

## 2.5 Implementation Planning

A preliminary construction plan and construction methods have been worked out based on the local conditions, equipment capacity and similar construction experiences. The statements below are based on the proposed port layout plan and design of facilities described in the previous chapters. This plan is aimed to evaluate technical and economical feasibility of the project. Firstly the construction plan of New Cebu Port is described followed by the renovation work schedule of Cebu Base Port.

### 2.5.1 Marine Works

#### (1) Pile Driving and Quaywall Construction

Preliminary numbers and dimensions of the planned piling works are summarized in Table 2.5.1-1.

**Table 2.5.1-1 Number and Dimension of Piling Works**

	Number	Diameter (mm)	Total Length (m)	Driving Length (m)
<b>Container Berth</b>				
Steel Pipe Sheet Pile	415	1,200	32	17
Anchor pile	208	900	20	8
Crane foundation pile	207	800	32	18
<b>Multipurpose Cargo Berth</b>				
Steel Pipe Sheet Pile	131	1,200	32	17
Anchor pile	65	900	20	8
Crane foundation pile	66	800	32	18

The subsoil conditions vary from very loose to very dense sand with gravel-size broken corals. N-value generally ranges from 10 to 30 with the highest values exceeding 50 blows. 2 barge mounted piling rigs will be employed, the one for driving sea-side sheet piles and the other for landside piles. The period of the piling works are estimated based on the daily production rate as follows.

Steel Pipe Sheet Pile : 3 piles (driving length, approx. 50m)/day

Landside Pile; anchor pile : 6 piles (driving length, approx. 50m)/day

Landside Pile; crane rail foundation pile: 4 piles (driving length, approx. 70m)/day

Once some distance of piling works of quaywall are completed, tie wiring work, stone backfilling, concreting works of coping, and other fitting works will follow. Those works can be executed concurrently with the piling works and will be completed approximately 4 months after completion of the piling work. The period of quaywall construction is estimated at the production rate of 4.35 m/day.

## (2) Dredging

With the current alignment of the berth, nearly parallel to -13 m contour line, the area of dredging is limited to eastern side of the berthing area and the channel area for service boats. The volume is estimated at approximately 170,000 m<sup>3</sup>.

According to the soil investigation results, the soil to be dredged is sandy coral and silty clay. Although the number of samples is limited, the dredged soil seems not suitable for the reclamation and may have to be dumped at the site appointed by CPA, which is assumed to be found in the deep channel around 1 to 3 km away from the construction site.

Considering its volume and the construction sequence, dredging work will not affect the total schedule. For the nature of the soil, either cutter suction dredger or grab dredger may be applicable. The daily dredging volume by different types of dredgers are compared as shown in Table 2.5.1-2.

**Table 2.5.1-2 Daily Dredging Volume for Different Types of Dredger**

Type of Dredger	Cutter Suction Dredger	Grab Dredger		
Capacity	3200 PS	0.8 m <sup>3</sup>	6 m <sup>3</sup>	20 m <sup>3</sup>
Daily Dredging Volume (m <sup>3</sup> /day)	7,000 - 10,000	150 - 270	1,000 - 2000	3,300 - 5,000
Daily Operation Hour	16 hr operation	8 hr operation		
Dredging Cost*	0.8	1.2	1	1.5

Note: Proportions of dredging cost when dredging by 6m<sup>3</sup> dredger is 1. The costs of mobilization and demobilization are not included.

In this implementation plan, 6m<sup>3</sup> capacity Grab Dredger is considered in scheduling and cost estimation purpose with the average dredging volume 1,500 m<sup>3</sup>/day.

## (3) Reclamation

Total volume of 1,300,000 m<sup>3</sup> of soil will be required to fill the area of 331,000 m<sup>2</sup> to the elevation between 2.2 m and 3.2 m (finished ground level will be between 3 and 4 m). The characteristics of the reclamation materials normally required are well graded non-plastic sand or gravel with the silt content less than 10 - 30%.

### (a) Borrow Pit

Lime stone is abundant in Cebu Island, however its particle is very fine with its silt content normally exceeding 30%, and may not be suitable as reclamation material. Diorite material is also found in Cebu Province and normally used for reclamation.

For two recent projects, Cebu South Reclamation Project (executing agency: Cebu City) and

Cebu South Coastal Road Project (ditto: DPWH), approximately 12,000,000 m<sup>3</sup> of soil was used to fill the land between June 1998 and September 2000. Dredging material was originally planned to be used for reclamation, however, in concern of environmental impact, mining permit could not be obtained. The sources of material were, therefore, sought in mountains and rivers in Cebu, Bohol, Leyte and Negros. The monthly output was max. 1 million m<sup>3</sup> and average 100 to 200,000 m<sup>3</sup>.

In this study, sources of quarry and filling material near Cebu Island were studied. The locations thereof are indicated in Fig. 2.5.1-1 and 2. Their characteristics are summarized below.

- Compostela - About 10 km north of the site, 15 minutes from the main road or possible temporary jetty. Sufficient capacity. For the South Reclamation project average 8,000 m<sup>3</sup> was transported daily with 24 hr operation by 10 - 15 dump truck units and maximum 2,000 m<sup>3</sup> barge. Loading time for a barge was 3 hours.
- Talamban - about 15 km west of the site, unlimited volume. Currently supplying for Pier 6 construction of Cebu Base Port.
- Minglanilla - about 30 km south-west of the site; sufficient capacity. During the South Reclamation project, 3000 dump truck load of soil have been transported daily. Impact to the people along the traffic route was great and the road surface was severely damaged. After the construction, rehabilitation fund was raised to the city by the contractor/supplier and the damaged road has been mostly repaired. Currently this source is supplying for Talisay subdivision development project.
- Bohol Island - Large amount of soil is transported for South Reclamation Project from the north western part of the island, which is about 30 to 40 km away from New Cebu Port. From the view of the volume required for the project, it may not be necessary to purchase soil from there.

To extract soil from mountains or rivers, several permits such as development permit, mining permit and environmental permits are required. The local suppliers or land owners of the above borrow pits have already obtained the permits from the concerned authorities. Normally contractors purchase materials at the cost of project site delivery basis from such suppliers.

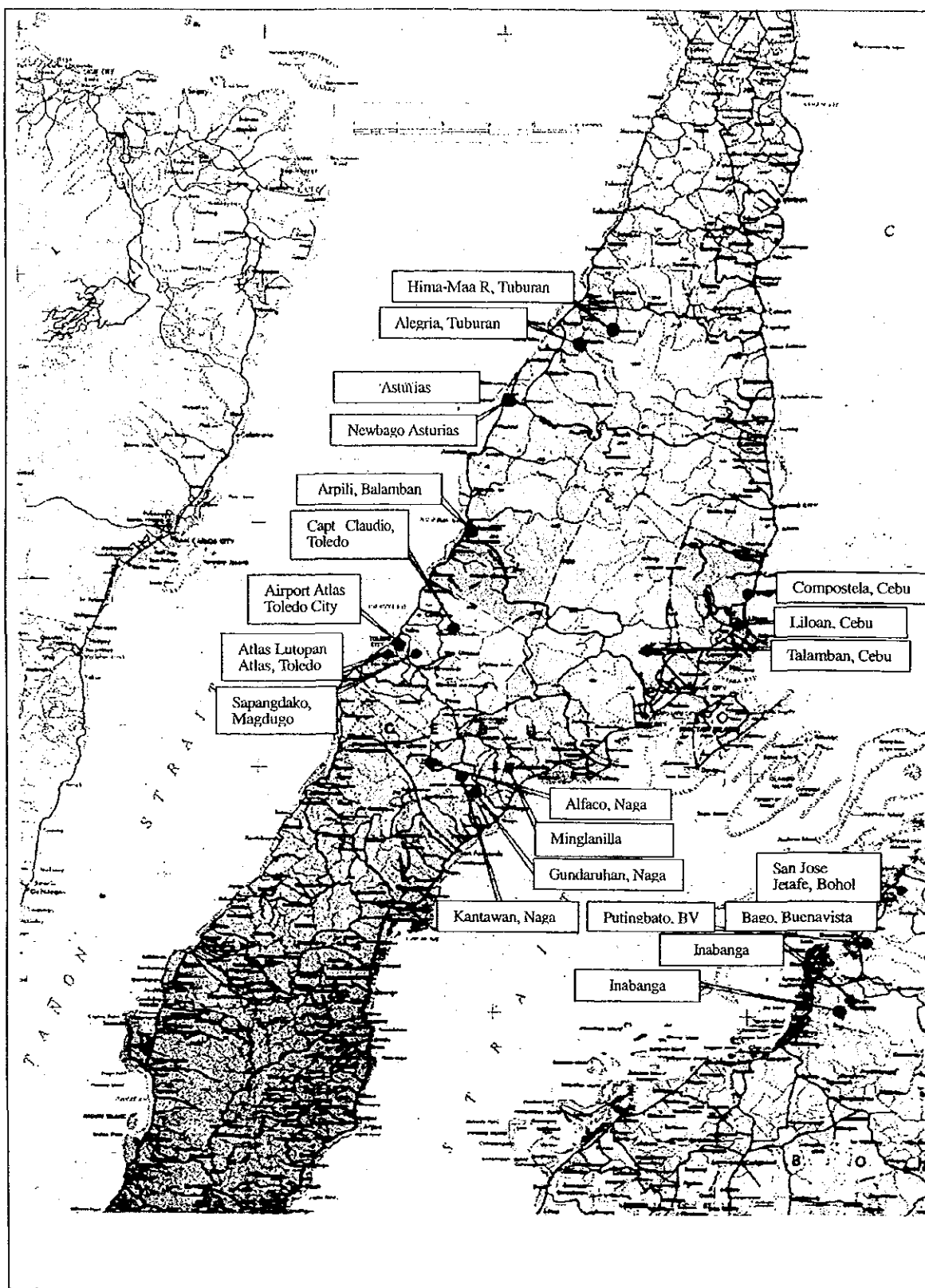


Fig. 2.5.1-1 Locations of Quarries in Cebu and Bohol Islands

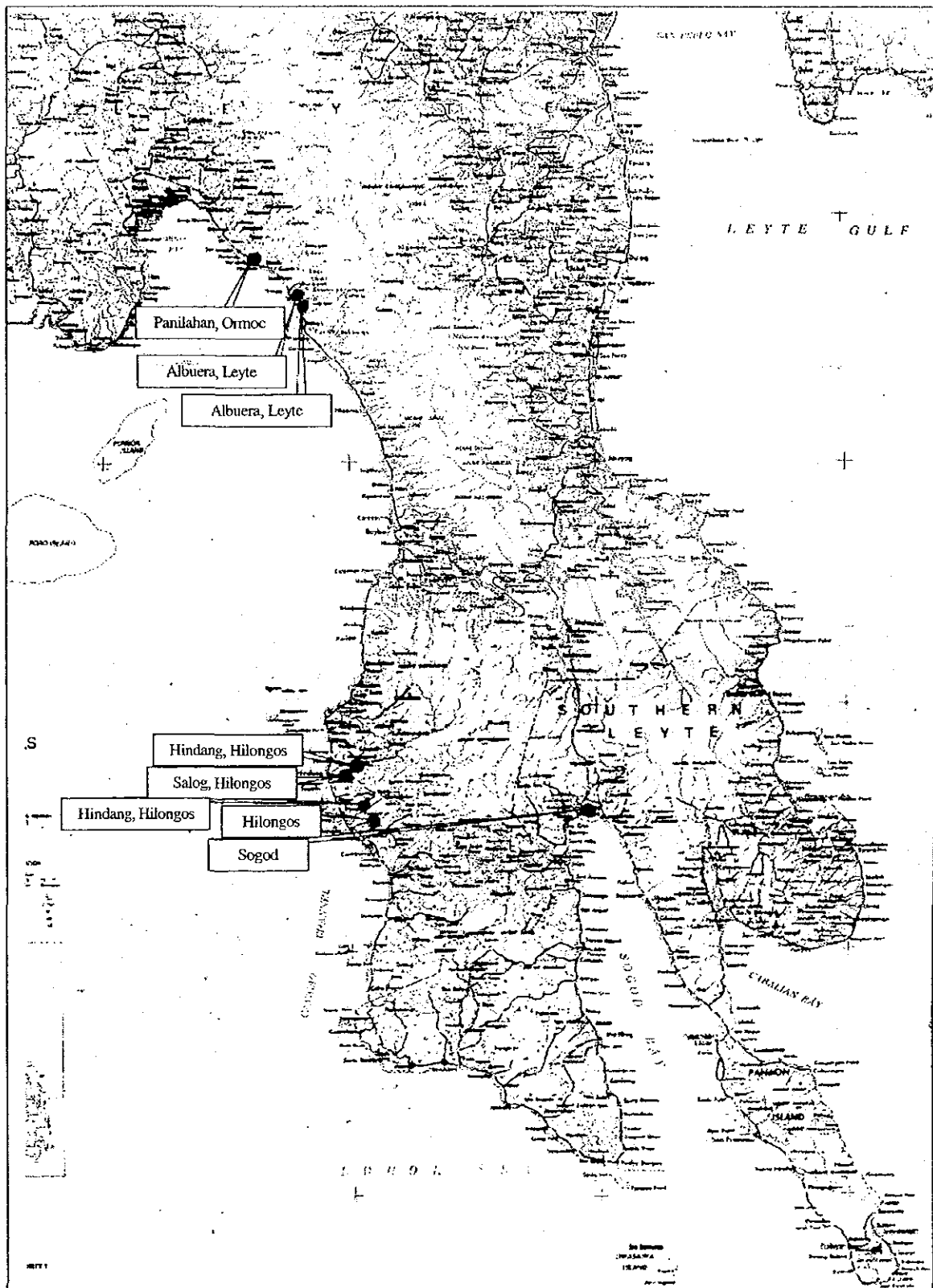


Fig. 2.5.1-2 Locations of Quarries in Leyte Island

#### (b) Method of Reclamation

The reclamation material may be transported from the borrow pit to the site either directly by dump truck or alternatively by dump truck to the nearest jetty and by barge from thereon. To finish the reclamation work in 10 months, required daily volume is approximately 5,000 m<sup>3</sup>. It is recommended that barges be used to transport the material since the present road between the proposed site and the national highway is narrow, winding, congested, heavily populated. Excessive traffic of dump trucks will greatly affect the social environment of its neighborhood.

In case of barge delivery, assuming that the travel distance is 15 km, required are three barges with 2,000 m<sup>3</sup> capacity each. The required number of dump trucks between the borrow pit and the jetty will be nearly equal to 1,000 trips per day or 60 trips/hour for 16 hour operation.. In case such materials are transported on land, construction of temporary access road may be needed.

Placement and compaction of the filling material will be commenced after the construction of revetment or temporary dikes. Spread of turbid water to the ocean has to be protected. As described in Section 2.5, if proper reclamation method is selected, impact to water quality is minor.

#### (c) Prediction of Settlement

According to the soil investigation, a normally-consolidated soft clay layer with a thickness of 3 - 5 m is found at a depth around -6 to -12m. Thus, reclamation and other loads such as container stacking will result in consolidation settlement. Effect of settlement was roughly estimated with parameters obtained in the laboratory test.

