's gear ("Without" case).
2. The other is 300 tones/berth hour using quay crane and ship's gear ("With" case).

(b) Required port areas

1) Container yard

Required land areas in the future consist of the container yard and largely the breakbulk terminal. Container yard (CY) is calculated by the following conditions and formulas:

$$GSC = AT \times \frac{ADT}{SH \times AWD} \times \frac{PF}{E}$$

$$CY = GSC \times 30m^2$$

Wherein,

GSC: Ground Slot Capacity (TEU)

AT:	Annual Throughput (TEU)	
AW:	Ave.Weight per TEU	= 9.74 MT/TEU
ADT:	Ave.Dwell Time	= 5 day
SH:	Stacking Height(SH)	= 4 tiers
AWD:	Annual Working Day	= 362 days
E:	Efficiency	= 0.8
PF	Peak Factor	= 1.2

The area requirement per TEU depends on the type of container handling equipment used and the consequent access requirements and maximum stacking height. Typical area requirements are indicated referring to UNCTAD:

TABLE 9.4.19 CONTAINER HANDLING EQUIPMENT AND STACKING HEIGHT

Handling Equip.	Stacking height (tier)	Square metres per TEU
Trailer	1	60
Fork-lift truck	1	60
	2	30
	3	20
Straddle-carrier	1	30
	2	15
	3	10
Gantry-crane	2	15
	3	10
	4	7.5

In this study, 30 m^2 of unit ground slot area per TEU is adopted assuming that the straddle-carrier system or gantry- crane system will be installed in the future.

The peak factor fluctuates seasonally, monthly or daily throughout the year. The peak factor should be calculated based on the port data considering the characteristics of stocked containers. The average peak factor of 1.2 is assumed in this study.

2) Breakbulk Terminal

Land area of the breakbulk terminal is calculated by the following conditions and formula:

$$SA = AV \times \frac{ACDT}{APH \times R \times AWD} \times \frac{PF}{SUF}$$

Where;

SA:	Stacking Area for Breakbulk Cargo (m2)	
AV:	Annual Volume of Breakbulk (MT)	
ACDT:	Ave.Cargo Dwell Time	= 7 days
APH:	Ave.Piling Height	= 2 m
R:	Ratio of Metric Ton to Revenue Ton	= 0.7 R
AWD:	Annual Working Day	= 362 days
SUF:	Standard Space Utilization Factor	= 0.6
PF:	Peak Factor	= 1.2

3) Assessment

Required land areas for CY and SA in 2010 correspond to the base demand are summarized as follows:

TABLE 9.4.20 PROPOSED LAND REQUIREMENT FOR CONTAINER YARD AND STAKKING AREA

Year	2000	2010
Container Yard:		
GSC (TEU)	2,695	5,413
CY (m^2)	80,850	162,390
Breakbulk Terminal:		
SA (m^2)	75,580	120,249
Total (m^2)	156,430	282,639

Therefore, in comparison of the existing SA, CY with required SA, CY the followings are concluded:

1. Required land areas for SA and CY in the year 2000 exceeds the existing ones.

2. Required land areas for SA and CY in the year 2010 is estimated to be around 120,000 m^2 and 162,000 m^2 respectively, and will be largely in excess of those physically available at present.

3. Above estimation includes some assumptions, and it is recommended that the detailed examination based on the field data should be implemented for the feasible study.

TABLE 9.4.21 COMPARISON OF EXISTING LAND AREA WITH REQUIRED AREA

(Unit: m^2)

Existing		Required			
1993		2000		2010	
SA	CY	SA	CY	SA	CY
76,922	77,700	75,580	80,850	120,249	162,390
	(2,590)		(2,695)		(5,413)

Notes: 1) Parentheses indicate GSC (TEUs).
2) Existing SA includes SA at the whole port.
3) Existing CY means CY at CIP.

(c) Required berths

Required numbers of berths are calculated by the following three categories:

- Foreign Container Berth
- Foreign Breakbulk Berth
- Domestic Cargo Berth

1) Foreign container berth

Foreign containers are planned to be handled at container berths exclusively. Container berth length is assumed to be 165m. Required berths are calculated by the following equation:

$$B = \frac{AT \times AM}{AP \times AWD \times AWH \times BOR}$$

Where:

AT	:Annual Throughput(TEU)	
AW	:Ave.Weight per TEU(tones/TEU)	= 9.74 (tones/TEU)
AP	:Ave.Productivity (tones/berth hour)	= 200 (Without case), = 300 (With case)
AWD	:Annual Working Day(days/year)	= 362 days/year
AWH	:Ave.Working Hours per Day	= 24hrs/day
BOR	:Berth Occupancy Ratio	= 0.5

The results are as follows:

TABLE 9.4.22 FOREIGN CONTAINER BERTHS REQUIREMENT

Year	2000	2010
Required Berths(No.)	0.8	1.6
	(0.5)	(1.1)
Required Berth Length(m)	165	330
	(165)	(165)

Note: Parentheses indicate "With"case

2) Foreign breakbulk berth

Foreign breakbulk cargoes are planned to be handled by larger ships than domestic ones. Berth length is assumed to be 130m. Required berths are calculated by following equation.

$$B = \frac{AV}{AP \times G \times AWD \times AWH \times BOR}$$

Where:

AV	:Annual Volume of Breakbulk(tones/year)	
AP	:Ave.Productivity(tones/gang hour	= 18
G	:No. of gangs per ship	= 1.5
AWD	:Annual Working Day(days/year),	= 362
AWH	:Ave.Working Hours per Day(hours/day)	= 24
BOR	:Berth Occupancy Ratio,	= 0.7

The results are as follows:

TABLE 9.4.23 FOREIGN BREAKBULK BERTHS REQUIREMENT

Year	2000	2010
Required Berths(No.)	2.2	3.7
Required Berth Length(m)	260	520

3) Domestic cargo berth

Domestic cargoes are planned to be handled by many kinds of ships including Ro/Ro ships. Planned ship for domestic cargoes is assumed to be average 770 DWT. Average berth length is assumed to be 70m. Required berths are calculated using the equation below. The results are shown in Table below.

$$B = \frac{AV}{AP \times G \times AWD \times AWH \times BOR}$$

Where:

AV	:Annual Volume of Breakbulk(tones/year)	
AP	:Ave.Productivity(tones/gang hour)	= 18
G	:No. of gangs per ship	= 1.5
AWD	:Annual Working Day(days/year)	= 362
AWH	:Ave.Working Hours per Day(hours/day)	= 24
BOR	:Berth Occupancy Ratio	= 0.7

TABLE 9.4.24 DOMESTIC CARGO BERTHS REQUIREMENT

Year	2000	2010
Required Berths (No.)	41.2	76.1
Required Berth Length (m)	2,870	5,320

4) Assessment

Among berthing facilities, around 840m of the total length is not available due to the following reasons.

1. A total length of 100m in two sites of the general purpose berth can not be used for cargo handling because of the destruction.
2. A total length of 80m of the general purpose berth is occupied as the ship repairing dock, and can not be facilitated for cargo handling.
3. It is assessed that around 20% of the berth length at the domestic terminal is not usable because of the superannuation.
4. The tips of the piers 1-3, a total length of 98m are used for the berthing of the small boats and fleets etc. so it is not available for cargo handling.

So, the present situation of the berthing facilities is shown below.

TABLE 9.4.25 PRESENT BERTHS

Terminal	Nominal Length (m)	Actual Working Length (m)
CIP	690	690
General Purpose Berth	1,265	1,085
Domestic Terminal	2,798	2,140
Total	4,753	3,915

Therefore, the followings are concluded by the comparison of the existing berths with the required ones.

1. Required berth length in the year 2010 is calculated to be 6,170m (W/O case), and 6,005m (W/ case) respectively, and exceeds the actual working berth length largely

2. Even though the whole berth length (4753m) is usable by the rehabilitation, berth length will be short in the year 2010.

3. Introduction of the quay crane at the container berth contributes to the reduction of the cargo handling time and ship waiting time, and produces the benefit due to the investment.

TABLE 9.4.26 COMPARISON OF EXISTING BERTH LENGTH WITH REQUIRED ONE

(Unit: m)

Existing	Required	
1993	2000	2010
3,915	(w/o) 3,295	(w/o) 6.170
	(w/) 3.295	(w/) 6.005

Notes: 1) w/o case: Container handling productivity is 200 tons/berth hour the same as the existing one using the ship's gear.
2) w/ case: Container handling productivity is 300 tons/berth hour using quai crane and ship's gear.

(2) Facility Requirements in Other Ports

(a) Preconditions

1) Planned Cargo Volume and Passengers

Planned cargo volume and passengers of the other ports are set as follows based on the estimation.

TABLE 9.4.27 BASE DEMAND ON OTHER PORTS

Port	Cargo (tones)			Passenger (persons.)		
	1992	2000	2010	1992	2000	2010
Mandaue	53,485	91,700	179,700	-	-	-
Argao	-	-	-	11,074	21,100	47,600
Santander	-	-	-	92,215	175,800	390,600
Samboan	-	-	-	107,922	205,800	457,100
Dumanjug	-	-	-	24,985	47,600	105,800
Tuburan	58,968	101,100	198,200	68,035	141,650	355,000
Toledo	63,279	108,400	212,700	118,772	309,100	1,028,960
Santa Fe	23,042	39,500	77,400	68,752	105,500	181,600
Bantayan	-	-	-	14,732	21,800	35,300
Hagnaya	-	-	-	82,765	105,500	181,600
Carmen	85,840	147,100	288,500	6,010	12,100	28,600
Danao	-	-	-	27,375	44,000	79,870
San Francisco	-	-	-	27,375	44,000	79,870

Notes: Passenger numbers represent one way traffic only.
Cargoes at Tuburan and Sta Fe are transported by Ro/Ro Ferries.

2) Planned ship type

Toledo and Carmen Ports serve as alternatives to the industrial ports for the private industries, therefore cargoes at both ports are assumed to be transported by traditional cargo ships as well as Ro/Ro ships. At Mandaue, cargoes are transported by traditional cargo ships only.

As for other ports, cargo volume is not clear but both cargoes and passengers are estimated to be transported by Ro/Ro ships.

For planning purposes, these characteristics are assumed to be continued in the future, and it is assumed also that cargo sharings by traditional cargo ships and Ro/Ro ships at Toledo and Carmen ports are 50% each.

Planned cargo ship size is set to be 3,000 DWT considering the current calling ships at the private ports.

According to the "List of Operating Vessels of Non-CISO Members", distribution of the interisland ship size is shown in figure below. Referring to this data, Ro/Ro ship size is planned to be between 100 and 500 GRT.

TABLE 9.4.28 PLANNED RO/RO SHIP SIZE

Cargo/Passenger	Ship Type	DWT/GRT	LOA(m)	Draft(m)
Mixed Cargo	Traditional cargo ship	3,000 DWT	92	5.7
Cargo & Passenger	Ro/Ro ship	100-500 GRT	30-50	2.0-4.0

3) Productivity

The average productivity is assumed to be 18 tones/gang-hour same as the Port of Cebu.

(b) Required berths

Required numbers of berths are calculated by the following two categories: (1) Cargo Berth and (2) Ro/Ro Berth

1) Cargo Berth

Planned ship size for cargoes at Mandaue, Toledo and Carmen is assumed to be 3,000 DWT. Average berth length and berth depth are 10.5 m and -6.5 m respectively.

Required berths are calculated by the following equation:

$$B = \frac{AV}{AP \times G \times AWD \times AWH \times BOR}$$

Where:

B	: Number of Required Berths, No.	
AV	: Annual Volume of Breakbulk (tones/year)	
AP	: Ave.Productivity(tones/gang hour)	= 18
G	: No. of gangs per ship	= 1.5
AWD	: Annual Working Day(days/year)	= 362
AWH	: Ave.Working Hours per Day(hours/day)	= 12
BOR	: Berth Occupancy Ratio	= 0.7

The results are a follows:

TABLE 9.4.29 CARGO BERTH REQUIREMENT

	2000			2010		
	Mandaue	Toledo	Carmen	Mandaue	Toledo	Carmen
Required Berths (No.)	0.6 (1)	0.7 (1)	0.9 (1)	1.1 (1)	1.3 (1)	1.8 (2)
Required Berth Length (m)	105	105	105	105	105	210

2) Ro/Ro Berth

Planned Ro/Ro ship size is chosen according to the passenger numbers. Correlation between GRT and ship length of ferry boats at Visayas is shown below referring to Port Inventory Project Report 1990, JICA. Dimensions of Ro/Ro ship and Ro/Ro berth are planned as follows:

TABLE 9.4.30 RO/RO SHIP SIZE AND PASSENGERS

Ro/Ro Ship GRT	Passenger (No.)	Ro/Ro Berth Depth(m)	Length (m)
100	100	2.5	40
200	200	2.5	40
300	300	3.0	50
400	350	3.0	50
500	400	3.5	60

Note: Depths (m) of the berths are expressed under M.L.L.W.

