PORT DISTRICT OF BATANGAS

A STUDY REPORT

Prepared by:

The Port Planning Dept.

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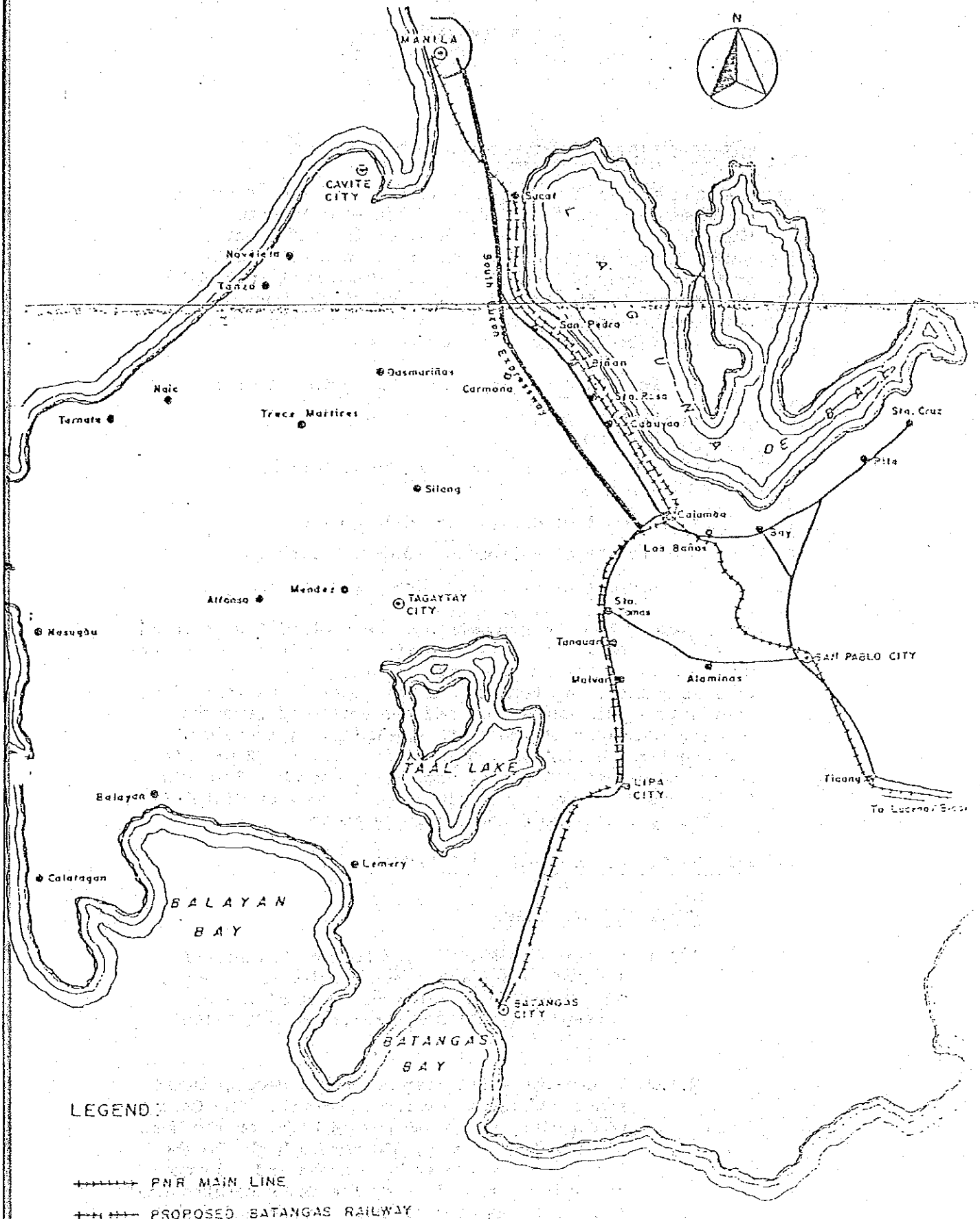
THE STUDY AREA



PORT OF BATANGAS

1. THE PORT DISTRICT: ITS COVERAGE

The Port District of Batangas consists of the provinces of Batangas, Oriental Mindoro, Occidental Mindoro, Marinduque, Quezon and Aurora, where the different national, municipal and private ports are situated under the jurisdiction of the Port Management Unit (PMU) of Batangas, with its office located at the Port of Batangas (baseport), Sta. Clara, Batangas City. The Port District is subdivided as follows:

1. Port of Batangas (baseport), Batangas City
2. Subport of Calapan, Calapan, Oriental Mindoro
3. Subport of San Jose, San Jose, Occidental Mindoro
4. Subport of Siain, Plaridel, Quezon
5. Subport of Balanacan, Mogpog, Marinduque
6. Subport of Sta. Cruz, Sta. Cruz, Marinduque

The baseport and the subports are the controlling offices of all government and private ports within their respective provinces. Monitoring/coordination re - development, administration, maintenance and port operations (including statistical data gathering) and collection of revenues are the functions of these PMU sub-units, as individual cost centers. A total of 50 municipal ports, 22 private ports and 5 national ports: Sta. Rita, Nasugbu, Guisguis, Mauban and Bondagua (presently under Subport of Siain) is officially under the 6 control ports above.