The formula used for the calculation is as follows:

$$S_c = \left( \frac{C_c}{1 + e_o} \right) H \log \left( \frac{P_o + \Delta}{P_o} \right)$$

Where:

- $S_c$  = ultimate consolidation settlement
- $C_c$  = compression index obtained from tests
- $e_o$  = void ratio obtained from tests
- $P_o$  = effective overburden pressure at mid-depth of the layer
- $\Delta P$  = average increase in pressure due to load
- $H$  = thickness of the compressible layer being considered

Since the stratification of the layers varies at the shallow area and deep area, settlement is calculated separately. As shown in Table 2.5.1-3 the settlement is estimated at around 20 cm at the shallow area and 80 cm at the deep area.

**Table 2.5.1-3 Estimated Consolidation Settlement**

Location	Depth (m)	thickness of layer, H, m	Cc	e <sub>o</sub>	P' <sub>o</sub> (kPa)	Δp	S <sub>c</sub> (mm)
Shallow Area	-6 - -9	3.00	0.50	2.00	68.84	82.0	170
Deep Area	-8 - -12	4.00	0.50	2.00	11.78	162.0	779

Δp = 4m x 18 kPa + 10 kPa = 82 kPa (at the shallow area)

Δp = 8m x 10 kPa + 4m x 18 kPa + 10 kPa = 162 kPa (at the deep area)

The elapsed time necessary for 80 % completion of settlement is estimated with the following formula:

$$t = \left( \frac{T_v \times H^2}{c_v} \right)$$

Where:

T<sub>v</sub> = Coefficient of time (0.57 for 80% consolidation)

C<sub>v</sub> = coefficient of consolidation (=1.07 x 10<sup>-3</sup> cm<sup>2</sup>/sec)

The result of calculation is shown in Table 2.5.1-4.

**Table 2.5.1-4 Estimated Elapsed Time of Consolidation**

Location	Compressible thickness of Clay	Elapsed time after loading (months)
Shallow Area	1.5m	4.5
Deep Area	2.0m	8

To improve the strength of the soft clay it is considered to place preloading for 3 to 4 months at the shallow area and 8 months at the deep area.

It should be noted that the number of test is very minimal and the above calculation is used only for a preliminary assessment of settlement.

#### (4) Rock Works

Rock works comprise mainly the followings:

- Backfill stone behind the quaywall (1 - 10 kg/pc) : 400,000 m<sup>3</sup>
- Core stone for revetment and causeway (1 - 30 kg/pc) : 70,000 m<sup>3</sup>
- Armor rock for revetment and causeway (> 100 kg/pc) : 12,000 m<sup>3</sup>

The characteristics of rocks normally required for the marine works is hard (compressive strength 50 MPa or more), heavy (unit weight 2.5 to 2.7 kg/cm<sup>3</sup>) and highly resistant to weathering. In Cebu Province, marbleize stone are often used and found by the west coast of the island.

The study team visited a quarry in Atlas, Toledo, approximately 50 km W of site. Apparently the quarry can provide the required volume and quality of marbleize stone for the project.

There are 2 routes for delivering the material to the site from the quarry; National Road (via Talisay) and Provincial road (via Naga). The road is mountainous. Only half of the National road is paved and the condition is not good. Provincial road is partially unpaved but condition is much better. Traffic is also heavier in the provincial road.

For backfill stone, placement of approximately 2,000 m<sup>3</sup> of rocks are required daily, or equivalent to 400 dump truck loads. In case they are transported from Toledo, truck route will pass through the central area of Cebu city. One alternative route to avoid traffic through the city may be by use of barge from Naga.

Assumed daily production rate of rock works is as follows.

- Backfill stone behind the quaywall (1 - 10 kg/pc) : 2,000 m<sup>3</sup>/day
- Core stone for revetment and causeway (1 - 30 kg/pc) : 400 m<sup>3</sup>/day
- Armor rock for revetment and causeway (> 100 kg/pc) : 100 m<sup>3</sup>/day

#### (5) Concrete Works

The main concrete works involved in marine works will be coping for quaywall, crane foundation beam and concrete revetment wall. The material will be well resistant to sea environment. According to the market research, cement is manufactured locally, however, the aggregate produced in Cebu Island is of poor quality. The good quality concrete aggregate is normally transported from Leyte Island.

Concrete may be mixed on site or on barge or purchased from ready mix concrete manufacture and transported to the site. The total volume and average daily rates of concreting are estimated as follows.

- Coping for quaywall and crane foundation : 13,000 m<sup>3</sup> — 65 m<sup>3</sup>/day
- Concrete revetment wall : 1,200 m<sup>3</sup>



## 2.5.2 Civil Works

### (1) Excavation

The construction of the proposed access road requires 100,000 m<sup>3</sup> of excavation. While suitable materials will be used as fill or top soil, unsuitable material will be removed from site and dumped at a proper disposal area. At this stage subsoil conditions at the access road area is unknown.. Rates of excavation and disposal are, assuming that the soil is a combination of sand, weathered rock and hard rock, estimated at 900 m<sup>3</sup> per day.

### (2) Flyover

With very limited information, a standard structure of a three lane flyover with approximate total length of 1,000m has been designed and the major work volumes and daily progress rates are assumed as follows:

- Pre-cast Concrete Piles : 14,000 m (26 x 36 x 15m) --- 75 m/day (5 piles/day)
- Concrete substructure : 8,000 m<sup>3</sup> --- 40 m<sup>3</sup>/day
- PCI-Girder: 200 peaces
- Slab Deck: 2,500 m<sup>3</sup>

### (3) Road and Yard Pavements

Road and Yard Pavements will comprise interlocking concrete blocks, in-situ concrete slabs and asphalt pavement.

Approximate volume of each pavement type is as follows:

- Interlocking Concrete Block : 100,000 m<sup>2</sup>
- Concrete Pavement for Apron and Terminal Yard : 170,000 m<sup>2</sup> (45,000 m<sup>3</sup>)
- Concrete Pavement for Service Road : 20,000 m<sup>2</sup> (4,000 m<sup>3</sup>)

Assumed output rates are:

- Interlocking concrete block pavement : 400 m<sup>2</sup> per day
- Concrete Pavement for Apron and Terminal Yard: 600 m<sup>2</sup> per day
- Concrete Pavement for Service Road: 400 m<sup>2</sup> per day

## 2.5.3 Building Works

5 main building/warehouses with floor area of 13,000 and a 13-lane gate facility are proposed. The building names and their features are given below.

**Table 2.5.3-1 Proposed Buildings**

<b>Building</b>	<b>Total Floor Area (m<sup>2</sup>)</b>
Office Building	4,900
Seamen's Club and Duty Free Shop	2,000
Container Freight Station	3,200
Main Gate and Toll Booth	13 lanes
Repair Shop (Maintenance )	900
Conventional Berth Cargo Shed	2,100

The total construction period of building works is estimated at 12 months.

#### **2.5.4 Utilities**

These comprise:

- water supply system (including connection to city water network system, elevated water tank and vessel water supply)
- power supply (including substations, backup generator and connection to VECO)
- lighting
- low current (telephone, communication, etc.)

The total construction period of utilities works is estimated at 16 months.

#### **2.5.5 Environmental Treatment Facilities**

The proposed facilities are as follows:

- sewage collection and treatment,
- bilge oil treatment and separation facility

The total construction period of is estimated at 12 months.

#### **2.5.6 Cargo Handling Equipment**

5 Quay Gantry Cranes are planned to be procured by CPA and other equipment such as 14 RTG and trailers will be procured by the operator. The procurement schedule is considered as follows.

**Table 2.5.6-1 Schedule of Equipment Procurement**

	Quay Gantry Crane	Rubber Tired Gantry	Auxiliary Yard Equipment
Design and Preparation of shop drawings	4 months	2.5 months	-
Manufacturing	13 months	10 months	8 months
Transport and Installation	4 months	3 months	2.5 months
Testing and training	3 months	2 months	-

## 2.5.7 Environmental Considerations

The construction activities which may cause negative impact on the environment and the possible counter measures are summarized in Table 2.5.7-1.

**Table 2.5.7-1 Construction Activities which may affect environment and Countermeasures**

Activities	Possible impact and cause	Counter measures
Piling work	Noise and tremor of pile driving will be noticed at the houses near the coast everyday for a duration of 7 months. However the work area is more than 1 km away from the nearest residence and the level will not be large	The noise level will satisfy the noise regulation, however, to avoid trouble, some of the possible countermeasures are to limit the working hours and to use hydraulic pile drivers.
Waste material dumping	Large volume of construction waste such as refused soil, concrete debris wood, etc. will be generated.	The waste shall be dumped at designated areas.
Dredging and Reclamation	Dumping soil directly in seawater will make the water turbid	Control the diffusion of turbid water, such as constructing dikes before reclamation and using silt protector. Dredged material shall be dumped at a designated area.
Traffic of construction equipment such as dump truck	Heavy traffic will generate noise, tremor, dust, may cause traffic accident and damage the pavement	Traffic shall avoid densely populated area or sensitive area such as near school and hospital. Use water transport. Repair the road if damaged.

## 2.5.8 Overall Construction Schedule

A construction schedule based on the methodology, sequence and rates of output described in the preceding sections is shown in Fig. 2.5.8.1. A total estimated construction period will be 36 months.

The schedule is based on the following assumptions:

**FIG.2.5.8-1 CONSTRUCTION SCHEDULE (New Cebu Port Phase 1)**

- a) Construction activities will be carried out every day except Sundays and national holidays.
- b) An allowance of 2 days per month has been made for suspension of the construction as a consequence of adverse weather conditions on Site.
- c) Therefore average number of working days per month is assumed at 23 days.
- d) Basically site working hours are from 7:00 am to 6:00 pm (10 hours), except that reclamation work may be carried out longer hours.

### 2.5.9 Renovation Works of Cebu Baseport

The renovation works of Cebu Baseport, already planed by CPA and newly proposed in the study, are basically classified by work types as follows:

**Table 2.5.9-1 Work Types of Cebu Baseport Renovation**

Work Type	Description	Location
Quay Construction (concrete deck type)	Concrete piling, concrete decks, paving, fender installation	Berths 8 - 16, 18 - 19, 21 - 22, 24 - 25, 28 - 30, Pier 3
Quay Construction (sheet pile type)	Sheet piling, paving	Pier 1 and 2
Building Works		Passenger Terminal Building (Large RORO, Middle RORO and Fast Craft)

A part of quay construction and fender installation works have been undergoing. The construction works must be undertaken while the wharves are used for vessel berthing, cargo handling operation and passengers embarkation and disembarkation. Therefore, the current construction schedule has been worked out jointly with vessel relocation schedule. For the present construction of Pier 6 and Pier 2, some of the vessels have been temporarily relocated to other piers.

In the same way, after some projects are added to the original plan, a new implementation plan was prepared. Each work was divided into small segments of works which are completed within 12 to 18 months. The construction works will be continued until the year 2017. The overall schedule is also described in the planning section and the chart is shown in Section 2.2.3.

## 2.6 Development Plans

### 2.6.1 Private Sector Participation

#### (1) Port Operation of Container Berth

##### 1) The actual situation of CIP

Area of lease	: CPA does not lease Quay and Land
	: CPA provides the cargo handling service
	: The berth is kept public
Form of operation	: Public Berth
Contractor	: OPASCO (Oriental Port & Allied Service Corporation)
Period of contract	: 10 years
Handling Charge	: CPA prescribes Handling Charge
	: CPA imposes 20%, and OPASCO receive 80%

##### 2) Manila International Terminal Company

Area of lease	: PPA leases Quay and Landside
	(5 berths, 1,300m, 29ha yard, 3 CFS)
Form of operation	: Commercial Berth
Contractor	: ICTSI (International Container Terminal Services, Inc.)
Period of contract	: 25years
Handling Charge	: PPA prescribes Handling Charge
	: PPA imposes 10%, and MITC receives 90%
	: PPA sets up minimum charge regardless of whether handling volume increases or decreases
Container Traffic	: 951,000TEU ( 2,000 year )
Handling equipment	: Quay Side Gantry Crane 10units
	RTG 25units
	(Quay Side Gantry Crane 2 units planning)
	(RTG 3 units planning)
Business Hours	: 362 days, 24hours
Employees	: 1,154 persons
	( Office Worker 385 persons)
	( Operator 767 persons)

MITC was advancing into Buenos Aires Container Terminal, Port of Buenos Aires (Argentina) International Specialized Container Terminal, Port of Veracruz (Mexico), International Container Terminal, Port of Dammam (Saudi Arabia), Berths 22-24A , Port of Karachi (Pakistan), Ensenada Container Terminal, Port of Ensenada (Mexico), International Container Terminal, Port of Dar es Salaam (Tanzania), International Container Terminal, Port

of Laemchabang (Thailand). But MITC sold them to Hutchison in 2000, since business was falling off due to the weak Peso.

Now, MITC is advancing into International Container Terminal, Port of Subic, Calamba Inland Container Depot Laguna, Bauau Terminal Batangas, Marker Warf General Santos.

### 3) Asian Terminals Incorporated

Area of lease	: PPA leases Quay and Landside
	: ( 15 berths, 1,002m, 85ha yard )
Form of operation	: Commercial Berth
Contractor	: ATI ( P& O Australia Holding )
Period of contract	: 25 years
Handling Charge	: PPA prescribes Handling Charge
	: PPA impose 20%, and ATI receives 80%
	: ATI pays to PPA P300 million fixed charge every year.
Container Traffic	: 577,000 TEU ( 2,000 year )
Handling	: Quay Side Gantry Crane 8 units
equipment	: RTG 17 units
Business Hours	: 363 days, 24hours
Employees	: 3,000 persons
	( Office Worker 300 Persons)
	( Operator 2,700 persons)

Now, ATI is advancing into Mariveles Grains Terminal, Battan Peninsula, Inland Clearance Depot (ICD), Systematized Terminals for Multimodal International (STMI), Port of Batangas. ATI intends to expand its business both domestically and internationally.

ATI also plans to invest in port development under a BOT scheme.

### (2) Basic scheme of privatization at the new Cebu port

The leasing system in which infrastructure is constructed by the public sector and leases it to the private operator, has already recommended for the basic scheme of the new Cebu port. Infrastructure should be included quay side gantry crane, because a large investment is required for infrastructure and involves greater risks. Moreover, CPA can use funds with lower interest to finance the initial investment. Superstructure, such as cargo handling equipment and buildings, will be invested by private sector (lessee). Private sector aims at high productivity with efficient investment based on its experience and know-how. Private sector also has flexibility in responding to the social and economic situation.

There are a few options in terms of private participation at the new Cebu port. Advantages and disadvantages of the different options are discussed below.

1) CPA leases container berth and landside to one private sector.

- It is difficult to keep public use.
- It is the easiest for CPA to manage the port.
- Since leasing fee is high, the lessee would have to be a major company.
- Since principle of competition is lacking, there is a possibility of monopoly.

When CPA enters a contract with the private sector, it should contain a provision to ensure the berths is for public use. Therefore, it is possible that the berth remains public. To prevent monopolistic practices, CPA should enter a contract with another private sector in phase 2.

2) CPA leases container berth and landside to two private sectors.

- It is difficult to keep public use.
- Since competition is generated, efficiency is increased.
- Since leasing fee is a low price, plural private sectors can tender.
- If private companies are unable to cooperate with each other, efficiency would be decreased.

When CPA enters a contract with the private sector, it should contain a provision to ensure the berths is for public use. Therefore, the berth remains public.

Both private operators should introduce computer systems to maximize efficiency, and they should cooperate with each other.

3) CPA leases landside to one private sector

- It is possible to keep public use.
- Since leasing fee is high, the lessee would have to be a major company.
- Since principle of competition is lacking, there is a possibility of monopoly.