Based on the preconditions above mentioned, the following transportation plan is proposed. Ro/Ro ferry operation with utilization rate more than 60% is feasible provably considering the peak time fluctuation. The utilization rate at Carmen Port is low compared to other ports, but Carmen Port is planned to handle around 150,000 tones of cargo (half of the total cargo volume) by using the Ro/Ro ferries together with passengers. So, it will be feasible.

$$U = \frac{P}{N \times C \times 365 \times W}$$

Where:

U : Average Utilization Rate
P : Planned Passenger, No.
N : Daily Navigation, No.
C : Capacity of Passengers, No.
W : Workable Days/365 = 0.9

TABLE 9.4.31 TRANSPORTATION PLAN OF PASSENGERS AT OTHER PORTS

Service Links	Distance (nautical mile)	No. of Planned Passengers (P)	Ship size (GRT)	Capacity (C)	No. of Voyages (N)	Utilization Rate (U)
Argao-Loon	12.0	21,000 47,600	100	100	2 2	0.321 0.725
Santander-Dumaguete	4.5	175,800 390,600	300	300	4 6	0.446 0.661
Samboan-Tandayagu	4.5	205,800 457,100	300	300	4 7	0.522 0.663
Dumanjug-Guihulangan	9.0	47,600 105,800	200	200	2 2	0.362 0.805
Tuburan-Escalante	18.0	141,650 355,000	300	300	4 6	0.359 0.600
Toledo-San Carlos	12.0	309,100 1,028,960	500	400	4 12	0.588 0.653
Santa Fe-Hagnaya	9.5	105,500 181,600	200	200	3 4	0.535 0.691
Bantayan-Cadiz	24.3	21,800 35,300	200	200	1 1	0.332 0.537
Hahnaya-Santa Fe	9.5	105,500 181,600	200	200	3 4	0.535 0.691
Carnen-Isabel	65.0	12,100 28,600	200	200	1 1	0.184 0.435
Danao-San Francisco	23.6	44,000 79,870	100	100	3 4	0.446 0.608
San Francisco-Danao	23.6	44,000 79,870	100	100	3 4	0.446 0.608

Notes: Number of Passengers represents one way traffic only.
Upper row is for the year 2000; Lower the year 2010.

(3) Other Facility Requirements

(a) Industrial ports

This item means the facilities required based on the project demand. Planned port of project demand is Toledo Port and its amount is assumed to be 200,000 ton/year general cargo. (Refer to 9.4.6 (3)) Planned ship size is 5,000 DWT judging from the calling ships data of Toledo Port. Berth depth and berth length are planned -7m and 155m respectively.

Required berths are calculated by the following equation:

$$B = \frac{AV}{AP \times G \times AWD \times AWH \times BOR}$$

Where:

B	:Required Berths, No.	
AV	:Annual Volume of General Cargo(tones/year)	
AP	:Ave.Productivity(tones/gang hour)	= 18
G	:No. of gangs per ship	= 1.5
AWD	:Annual Working Day(days/year)	= 362
AWH	:Ave.Working Hours per Day(hours/day)	= 12
BOR	:Berth Occupancy Ratio	= 0.7

As a result, two berths are required.

(b) Tourism ports

Tourism ports are the facilities which are necessary to the planned marine tourism courses in this study. Four courses are proposed for the transportation and sight seeing of the tourist. Tourism ports are planned to be used for ferry ships as well as tourismships.

1) Planned marine tourism courses

- Cebu, Cordova - Argao - Panglas(Bohol) (Target year 2000)
- Hagnaya - Sta Fe (Target year 2000)
- Cebu, Cordova - Danao - San Francisco (Target year 2010)
- Boljoon - Siquijor (Target year 2010)

2) Planned ship size

Planned ship type is jet catamaran and its dimensions and berths are planned as follows:

TABLE 9.4.32 JET CATAMARAN AND PLANNED BERTH

Jet Catamaran		Planned Berth	
GRT	Passenger(No.)	Depth(m)	Length(m)
100	100	2.5	40
200	200	2.5	40
300	300	3.0	50

Note: Depths(m) of the berth are expressed under M.L.L.W.

3) Required berths

Berthing facilities required for tourism ships are as follows.

TABLE 9.4.33 BERTHS REQUIRED FOR TOURISM SHIPS

(Unit: m)

Port	2000	2010
Mactan	-3.0x50	-3.0x50
Argao	-3.0x50	-3.0x50
Panglao (Bohol)	-3.0x50	-3.0x50
Hagnaya	-2.5x40	-2.5x40
Sta Fe	-2.5x40	-2.5x40
Danao	-	-2.5x40
San Francisco	-	-2.5x40

9.4.8 DEVELOPMENT CONCEPT AND KEY ISSUES FOR THE CEBU PORTS

(1) Development Concept

Total coastal line of Cebu Province is around 819 km and there are 46 ports consisting of 19 public ports and 27 private ports (1 port/18km). These ports handle around 10 million ton cargo and 4 million passengers.

At present, the roles of the port are classified into following three patterns below and some ports are also used for fishing boats:

1. Distribution center for cargoes
2. Traffic measures for local residents
3. Cargo transportation for industries

The arrangement and the numbers of these ports are evaluated to be appropriate judging from the population distribution pattern, inter-island sea linkage and economic activities. However, some facilities at each port are damaged or superannuated, and their dimensions are currently small for use of calling ships. The future marine traffics are expected to increase. Therefore, the port facilities should be improved or to be constructed corresponding to the ports demand.

To play the expected roles in the Master Plan, the following subjects should be addressed:

1. Increase of traffic volume by sea and modernization of the ports
2. Infrastructure for the inter-island communication
3. Infrastructure for industry and tourism

(a) Increase in traffic volume by sea and modernization of the ports

The Philippines is consists of some 7,100 islands and the sea transportation originally plays an important role. All the above sea transport connecting with Cebu Province occupies notably significant share of all the country; Cargo volume by sea transport connecting Visayas viz, Visayas-Luzon, Visayas-Mindanao and within the Visayas area, share some 70% of the total volume in the country. Similarly, passenger traffic by sea connecting Visayas shares some 60% of the total. In both cases, Cebu Province is the center of cargo traffic in Visayas.

Under these circumstances, development of the economy at Cebu Province causes naturally the increase of traffic volume by sea. Over the past 10 years, port cargo in

Cebu Province has an annual average growth rate 6.9%. Based upon the similar trend, port cargoes will be 16 million tons in the year 2010 or three times the current volume. Similarly, passenger traffic will be 5.3 millions.

Therefore, the ports at Cebu Province should deal with the increase of the traffic volume by sea in the future. Especially, the Port of Cebu sharing 94% of the total Province is expected to handle a great deal of the future increase by development of the port facilities.

Cebu Port has currently good advantages such as:

Cebu Port functions as the distribution center in the Visayas. Some 70% of the shipping companies in Philippines are located at Cebu Port, and collect the ship cargoes actively. Cebu Port is the first port which introduced the domestic containers in the Philippines. Cebu Port handles the port cargoes around five (5) million tons, and their containerization rate is some 50% which is higher compared to other ports.

Taking advantage of the above situations, Cebu Port should promote further the modernization of the port in order to handle the increased cargo, to realize the improvement of port services and to reduce the transportation cost. By the modernization of the port and with the increased cargo, Cebu Port will function as a hub port at international sea routes. These strategies should be taken to make Cebu Port internationally competitive and can be a springboard for the development of economy of the Cebu Province.

(b) Infrastructure for the inter-island communication

Sea routes linking Cebu Province with its neighboring islands are categorized as follows (Refer to Figure 9.4.9):

1. Cebu Eastern Coast - Another Provinces:

   - Cebu-Ormoc(Leyte)
   - Cebu-Talibon(Bohol)
   - Cebu-Tagbilaran(Bohol)
   - Argao-Loon(Bohol)
   - Carmen-Isabel(Leyte)

2 Cebu western Coast - Another Provinces:

   - Santander-Dumaguete(Negros Or.)
   - Samboan-Tandayag(Negros Or.)
   - Dumanjug-Guihulngan(Negros Or.)

- Toledo-San Carlos(Negros Oc.)
- Tuburan-Escalante(Negros Oc.)
- Bantayan-Cadiz(Negros Oc.)

3. Intra-Provincial Sea Linkages:

- Hagnaya-Sta Fe(Bantayan Is.)
- Danao-San Francisco(Camotes Is.)

As described above, there are 12 sea routes between Cebu Province and other provinces in neighboring major islands which currently transport annually 1 million passengers and are expected to transport 5 million annum in the year 2010.

Cebu Province and its surrounding islands depend on each other socio-economically. Therefore, the sea transport connecting Cebu Province with these islands is indispensable for the living of the local residents as well as economic activities. Nevertheless, the current conditions of the port facilities are very poor and the sea transport is not reliable enough.

Port facilities for these routes should be developed to realize a new national trunk line centered in Cebu, namely, Panay-Negros-Cebu-Leyte corridor and Cebu-Bohol link (Refer to Figure 9.4.10). A new national trunk line will be formed effectively by connecting the sea routes with land routes.

While, there are other intra-provincial sea linkages connecting Cebu main land with small island, these linkages are estimated to transport around 0.3 millions passengers in the year 2010.

In the view point of the improvement of living and welfare of the local residents, port facilities should be developed for the safe and comfortable transportation in the local areas of the Province. Furthermore, the sea transportation at these areas contribute to the development of the local industries such as fishing, tourism and others.

(c) Infrastructure for industry and tourism

1) Infrastructure for industry

There are 27 private ports in Cebu Province, and these ports also function as industrial ports handling the materials, fuels and products around 5 million tons annually. Some public ports such as Toledo, Carmen and Mandaue, also serve as alternatives to the above industrial ports. In the future, additional berthing facilities will be necessary for the increase in cargo due to industries.

In this Study, Toledo industrial base is newly planned. This base includes the following industries:

1. Oil Refinery (Plant Capacity 250,000 BPSD)
2. Petrochemical (P.C. 400,000 ton)
3. Cement (P.C. 2,600,000 ton)
4. Plastic Materials (P.C. 18,000 tonx5)
5. Iron and Steel Works (P.C. 1,500,000 ton/year)
6. Iron Casting and Molding (P.C. 3,600 tonx5)
7. Agro Machinery (P.C. 5,000 tonx2)
8. Iron Works for Bridge (P.C. 1,000 tonx2)
9. Ship Repairing (P.C. 1,000 tonx20; P.C. 50,000 tonx20)