It is possible that the berth remains public. To prevent monopolistic practices, CPA should enter a contract with another company in phase 2.

4) CPA leases landside to two private sectors that use quay jointly.

- It is possible to keep public use.
- Since competition is generated, efficiency is increased.
- Since leasing fee is low, plural private sectors can tender.
- It is difficult for CPA to manage both private sectors.

If both private sectors did not operate by computer, they could not increase efficiency. Both private operators should introduce computer systems to maximize efficiency, and they should cooperate with each other.

In selecting a leasing system, CPA should give priority to maintaining public use and increasing efficiency. CPA should lease berth and landside, because high efficiency can be secured by unified operating. However, the new Cebu port is not used by only one shipping company, used by plural shipping companies. When CPA enters a contracts with private sector, it should contain a provision to ensure that berths are for public use. Moreover, CPA should lease two private sectors. Since competition is generated, efficiency is increased.



However, both private operators should introduce computer systems to maximize efficiency, and they should cooperate each other.

It is considered leasing system of multi purpose berth is as follow.

CPA leases multi purpose berth to private sector.

- Since handling volume of multi purpose berth is not likely to be large, CPA should lease both multi purpose and container to the same private sector.
- If a large ship or many ships came, appropriate adjustments could be made between the multi purpose berth and container berth.
- It is difficult to keep public use.

Particularly, multi purpose berth is used by small shipping companies. It is important that CPA sets up a system to secure public access. When CPA enters a contract with the private sector, it should contain a provision to ensure berth is for public use. Therefore, the berth remains public.

### (3) Scheme of Leasing Fee

For preparation of the lease, it is important to analyze and decide how to recover the investment and related cost. There are three major ways to recover the cost when the facilities and leased out for use to the public sector.

#### 1) Variable Fee

The amount that private container terminal operators pay is proportional to the traffic volume handled on the basis of a fixed amount per TEU. The Variable Lease Fee is the most simple and popular calculation system for container terminal leasing.

#### 2) Fixed Fee

The private container terminal operators pay a fixed amount annually, in accordance with the initial investment cost of CPA, regardless of actual number of containers handled by operators. It is possible to depend totally on the investment cost to compute a container terminal leasing fee. This computing method is historically the oldest one and even today it is still popular among many terminal operators in the world.

#### 3) Combinations of the variable fee and fixed fee

The private container terminal operators pay both the variable fee and fixed fee. Variable Leasing Fee totally depends on throughput, and it is sometimes too risky for CPA as well as terminal operators. This fixed and Variable mixed lease fee system can be employed to reduce that risk.

The first scheme is most advantageous for the operators because they pay in accordance with the traffic volume. In other words, they pay as they earn. The second scheme is the most advantageous for CPA. Because the annual income through the container terminal lease is

fixed regardless of the container traffic volume. The third scheme takes a middle position between the variable fee and fixed fee is advantageous for both the operators and CPA.

CPA should adopt combinations of the variable fee and fixed fee. Moreover, CPA should set up a minimum volume and offer incentives to exceed that fee.

Example of Leasing Fee in Philippine is shown in Table 2.6.1-1

**Table 2.6.1-1 Example of Leasing fee in Philippine (2001 year)**

	MICT	ATI	CPI
Variable fee	10% of Handling charge	20% of Handling charge	20% of Handling charge
Fixed fee	—	P 300 million	—
NO of TEU/year	950 thousand (2000 year)	580 thousand (2000year)	104 thousand (2000 year)
Handling charge/TEU	P 4400	P 4400	P 1700
Lease Fee/TEU	P 440	P 1400	P 340
Leasing Fee Rate/TEU	10 %	30%	20 %

## 2.6.2 Investment Plans

The investment plans for the new Cebu Port and Cebu Baseport are as follows.

### (1) The New Cebu Port

#### 1) Container Terminal

For the development of the new container terminal, a lease system is recommended as the results of the evaluation of various development and management systems (See chapter 2.6.1). CPA will invest in infrastructure and quay gantry cranes. Superstructure, such as cargo handling equipment and buildings, should be invested by private sector.

#### 2) Multi purpose Terminal

Multi purpose berth is public infrastructure for various users and should be constructed by CPA.

#### 3) Access Road

Access Road is essential infrastructure for port activities and should be constructed by CPA.

Based on the above assumptions and the implementation schedule (See chapter 2.5), the investment plan is shown in Table 2.6.2-1.

### (2) Cebu Baseport

All planned projects, except relocation of the fast craft terminal, are to be conducted by CPA own. The development of the fast craft terminal was carried out by the shipping companies own and relocation also should be carried out by themselves. Most proposed projects at Cebu Baseport are renovation and improvement of the existing port facilities. Since CPA owns and manages these facilities, these projects should be conducted by CPA.

The proposed renovation and expansion of existing port facilities also should be conducted by CPA. However, passenger terminal buildings are service facilities for passengers and improvement of the comfort and convenience of the passengers contributes to increase the passengers. Some passenger terminal buildings are developed by private sector, such as shipping company own. Moreover, revenues from passenger terminal buildings, such as lease fee from tenants and terminal fees, also can be expected. The development of passenger terminal buildings at Cebu Baseport, which handles a large number of passengers, should be promoted basically on private sector project bases with initiative and encouragement of CPA.

Regarding the expansion of back-up area for RORO ferries in Port Zone, the private land owners, including shipping companies, have intention to use this area for efficient port activities. This area is considered to be used for back-up areas mainly for RORO ferries, such as cargo stacking area, vehicle parking area and passenger facilities. In particular, up to the operation of

the new Cebu Port, this area should be used efficiently. The development of this area also should be promoted basically on private sector project bases under coordination between land owners and CPA.

Based on the above assumptions and the implementation schedule (See chapter 2.5), the investment plan is shown in Table 2.6.2-2.

Table 2.6.2-1 Investment Plan of the New Cebu Port (unit: million pesos)

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	Total
Public Sector				113	113	2,517	2,199	1,989	105	105	7,141
Private Sector				23	23	422	556	412	26	26	1,488
Total				137	137	2,938	2,755	2,401	131	131	8,630

Table 2.6.2-2 Investment Plan of Cebu Baseport (unit: million pesos)

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	Total
Public Sector	335	220	11	166	138	132	228	141	133	96	1,600
Private Sector	8	128	199	240	187	54					816
Total	343	349	210	406	325	186	228	141	133	96	2,416

## 2.7 Improvement Program on Port Management and Operation

### 2.7.1 Institutional Framework

#### (1) Framework of CPA

The Cebu Port Authority or CPA was created through R.A. 7621 in 1992 to administer all ports located in Cebu province, effectively separating them from the PPA system. CPA began operations and took over all Cebu ports on 01 January 1996, 5 years ago. Until 1995, CPA was the branch office of PPA in Cebu Island. Organizational structure and the number of employees in 1995 are shown in Fig. 2.7.1-1, while the organizational structure and the number of employees in 2001 are shown in Fig. 2.7.1-2

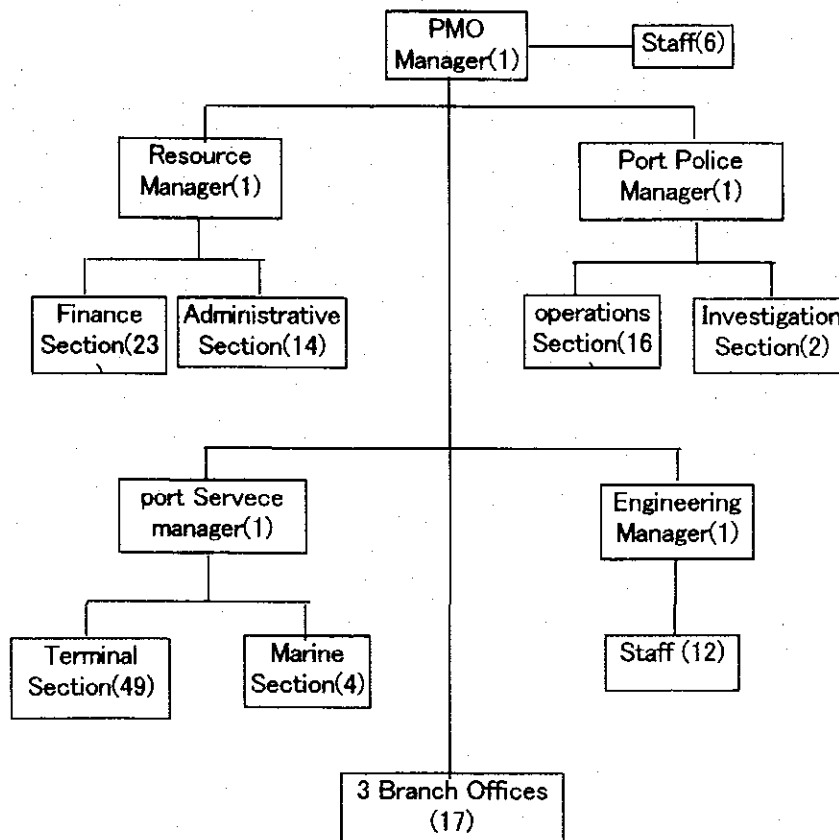
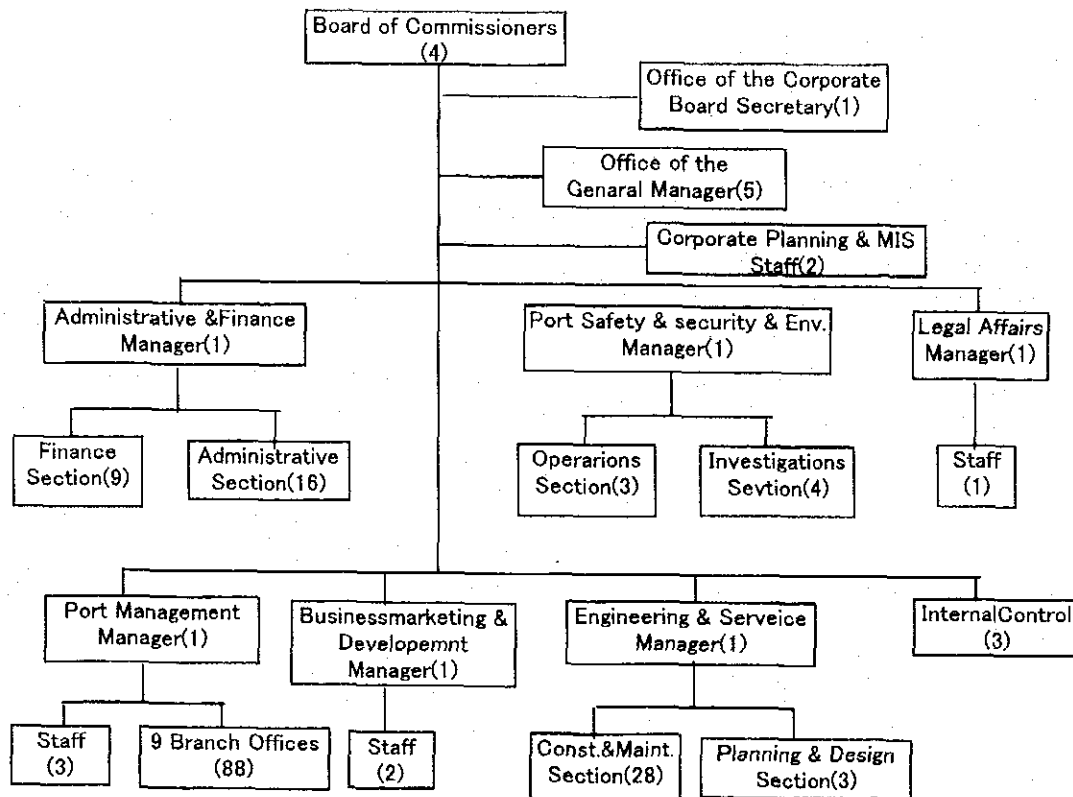


Fig. 2.7.1-1 Organizational structure of the branch office in 1995



**Fig. 2.7.1-2 Organizational structure of CPA in 2001**

CPA was established from the branch office of PPA in Cebu Island. CPA set up port management, marketing, and legal departments. And CPA prescribed duties and responsibilities of the organization in an attempt to operate more efficiently and effectively.

In general, when we carry out a project, we plan a project, do, see. CPA's organization can be applied to Plan, Do, See.

#### Plan Group

(Two Section, 7 Persons, about 4 %)

Commissioners, Planning & Monitoring Section.

#### Do Group

(Six Department, 136 persons, about 77%)

Board Secretary, Port Safety & Security & Environment Dept., Port Management Dept., Businessmarketing & Development Dept., Engineering & Service Dept., Internal Control Dept.

See Group

(Three Department, 33 Person, about 19%)

Office of the General Manager, Administrative & Financial Dept., Legal Affair Dept.

In terms of Management Cycle Allocation, the branch office of PPA in 1995 and CPA in 2001 are shown in Table 2.7.1-1

**Table 2.7.1-1 Management Cycle Allocation of CPA**

	Branch Office of PPA in 1995	CPA in 2001
Plan	1 %	4%
Do	95 %	77 %
See	4 %	19 %

In allocation calculation, Plan increased by 3 points, See increased by 15 points, and Do decreased by 18 points. Since CPA was established, the See section has been strengthened.

But there are only three members of CPA who are engaged in Planning and this figure is too low. The flow of port planning at CPA is that management office submits the list of rehabilitation and maintenance to main office. Then Board decides the projects comparing with budget. A Master Plan and Short-term Plan are not made. Shipping companies and handling companies are reluctant to invest because there is no clear port plan.

Some organizations for port administration are shown as follows.

**Table 2.7.1-2 Example of some Japanese organizations**

	Port of Yokohama	Port of Tokyo	Port of Kitakyusyu
Plan	38%	19%	19%
Do	26%	42%	54%
See	20%	15%	19%
Other	16%	24%	8%

CPA should strengthen Port Planning Section in the future.

CPA should develop ports with close relation to municipal, regional, national government. And CPA should develop ports not only with the cooperation of stevedoring companies, ship companies but also PPA. It is difficult for a Port Authority to develop a port entirely on its own. Moreover, cooperation with related parties has many beneficial aspects. Therefore CPA should introduce a system that promotes information exchange among related parties.

#### (2) Strengthening the organization

Employees at CPA are essentially specialists and rarely move from one department to another. As a result, there are few employees who have comprehensive knowledge of operations.

In this type of vertical structure, there is often a lack of information exchange and cooperation that are essential for an organization to function effectively.

For CPA to operate efficiently, the following measures need to be adopted.

- Employees should inform others of their activities and duties.
- Employees should discuss ways to improve their work or solve problems.
- Information should be exchanged at regular meetings.
- An environment where employees can discuss problems should be fostered.
- Employees should take an interest in world trends, especially those related to their work. Newspapers, magazines, the internet etc., are important sources of information in this regard.
- Both specialist and generalists should systematically be promoted.
- The liaison conference should be established with PPA, DOTC, etc. As a result, CPA will be able to acquire high quality information, and cooperation among organizations will be enhanced.

### (3) Staff Training System for CPA

The port sector is composed of various sectors including the government organizations, public corporations or government owned companies and private business entities and many other related organizations and associations which play their own roles to achieve their original assignment and target. Although the required roles or functions of each organization are different and diversified, overall capability or performance is largely controlled by quality of manpower which may be evaluated by level of moral, knowledge, skill, experience and mental/physical soundness of each individual staff of the organizations.

In this sense, staff training system for CPA should be designed and developed with comprehensive training program structure covering across various training demands so that effective improvement of total power or capability could be expected. In other words, staff training for CPA needs to be conducted under well- coordinated programs with constant exchange of relevant information, for instance, on new technologies for port operation or development, and recent trends of administrative or legal requirements.

While to develop and apply such a comprehensive training system instantly to CPA is not considered easy, it is recommended that DOTC should incorporate the above basic training concept when designing or conducting its own staff training program and advising the matter to port sector.

#### 1) Strengthening exact knowledge and deepening understanding of other organizations

This is particularly important in making better coordination with relevant agencies or entities for effective adjustment of contradictory interests.



2) Active introduction of information on new technology

This includes the fields of port planning, designing, operation and construction method of facilities. Through this kind of training, positive incentive and interest of trainee could be developed for every aspect of port administration.

3) Promotion of On-The-Job- Training (OJT)

This can become more effective by strengthening understanding on significance of OJT of all senior staff and by development OJT methods and manuals applicable to actual training stage. It is commonly understood that OJT is quite effective, if appropriately conducted, for young staff in particular not only to strengthen their practical knowledge but also to improve their cooperating capability with their superiors or colleagues. Periodical staff rotation among the relevant initial section is also effective in career development of the staff as an alternative pattern of OJT.

4) Strengthening evaluation of effects of training

This is another requirement for improvement the system, which need to be executed on various view points including direct on the job or paper testing of the staff, overall evaluation of performance of certain section and training course or method wise evaluation of effectiveness.

5) Evaluation of Training Effect and Re-Training

CPA should evaluate the effect of training courses, in order to achieve a more effective training system.

The participants of training courses have improved their knowledge and ability. But after few years, the knowledge tends to forgotten unless they engage in the job related to the knowledge. So, it is necessary that CPA provides employees with re-training courses, in order to make the training effective.

Training course is not effective unless contents of the training courses are understood easily by the trainees. So, CPA should have several types of training materials for staff training such as audio-visual system, computer, simulators, in order to make the training course easier to be understood by the trainees.

6) Utilizing PPA's Training system

The Philippine Port Authority Training Center (PPATC) is the manpower training and development arm of PPA. The Center was originally created and administered by the Bureau of Customs in early 1973 and was formally transferred to the PPA in August 1, 1976 when the Authority assumed the responsibility of implementing an integrated program for the planning, construction, development, maintenance, financing and operations of ports.

## 2.7.2 Port Management

### (1) Institutionalization for Authorizing Port Master Plan

#### 1) Scope of Port Master Plan

The scope covered by port master plan should include all land and water area desirable to be considered for development, use or conservation. Port is a key node and vital base for supporting distribution, industry and livelihoods. Therefore, port master plan should be composed with careful consideration on various relevant factors including potential expansion requirement, socio-economic activities in hinterland, natural conditions of areas in and around so on. The proposed master plan can then ensure future function of the target port.

Provision of port master plan should contain planning of wharves, terminal, navigational channel and other related facilities which would fall under the same port, administrative area. As described above, the port master plan should be so comprehensive that planning procedure needs to be institutionalized in close cooperation with other related organs parties concerned.

#### 2) Authorization of Port Master Plan

Before a port master plan is officially authorized, the draft plan must be understood and agreed upon by the various parties concerned. Opinions from government agencies, local people, users and people of academic fields should be invited and reflected in the master plan accordingly.

In Japan, the Central and Local Port Council have been established. They are to investigate and discuss the draft plans on the important items including basic port policy, development of port facilities, financing and management affairs. Port master plan must be approved by these councils as a part of authorization procedure.

While the above mentioned Japanese system is not always applicable to other countries, it may be useful in streamlining port planning administration to introduce CPA. If permanent establishment of such a system would be difficult under current CPA situation, an alternative organization with similar function needs to be set up even on an ad hoc basis so that opinions from various parties could be fairly reflected in official port master plans and thus smooth and reasonable port development could be realized.

### (2) Improving Port Statistics System

Port statistics should cover all ports including private ports. It should clarify at least the trend of cargo handling volume by lot and the origin/distribution of each kind of commodity and cargo type, as well as number of calling vessels, number of passenger and situation of basin, warehouse and stock yard, etc. Table 2.7.2-1 to Table 2.7.2-3 show the examples of questionnaire for port statistical survey.

And, if possible, port statistics should be integrated with statistics system of land transportation, which is closely related to port activities, and also be compatible with international standards. In that case, it will become very important to define the classification of individual cargo by categorizing into a couple of strata and to unify the survey period. These are indispensable matters also for adequately revising the subject items according to the change of times.

**Table 2.7.2-1 An example of Questionnaire for Stockyard**

Classification			Number of Yards	Area	Stock	Handling Volume		Remark
						Shipping	Arrival	
Container	Wate	For Business						
		For Private Use						
	Land	For Business						
		For Private Use						
	Total							
Multi Yard	Wate	For Business						
		For Private Use						
	Land	For Business						
		For Private Use						
	Total							
Storage	Open	For Business						
		For Private Use						
		Total						

**Table 2.7.2-2 An example of Questionnaire for Warehouse and Storehouse**

Classification		Number of	Area or Capacity	Stock		Handling Volume	
				ton	Lot	Shipping	Arrival
Warehouse	For Business						
	For Private sector						
	Total						
Storehouse	For Business						
	For Private sector						
	Total						
Silo	For Business						
	For Private sector						
	Total						

**Table 2.7.2-3 An example of Questionnaire for Vessel and Cargo**

Vessel								Cargo									
Entering Time (Waiting Time)	Name of Vessel	GT (ton)	Course	Nationality	Purpose	Mooring		Outbound					Inbound				
						Place	Time	Lot	From	Volume	Destination		Lot	From	Volume	Origin	
											Country	Port				Country	Port

### (3) The Port Promotion Association

CPA should establish a port promotion association with relevant companies and associations. One of the roles of this association would be to ascertain the needs of port users and discuss ways in which those needs can be met.

It is estimated that the container volume will be increased in future, the other side import and export will be unbalance. This is problem that plenty of empty containers occur and shipping company hesitates to make new shipping line. The port promotion association promotes Cebu port to consignor of Cebu area cooperating with CPA. And it carries out presentation to invite shipping company and consignor. Moreover, it should produce promotional materials such as port brochure, promotional video, handbook, etc.

### **2.7.3 Port Operation and Cargo Handling**

#### 1) Safety Operation for RORO Ferries

At Cebu Baseport, the cargo handling area for containers and palletized cargoes to be loaded to/discharged from RORO ferries is very small. Moreover it often happens that passenger embarkation/disembarkation and cargo handling are carried out at the same area and time.

To avoid this dangerous situation, following measures should be taken:

- To demarcate the cargo handling area for in bound and out bound cargoes with paint
- To control cargo receiving/delivering vehicles
- To control vehicles on ramp-way between vessel and pier
- To make and use sequence work sheets for systematic operation
- To build a passenger boarding bridge for safety operation
- To install a lighting system for night operation

#### 2) Avoiding Direct Loading and Discharging to/from Trucks

In case of conventional cargoes, loading/discharging of cargoes are generally conducted with ships gear (crane or derricks) or shore crane (mobile crane). Currently, most cargoes discharged from a ship's hold are directly loaded on truck/trailer. Although this method reduces cargo damage during operation, its productivity is lower than that of landing cargoes on the quay-side apron. To land cargoes on small platform of trucks/trailers makes the operation cycle time longer. Moreover the handling productivity depends on the arrival of trucks.

It is recommended that this cargo handling method should be adopted only for specific cargoes, such as hazardous cargoes, frozen cargoes, perishable cargoes and special heavy cargoes.

#### **2.7.4 Information System**

Exchange of information among CPA headquarters and each PMO (port management office) is basically conducted by telephone and hard copy delivery. Mistake often happens. Therefore CPA should establish advanced communication system through computerization.

Container transport system includes not only sea transport but also land transport. World-wide information network for container transport has been established through the advance of the communication system. For efficient use of container terminal it is important to establish the communication link with CPA, shipping lines, custom office, stevedoring companies and so on at the port. This system also should be coordinated with world-wide container information system for further improvement. Since container vessel berthing schedule is now mostly on a fixed-day weekly base, it is essential for port authority to make the maximum use of port facilities by controlling time schedule with sufficient information ranging from vessel arrival to departure, including discharging/loading of containers.

The adequate communication system should be prepared for efficient operation of the New Cebu Port and Cebu Baseport. It is envisaged that the following systems are required.

- 1) On-line communication systems covering each PMO, warehouse, open cargo storage yard, and port entrance gate booth etc, for management, administration and operation with real time information (voice and data links).
- 2) Connection to Philippine telephone network system (voice and data links).
- 3) Telephone control system (equipment control).
- 4) Between vessels and shore side communication link.
- 5) Security system link.
- 6) Other government official offices communication system link.
- 7) Backup system for emergencies.

#### **2.7.5 Marketing and Promotion Strategy**

South and East China Sea area is one of the emergent areas for sea transport, where maritime industry has highly developed. There are several large hub-ports such as Singapore, Kaohsiung, Shanghai and Hong Kong, of which transshipment market cover the areas of the South and East China sea, the East China sea and South Pacific sea. They have severe port competitions within this area.

The New Cebu Port is expected to play an important role as the regional hub port for the development of Visayas area. The New Cebu Port should have the container transport network with large hub-ports mentioned above in order to offer efficient transport service to port users. Port marketing and promotion is a key factor to introduce a new sea transport route. However, there are no particular port marketing and promotion activities at present. CPA should positive

action of port promotion for shipping lines and their agents. Port marketing and promotion activities are most important to the future development of CPA. CPA must play the main role in these activities in cooperation with other related organizations including private sector.

CPA should endeavor to increase port cargoes and to attract shipping lines. To offer good performance and competitive charges is an essential factor to attract shipping companies. Good reputation encourages port promotion.

### **3. Evaluation of Short-term Plans**

#### **3.1 Economic Analysis**

##### **3.1.1 Framework of the Economic Analysis**

The framework has been already presented in the one for the evaluation of the “Long-term Plans” in the section 3.1, Report Volume 2. It can be summarized for the reference hereinafter.

##### **(1) Deferent Points in the Framework from the One for the Long-term Plan Evaluation**

###### **1) Subjects of the Analyses**

The four (4) port projects are the subjects of the analyses in the case of the long-term plan evaluation, while the following two(2) port projects are the subjects in the case of the short-term plan evaluation:

- \* The New Cebu Port project, and
- \* Cebu Baseport project.

###### **2) Investment Plans**

The long-term investment plans on the two ports intend to meet the potential traffic demands of the port concerned until the year 2020, while the short-term investment plans are to cope with the demands until the year 2010.

##### **(2) Common Points in the Frameworks**

The following points are common in the two frameworks. Contents of the points have been already presented in the “Economic evaluation framework for the Long-term Plans”, section 3.1, Report Volume 2.

- 1) Premises on the evaluation works,
- 2) Evaluation method,
- 3) Yearly investment during the period of the short-term plans,
- 4) Benefit items,
- 5) Estimation formulas of the benefits and
- 6) Values of the variables in the estimation formulas.

The yearly investment is same as the one of the long-term plans for the period of the short-term plan evaluation. It is because the short-term investment plans are the first half of the long-term investment plans.



(3) (Summary) Different Items in the Frameworks

- 1) The differences in the investment periods between the short-term plans and long-term plans bring about differences in the phase of time-series values of the following items:

a) Construction cost: Roughly speaking,

\* Short-term plans : The cost generates for the period 2004-2008, and none of the generation afterwards.

\* Long-term plans: The cost generates for the period 2004-2015.

The yearly investment (the yearly construction costs) has been already presented in the "Cash Flows" Tables of the projects concerned in the section 3.1, Report Volume 2.

b) Replacement cost, Maintenance cost and Operation cost:

\* Short-term plans: The costs generate for the whole period of the evaluation, i.e. until the year 2038. However, the costs are estimated, based on the short-term investment plans.

\* Long-term plans: The costs also generate for the whole period, but the costs are estimated, based on the long-term investment plans.

The costs will be presented in the "Cash Flows" Tables of the projects concerned attached hereinafter.

c) Traffic demands and Amounts of the Benefits:

\* Short-term plans: They change until the year 2010, but none of the changes afterwards.

\* Long-term plans: They change until the year 2020, but none of the changes afterwards.

The traffic demands will be presented in the subsequent sub-sections concerned and the annual amounts of the benefits, in the "Cash Flows" Tables attached hereinafter.

- 2) The amount of the Benefit 3 of the Cebu Baseport project "Reduction Benefit of Embarkation and Disembarkation Time Cost of Passengers" is estimated as follows:

\* Short-term plans: Two-thirds of the amount expected in the long-term plan evaluation will be realized.

\* Long-term plans: The whole amount expected in the long-term plan evaluation will be realized.

### 3.1.2 Economic Analysis on the New Cebu Port Short-term Project

#### (1) Conclusion on Investment Efficiency of the Project

EIRR of the base case of the short-term project is estimated to be 23%/annum. The rate exceeds the social discount rate or opportunity cost of capital in the Philippines. Accordingly, it can be concluded that the project is surely economically feasible (15%/annum). Moreover, the cases where the project cost increases by 20% from the one adopted in this economic evaluation and at the same time, the total amount of the benefits decreases by 20% from the one expected in this evaluation (14%/annum), this project continues to be almost economically feasible. The above-mentioned situation is shown in Table 3.1.2-1.

**Table 3.1.2-1 EIRRs of the New Cebu Port Project -Short-term Plan-** (unit: %/annum)

		Benefits			
		Base case	10% down	20% down	30% down
Project Cost	Base case	23	20	18	15
	10% up	21	18	16	13
	20% up	19	16	14	11
	30% up	17	15	12	10

**Table 3.1.2-2 Cost Benefit Ratios of the New Cebu Port Project -Short-term Plan-**  
- Discount rate : 15%/annum -

		Benefits			
		Base case	10% down	20% down	30% down
Project Cost	Base case	1.42	1.28	1.14	1.00
	10% up	1.29	1.16	1.04	0.91
	20% up	1.19	1.07	0.95	0.83
	30% up	1.09	0.99	0.88	0.77

**Table 3.1.2-3 Net Benefits of the New Cebu Port Project -Short-term Plan-**  
- Discount rate : 15%/annum -

(unit : million pesos on 2001 economic prices basis)

		Benefits			
		Base case	10% down	20% down	30% down
Project Cost	Base case	3,197.1	2,122.2	1,047.4	-27.5
	10% up	2,441.9	1,367.1	292.2	-782.7
	20% up	1,686.8	611.9	-463.0	-1,537.9
	30% up	931.6	-143.3	-1,218.1	-2,293.0

#### (2) Project Cash Flows of the Base Case

The project cash flows are tabulated in Table 3.1.2-4. The values are expressed on the Philippine domestic economic price basis which is the numeraire adopted in this economic analysis.