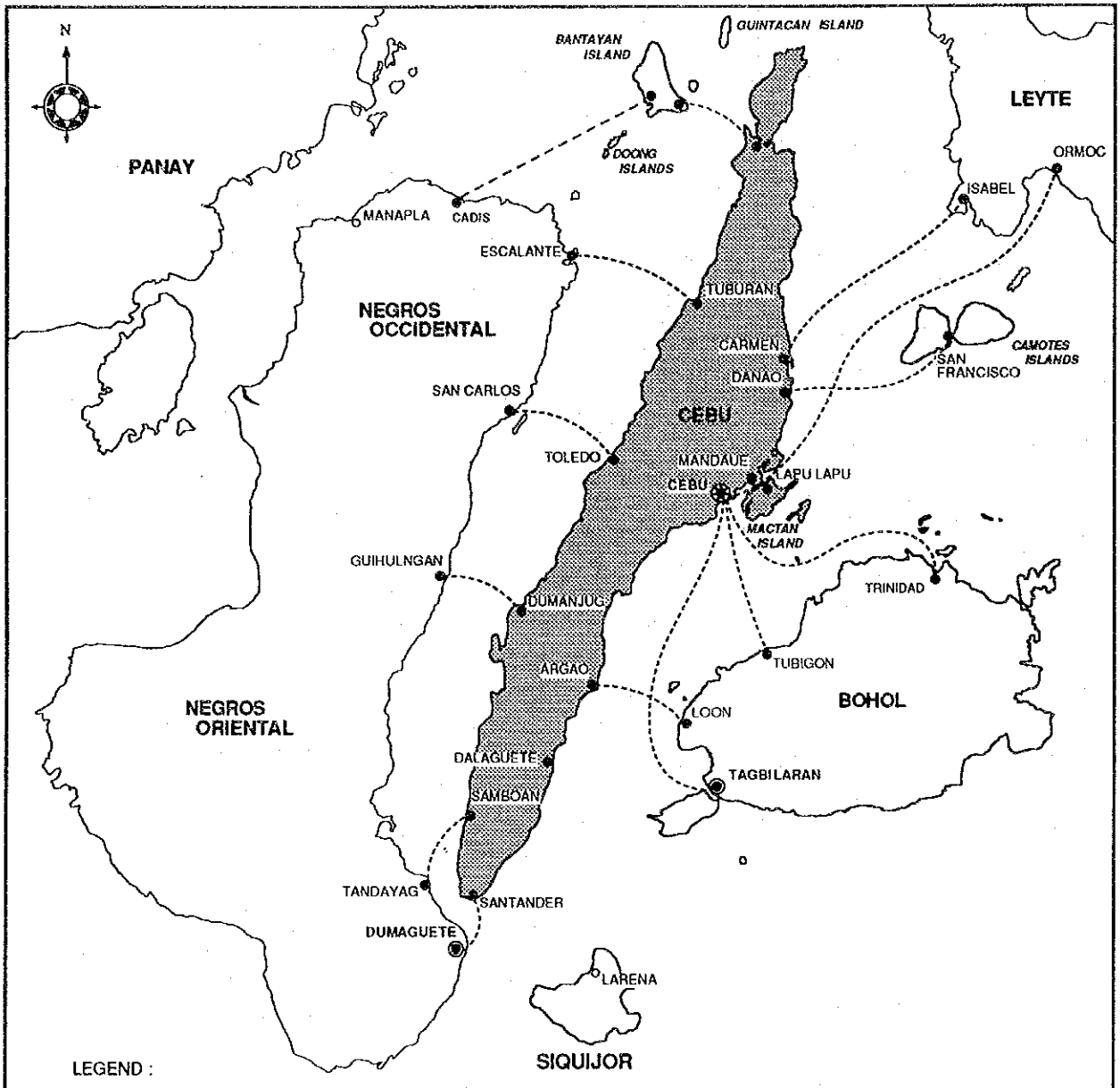


FIGURE 9.4.9 INTER-ISLAND RERRY SOUTES

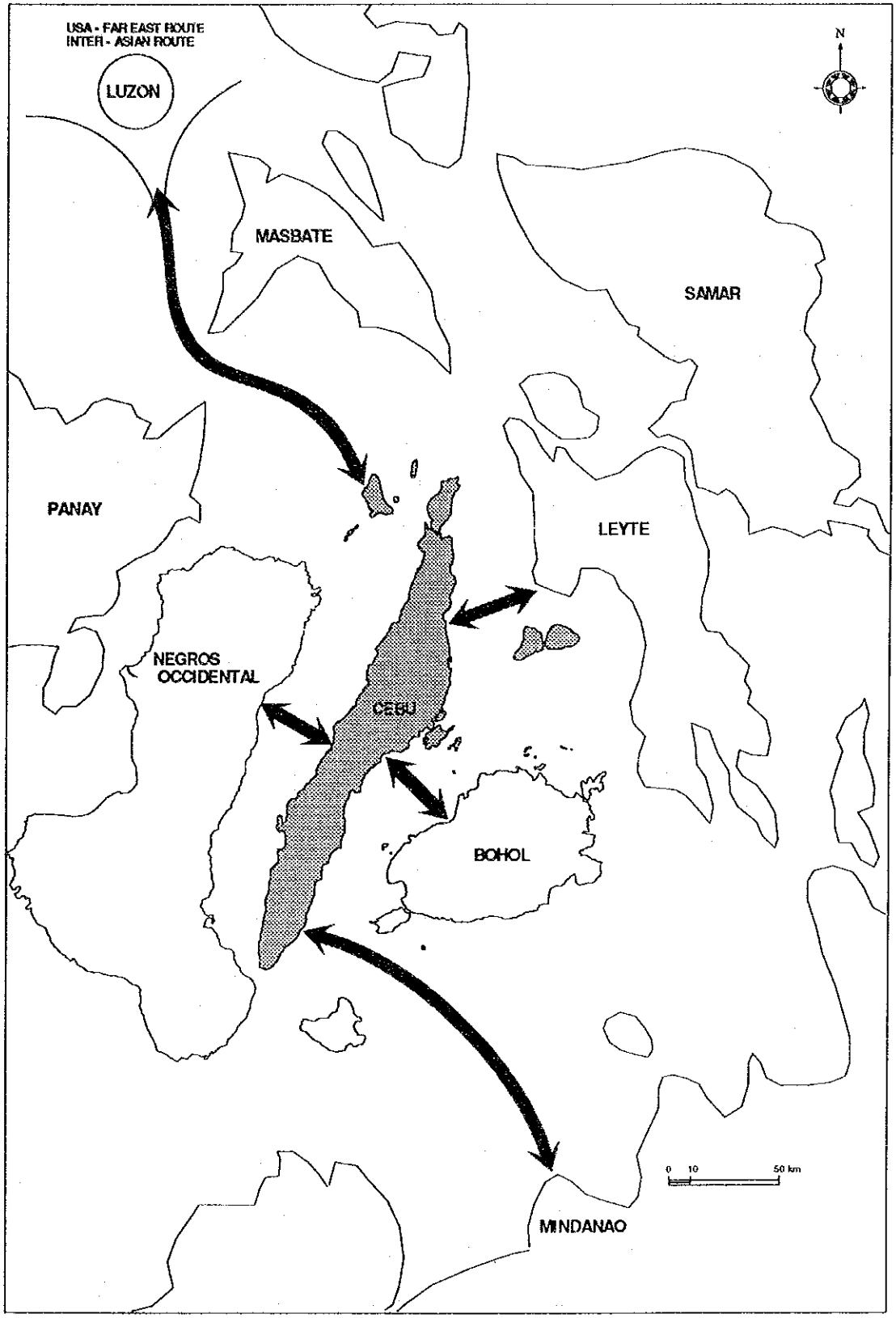


FIGURE 9.4.10 SEA ROUTE DEVELOPMENT STRATEGY

These industries needs to transport a large amount of sea-born cargoes. In principle, planned indutries are assumed to transport their cargoes by own berthing facilities in time of plant operating schedule.

But, some portion of their cargoes are expected to be transported by public facilities (Refer to (3) "Port Development Project" section below).

As to the construction cost allocation, costs for berthing facilities to be exclusively used are charged by user, and berthing facilities for general use are constructed by public investment. It is better that breakwater and water basin, if necessary, are constructed by public investment in order to support location of industries.

Generally, the planned port at industrial base is expected to play the role of promoting urban development as well as transportation. Planned Toledo industrial base is proposed at the area centered within the existing public port and private port. Population inflow and economic activities concentration in this area are expected to occur. Therefore, the desirable urban development plan centered the port development should be made at the more detailed stage.

2) Infrastructure for tourism

In this study, the following marine tourism courses are planned for the tourism development.

1. Cebu, Cordova - Argao - Panglao(Bohol) (Target year 2000)
2. Hagnaya - Sta Fe (Target year 2010)
3. Cebu, Cordova - Danao - San Francisco (Target year 2010)
4. Boljoon - Siquijor (Target year 2010)

Planned port facilities for Cebu, Argao, Hagnaya, Sta Fe, Danao and San Francisco are used for ferry transport as well. Panglao is located at Bohol and has nice beaches but, it has no existing port facilities. It is expected to develop its port facilitiesfor future demand.

(2) Key Issues for the Port Development

In order to solve the subjects mentioned above, key issues to be addressed are as follows:

1. Development of Cebu Port as a hub port of the foreign cargo transport at Visayas

2. Development of Cebu Port as the distribution center of the domestic cargo in the areas which includes Leyte, northern Mindanao as well as Region VII

3. Development of Cebu Port as the center of inter-island traffic

4. Development of local ports to promote the inter-island traffic

5. Development of industrial ports to support the industries

6. Development of tourism ports to promote the tourism

(3) Port Development Project

The proposed projects based on the above key issues are as follows:

1. **Expansion of the Cebu Port:**
   Construction of the deep water port in order to meet with larger ships in the sea transportation

2. **Cebu International Port:**
   Modernization of the cargo handling equipments of Cebu Port to upgrade the productivity

3. **Rehabilitation of the General Purpose Berth Area:**
   Improvement of the existing berthing facilities of Cebu Port to handle the increasing port cargoes

4. **Redevelopment/Improvement of Domestic Terminal Area:**
   Redevelopment of existing out-of-date piers to heighten the efficiency of land use Construction of terminal and boarding bridge for the passenger transport to match with the increase of passenger traffic and to obtain the smooth traffic flow.

5. **Construction of the berthing facilities and passenger terminal at the following link ports of inter-island traffic according to the target passengers:**
   Cebu, Argao, Santander, Samboan, Dumanjug, Tuburan, Toledo, Hagnaya, Santa Fe, Bantayan, Carmen, Danao, San Francisco

6. **Constructionof the following industrial ports according to the planned industries:**
   Cebu, Toledo, Carmen, Mandaue

7. **Construction of berthing facilities for the tourist transport:**
   Cebu, Cordova, Argao , Boljoon, Sta Fe, Hagnaya, Danao, San Francisco

9.4.9 MASTER PLAN OF THE PORTS IN CEBU PROVINCE

(1) Master Plan of the Port of Cebu

The Master Plan of the Port of Cebu consists of the short-term plan (target year 2000) and the long-term plan (target year 2010). The short-term plan includes the improvement of the existing facilities and the construction of relevant port facilities. The long-term plan is made for the port expansion based on the future outlook.

(a) Short-term plan

Major items for the short-term plan are shown in Table 9.4.34, and these items are described below.

TABLE 9.4.34 MAJOR ITEMS FOR SHORT-TERM PORT DEVELOPMENT

Main Item for Improvement	CIP	General Purpose Area	Domestic Terminal Area	Others
Wharf	-	o	o	-
Dredging	-	o	-	-
Cargo Handling Eqipment	o	-	-	-
Backup Area, Inner-Port Road	-	o	o	-
Passenger Terminal, Access Bridge	o	-	o	-
Inland Junction	-	-	-	o

- Wharf

This item includes the construction of the ferry berth at CIP area, the improvement of general purpose berth and piers at domestic terminal area.

The ferry berth of a dolphin-type finger pier is planned at the end of CIP. This pier is to be used for the long distance Ro/Ro ferry and is expected to promote the effective use of wharves at CIP.

The planned improvement of the wharves at general purpose berth area is to widen by 68.5 m offshore and deepen by 10 m teh existing wharves along the 450 m length to align with the existing alignment of the CIP. This makes it feasible to widen a backup area behind.

Existing finger-type wharves at domestic terminal area area physically syuperannuated and functionally obsolete. So, the new wharves including Ro/Ro berths are planned by the reclamation of those piers.

- Dredging

Water depths at the water basin in front of the general purpose berth area between 5 and 9 m. Dredging up to -10 m is planned accompanying the wharves improvement mentioned above.

- Cargo handling Equipment

CIP berths are equipped with two level-luffing cranes. But in order to increase the cargo handling productivity, container cranes are planned to be installed.

Reach stackers are alos planned to be introduced for the effective use of stacking area.

- Backup area and innner port road

This is aimed to pave the backup area and inner-port road at the general purpose berth area.

- Passsenter terminal and boarding bridge

At the new wharf of domestic terminal area, passenger terminal and boarding bridge connecting terminal and Ro/Ro ferry berth are planned. Theis project is aimed to obtain the smooth traffic flow at the port area (Figure 9.4.13).

- Inland junction

Inland junctions linking passenger terminals and bus terminals in Cebu City are planned. Passengers for ferry boats are transported by bus.

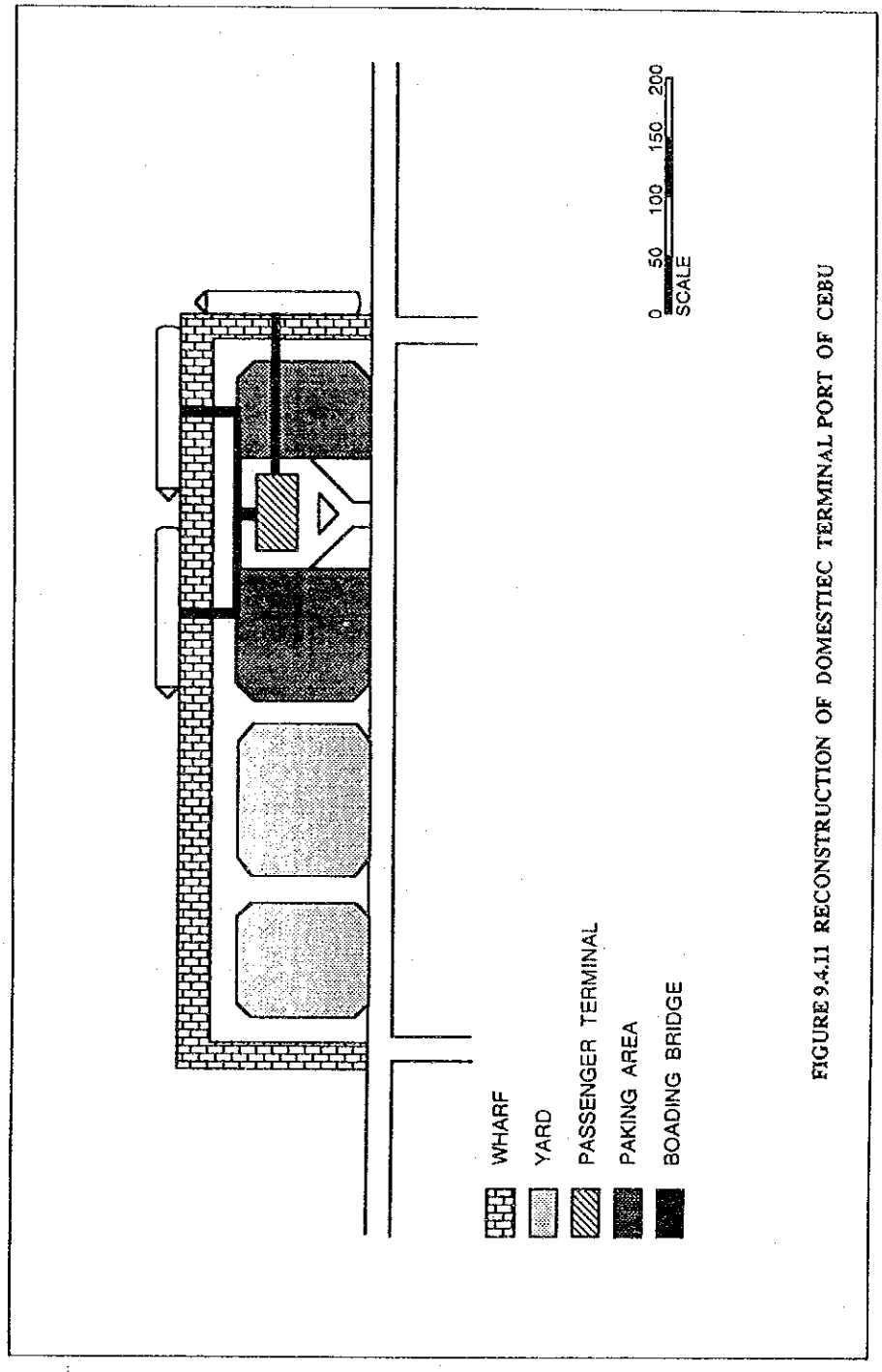


FIGURE 9.4.11 RECONSTRUCTION OF DOMESTIEC TERMINAL PORT OF CEBU

(b) Long-term plan

Main items for the expansion of the Port of Cebu targeted for the year 2010 are as folow:

• Wharf	In spite of the improvement of existing berths and the introduction of new cargo handling equipment, the total berth length will be short in the year 2010. Therefore, a new wharf of total length of 1,500m is planned. The water depth of wharf is planned to be Max. -11.5m considering the trend of the container ships.
• Backup Area	Backup area including stacking area, container yard, parking area and inner-port road etc. are planned to be 75 hectares. This area also includes areas for the green belts, transit sheds, ware houses and utilities.
• Approach Channel and Water Basin	Water depth of approach channel and water basin is planned to be -11.5m.
• Basin for Small Crafts	This facility is planned for small boats such as tug boats or working vessels and to be with a -5.5m depth.
• Access Road	Access road connecting the port area and its hinterland is planned.
• Reserved Area	Coastal zones are to declared/established in the planned port as a reserved area for future development.

(c) Alternative for port layout

Expansion of the Port of Cebu is planned taking advantage of the development potential at existing port area. Expanded port area should be operated and managed by the same organization. Otherwise, the scale merit of the port could not be expected.

With the current coastal area development situation in mind, three sites are chosen for the future expansion.

Alternative 1: Mactan Island South Area
Alternative 2: Cebu South Area
Alternative 3: Mactan Island North Area

Thereby, the following three alternatives for the master plan of the Port of Cebu are proposed:

1) Alternative 1

Alternative 1 is planned by the reclamation of the south-western part of Mactan. This area is a shallow bay with coral shoals having a depth of 1 to 4 feet at M.L.W.L. Reclaimed land is planned to be 400 ha. Among this, 83 hectares are used for the port area and remaining 317 hectares could be used for the industrial area and other uses.

After the year 2010, this area will be further expanded corresponding to the development requirement.

Deep sea port is constructed at the water front line of the reclamation facing the planned water basin. Access road connecting the port area and existing road in Mactan Island is to be constructed. But in the future, the port area should be linked directly with Cebu City by a new bridge or a tunnel.

Due to above constraints, port cargo is planned to be allocated in the year 2010 as follows:

Existing Cebu Port:	Cargo originated from/destined to Metro Cebu Ferry cargo and passengers
New Port:	Transit Cargo Cargo which use the Cebu Port as a hub port

2) Alternative 2

Alternative 2 is planned to reclaim the shallow water off the southern part of Cebu City. The total reclaimed land is around 380 ha, 100 ha for the port area, and the others for the industrial area, residential area and road network.

At the water front, berthing facilities ranging from -5.5m to -11.5m are planned. The proposed road behind the port area could connect the north and south of Metro Cebu.

This plan should be coordinated with Cebu South Reclamation Project mentioned before.

3) Alternative 3

Alternative 3 is planned by the reclamation of the north-eastern part of Mactan. Reclaimed land is planned to be 370 ha, 83 ha for the port area, and the others for the industrial area and other uses.

The proposed site is ideal for a port because of its topography and good marine conditions.

The site is obtainable for sufficient reclaimed land area, but the site is near the Mactan International Airport. So, the site has some constraints for its land use due to the progressing zone - the zone which prohibits construction of high vertical structures along flight lane of the airplane.

The site is situated in live corals and the area should be better left preserved.

4) Evaluation of alternatives

1. The following table shows the comparison of each alternative extracting the major items. The construction costs have no large difference because their scales of dredging and reclamation are almost the same.

2. According to the boring explorations carried out by the Public Estate Authority, the existence of strong supporting strata composed of coral limestone could be estimated at the sea bottom on the site of Alternative 1.

   The site of Alternative 3 has the same sub-soil condition as that of Alternative 1 - good for facility structures but high cost for dredging.

   On the other hand, above survey discloses the existence of extremely soft sub-soils of silty clay or sand until -20m depth at the site of Alternative 2. This unfavorable sub-soil conditions would be met in places farther off the shoreline and would probably need some form of reconsolidation of clay materials.

TABLE 9.4.35 COMPARISON OF MAJOR ITEMS ON EACH ALTERNATIVE

Item	Alternative 1	Alternative 2	Alternative 3
Total planned Area (m^2)	4,000,000	3,800,000	3,700,000
Port Area (m^2)	830,000	1,000,000	830,000
Other Area (m^2)	3,170,000	2,800,000	2,870,000
Reclamation (m^3)	12,250,000	12,600,000	12,340,000
Dredging (m^3)	1,630,000	1,980,000	1,318,000
Wharf(-11.5m) (m)	500	500	500
Wharf(-10.0m)	1000	1,000	1,000
Wharf(-5.5m) (m)	300	800	500
Revetment(0-+3.5m) (m)	5,200	1,700	3,100
Construction Cost('000Pesos)	3,467,582	3,406,977	3,546,000

Notes: 1) Existing ground height and planned ground height at reclamation areas are assumed to be 0 and 3.5m, respectively. (MLLW)
2) Revetment is to protect the reclamation slope.
3) Construction cost includes the cost for other purpose area.

3. The design wave height normally adopted in the area is only 0.92 m. But, as the site of Alternative 2 is facing the deep water wave attack directly, the breakwater might be necessary depending on the natural condition survey.

4. Alternative 1 and Alternative 3 are flexible to allow further expansion.

5. In Alternative 1, port cargo should be allocated without access bridge or tunnel to Cebu City, while in Alternative 2, port area could be easily linked with its hinterland.

6. The site of Alternative 3 is far from the existing Cebu Port, therefore, cargo handling equipment (movable) has a long way to be transported. This area cannot be operated as one port.

7. As a result, the priority of two alternatives depends on the further detailed study. However, Alternative 1 is assumed to be master plan in this study.