Table 3.1.2-4 Cash Flows of the New Cebu Port Project---Short-term project---

(unit : million Pesos at June 2001 prices on Economic price basis)

Year	Project cost					Benefit					Net Benefit
	Construction cost	Replacement cost	Maintenance cost	Operation cost	Total	Benefit 1	Benefit 2	Benefit 3	Benefit 4	Total	
2003					0					0.0	0
2004	140.0				140					0.0	-140
2005	140.0				140					0.0	-140
2006	3,014.8				3014.8					0.0	-3014.8
2007	2,828.8				2828.8					0.0	-2828.8
2008	2,464.4				2464.4					0.0	-2464.4
2009			129.1	403.2	532.3	2,045.4	199.5	369.6	186.7	2,801.2	2268.9
2010			129.1	469.2	598.3	2,193.3	223.8	722.9	227.7	3,367.7	2769.4
2011			129.1	530.7	659.8	2,193.3	223.8	722.9	227.7	3,367.7	2707.9
2012			129.1	594.3	723.4	2,193.3	223.8	722.9	227.7	3,367.7	2644.3
2013			129.1	594.3	723.4	2,193.3	223.8	722.9	227.7	3,367.7	2644.3
2014			129.1	594.3	723.4	2,193.3	223.8	722.9	227.7	3,367.7	2644.3
2015			129.1	594.3	723.4	2,193.3	223.8	722.9	227.7	3,367.7	2644.3
2016			129.1	594.3	723.4	2,193.3	223.8	722.9	227.7	3,367.7	2644.3
2017		701.0	129.1	594.3	1424.4	2,193.3	223.8	722.9	227.7	3,367.7	1943.3
2018		701.0	129.1	594.3	1424.4	2,193.3	223.8	722.9	227.7	3,367.7	1943.3
2019			129.1	594.3	723.4	2,193.3	223.8	722.9	227.7	3,367.7	2644.3
2020			129.1	594.3	723.4	2,193.3	223.8	722.9	227.7	3,367.7	2644.3
2021			129.1	594.3	723.4	2,193.3	223.8	722.9	227.7	3,367.7	2644.3
2022			129.1	594.3	723.4	2,193.3	223.8	722.9	227.7	3,367.7	2644.3
2023			129.1	594.3	723.4	2,193.3	223.8	722.9	227.7	3,367.7	2644.3
2024			129.1	594.3	723.4	2,193.3	223.8	722.9	227.7	3,367.7	2644.3
2025			129.1	594.3	723.4	2,193.3	223.8	722.9	227.7	3,367.7	2644.3
2026			129.1	594.3	723.4	2,193.3	223.8	722.9	227.7	3,367.7	2644.3
2027		1,402.0	129.1	594.3	2125.4	2,193.3	223.8	722.9	227.7	3,367.7	1242.3
2028		1,402.0	129.1	594.3	2125.4	2,193.3	223.8	722.9	227.7	3,367.7	1242.3
2029			129.1	594.3	723.4	2,193.3	223.8	722.9	227.7	3,367.7	2644.3
2030			129.1	594.3	723.4	2,193.3	223.8	722.9	227.7	3,367.7	2644.3
2031			129.1	594.3	723.4	2,193.3	223.8	722.9	227.7	3,367.7	2644.3
2032			129.1	594.3	723.4	2,193.3	223.8	722.9	227.7	3,367.7	2644.3
2033			129.1	594.3	723.4	2,193.3	223.8	722.9	227.7	3,367.7	2644.3
2034			129.1	594.3	723.4	2,193.3	223.8	722.9	227.7	3,367.7	2644.3
2035			129.1	594.3	723.4	2,193.3	223.8	722.9	227.7	3,367.7	2644.3
2036			129.1	594.3	723.4	2,193.3	223.8	722.9	227.7	3,367.7	2644.3
2037		701.0	129.1	594.3	1424.4	2,193.3	223.8	722.9	227.7	3,367.7	1943.3
2038		701.0	129.1	594.3	1424.4	2,193.3	223.8	722.9	227.7	3,367.7	1943.3
Total	8588	5608	3873	17449.2	35518.2	65,651.1	6689.7	21333.7	6790	100,464.5	64946.3

EIRR = 23 %

## Legend :

Benefit 1 : Benefit brought about by treatment of transport demand of foreign trade cargoes which will exceed the treatment capacity of the existing Cebu Baseport at the New Cebu port planned to be constructed.

Benefit 2 : Reduction Benefit of transportation cost of foreign trade containerized cargoes which would be brought about by larger-sized vessels than the ones at present at the New Cebu port.

Benefit 3 : Reduction Benefit of navigation cost and handling cost of containerized cargoes which would be brought about by avoidance of transportation of the cargoes by transship vessels at the new Cebu port.

Benefit 4 : Reduction Benefit of handling cost of cargoes which would be brought about by installation of efficient cargo-handling equipment at the new Cebu port.

### (3) Values of the Variables in the Estimation Formulas adopted in the Short-term Evaluation

The following variables have been already adopted in the estimation formulas of the Benefits concerned which are presented in the section 3.1, Report Volume 2. However, only the time-series values of the variables are deferent from the ones adopted for the long-term evaluation of the projects.

a)  $T^{fc}$ : Excessive transportation demand of the foreign trade containerized cargoes at Cebu Baseport.

(unit : 1000 tons)

2009 : 2,005.1

2010 - 2020 : 2,249.2

b)  $T^{fg}$ : Excessive transportation demand of the foreign trade general (conventional) cargoes at Cebu Baseport.

(unit : 1000 tons)

2009 : 498.7

2010 - 2020 : 477.0

c)  $N^{fc}$ : Number of containers transported by the transshipped container vessels at Cebu Baseport.

(unit : 1000 containers)

2009 : 36.4

2010 - 2020 : 71.2

d)  $N^{fc}$ : Number of foreign trade containers treated at the new Cebu port.

(unit : 1000 containers)

2009 : 369.4

2010 - 2020 : 445.0

### 3.1.3 Economic Analysis on Cebu Baseport Short-term Project

#### (1) Conclusion on Investment Efficiency of the Project

EIRR of the base case of the short-term project is estimated to be 28%/annum. The rate exceeds the social discount rate or opportunity cost capital of the Philippines (15%/annum). Accordingly, it can be concluded that the project is economically feasible. Moreover, even though the project cost were increased by 20% and at the same time, the amount of the

benefits were decreased by 20% from the ones of the base case (16%/annum), the project continues to be economically feasible. The rate is higher than the one of the Cebu Baseport long-term project (20%/annum). It implies that the short-term project had better be realized at first and then realization of the Phase 2 project (the latter half of the long-term investment plan) had better be decided, taking into consideration situation of the traffic demand at that time. The above-mentioned situation is presented in Table 3.1.3-1.

**Table 3.1.3-1 EIRRs of Cebu Baseport Project -Short-term Plan-**

(unit: %/annum)

		Benefits			
		20% down	10% down	Base case	10% up
Project cost	20% up	16	19	22	25
	10% up	19	22	25	28
	Base case	21	25	28	31
	10% down	24	28	31	34

**Table 3.1.3-2 Cost Benefit Ratios of Cebu Baseport Project -Short-term Plan-**

- Discount rate : 15%/annum -

		Benefits			
		20% down	10% down	Base case	10% up
Project cost	20% up	1.06	1.19	1.33	1.46
	10% up	1.16	1.30	1.45	1.59
	Base case	1.27	1.43	1.59	1.75
	10% down	1.42	1.59	1.77	1.95

**Table 3.1.3-3 Net Benefits of Cebu Baseport Project -Short-term Plan-**

- Discount rate : 15%/annum -

(unit : million pesos on 2001 economic prices basis)

		Benefits			
		20% down	10% down	Base case	10% up
Project cost	20% up	47.8	150.1	252.5	354.8
	10% up	112.0	214.4	316.7	419.1
	Base case	176.3	278.6	381.0	483.3
	10% down	240.5	342.9	445.2	547.6

## (2) Project Cash Flows of the Base Case

The project cash flows are tabulated in Table 3.1.3-4. The values are expressed on the Philippine domestic economic price basis which is the numeraire adopted in this economic analysis.

**Table 3.1.3-4 Cash Flows of the Cebu Baseport Project---Short-term project---**

(unit : million Pesos at June 2001 prices on Economic price basis)

Year	Project cost					Benefit				Net Benefit
	Construc- tion cost	Replacem- ent cost	Maintena- nce cost	Operatio- n cost	Total	Benefit 1	Benefit 2	Benefit 3	Total	
2003		0.0	0.0	0.0	0				0.0	0
2004		0.0	0.0	0.0	0				0.0	0
2005	8.4	0.0	0.0	0.0	8.4				0.0	-8.4
2006	135.4	0.0	0.0	0.0	135.4				0.0	-135.4
2007	233.3	0.0	0.3	0.0	233.6				0.0	-233.6
2008	144.0	0.0	0.9	0.0	144.9				0.0	-144.9
2009	136.1	0.0	1.3	22.9	160.3	172.2	23.3	74.9	270.4	110.1
2010	98.1	0.0	1.6	47.4	147.1	166.6	45.3	78.6	290.5	143.4
2011		0.0	1.6	68.0	69.6	169.8	46.5	80.6	296.9	227.3
2012		0.0	1.6	89.6	91.2	172.9	47.7	82.6	303.2	212
2013		0.0	1.6	89.6	91.2	175.7	48.9	84.8	309.4	218.2
2014		0.0	1.6	89.6	91.2	178.6	50	87	315.6	224.4
2015		0.0	1.6	89.6	91.2	181.3	51.1	89.2	321.6	230.4
2016		0.0	1.6	89.6	91.2	183.8	52.1	91.6	327.5	236.3
2017		0.0	1.6	89.6	91.2	186.1	53.2	94	333.3	242.1
2018		0.0	1.6	89.6	91.2	188.0	54.1	96.4	338.5	247.3
2019		0.0	1.6	89.6	91.2	189.8	55.1	99	343.9	252.7
2020		0.0	1.6	89.6	91.2	191.3	55.9	101.6	348.8	257.6
2021		0.0	1.6	89.6	91.2	191.3	55.9	101.6	348.8	257.6
2022		0.0	1.6	89.6	91.2	191.3	55.9	101.6	348.8	257.6
2023		0.0	1.6	89.6	91.2	191.3	55.9	101.6	348.8	257.6
2024		0.0	1.6	89.6	91.2	191.3	55.9	101.6	348.8	257.6
2025		0.0	1.6	89.6	91.2	191.3	55.9	101.6	348.8	257.6
2026		0.0	1.6	89.6	91.2	191.3	55.9	101.6	348.8	257.6
2027		0.0	1.6	89.6	91.2	191.3	55.9	101.6	348.8	257.6
2028		0.0	1.6	89.6	91.2	191.3	55.9	101.6	348.8	257.6
2029		0.0	1.6	89.6	91.2	191.3	55.9	101.6	348.8	257.6
2030		0.0	1.6	89.6	91.2	191.3	55.9	101.6	348.8	257.6
2031		0.0	1.6	89.6	91.2	191.3	55.9	101.6	348.8	257.6
2032		0.0	1.6	89.6	91.2	191.3	55.9	101.6	348.8	257.6
2033		0.0	1.6	89.6	91.2	191.3	55.9	101.6	348.8	257.6
2034		0.0	1.6	89.6	91.2	191.3	55.9	101.6	348.8	257.6
2035		0.0	1.6	89.6	91.2	191.3	55.9	101.6	348.8	257.6
2036		0.0	1.6	89.6	91.2	191.3	55.9	101.6	348.8	257.6
2037		0.0	1.6	89.6	91.2	191.3	55.9	101.6	348.8	257.6
2038		0.0	1.6	89.6	91.2	191.3	55.9	101.6	348.8	257.6
Total	755.3	0	48.9	2557.5	3361.7	5,599.5	1589.4	2889.1	10,078.0	6716.3
EIRR =										28%

**Legend :**

Benefit 1:Recovery Benefit of treatment capacity of domestic trade cargoes

Benefit 2:Improvement Benefit of treatment efficiency of domestic trade cargoes

Benefit 3:Reduction Benefit of embarkation-disembarkation time cost of passengers

(3) Values of the Variables in the Estimation Formulas adopted in the Short-term Evaluation

The variables relating to the short-term evaluation are also a part of the ones of the new Cebu port short-term evaluation, and the values of them have been already presented in the sub-section 3.1.2-3).

### 3.2 Financial Analysis

#### 3.2.1 Methodology

The procedure of the financial analysis is shown in fig.3.2.1-1

(1) Viability of the project

The viability of the project is evaluated using the Financial Internal Rate of Return (FIRR). The FIRR is a discount rate which makes the cost and the revenue during the project life equal. The FIRR is calculated by the following formula.

$$\sum_{i=1}^n \frac{R_i - C_i}{(1+r)^{i-1}} = 0$$

n : Project life

R<sub>i</sub> : Revenue in the *i* th year

C<sub>i</sub> : Cost in the *i* th year

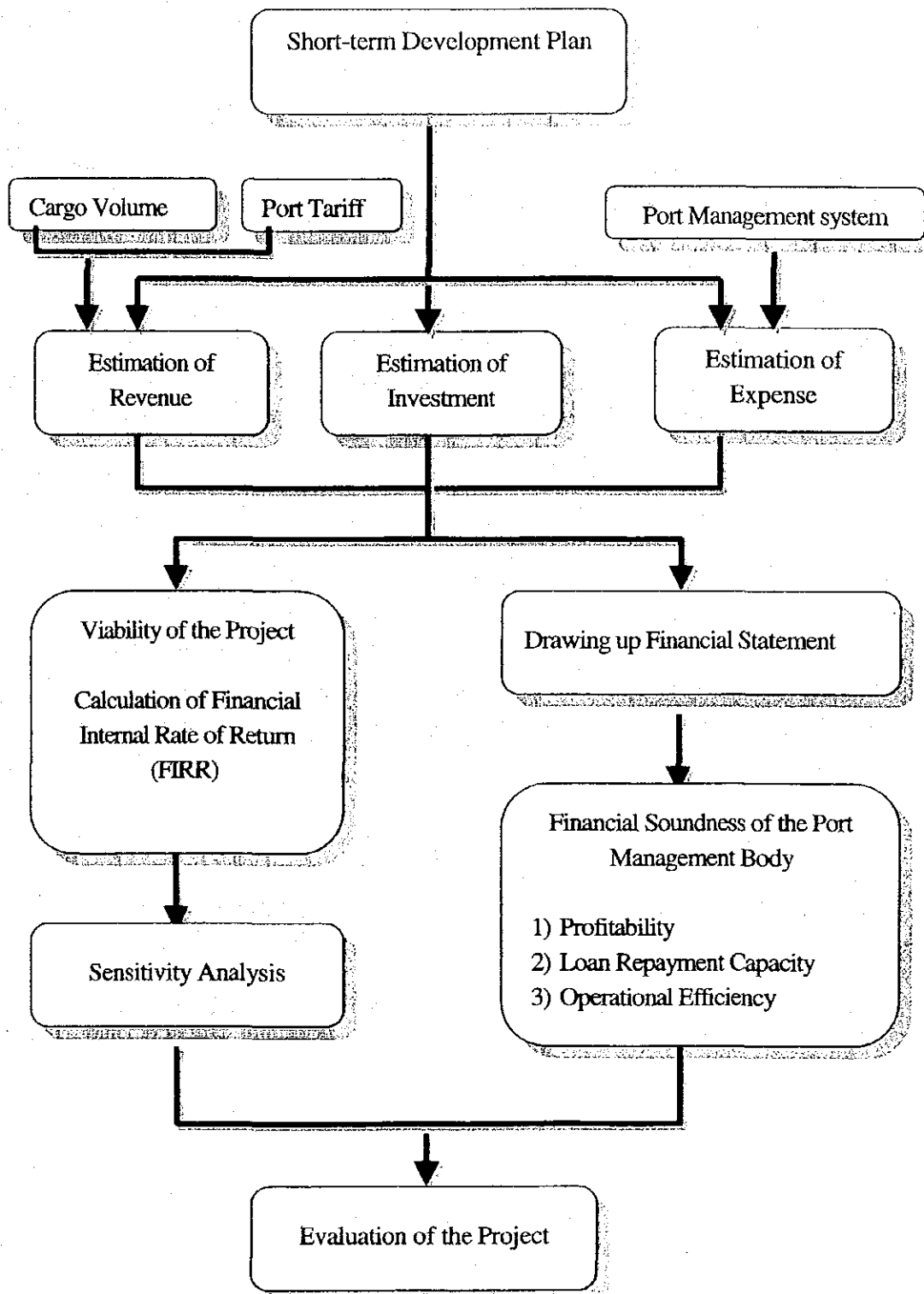
r : Discount rate

The revenues and the costs in the calculation of FIRR are summarized in Table 3.2.1-1

**Table 3.2.1-1 The Revenues and the Costs in the Calculation of FIRR**

Revenues	Costs
1) Port Tariff	1) Initial investment costs for the project
2) Operating revenues by the project	2) Operating expenses by the project such as maintenance, personnel and administration costs

The revenues and costs excluded from the calculation of FIRR are summarized in Table 3.2.1-2.