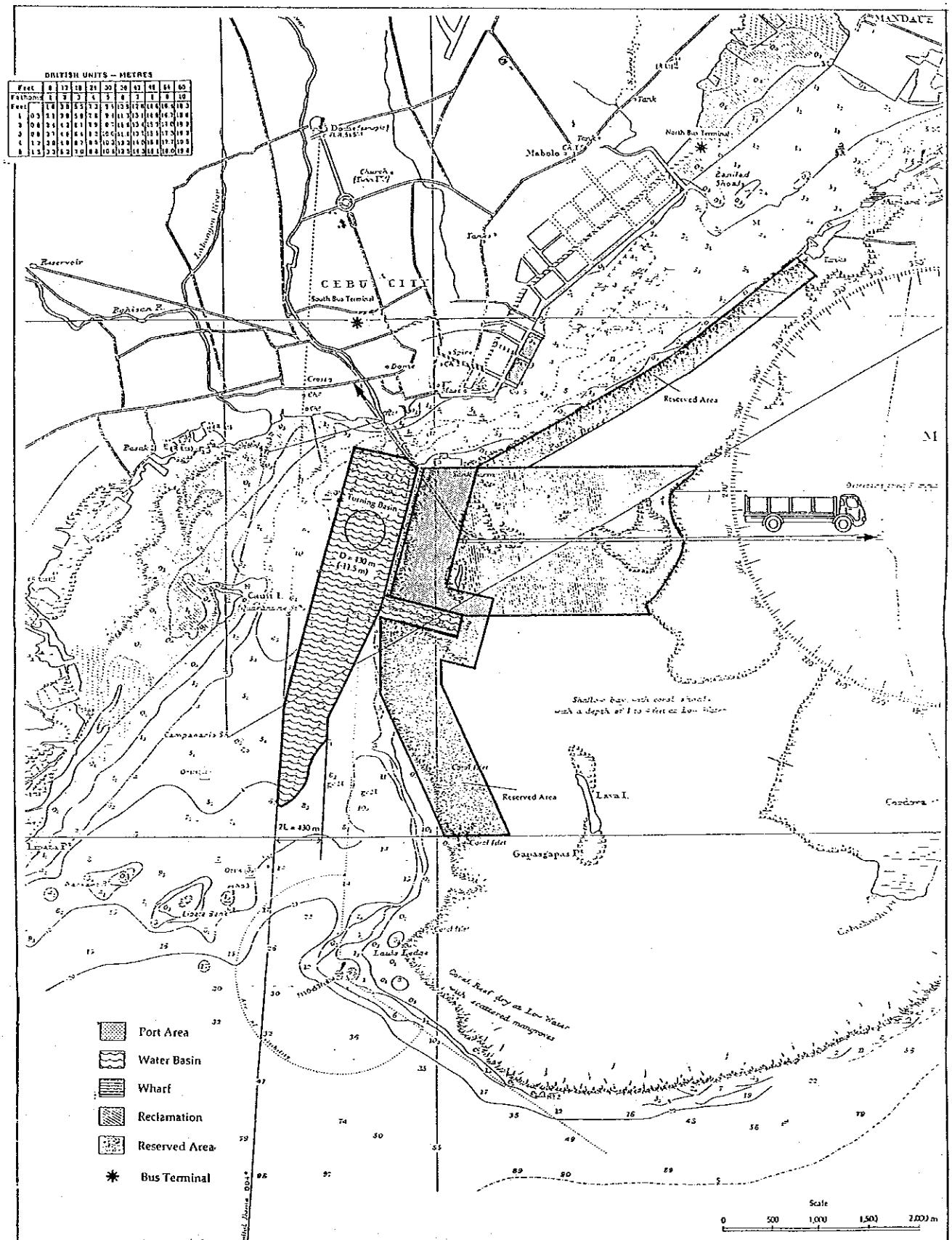


FIGURE 9.4.12 MASTER PALN FOR THE PORT OF CEBU- ALTERNATIVE 1

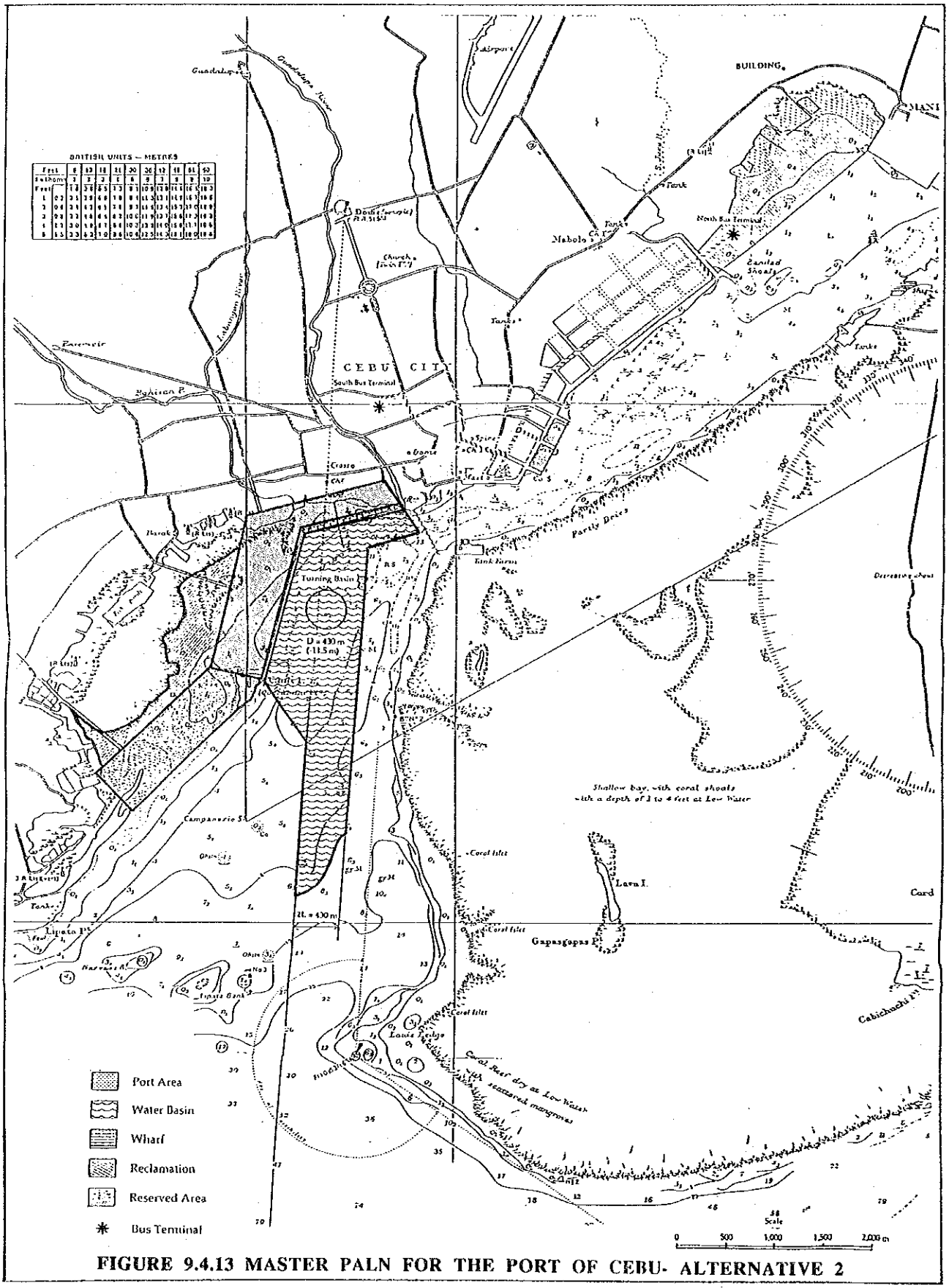


FIGURE 9.4.13 MASTER PALN FOR THE PORT OF CEBU- ALTERNATIVE 2

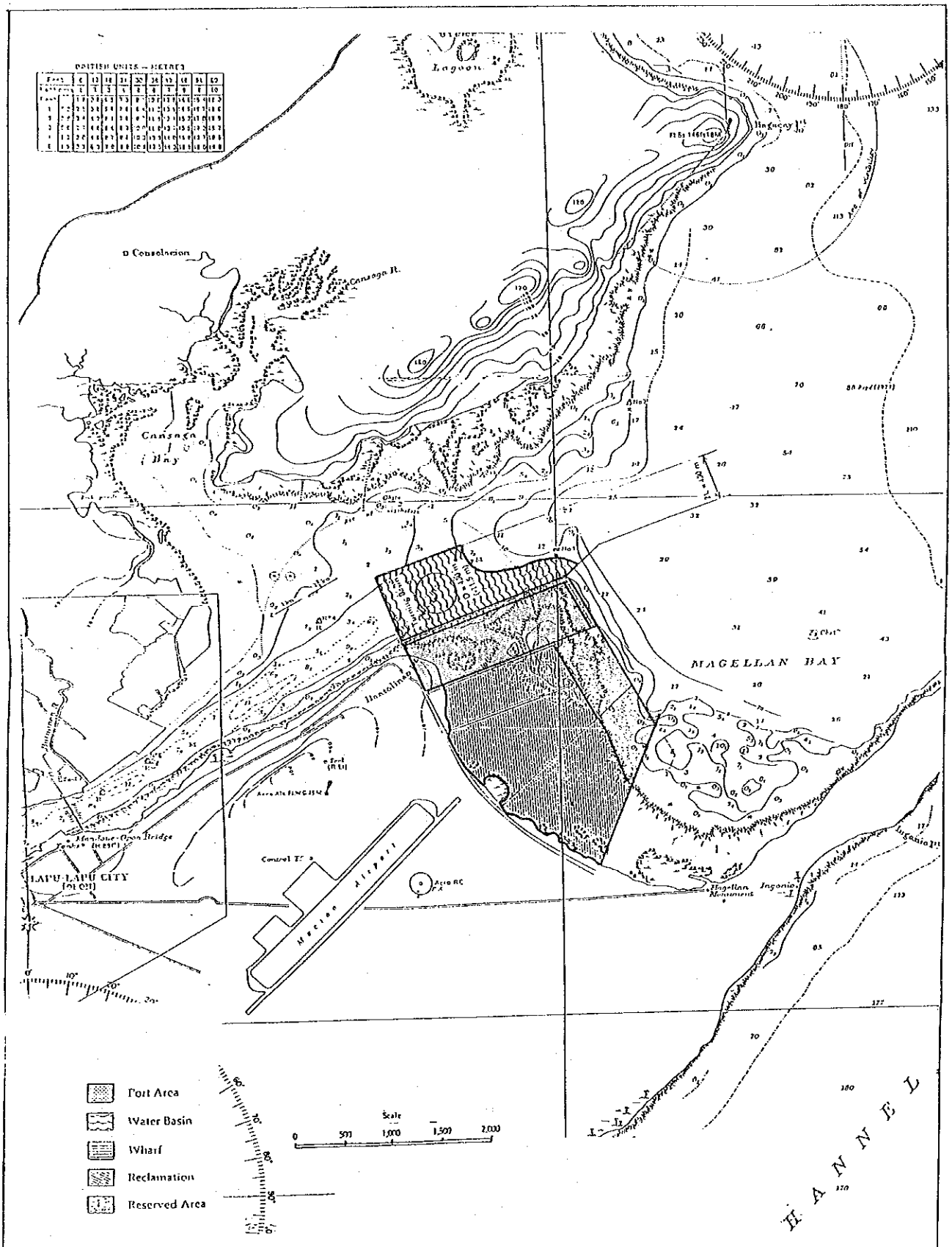


FIGURE 9.4.14 MASTER PALN FOR THE PORT OF CEBU- ALTERNATIVE 3

(2) Master Plan on Other Ports

(a) Planned ports

The Master Plan on other ports is made at the following ports based on the future demand. As for Santander, its facilities are constructed privately.

Other ports: Argao, Boljoon, Samboan, Dumanjug, Tuburan, Toledo, Hagnaya, Santa Fe, Bantayan, Carmen, Danao, San Francisco, Mandaue, Cordova

(b) Industrial ports

Industrial ports are needed to support the industries located at the hinterland of the ports.In this Master Plan, major industrial locations are planned in Metro Cebu and Toledo City. The demand for the Port of Cebu generated by industrial locations at Metro Cebu could be supplied comprehensively by the Master Plan of the Port of Cebu. At Toledo Port, industrial port facilities are planned based on the facility requirement estimation mentioned before (Refer to 9.4.7 (3)). Another industrial ports are planned in Carmen and Mandaue.

(c) Tourism ports

Tourism ports are required based on the planned marine tourism courses using jet catamaran. The proposed marine tourist courses are:

Cebu, Cordova - Argao - Panglao (Bohol): (Target year 2000)
Hagnaya - Sta Fe (Bantayan Island): (Target year 2000)
Cebu, Cordova - Danao - San Francisco (Camotes Island): (Target year 2010)
Boljoon - Siquijol: (Target year 2010)

Tourism ships shall be owned and managed privately. But the port facilities are to be constructed by public works based on the condition of general use.

The proposed berthing facilities at each port are to be used by ferry boats as well as jet catamarans.

(d) Master plan

Target year of each facility in Master Plan is decided based on the following criteria: The Master Plan on other ports are set as shown in Table 9.4.36.

- Ferry facility — Target year 2000 means the case that planned utilization rate of ferry boat is over 0.5 in the year 2000 (Refer to 9.4.7 (2)). But in the cases of Argao, Sta Fe, and Hagnaya, ferry port facilities are to be constructed in the year 2000 in time for tourism uses.
- Industrial port — Target year 2000 means the case that required berth number is around 1 in occupancy ratio of 0.7 in the year 2000. (Refer to 7.4.7.2)

- Industrial port at Toledo Industrial Base — Target year is the year 2000 based on the Industrial Development Plan.
- Tourism port — Target year depends on the Tourism Development Plan.

TABLE 9.4.36 MASTER PLAN OF OTHER PORTS

Port	Wharf		Water	Passenger	Target Year	
	Dimension	Remark	Basin	Terminal	2000	2010
Argao	-3.0x 50m	Ferry	o	ò	o	-
		Tourism	o	o	o	-
Boljoon	-2.5x 40	Tourism	o	o	-	o
Samboan	-3.0x 50	Ferry	-	o	o	-
Dumanjug	-2.5x 40	Ferry	-	o	-	o
Tuburan	-3.0x 50	Ferry	-	o	-	o
Toledo	-3.0x 50	Ferry	-	-	o	-
	-6.5x105	Industry	o	-	o	-
	-7.5x260	Industry	-	-	-	o
Sta Fe	-2.5x 40	Ferry	-	-	o	-
		Tourism	-	-	o	-
Bantayan	-2.5x 40	Ferry	-	o	-	o
Hagnaya	-2.5x 40	Ferry	-	o	o	-
		Tourism	-	o	o	-
Carmen	-2.5x 40	Ferry	-	o	-	o
	-6.5x105	Industry	o	-	o	-
	-6.5x105	Industry	o	-	-	o
Danao	-2.5x 40	Ferry	o	o	-	o
		Tourism	o	o	-	o
San Francisco	-2.5x 40	Ferry	o	o	-	o
		Tourism	o	o	-	o
Cordova	-3.0x 50	Tourism	o	o	o	-
Mandaue	-6.5x105	Industry	-	-	o	-

Note: Water Basin: o denotes the case where the planned berth depth is over existing one.
Passenger terminal: o denotes port without existing passenger terminal.

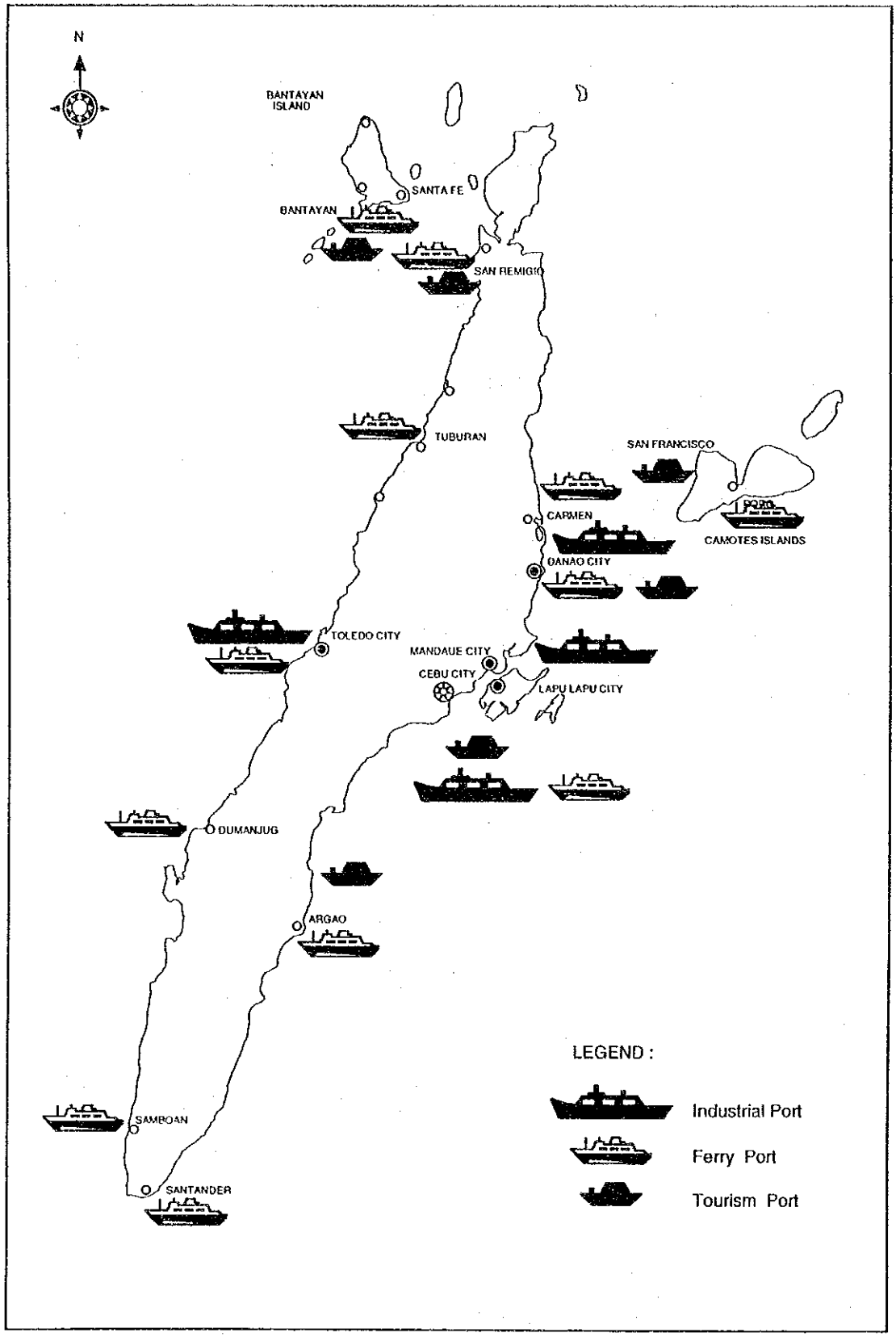


FIGURE 9.4.15 PLANNED PORTS IN MASTER PLAN

(3) Construction Cost

Construction costs for the master plans are roughly estimated. The precedent JICA studies such as "National Roll-on Roll-off Transport System Development Study, 1992" are used as referrence for the cost estimate. The physical contingency and engineering service charge are included 10% and 7% respectively.

The total construction cost for the Master Plan is estimated to be 5,955 million Pesos. The components of the cost are shown below.

TABLE 9.4.37 CONSTRUCTION COST

Unit: '000 Pesos

Year	2000	2010	Total
Port of Cebu	1,843,000	3,468,000	5,311,000
Other Ports	309,000	335,000	644,000
Total	2,152,000	3,803,000	5,955,000

Note: The exchange rate of the foreign currencies are assumed as:
1 Pesos = 5 Yen; 1 US$ = 26 Pesos

9.4.10 RECOMMENDATIONS

The Study TEam made the following recommendations on the port development in Cebu.

1. The Master Plan targeted for the year 2010 is presented in this study. The construction and improvement of Cebu Port and other 12 ports are proposed in the Master Plan. But, it is desirable to review the Master Plan corresponding to the change of economic environment.

2. It is recommended to supplement or revise this Master Plan by conducting detailed field survey especially on the natural condition such as sub-soil exploration, marine survey and others to be completed before 2000.

3. The Master Plan on Cebu Port cannot affirm feasibility of any location in the absence of information on the natural conditions, which requires a specifically designed plan for measurement. Consequently, one recommendation of this Plan is for a survey of conditions at Alternative 1 and on any other possible location to be undertaken in the short-term to enable a feasibility study to be completed.

4. The required port area changes largely depending on the cargo handling system. So data collection and its analysis should be continued to grasp the port situation.

5. The required berth length is estimated to be short in the year 2000. On the other hand, 200m or more berth length are occupied by the ship repairing and maintenance works. These activities lessen the effective berth length, and as a

result, decrease the cargo handling productivity. Therefore, these works irrelevant to port activities should be removed and transferred to existing shipping yards.

6. Port Authority should establishe the port zone including land area and water area at public port and clearly define their boundaries. The authority should take full control of the said area in order to use their facilities effectively.

7. In the view point of the regional development and the improvement of living and welfare of the local residents, local ports should be developed for the safe and comfortable transport of passengers. Local ports should be developed based on the planned priority.

8. Local ports are infrastructures for the public traffic, and in principle these facilities should be constructed by PPA as public works.

9.5 AIR TRANSPORT ANALYSIS

9.5.1 AIR TRANSPORT SYSTEM

(1) National System

The present airports consist of 83 national airports, 120 private airports/landing strips, military airports and helicopters. The national airports comprise international airports, trunkline airports, secondary airports and feeder airports. The six international airports such as Manila, Cebu, Davao, Zamboanga, Puerto Princesa and Laoag are used for the operation of airport engaged in international air commerce and the trunkline airports serve the principal commercial centers of the country. On the other hand, secondary airports serve towns and cities with less regular air traffic densities and feeder airports serve towns and rural communities with limited air traffic potential.

(2) Regional System

(a) Airport distribution

The region has ten national airports, including one international airport in Mactan and two trunkline airports in the provincial capital cities of Dumaguete and Tagbilaran.

In the province of Cebu, in addition to Mactan International Airport (MIA), there are several feeder and private airports to accommodate small planes, that is, Lahug in Cebu City, Sangi and Lutopan in Toledo City, Sta.Fe, San Francisco, Bogo and Argao. There is no regular flight service within the province due to limited traffic demand.

(b) Mactan International Airport (MIA)

MIA is located in Mactan Island and connected to Cebu City, the provincial capital 20 km due southwest, through the Mactan-Mandaue Bridge. It started operations in the middle 1960's as a replacement of the old Lahug Airport which was situated within Cebu City and had no more room for expansion due to safety and physical constraints.

All of the facilities which were constructed in 1960's are now either obsolete or inadequate and could no longer satisfactorily serve the present traffic demand. Therefore, in order to upgrade the facilities to a level required by international standards, the Mactan International Airport Development Project (MIADP) starts in 1993 with financial assistance of the Overseas Economic Cooperation Fund (OECF) of Japan.

Because of the huge financial outlay, the MIADP staggers its implementation into two phases, that is, the phase one by the year target 2000 and the phase two by 2010. The phase one includes runway extension from 2,590 to 3,300 meters, construction of terminal facilities and installation of utilities. The phase two intends to expand all facilities and to improve operational efficiency in line with the increase in traffic demand.

9.5.2 TRAFFIC DEMAND

The country's domestic air route network consists of two main hubs from which all flights originate; the Ninoy Aquino International Airport (NAIA) in Manila serves as the northern hub while MIA in Cebu is the southern hub. The Manila - Cebu route is the main artery of this domestic network, and passengers from Manila bound for designations in Mindanao except for Danao and parts of Visayas are funneled through Cebu. In fact, about 20% of the total passengers are transfer passengers to/from the southern parts of the Philippines.

Annual domestic passenger at MIA has constantly keep its share of around 20%. On the other hand, international volume has been fluctuating due to chartered flights. At present 27 airports inclusive of 22 domestic and 5 overseas are connecting directly to the airport by 360 regular flights a week as shown in Figure 9.5.1.

On the contrary, NAIA takes the dominant role as an international gate. For instance, NAIA has around 25,828 flights in 1991 while MIA has only around 777 flights in the same year. This imbalance situation, however, will be changed in the near future. According to the Civil Aeronautics Board (CAB), several foreign carriers such as Malaysian Airline, Eva Air and All Nippon Airline are going to begin their regular services to MIA.

TABLE 9.5.1 DOMESTIC PASSENGER TRAFFIC BY AIR 1986 TO 1992 (IN THOUSANDS)

		MIA	
Year	Nationwide	Incoming	Outgoing
1986	3,457	683	682
1987	3,769	746	727
1988	3,956	823	806
1989	4,121	894	895
1990	3,988	772	770
1991	3,651	694	701
1992	n.a.	775	770

Source: PAL, MIAA

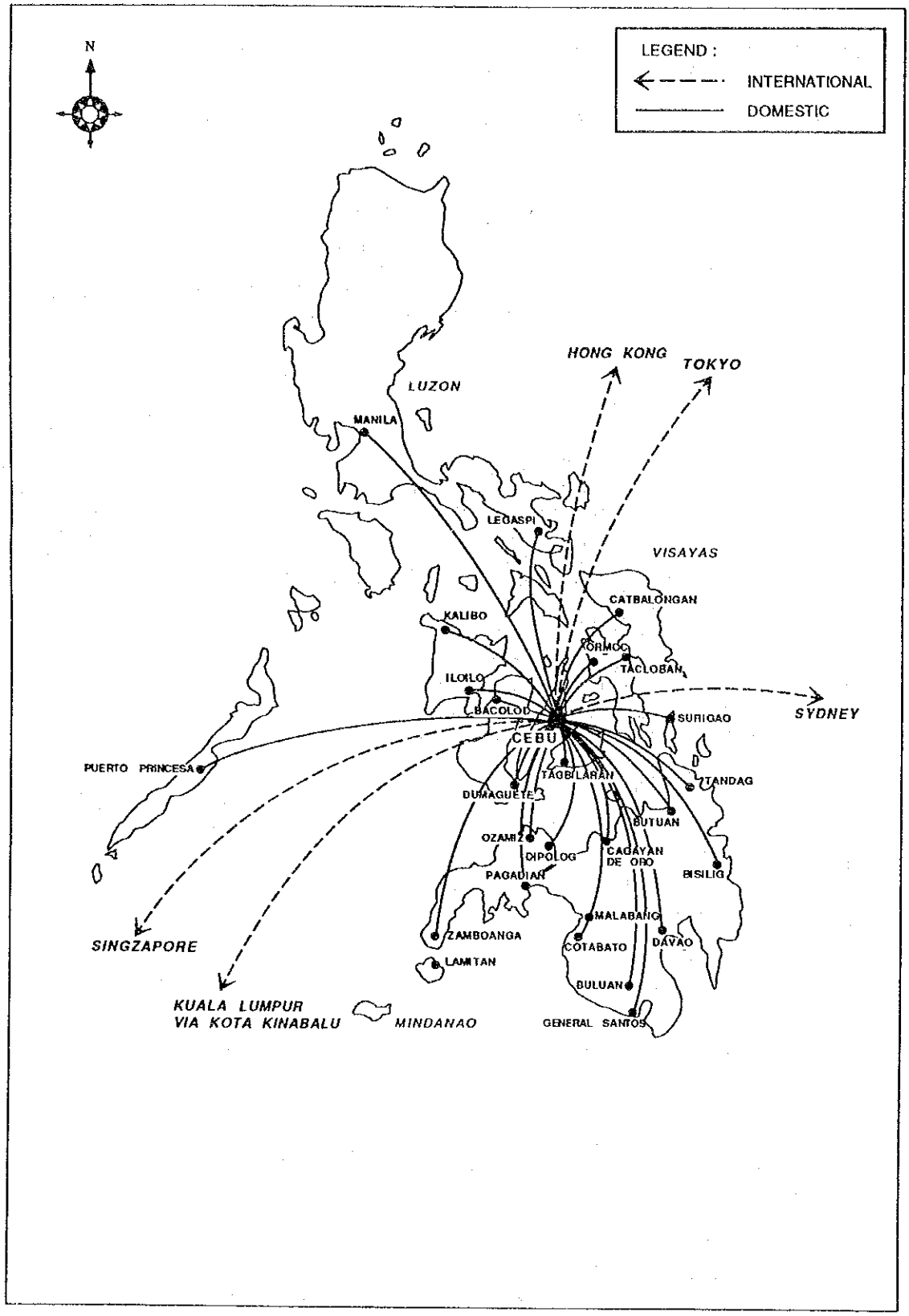


FIGURE 9.5.1 NATIONAL AIRPORT LOCATION AND AIR ROUTES

TABLE 9.5.2 INTERNATIONAL PASSENGER TRAFFIC BY AIR, NAIA AND MIA, 1986 TO 1992 (IN THOUSANDS)