**Fig. 3.2.1-1 Procedure of Financial Analysis**



**Table 3.2.1-2 Revenues and the Costs excluded from the Calculation of FIRR**

Revenues	Costs
1) Fund management income	1) Repayment of the principal 2) Interest on loans

When the calculated FIRR exceeds the weighted average interest rate of the total funds for investment of the project is regarded as financially feasible.

(2) Financial soundness of the port management body.

Financial soundness of the port management body is appraised with its project financial statement ( income statement, cash flow statement and balance sheet).The appraisal is made from the viewpoints of profitability, loan repayment capacity and operation efficiency, using the following ratios.

1) Profitability

$$\text{Rate of Return on Net Fixed Assets} = \frac{\text{Net Operating Income}}{\text{Total Fixed Assets}} \times 100\%$$

The rate return on net fixed assets shows the profitability of the investments that are presented as net total fixed assets. It is necessary to keep the rate higher than the average interest rate of the funds for investment.

2) Loan repayment capacity

$$\text{Debt Service Coverage Ratio} = \frac{\text{Net Operating Income before Depreciation}}{\text{Repayment of Principal and Interest on Long - Term Loan}} \times 100\%$$

The debt service coverage ratio shows whether the operating income can cover the repayment of principal and interest on long term loans. The ratio must be higher than 1.0 and it is generally preferable to be higher than 1.75.

3) Operational efficiency

$$\text{Operating Ratio} = \frac{\text{Operating Expenses}}{\text{Operating Revenues}}$$

The operational ratio shows the operational efficiency of the terminal management body, namely the ratio of port revenue that is consumed by operating expenses. Generally it must be less than 70-75%.

$$\text{Working Ratio} = \frac{\text{Operating Expenses} - \text{Depreciation}}{\text{Operating Revenues}}$$

Working ratio shows the efficiency of the routine operations of the port. Generally it must be less than 50-60%.

### 3.2.2 Prerequisites of the Financial Analysis

#### (1) General

##### 1) Scope of the Financial Analysis

Scope of this analysis is the project in the Short-term Development Plan. The concrete projects are as follows.

- Cebu Baseport Project of CPA
- The New Cebu Port Project of CPA
- Cebu Baseport and the New Cebu Port Project of CPA
- The New Cebu Port of private sector

##### 2) "With Case "and "Without Case"

The viability of the project, namely FIRR is analyzed based on the difference of revenues and costs between "With Case "and "Without Case". Here, "With Case " is the case in which the Short-term Development Plan is executed while "Without Case" is the case which represents the existing situation. The financial soundness of the port management body is analyzed using "With Case ".

#### (2) Base Year

All costs and revenues are indicated in price as of 2001, when the price survey was conducted (US \$ 1.00= 52.5 Peso, 1Peso=2.38 Yen). We call this year the "Base Year ".

#### (3) Project Life

Considering the long-term loans and service lives of the port facilities, the project life in the financial analysis is assumed to be 35 years including the period of 5 years for detailed design and construction work. Neither inflation nor an increase in nominal wages is considered during the project life.

#### (4) Fund Rising

Fund rising is divided into foreign and domestic funds. In this study, referring to funding conditions of soft loan by international financial institute including JBIC, the upper limit of

finance for foreign funds is assumed to be the total amount of foreign portion or 75% of initial investment costs, whichever is higher. In the proposal projects, seven–five percent of initial investment costs is assumed to be raised by foreign fund. The remaining initial investment costs (25%) and all renewal investment are assumed to be raised by domestic fund. Conditions of loans are assumed as follows.

1) Foreign funds

loan Period	: 30 years, including a grace period of 10 years
Interest rate	: 2.0%
Repayment	: Fixed amount repayment of principal

2) Domestic fund

loan Period	: 10 years
Interest rate	: 15.0%
Repayment	: Fixed amount repayment of principal

3) Weighted average interest rate of CPA

$$5.25 \% = 2\% \times 0.75 + 15\% \times 0.25$$

4) Interest rate of Private Sector

20%~15% (Manila Port applies 20% to their basic consideration for the lease condition)

(5) Revenue and Expenditure

1) Cebu Baseport Project

Revenues)

The CPA has announced that it will revise its port tariff. The financial analysis employs the revised tariff, and all the revenues are calculated on the basis of the revised tariff in January 2001.

The item of revenue shouldered by CPA are as follows.

Harbor Fees  
Berthing Fees  
Anchorage Fees  
Storage Charges  
Handling Charges (domestic 10%)

Expenditures)

- Project Costs

Project Costs are shown in Chapter 2.4.

#### - Personnel Costs

Stevedoring is being done by Private Companies and CPA is getting royalty fee from these companies now. Therefore the CPA personnel costs required in this project are for administration and security. Personnel costs for stevedoring are excluded from this analysis.

Required manpower level is calculated as follows.

PMO 3~4 Management Office

Manager - 2

Staff - 21

Assuming that the staff is provided to each present berth (Total-16berths, 1978m) equally.

Required annual personnel costs per berth are calculated by multiplying number of staff by average unit wages estimated according to personnel level.

Manager = 2 person  $\times$  P350,000/Personnel  $\cdot$  year  $\div$  1978m = P 354/year  $\cdot$  m

Staff = 21 person  $\times$  P200,000/Personnel  $\cdot$  year  $\div$  1978m = P2123/year  $\cdot$  m

Total P 2477/year  $\cdot$  m

Therefore required personnel costs for the Cebu Baseport Project are as follows

Personnel Costs = P2477/year  $\cdot$  m  $\times$  1210 m

$\Rightarrow$  P3,000,000

#### - Maintenance Costs

The annual maintenance costs for the port facilities are calculated as follows.

Infrastructure : 1.0% of the original construction cost

Equipment : 5.0% of the original construction cost

#### - Administration Costs

Administration Costs are assumed as follows according to the actual present level of CPA

Administration Costs = Total Personnel Costs  $\times$  0.6

## 2) The New Cebu Port Project of CPA

### Revenues)

CPA has announced that it will revise its port tariff. The financial analysis employs the revised tariff, and all the revenues are calculated on the basis of the revised tariff in January 2001.

The item of revenue shouldered by CPA are as follows.

- Harbor Fees
- Berthing Fees
- Anchorage Fees
- Storage Charges
- Lease Charge from Private Company ( fixed P250 million/year)

Fixed Lease Charge is calculated as follows.

Total investment by CPA for civil works and quay side gantry crane is about P6.8 billion. CPA recovers its initial investment cost for 30 years. The fixed fee is equal to P 250 million/year for private sector.

### Expenditures)

#### - Project Costs

Project Costs are shown in Chapter 2.4.

#### - Personnel Costs

Stevedoring is being done by Private Companies and CPA is getting royalty fee from these companies now. Therefore the CPA personnel costs required in this project are for administration and security. Personnel costs for stevedoring are excluded from this analysis.

Required manpower level is calculated as follows.

PMO 1    Management Office  
          Manager -    1  
          Staff        - 22

Assuming that the staff is provided to each present berth (PMO1-10berths)equally, the required number for each berth is as follows.

Manager – 0.1 Person/berth

Stuff - 2.2 Person/berth

Required annual personnel costs per berth are calculated by multiplying number of staff by average unit wages estimated according to personnel level.

Manager =  $0.1 \text{ person/berth} \times \text{P}350,000/\text{Personnel} \cdot \text{year} = \text{P}35,000/\text{year} \cdot \text{berth}$

Staff =  $2.2 \text{ person/berth} \times \text{P}200,000/\text{Personnel} \cdot \text{year} = \text{P}440,000/\text{year} \cdot \text{berth}$

Total P 475,000/year· berth

Therefore required personnel costs for the Cebu Baseport Project are as follows

$$\begin{aligned}\text{Personnel Costs} &= \text{P } 475,000/\text{year} \cdot \text{berth} \times 3 \text{ Berths} \\ &= \text{P } 1,425,000\end{aligned}$$

- Maintenance Costs

The annual maintenance costs for the port facilities are calculated as follows.

Infrastructure	:	1.0% of the original construction cost
Equipment	:	5.0% of the original construction cost

- Administration Costs

Administration Costs are assumed as follows according to the actual present level of CPA

$$\text{Administration Costs} = \text{Total Personnel Costs} \times 0.6$$

3) The New Cebu Port Project of Private Sector

Revenues)

The CPA has announced that it will revise its port tariff. The financial analysis employs the revised tariff, and all the revenues are calculated on the basis of the revised tariff in January 2001.

Expenditures)

- Project Costs

Project Costs are shown in Chapter 2.4.

- Personnel Costs

While it is assumed that the New Cebu Port will be leased to a private sector, we estimated newly required personnel costs including for stevedoring here.

The required staff is as follows.

Administration Section ( in Terminal including General Affaires )

$$8 \text{ Person} \times 1 \text{ shift} = 8 \text{ Person (Office Worker)}$$

Operation Section

$$\begin{aligned} \text{Gantry Crane } 4 \text{ Units} \times 1.5 \text{ Person / Unit} \times 3\text{shift} \\ = 18 \text{ Persons ( Licensed Staff-18 )} \end{aligned}$$

$$\begin{aligned} \text{Transfer Crane } 13\text{Units} \times 1.5 \text{ Person / Unit} \times 3\text{shift} \\ = 59 \text{ Persons ( Licensed Staff-59 )} \end{aligned}$$

$$\begin{aligned} \text{Tractor\&Trailer } 28 \text{ Units} \times 1 \text{ Person / Unit} \times ( 3\text{shift} + 1 \text{ for substitute}) \\ = 85 \text{ Persons (Licensed Staff-85 )} \end{aligned}$$

Yard Control Sections

$$5 \text{ Person} \times 3\text{shift} = 15 \text{ Persons (Licensed Staff-3, Staff-12)}$$

Ship Operation Sections

$$8 \text{ Person} \times 3\text{shift} = 24 \text{ Persons (Licensed Staff-6, Staff-18)}$$

CFS Operation Sections

$$\text{Import : } 4 \text{ Person} \times 2\text{shift} = 8 \text{ Persons (Licensed Staff-2, Staff-6)}$$

$$\text{Export : } 4 \text{ Person} \times 2\text{shift} = 8 \text{ Persons (Licensed Staff-2 ,Staff-6)}$$

Documentation Sections

$$\text{Import } 4 \text{ Person} \times 2\text{shift} + 1 \text{ Person (3}^{\text{rd}} \text{ shift)} = 9 \text{ Persons (Licensed Staff-9)}$$

$$\text{Export } 5 \text{ Person} \times 2\text{shift} + 1 \text{ Person (3}^{\text{rd}} \text{ shift)} = 11 \text{ Persons (Licensed Staff-11)}$$

Maintenance Sections

$$15 \text{ Person} \times 3\text{shift} = 45 \text{ Persons (Licensed Staff-9, Staff-36)}$$

Gate Operation Sections

$$13 \text{ gates(in and out)} \times 1 \text{ person/lane} \times 3\text{shift} = 39 \text{ Persons (Staff-39 )}$$

Total	Office Worker	8	Persons
	Licensed Staff	204	Persons
	Staff	117	Persons

Required annual personnel costs for the New Cebu Port of Private Company are calculated by multiplying number of staff by average unit wages estimated according to present level.

Office Worker = P150,000 × 8 Persons = P 1,200,000  
 Licensed Staff = P200,000 × 204 Persons = P 40,800,000  
 Staff = P100,000 × 117 Persons = P 11,700,000

Total = P 53,700,000

#### - Maintenance Costs

The annual maintenance costs for the port facilities are calculated as follows.

Infrastructure : 1.0% of the original construction cost  
 Equipment : 5.0% of the original construction cost

#### - Administration Costs

Administration Costs are assumed as follows according to the actual present level of CPA

Administration Costs = Total Personnel Costs × 0.6

#### - Lease Charge

While it is assumed that the New Cebu Port will be leased to a private sector, Lease charge is assumed as follows.

Lease Charge from Private Company ( fixed P250 million/year)

### 3.2.3 Evaluation of the Project

#### (I) Viability of the Project

##### 1) Calculation of FIRR

A well-balanced combination scheme of the variable fee and fixed fee is advantageous for both the operators and CPA.

The result of FIRR calculation of the New Cebu Port, under the above rent condition of the terminal, is variable in Table 3.2.3-1.



**Table 3.2.3-1 Result of FIRR Calculation (The New Cebu Port)**

Variable fee (%)	FIRR of CPA	FIRR of Private Sector
0	4.2 %	28.5 %
10	5.9 %	24.5 %
15	6.6 %	22.3 %
20	7.4 %	20.1 %
25	8.1 %	17.6 %
30	8.8 %	15.0 %

Judging from the above calculation, assuming that variable fee is set at 20%, FIRR'S of CPA and private sector are well-balanced.

The result of FIRR calculation is shown in Table 3.2.3-2. In all projects, FIRR exceeds the weighted average interest rate of the funds.