Year	Nationwide		MIA	
	Incoming	Outgoing	Incoming	Outgoing
1986	1,538	1,675	1	1
1987	1,679	4,864	4	1
1988	1,910	2,043	27	18
1989	2,118	2,250	21	14
1990	2,104	2,264	30	23
1991	2,104	2,264	29	29
1992	n.a.	n.a.	51	47

Source: NAIA, MIAA

9.5.3 DEMAND FORECAST

The on-going Mactan International Airport Development Project (MIADP) has its master plan which reviewed the previous master plan made in 1981 under a U.S. Aid grant and reformulated in 1990. According to the updated master plan, the air traffic of MIA was forecast as shown in Table 9.5.3. It is needless to say, the MIADP will provide enough facilities to accommodate the estimated traffic volume.

Compared with 1992 actual figures, increase ratio of domestic and international passengers by 2010 is estimated at 491% and 1,362%, respectively. The international increase ratio is relatively high but the estimated figures, 1,335 thousand passengers in 2010, account for only 30% of NAIA international passengers in 1992.

Tourism sector of this study addresses "Cebu One-Million Program" toward the year 2010 which aims at attracting one million foreign tourist arrivals to Cebu. The improvement of international accessibility will make possible to achieve the program in parallel with tourism development.

TABLE 9.5.3 FORECAST OF AIR TRAFFIC IN MIA

(Unit: 1,000 persons)

Year	Domestic Passengers	International Passengers	Foreign Visitor Arrivals
1992	1,545 (Actual)	98	132
2000	4,086	496	327
2010	(*) 7,585	(*) 1,335	1,000

Note (*) : forecasting case based on medium assumption
Source : Mactan International Airport Development Master Plan, CIADMPS

9.6 TRANSPORTATION DEVELOPMENT AND PLANNING DIRECTIONS

9.6.1 BASIC RECOGNITION OF TRANSPORTATION DEVELOPMENT

It is obvious that transportation is a means of regional development and not an objective of regional development. It is also understandable that transportation is a key element for physical, socio-economic and political integration of a region at different levels. Therefore, transportation planning works in this study aims at materializing the proposed development scenario. For that purpose, the four levels of spatial hierarchy which are composed of international, regional, provincial and local levels are employed and duly considered.

Transportation is a system comprising infrastructure which supports various economic activities, and dynamics which generates and induces further economic activities. But its investment per se is hardly self-financing and it requires large finance and long construction time as well as recurrent operation and maintenance inputs. Therefore, transportation development should be well-coordinated with other sectoral studies as well as overall development scenario.

The overall development scenario in this study is proposed and spelt out in Volume I. In the said scenario, regional development policy is represented by three goals and three strategies as follows:

GOALS:

(1) Robust and Sustainable Economic Growth
(2) Equitable Growth
(3) Stable Social Development and Poverty Alleviation

STRATEGIES

(1) Industrialization
(2) Internationalization
(3) Integration

Needless to say, this transport sector study tries to follow and materialize the overall development scenario.

Transportation development has to support various activities which are agriculture, industry and trade, tourism, and human settlements and urban centers in coordination with other infrastructure development such as power and energy, telecommunication and water. Transportation development also should pay attention to environmental, administrative and financial aspects.

Based on the aforementioned recognition, transportation development is considered to be situated as shown in Figure 9.6.1.

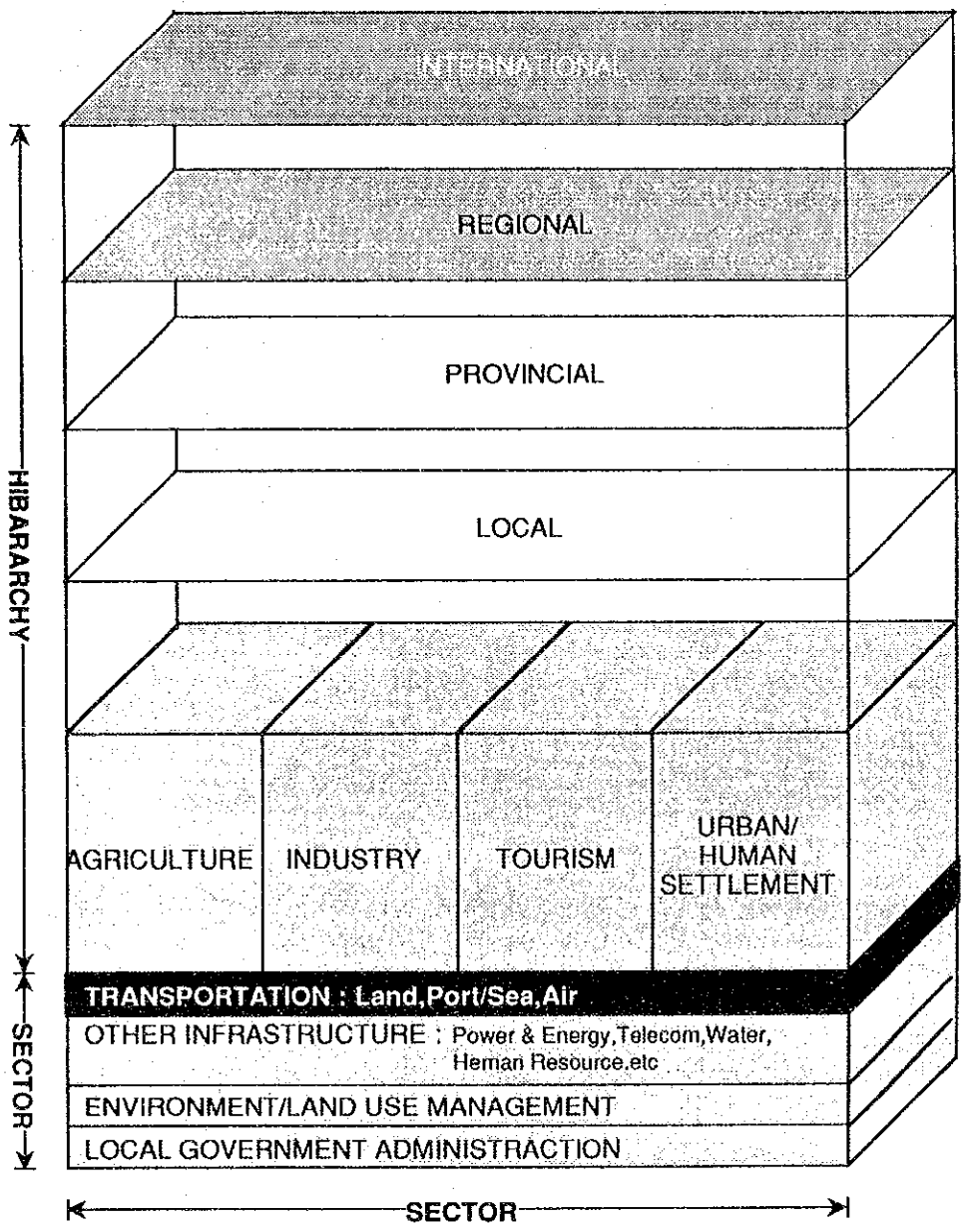


FIGURE 9.6.1 APPROACH TO TRANSPORTATION DEVELOPMENT

9.6.2 TRANSPORTATION PLANNING DIRECTIONS

(1) Hierarchical Integration (5-level Transport Subsystems)

(a) International transport subsystem

Cebu has two international nodes, Cebu Port and Mactan International Airport. In order to achieve the following goals, the two nodes should be fully utilized.

1. To attract the foreign investors who are looking for new industrial sites
2. To compete with ASEAN tourist destinations
3. To raise Cebu's position as the trading center of South compared with Manila

(b) Regional transport subsystem

The Visayas comprising many islands configuration pose a unique challenge to transportation system development. Because isolated road network leads to greater dependence on sea transport.

Cebu has been a position of the biggest trading center in so-called Greater Cebu Economy with 15 million population including Visayas and Northern Mindanao. Mainly it is explainable by the accumulation of active shipping business and its related industries.

To keep this position in future, Cebu must tackle the following points in line with establishment of the proposed intermodal transport system (Refer to (3) in this section);

1. To strongly connect with the designated RICs (Regional Industrial Centers)
2. To develop Central Cebu as a new RIC in Region VII

(c) Provincial transport subsystem

In contrast with well developed regional network, some area in the province suffer from scarcity of transportation means due to small traffic demand and financial constraints. Accordingly, completion of basic trunk road including opening missing links and improvement of feeder ports and feeder operations are essential.

Proximity to Metro Cebu is an important measure of the provincial transport network. Therefore, the provincial network should be formulated to achieve the following accessibility:

1. To connect between somewhere in Mainland and Metro Cebu within two hours by all-weather roads, and

2. To connect between remote islands such as Bantayan and Camotes and Metro Cebu within three hours by safe and frequent sea transport and paved roads

As a result, the provincial transport network can expect the following social and economic benefits:

1. to reduce gaps between Metro Cebu and the rest
2. to improve living conditions in rural area
3. to foster agro-industry and to promote distribution of agriculture products

(d) Local transport subsystem

Local transport network serves mainly for short distance and small demand trips in rural area. Therefore they need a sufficient length of the local roads which are all-weather and well maintained, and convenient public transport services instead of a series of high grade infrastructure.

But current situation is far from the satisfactory level and improvement efforts having been paid is insufficient due to financial constraints.

To increase implementability of local road development, its construction and maintenance system should be developed with utilization of local people.

(e) Metro Cebu urban transport subsystem

Metro Cebu is one of local areas while urban transport in a metropolis needs a quite unique and complicated approach to transportation planning. For this reason, Metro Cebu should be prepared as a specific transport network.

In line with the increase in traffic demand of Metro Cebu in future, large-scale infrastructure development will be unavoidable. Therefore Metro Cebu should resort to some structural solutions. It is conceptualized as stratified trunk roads on the north-south direction in this study.

As for the stratified trunk roads, the existing main corridor is designated to be a public transit corridor. In addition, a series of causeways is to be an industrial corridor for freight traffic while the proposed Urban Circumferential Road and A. Abellana St. will be formed to be a circumferential bypass for through traffic as shown in Figure 9.6.2.