**Table 3.2.3-2 Result of FIRR Calculation**

	Cebu Baseport	The New Cebu Port of CPA	Cebu Baseport and the New Cebu Port of CPA	The New Cebu Port of Private Sector
FIRR	7.1% (Table 3.2.3-5)	7.4% (Table 3.2.3-6)	7.4% (Table 3.2.3-7)	20.1% (Table 3.2.3-8)

## 2) Sensitivity Analysis

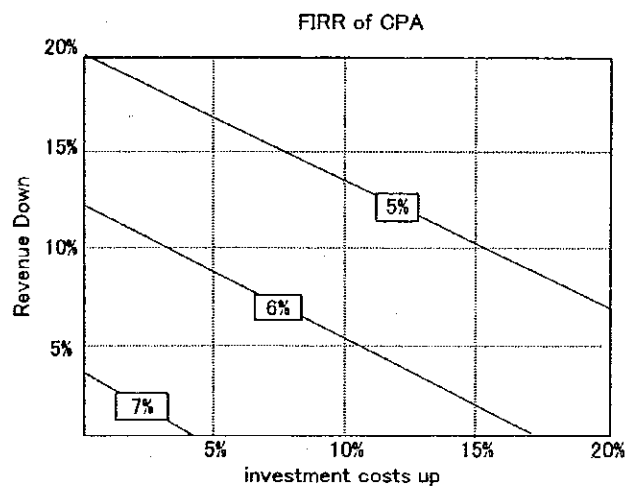
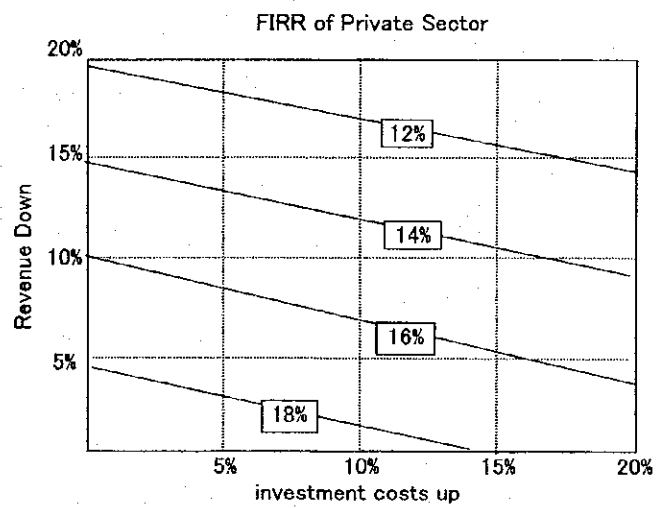
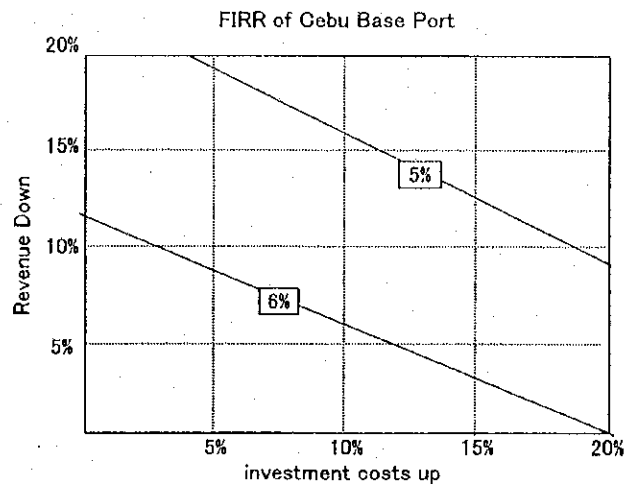
Sensitivity analysis is calculated to examine the impact of unexpected future changes such as cargo volume, construction cost, inflation or exchange rate. The following cases are envisioned.

- Case 1: The investment costs increase by 10%
- Case 2: The revenue decrease by 10%
- Case 3: The investment costs increase by 10% and the revenue decrease by 10%

The result of FIRR by the fluctuation of cost and revenue are shown in Table 3.2.3-3.

**Table 3.2.3-3 Result of FIRR by the fluctuation of Cost and Revenue**

	The New Cebu Port		Cebu Baseport
	FIRR of CPA	FIRR of Private Sector	FIRR of CPA
Base Case	7.4%	20.1%	7.1%
Case 1	6.5%	18.5%	6.5%
Case 2	6.2%	16.0%	6.2%
Case 3	5.4%	14.7%	5.5%



### 3) Evaluation

Judging from this above, this project is regarded as financially feasible under the assumptions Chapter 10.2. Enhancing capacity of Cebu Baseport decreases a burden on the New Cebu Port. Therefore, CPA should set up a package of the New Cebu Port and Cebu Baseport.

### (2) Financial Soundness of CPA

The financial statement and financial indicators, the rate of return fixed assets, debt service coverage ratio, operating ratio and working ratio of CPA are shown in Table 3.2.3-9.

#### 1) Profitability

The rate of return on net fixed assets exceeds 5.25% ( weighed average interest rate of CPA) after 2009, the beginning of the operation.

#### 2) Loan repayment capacity

The debt service coverage ratio exceeds 1.0 after 2009, the beginning of the operation.

#### 3) Operational efficiency

Based on the above indicators, it can be judged that financial status of CPA can be easily secured.

### (3) Conclusion

Judging from above analysis, this project can be regarded as financially feasible. However, CPA and operators should make efforts to heighten the quality of the service, to improve cargo handling efficiency, to secure the forecast cargo volume, and to reduce operating expenses.

**Table 3.2.3-4 Cebu Baseport**

(Unit:1000Pesos)								
Year	Revenue (1)	Cost(2)			Difference (1)-(2)	Net Present Value		
		Investment	Expenses	Total		Revenue	Cost	Difference
1 2,004	0	0	0	0	0	0	0	0
2 2,005	0	9,000	0	9,000	-9,000	0	8,405	-8,405
3 2,006	0	145,600	0	145,600	-145,600	0	126,980	-126,980
4 2,007	0	250,500	0	250,500	-250,500	0	204,019	-204,019
5 2,008	0	154,700	0	154,700	-154,700	0	117,663	-117,663
6 2,009	18,846	146,200	7,188	153,388	-284,541	13,386	215,494	-202,107
7 2,010	38,846	105,400	9,391	114,791	-75,945	25,767	76,143	-50,376
8 2,011	49,058		12,534	12,534	36,524	30,389	7,764	22,625
9 2,012	59,147		12,534	12,534	46,613	34,216	7,251	26,965
10 2,013	69,072		12,534	12,534	56,538	37,316	6,771	30,544
11 2,014	78,772		15,734	15,734	63,038	39,741	7,938	31,803
12 2,015	88,188		15,734	15,734	72,454	41,550	7,413	34,137
13 2,016	97,256		15,734	15,734	81,522	42,792	6,923	35,869
14 2,017	105,897		15,734	15,734	90,163	43,513	6,465	37,048
15 2,018	114,036		15,734	15,734	98,302	43,759	6,038	37,721
16 2,019	121,581		15,734	15,734	105,847	43,569	5,638	37,930
17 2,020	128,438		15,734	15,734	112,704	42,982	5,265	37,717
18 2,021	128,438		15,734	15,734	112,704	40,140	4,917	35,223
19 2,022	128,438		15,734	15,734	112,704	37,486	4,592	32,894
20 2,023	128,438		15,734	15,734	112,704	35,007	4,288	30,718
21 2,024	128,438		15,734	15,734	112,704	32,692	4,005	28,687
22 2,025	128,438		15,734	15,734	112,704	30,530	3,740	26,790
23 2,026	128,438		15,734	15,734	112,704	28,511	3,493	25,019
24 2,027	128,438		15,734	15,734	112,704	26,626	3,262	23,364
25 2,028	128,438		15,734	15,734	112,704	24,865	3,046	21,819
26 2,029	128,438		15,734	15,734	112,704	23,221	2,845	20,376
27 2,030	128,438		15,734	15,734	112,704	21,685	2,656	19,029
28 2,031	128,438		15,734	15,734	112,704	20,251	2,481	17,770
29 2,032	128,438		15,734	15,734	112,704	18,912	2,317	16,595
30 2,033	128,438		15,734	15,734	112,704	17,661	2,164	15,498
31 2,034	128,438		15,734	15,734	112,704	16,494	2,021	14,473
32 2,035	128,438		15,734	15,734	112,704	15,403	1,887	13,516
33 2,036	128,438		15,734	15,734	112,704	14,384	1,762	12,622
34 2,037	128,438		15,734	15,734	112,704	13,433	1,646	11,788
35 2,038	128,438		15,734	15,734	112,704	12,545	1,537	11,008
Total	3,281,025	811,400	447,531	1,258,931	1,872,095	868,828	868,828	0

**FIRR= 7.08%**

**Table 3.2.3-5 The New Cebu Port (CPA)**

(Unit: 1000Pesos)									
Year	Revenue (1)	Cost(2)			Difference (1)-(2)	Net Present Value			
		Investment	Expenses	Total		Revenue	Cost	Difference	
1 2,004		124,700		124,700	-124,700	0	124,700	-124,700	
2 2,005		124,700		124,700	-124,700	0	116,115	-116,115	
3 2,006		2,809,800		2,809,800	-2,809,800	0	2,436,233	-2,436,233	
4 2,007		2,449,800		2,449,800	-2,449,800	0	1,977,861	-1,977,861	
5 2,008		2,218,400		2,218,400	-2,218,400	0	1,667,733	-1,667,733	
6 2,009	757,927		133,868	133,868	624,059	530,561	93,709	436,852	
7 2,010	875,241		133,868	133,868	741,373	570,502	87,258	483,244	
8 2,011	875,241		133,868	133,868	741,373	531,226	81,251	449,975	
9 2,012	875,241		133,868	133,868	741,373	494,653	75,657	418,996	
10 2,013	875,241		133,868	133,868	741,373	460,599	70,448	390,150	
11 2,014	875,241		133,868	133,868	741,373	428,888	65,598	363,290	
12 2,015	875,241		133,868	133,868	741,373	399,361	61,082	338,279	
13 2,016	875,241		133,868	133,868	741,373	371,867	56,877	314,990	
14 2,017	875,241		133,868	133,868	741,373	346,266	52,961	293,304	
15 2,018	875,241		133,868	133,868	741,373	322,427	49,315	273,112	
16 2,019	875,241		133,868	133,868	741,373	300,229	45,920	254,309	
17 2,020	882,302		133,868	133,868	748,434	281,815	42,758	239,056	
18 2,021	882,302		133,868	133,868	748,434	262,413	39,815	222,598	
19 2,022	882,302		133,868	133,868	748,434	244,347	37,074	207,274	
20 2,023	882,302		133,868	133,868	748,434	227,525	34,521	193,004	
21 2,024	882,302		133,868	133,868	748,434	211,861	32,145	179,716	
22 2,025	882,302		133,868	133,868	748,434	197,275	29,932	167,344	
23 2,026	882,302		133,868	133,868	748,434	183,694	27,871	155,823	
24 2,027	882,302		133,868	133,868	748,434	171,047	25,952	145,095	
25 2,028	882,302		1,633,868	1,633,868	-751,566	159,271	294,942	-135,671	
26 2,029	882,302		133,868	133,868	748,434	148,306	22,502	125,804	
27 2,030	882,302		133,868	133,868	748,434	138,096	20,953	117,143	
28 2,031	882,302		133,868	133,868	748,434	128,589	19,510	109,078	
29 2,032	882,302		133,868	133,868	748,434	119,736	18,167	101,569	
30 2,033	882,302		133,868	133,868	748,434	111,493	16,916	94,576	
31 2,034	882,302		133,868	133,868	748,434	103,817	15,752	88,065	
32 2,035	882,302		133,868	133,868	748,434	96,669	14,667	82,002	
33 2,036	882,302		133,868	133,868	748,434	90,014	13,657	76,357	
34 2,037	882,302		133,868	133,868	748,434	83,817	12,717	71,100	
35 2,038	882,302		133,868	133,868	748,434	78,047	11,842	66,205	
Total	26,274,063	7,727,400	5,516,025	13,243,425	13,030,638	7,794,411	7,794,411	0	

**FIRR= 7.39%**

**Table 3.2.3-6 Cebu Baseport and New Cebu Port of CPA**

(Unit:1000Pesos)

Year	Revenue (1)	Cost(2)			Difference (1)-(2)	Net Present Value		
		Investment	Expenses	Total		Revenue	Cost	Difference
1	2,004	0	124,700	124,700	-124,700	0	124,700	-124,700
2	2,005	0	133,700	133,700	-133,700	0	124,539	-124,539
3	2,006	0	2,955,400	2,955,400	-2,955,400	0	2,564,262	-2,564,262
4	2,007	0	2,700,300	2,700,300	-2,700,300	0	2,182,385	-2,182,385
5	2,008	0	2,373,100	2,373,100	-2,373,100	0	1,786,522	-1,786,522
6	2,009	776,773	146,200	287,255	339,518	544,703	306,620	238,083
7	2,010	914,087	105,400	143,258	248,658	597,071	162,421	434,650
8	2,011	924,298		146,402	146,402	562,372	89,075	473,297
9	2,012	934,387		146,402	146,402	529,556	82,972	446,584
10	2,013	944,313		146,402	146,402	498,510	77,286	421,223
11	2,014	954,012		149,602	149,602	469,121	73,564	395,557
12	2,015	963,429		149,602	149,602	441,289	68,524	372,766
13	2,016	972,496		149,602	149,602	414,921	63,828	351,092
14	2,017	981,138		149,602	149,602	389,924	59,455	330,469
15	2,018	989,277		149,602	149,602	366,219	55,381	310,838
16	2,019	996,821		149,602	149,602	343,727	51,586	292,141
17	2,020	1,010,740		149,602	149,602	324,645	48,051	276,594
18	2,021	1,010,740		149,602	149,602	302,400	44,759	257,641
19	2,022	1,010,740		149,602	149,602	281,679	41,692	239,987
20	2,023	1,010,740		149,602	149,602	262,378	38,835	223,543
21	2,024	1,010,740		149,602	149,602	244,400	36,174	208,226
22	2,025	1,010,740		149,602	149,602	227,653	33,695	193,958
23	2,026	1,010,740		149,602	149,602	212,054	31,387	180,668
24	2,027	1,010,740		149,602	149,602	197,524	29,236	168,288
25	2,028	1,010,740		1,649,602	1,649,602	183,990	300,285	-116,295
26	2,029	1,010,740		149,602	149,602	171,383	25,367	146,016
27	2,030	1,010,740		149,602	149,602	159,639	23,629	136,011
28	2,031	1,010,740		149,602	149,602	148,701	22,009	126,691
29	2,032	1,010,740		149,602	149,602	138,511	20,501	118,010
30	2,033	1,010,740		149,602	149,602	129,021	19,097	109,924
31	2,034	1,010,740		149,602	149,602	120,180	17,788	102,392
32	2,035	1,010,740		149,602	149,602	111,945	16,569	95,376
33	2,036	1,010,740		149,602	149,602	104,275	15,434	88,841
34	2,037	1,010,740		149,602	149,602	97,130	14,376	82,753
35	2,038	1,010,740		149,602	149,602	90,474	13,391	77,083
Total		29,555,088	8,538,800	5,963,556	14,502,356	14,902,733	8,665,394	0

**FIRR= 7.36%**

Table 3.2.3-7 The New Cebu Port (Private Sector)