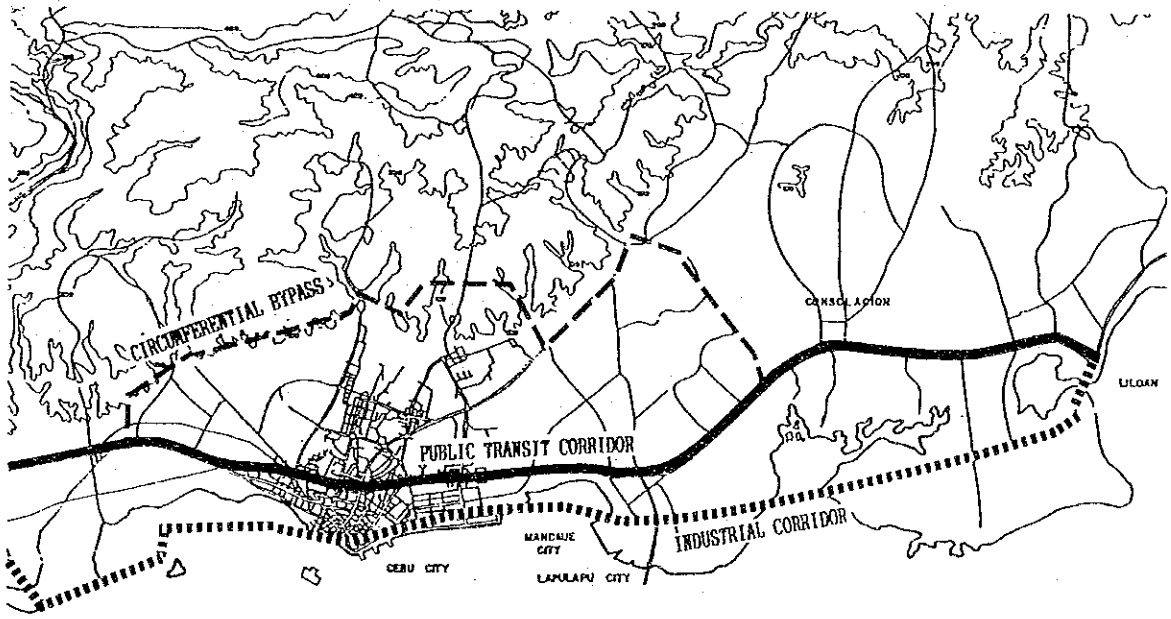


FIGURE 9.6.2 STRATIFIED TRUNK ROADS IN METRO CEBU

In addition, the following points should be considered in respect to planning directions:

1. Strong connection between Mactan and Mainland
2. Strengthening street roads (density, standards)
3. Provision of efficient and comfortable public transport service
4. Segregation of industrial from general urban traffic
5. Control of landuse and roadside activities

(2) Sectoral Integration

Other sectoral studies identify numerous and various issues and problems to transport sector. These can be summarized and analyzed from a transportation planning viewpoint as follows:

(a) Agriculture

Agriculture sector has recognized and laid stress on the importance of proper infrastructure in agricultural productivity. As a matter of fact, this study found the following aspects which continue to languish the agricultural sector in a miserable state.

- Inaccessibility to farm-to-market roads
- Unstable transport services due to many impassable roads during downpour and after
- Inefficiency of port management due to small and shallow port and poor cargo handling facilities, and delays and unsafe in movement due to obsolete domestic fleet
- Lack of transportation means

As a result, farmers suffer from expensive transportation costs on both road and sea. The poor road conditions contribute as much as 30 to 40% of delivery costs. The domestic tariff is much higher than the international one per mile. Such poor infrastructures finally deprived the Filipino farmers of a competitive power in the international market.

If the marketing and distribution costs are considered, a Thai farmer would spend only US$35 for moving one metric ton of corn from the farm gate to the user. A Filipino farmer, meanwhile, has to spend US$74 for moving the same amount of product according to one estimation found in the Marid Digest in October 1993.

Accordingly, development of rural roads should be facilitated in order to unleash agricultural and economical potentials. To solve the facing problems such as financial restrictions and too much maintenance works, the local road development program with utilization of local people is also to be considered. Increase in port efficiency and capability as well as efficient integration of road and sea transports are essential.

(b) Industry and trade

Industry and trade sector has a decentralization policy in industrial development. In practice, Cebu is short of infrastructure such as road, telecommunication, power and water. It will jeopardize the realization of the decentralization policy.

For example, many factories have recently been established in north of Consolacion with only one access road available from Cebu Port. It is that Cebu North Road is narrow and some old bridges still remain. Butuanon Bridge which is already more than 30 years old can accommodate less than 5- ton trucks. Nevertheless, the Study Team observed some trucks more than 5 tons passing through the bridge. Some questions were borne in mind. "Who would assume responsibility in case of an accident occurred?" And "Who did permit the construction of those factories despite of poor infrastructure?"

Without any dispute, such serious conditions should be solved as soon as possible by construction of a new bridge in replacement of the old one. In conclusion, transportation development should act in concert with industrial development. Particularly, large-scale infrastructure will be properly provided in Central Cebu designated as a new RIC.

Similar to the agriculture, expensive transportation cost is one of problems. The cost can be reduced in line with the development of integrated transportation system and proper competition.

Agro-industry is expected in many places of Cebu. According to the industry sector study, provision of better transportation and storage system are necessary for agro-based manufacturing.

(c) Tourism

This study addresses "Cebu One-Million Program" toward the year 2010, which aims at attracting one million foreign tourist arrivals to Cebu. To achieve this program, provision of comfortable and mass transportation means are essential.

For that purpose, the Mactan International Airport will be an ideal international node by the on-going Mactan International Airport Development Project (MIADP). In this connection, expansion of air links, both direct and chartered, and improvement of airport management will be also pursued.

After arrival at the airport, circulation of tourists to their destinations is an important issue and needs sophisticated management. Necessary measures related to transportation are identified in tourism sector study as follows:

- Upgrading/beautification of tourism roads
- Provision of local tourism transportation system (tourist jeepney, dinner cruise, etc.)
- Construction of a tourist port in Mactan plying with Panglao, Bohol via Argao

(d) Human settlements and urban centers

As for human settlements, there are around 1,200 barangays which are spread over provincial-wide. Of which, 45% of the barangays are located outside 2km from the main roads and 13% of the barangays are still located beyond 5km from the main roads. To offset such inaccessibility, local roads such as farm-to-market roads should be developed with sound standards.

Urban centers in the province have the following problems and issues:

- effective transport integration of urban centers
- mitigation of traffic congestions on approach roads to urban centers
- segregation of through traffic and intra-urban traffic

(e) Natural resources and environmental management

There are many environmental problems can be pointed out in Metro Cebu such as air pollution, noise and traffic nuisances. But it is difficult to evaluate their seriousness and mechanism related to transport activities.

In respect to natural resources, many landslides and erosions were observed along mountainous roads under construction and in operation. Therefore, environmental aspects should be duly considered when mountainous roads are being planned.

(3) Modal Integration (Intermodal Transport System)

Modal integration means the establishment of an efficient transport network in the province and neighboring islands which is intermodal in nature to provide fast and easy transport of passenger and cargo. Recognizing the inefficiency in the handling and transfer of cargoes and passengers at nodal points, i.e., at the interface where the land mode of transport changes to the sea or air mode, the proposed system aims to facilitate such transfers and drastically minimize handling time and improve the cargo handling operations.

To maximize the expected benefits, the backbone highway network shall be configured to connect the Regional Industrial Centers (RICs), other agro-industrial zones and clusters, service centers, and international transport gateways. Accordingly, the intermodal transport system is composed of the following components;

(a) Highway transport network component

Major arterial roads which link industrial centers and distribution centers as well as ports and airports in the region will be developed to cope with future traffic demand. Not only width but pavement quality should be duly considered based on the projected axial loads of trucks/trailers.

Being given emphases also are bad and dilapidated circumferential/coastal roads as well as cross-island routes.

(b) Ro-Ro and port development component

Road network terminal points - sea transport nodal points will be provided with improved ports with Ro-Ro facilities, efficient terminal and cargo-handling facilities.

Ro-Ro operations provide short and frequent services for large numbers of passengers and vehicles with safety. To enhance maritime safety, various measures such as installation of navigational aids, inspection of sea worthiness and strict prohibition of overloading should be implemented integrally.

(c) Airport development components

The major airports at regional centers will be provided with improved airport terminals and their runways will be strengthened and extended to carter to bigger aircraft.

This component also includes the provision of modern air navigational aids.

TABLE 9.6.1 SUMMARY OF PLANNING DIRECTIONS

	Road/land transportation	Port/Sea Transportation	Air Transportation
International	• Improve access to international port and airport	• Improve Cebu port facilities and export port area • Encourage direct international shipping access to Cebu port	• Extend MIA and improve MIA terminal facilities • Expand air links (direct, chartered) • Improve airport management
Regional	• Strengthen inter-island Ro-Ro system in the Cebu influence regions • Develop industrial corridors in Central Cebu as a new RIC • Develop regional tourist circulation routes	• Improve inter-island shipping operation and safety	• Expand air links • Improve fleet
Provincial	• Complete basic trunk road network (existing roads, missing links, trans-island/inter-island links)	• Improve feeder ports and transport operation	• Develop island commuter services and facilities
Local	• Construct farm-to-market roads • Expand local public transport services • Establish effective local roads construction and maintenance system	• Improve fishing ports	• Not applicable
Metro Cebu	• Strengthen overall urban roads (network, standards) • Expand public transport system • Strengthen traffic management and safety measures • Segregate industry and general urban traffic • Control land use/road side activities • Beautify tourism roads and provide tourism transportation means (tourist jeepney, dinner cruise)	• Consider improvement of urban ferry services between Mactan and Mainland	• Not applicable

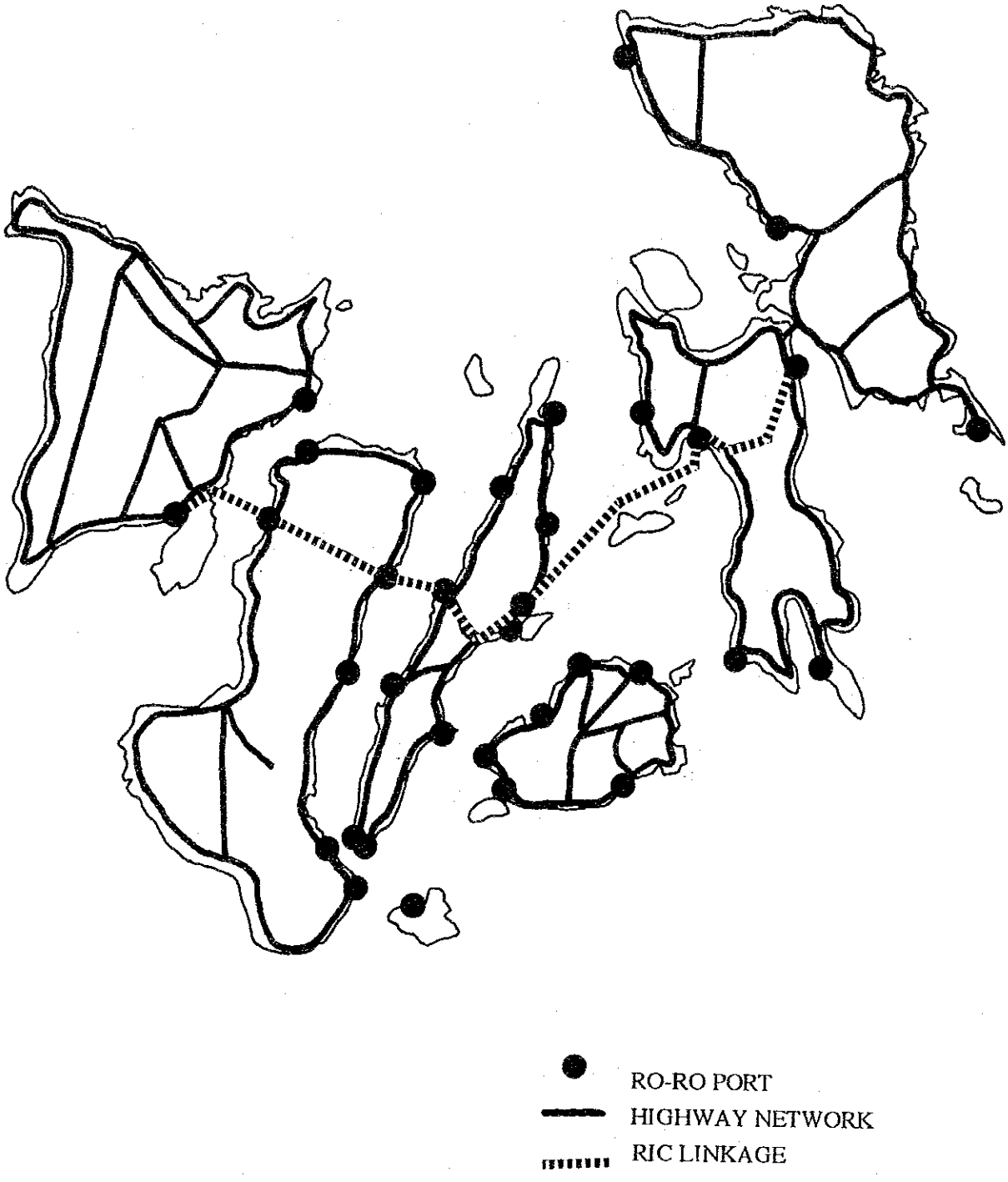


FIGURE 9.6.3 PROPOSED INTERMODAL TRANSPORT SYSTEM IN VISAYAS