(Unit: 1000Pesos)									
Year	Revenue (1)	Cost(2)			Difference (1)-(2)	Net Present Value			Difference
		Investment	Expenses	Total		Revenue	Cost	Difference	
1	2,004	25,800	0	25,800	-25,800	0	25,800	-25,800	
2	2,005	25,800	0	25,800	-25,800	0	21,482	-21,482	
3	2,006	463,700	0	463,700	-463,700	0	321,485	-321,485	
4	2,007	611,400	0	611,400	-611,400	0	352,949	-352,949	
5	2,008	453,400	0	453,400	-453,400	0	217,936	-217,936	
6	2,009	724,273	412,345	412,345	311,928	289,876	165,033	124,843	
7	2,010	872,608	412,345	412,345	460,263	290,798	137,415	153,383	
8	2,011	872,608	412,345	412,345	460,263	242,133	114,418	127,715	
9	2,012	872,608	412,345	412,345	460,263	201,612	95,270	106,341	
10	2,013	872,608	412,345	412,345	460,263	167,872	79,327	88,545	
11	2,014	872,608	412,345	412,345	460,263	139,778	66,051	73,727	
12	2,015	872,608	412,345	412,345	460,263	116,386	54,998	61,389	
13	2,016	872,608	899,145	899,145	-26,537	96,909	99,856	-2,947	
14	2,017	872,608	412,345	412,345	460,263	80,691	38,130	42,561	
15	2,018	872,608	412,345	412,345	460,263	67,187	31,749	35,438	
16	2,019	872,608	412,345	412,345	460,263	55,944	26,436	29,508	
17	2,020	872,608	412,345	412,345	460,263	46,581	22,012	24,570	
18	2,021	872,608	412,345	412,345	460,263	38,786	18,328	20,458	
19	2,022	872,608	412,345	412,345	460,263	32,295	15,261	17,034	
20	2,023	872,608	1,313,345	1,313,345	-440,737	26,890	40,472	-13,582	
21	2,024	872,608	899,145	899,145	-26,537	22,390	23,071	-681	
22	2,025	872,608	412,345	412,345	460,263	18,643	8,810	9,834	
23	2,026	872,608	412,345	412,345	460,263	15,523	7,335	8,188	
24	2,027	872,608	412,345	412,345	460,263	12,925	6,108	6,818	
25	2,028	872,608	412,345	412,345	460,263	10,762	5,086	5,677	
26	2,029	872,608	412,345	412,345	460,263	8,961	4,235	4,727	
27	2,030	872,608	412,345	412,345	460,263	7,462	3,526	3,936	
28	2,031	872,608	412,345	412,345	460,263	6,213	2,936	3,277	
29	2,032	872,608	899,145	899,145	-26,537	5,173	5,330	-157	
30	2,033	872,608	412,345	412,345	460,263	4,307	2,035	2,272	
31	2,034	872,608	412,345	412,345	460,263	3,587	1,695	1,892	
32	2,035	872,608	412,345	412,345	460,263	2,986	1,411	1,575	
33	2,036	872,608	412,345	412,345	460,263	2,487	1,175	1,312	
34	2,037	872,608	412,345	412,345	460,263	2,070	978	1,092	
35	2,038	872,608	412,345	412,345	460,263	1,724	815	909	
Total		26,029,917	1,580,100	14,731,750	16,311,850	9,718,067	2,018,954	2,018,954	0

FIRR= 20.10%

Table 3.2.3-8 Financial Statements

Income Statement																	
Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Operating Revenue	0	0	0	0	0	776,773	914,087	924,299	934,388	944,313	954,013	963,429	972,497	981,138	989,277	996,822	1,003,679
Operating Expenses	0	0	0	0	0	362,022	368,021	375,380	401,677	401,677	401,677	401,677	401,677	401,677	401,677	401,677	401,677
Personnel & Administration	0	0	0	0	0	4,658	6,045	7,080	7,080	7,080	7,080	7,080	7,080	7,080	7,080	7,080	7,080
Maintenance	0	0	0	0	0	136,398	137,214	139,322	165,619	165,619	165,619	165,619	165,619	165,619	165,619	165,619	165,619
Depreciation	0	0	0	0	0	220,966	224,762	228,978	228,978	228,978	228,978	228,978	228,978	228,978	228,978	228,978	228,978
Net Operating Income	0	0	0	0	0	414,751	546,066	548,919	532,711	542,636	552,336	561,752	570,820	579,461	587,600	595,145	602,002
Interest on Long-term Loans	0	2,494	5,168	64,276	106,612	211,664	281,296	273,602	262,404	247,034	231,664	216,169	200,541	181,958	161,257	138,805	123,253
Net Surplus	0	-2,494	-5,168	-64,276	-106,612	203,087	264,770	275,317	270,307	295,602	320,672	345,582	370,279	397,503	426,343	456,340	478,748
Accumulated Earnings	0	-2,494	-7,662	-71,938	-178,550	24,537	289,307	564,624	834,931	1,130,533	1,451,205	1,796,787	2,167,066	2,564,569	2,990,912	3,447,252	3,926,000
Cash Flow																	
Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Cash Beginning	0	0	-2,494	-7,662	-71,938	-178,550	187,151	556,172	935,544	1,306,748	1,703,246	2,118,579	2,552,137	2,862,622	3,094,493	3,267,627	3,522,426
Cash Inflow	124,700	133,700	2,955,400	2,700,300	2,373,100	781,917	876,228	777,897	761,689	771,614	781,314	790,730	799,798	808,439	816,578	824,123	830,980
Net Operating Income	0	0	0	0	0	414,751	546,066	548,919	532,711	542,636	552,336	561,752	570,820	579,461	587,600	595,145	602,002
Depreciation	0	0	0	0	0	220,966	224,762	228,978	228,978	228,978	228,978	228,978	228,978	228,978	228,978	228,978	228,978
Long-term Loans	124,700	133,700	2,955,400	2,700,300	2,373,100	146,200	105,400	0	0	0	0	0	0	0	0	0	0
Cash Outflow	124,700	136,194	2,960,568	2,764,576	2,479,712	416,216	507,208	398,524	390,486	375,116	365,981	357,171	489,313	576,569	643,443	569,324	491,612
Investment	124,700	133,700	2,955,400	2,700,300	2,373,100	146,200	105,400	0	0	0	0	0	0	0	0	0	0
Repayment of principal	0	0	0	0	0	58,352	120,512	124,922	128,082	128,082	134,317	141,002	288,772	394,611	482,186	430,519	368,359
Interest on Long-term Loans	0	2,494	5,168	64,276	106,612	211,664	281,296	273,602	262,404	247,034	231,664	216,169	200,541	181,958	161,257	138,805	123,253
Cash Balance	0	-2,494	-5,168	-64,276	-106,612	365,701	369,020	379,373	371,203	396,498	415,333	433,559	310,485	231,870	173,135	254,799	339,368
Cash Ending	0	-2,494	-7,662	-71,938	-178,550	187,151	556,172	935,544	1,306,748	1,703,246	2,118,579	2,552,137	2,862,622	3,094,493	3,267,627	3,522,426	3,861,794
Balance Sheet																	
Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Current Assets	0	0	0	0	0	187,151	556,172	935,544	1,306,748	1,703,246	2,118,579	2,552,137	2,862,622	3,094,493	3,267,627	3,522,426	3,861,794
Cash & Deposit	0	0	0	0	0	187,151	556,172	935,544	1,306,748	1,703,246	2,118,579	2,552,137	2,862,622	3,094,493	3,267,627	3,522,426	3,861,794
Fixed Assets	124,700	258,400	3,213,800	5,914,100	8,287,200	8,212,434	8,093,072	7,864,094	7,635,116	7,406,137	7,177,159	6,948,181	6,719,203	6,490,225	6,261,247	6,032,269	5,803,291
Total Assets	124,700	258,400	3,213,800	5,914,100	8,287,200	8,399,585	8,649,243	8,799,638	8,941,863	9,109,383	9,295,738	9,500,318	9,581,825	9,584,717	9,528,874	9,554,695	9,665,084
Liabilities	124,700	260,894	3,221,462	5,986,038	8,465,750	8,375,048	8,359,936	8,235,014	8,106,932	7,978,850	7,844,533	7,703,531	7,414,759	7,020,148	6,537,962	6,107,443	5,739,084
Short-term Loans	0	2,494	7,662	71,938	178,550	0	0	0	0	0	0	0	0	0	0	0	0
Long-term Loans	124,700	258,400	3,213,800	5,914,100	8,287,200	8,375,048	8,359,936	8,235,014	8,106,932	7,978,850	7,844,533	7,703,531	7,414,759	7,020,148	6,537,962	6,107,443	5,739,084
Net Worth	0	-2,494	-7,662	-71,938	-178,550	24,537	289,307	564,624	834,931	1,130,533	1,451,205	1,796,787	2,167,066	2,564,569	2,990,912	3,447,252	3,926,000
Total Liabilities & Net Worth	124,700	258,400	3,213,800	5,914,100	8,287,200	8,399,585	8,649,243	8,799,638	8,941,863	9,109,383	9,295,738	9,500,318	9,581,825	9,584,717	9,528,874	9,554,695	9,665,084
Financial Indicators																	
Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Rate of Return Fixed Assets						5.1%	6.7%	7.0%	7.0%	7.3%	7.7%	8.1%	8.5%	8.9%	9.4%	9.9%	10.4%
Debt Service Coverage Ratio						2.35	1.92	1.95	1.95	2.06	2.13	2.21	1.63	1.40	1.27	1.45	1.69
Operating Ratio						46.6%	40.3%	40.6%	43.0%	42.5%	42.1%	41.7%	41.3%	40.9%	40.6%	40.3%	40.0%
Working Ratio						18.2%	15.7%	15.8%	18.5%	18.3%	18.1%	17.9%	17.8%	17.6%	17.5%	17.3%	17.2%



(Unit:1,000Pesos)

## Income Statement

Year	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038
Operating Revenue	1,003,679	1,003,679	1,003,679	1,003,679	1,003,679	1,003,679	1,003,679	1,003,679	1,003,679	1,003,679	1,003,679	1,003,679	1,003,679	1,003,679	1,003,679	1,003,679	1,003,679	1,003,679
Operating Expenses	401,677	401,677	401,677	401,677	401,677	401,677	401,677	401,677	401,677	401,677	401,677	401,677	401,677	401,677	401,677	401,677	401,677	401,677
Personnel & Administration	7,080	7,080	7,080	7,080	7,080	7,080	7,080	7,080	7,080	7,080	7,080	7,080	7,080	7,080	7,080	7,080	7,080	7,080
Maintenance	165,619	165,619	165,619	165,619	165,619	165,619	165,619	165,619	165,619	165,619	165,619	165,619	165,619	165,619	165,619	165,619	165,619	165,619
Depreciation	228,978	228,978	228,978	228,978	228,978	228,978	228,978	228,978	228,978	228,978	228,978	228,978	228,978	228,978	228,978	228,978	228,978	228,978
Net Operating Income	602,002	602,002	602,002	602,002	602,002	602,002	602,002	602,002	602,002	602,002	602,002	602,002	602,002	602,002	602,002	602,002	602,002	602,002
Interest on Long-term Loans	115,161	107,598	100,413	93,229	86,045	78,861	71,677	64,492	57,308	50,124	42,940	35,756	28,572	21,387	14,203	7,019	3,835	1,651
Net Surplus	486,841	494,404	501,589	508,773	515,957	523,141	530,325	537,509	544,694	551,878	559,062	566,246	573,430	580,615	587,799	594,983	602,167	609,351
Accumulated Earnings	4,412,841	4,907,246	5,401,651	5,917,607	6,433,564	6,956,705	7,487,030	8,024,540	8,569,233	9,121,111	9,680,173	10,246,419	10,819,850	11,400,464	11,988,138	12,582,738	13,181,308	13,785,948

## Cash Flow

Year	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038
Cash Beginning	3,861,794	4,213,664	4,576,257	4,940,000	5,303,693	5,667,386	6,031,079	6,394,772	6,758,465	7,122,158	7,485,851	7,849,544	8,213,237	8,576,930	8,940,623	9,304,316	9,668,009	10,031,702
Cash Inflow	830,980	830,980	830,980	830,980	830,980	830,980	830,980	830,980	830,980	830,980	830,980	830,980	830,980	830,980	830,980	830,980	830,980	830,980
Net Operating Income	602,002	602,002	602,002	602,002	602,002	602,002	602,002	602,002	602,002	602,002	602,002	602,002	602,002	602,002	602,002	602,002	602,002	602,002
Depreciation	228,978	228,978	228,978	228,978	228,978	228,978	228,978	228,978	228,978	228,978	228,978	228,978	228,978	228,978	228,978	228,978	228,978	228,978
Long-term Loans	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cash Outflow	479,110	468,387	2,193,702	454,018	446,814	439,610	432,406	425,202	418,000	410,796	403,592	396,388	389,184	381,980	374,776	367,572	360,368	353,164
Investment	0	0	1,732,500	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Repayment of principal	363,949	360,789	360,789	360,789	360,789	360,789	360,789	360,789	360,789	360,789	360,789	360,789	360,789	360,789	360,789	360,789	360,789	360,789
Interest on Long-term Loans	115,161	107,598	100,413	93,229	86,045	78,861	71,677	64,492	57,308	50,124	42,940	35,756	28,572	21,387	14,203	7,019	3,835	1,651
Cash Balance	351,870	362,594	-1,362,722	376,962	384,146	391,330	398,514	405,699	412,883	420,067	427,251	434,435	441,619	448,803	455,987	463,171	470,355	477,539
Cash Ending	4,213,664	4,576,257	4,940,000	5,303,693	5,667,386	6,031,079	6,394,772	6,758,465	7,122,158	7,485,851	7,849,544	8,213,237	8,576,930	8,940,623	9,304,316	9,668,009	10,031,702	10,395,395

## Balance Sheet

Year	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038
Current Assets	4,213,664	4,576,257	4,940,000	5,303,693	5,667,386	6,031,079	6,394,772	6,758,465	7,122,158	7,485,851	7,849,544	8,213,237	8,576,930	8,940,623	9,304,316	9,668,009	10,031,702	10,395,395
Cash & Deposit	4,213,664	4,576,257	4,940,000	5,303,693	5,667,386	6,031,079	6,394,772	6,758,465	7,122,158	7,485,851	7,849,544	8,213,237	8,576,930	8,940,623	9,304,316	9,668,009	10,031,702	10,395,395
Fixed Assets	5,574,312	5,345,334	6,848,856	6,619,878	6,390,900	6,161,922	5,932,944	5,703,966	5,474,988	5,246,009	5,017,031	4,788,053	4,559,075	4,330,097	4,101,119	3,872,141	3,643,163	3,414,185
Total Assets	9,787,976	9,921,592	10,062,391	10,210,375	10,365,543	10,527,895	10,697,431	10,874,152	11,058,056	11,249,145	11,447,418	11,652,875	11,865,517	12,091,577	12,331,382	12,725,883	13,230,193	13,828,148
Liabilities	5,375,135	5,014,346	4,653,557	4,292,768	3,931,979	3,571,190	3,210,401	2,849,612	2,488,823	2,128,034	1,767,245	1,406,456	1,045,667	691,113	343,244	143,145	48,885	42,200
Short-term Loans	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Long-term Loans	5,375,135	5,014,346	4,653,557	4,292,768	3,931,979	3,571,190	3,210,401	2,849,612	2,488,823	2,128,034	1,767,245	1,406,456	1,045,667	691,113	343,244	143,145	48,885	42,200
Net Worth	4,412,841	4,907,246	5,408,834	5,917,607	6,433,564	6,956,705	7,487,030	8,024,540	8,569,233	9,121,111	9,680,173	10,246,419	10,819,850	11,400,464	11,988,138	12,582,738	13,181,308	13,785,948
Total Liabilities & Net Worth	9,787,976	9,921,592	10,062,391	10,210,375	10,365,543	10,527,895	10,697,431	10,874,152	11,058,056	11,249,145	11,447,418	11,652,875	11,865,517	12,091,577	12,331,382	12,725,883	13,230,193	13,828,148

## Financial Indicators

	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038
Rate of Return Fixed Assets	10.8%	11.3%	8.8%	9.1%	9.4%	9.8%	10.1%	10.6%	11.0%	11.5%	12.0%	12.6%	13.2%	13.9%	14.7%	15.5%	16.5%	17.1%
Debt Service Coverage Ratio	1.73	1.77	1.80	1.83	1.86	1.89	1.92	1.95	1.99	2.02	2.06	2.10	2.13	2.17	2.21	2.25	2.29	2.33
Operating Ratio	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%	40.0%
Working Ratio	17.2%	17.2%	17.2%	17.2%	17.2%	17.2%	17.2%	17.2%	17.2%	17.2%	17.2%	17.2%	17.2%	17.2%	17.2%	17.2%	17.2%	17.2%