2. PRESENT SITUATION - PORT OF BATANGAS

2.1 Physical Environment

2.1.1 Location of Port - The Port of Batangas is located at the northeast section of Batangas Bay along the southwestern part of Luzon, Latitude: 15°45'00"N; Longitude: 121°03'00" East.

2.1.2 Topography - Batangas Bay has a deep crescent shape and faces towards the South. The Calumpan peninsular, up to 500 meters high, on the West and Mount Pinamucan, 600 meters high, to the East, protect the inshore areas and a large low lying plain of paddy fields, separated from the sea by an area of tidal swamps and fish

ponds behind a narrow beach of low sand dunes. The Kalumpang river forms a delta where it flows into the eastern side of the bay.

The port of Batangas is at the end of a causeway built out from the line of sand dunes at the western edge of the Kalumpang river delta. Behind the narrow beach, fish ponds, salt drying beds and paddy fields separate the port from the town of Batangas.

2.1.3 Meteorology - At present, Batangas does not have its own meteorological station although a fourth class station was operated there before the Second World War.

A more detailed picture of the climatological conditions at Batangas can be taken from the Study conducted by Sir William Halcrow and Partners in 1975 which includes data taken from the Weather Bureau of the Province e.g., wind data and daily readings taken at 14:00 hours throughout 1907. From the wind roses information, it may be seen that the effects of the Monsoons have been reduced by the diurnal winds making onshore winds predominant and that these winds are generally light to moderate in intensity. There is a gap of 20 days in the record for mid August which was probably caused by a severe tropical cyclone. Since no tropical cyclones were actually recorded one may presume that Batangas suffered one that year. From figures given in "Tropical Cyclones in the Western Pacific and China Sea Areas 1884 - 1953" by the Royal Observatory, Hong Kong, it was calculated that Batangas could expect an average of 1.43 tropical cyclones per year.

A typical storm at Batangas was computed to have the following characteristics:

Radius to Maximum Winds	- 75 Nautical Miles
Radius to 20 Knot Winds	- 150 Nautical Miles
Maximum sustained wind speed 10 metres above sea surface	- 74 Knots
Forward velocity of storm	- 11 Knots
Time for storm to pass a point	- 26 Hours

The wet season at Batangas is from the beginning of May until the end of December with June, July and August as the wettest months. This is during the period when the South West Monsoon blows.

2.1.4 Hydrography - In order to gain a proper knowledge of the sea bed in the area of any possible developments, a hydrographic survey was carried out extending from the port area one kilometer to the North West in conjunction with the topographic survey. The survey covered the area from the shore line to the 30 meter contour. Information gained from this survey, together with a study of previous B.P.W. hydrographic plans of the port area, navigation charts published by the Philippine Coast and Geodetic Survey as well as aerial photographs obtained from various sources, was used by the Study to get an idea of the sea bed's characteristics and its movements. The port is in an area susceptible to accretion of fine to colloidal sediment originating from the nearby Kalumpang river.

As is usual in the Philippines, the sea bed slope is steep a little way off shore, although at Batangas, it is flatter than at other study ports probably due to the nature of the sediment forming the sea floor and the sheltered position of the bay itself.

2.1.5 Oceanography

2.1.5.1 Tides - There are at present no tidal data for Batangas port. The tidal stream in the Verde Island Passage originates in the China Sea and moves towards the Sibuyan Sea. The tide predictions for Manila, Calapan and Tayabas however indicate large changes within the tidal stream so that to interpolate for predictions at Batangas could lead to errors, especially because of the two channels leading into Batangas Bay. For a large bay with a single entrance, the geostrophic effect would normally cause the tidal stream to rotate anti-clockwise about an amphidromic point somewhere inside the entrance. Thus, the flood tide would be in that direction, or northgoing at the port. This has been confirmed by a short series of float tests made by the Halcrow Study.

The Study assumed the tide to be of the semi diurnal type but becoming diurnal near the time of the moon's maximum declination. The diurnal range,

mean lower low water to mean higher high water, was assumed to be 1.3 metres.

2.1.5.2 Waves - An investigation was carried out to determine the probable maximum wave conditions over a twenty year period and is described in Volume II of the Halcrow report.

Hindcasting was performed by the Study using the only wind data available for Batangas, which was for the year 1907. This consisted of daily wind velocity and direction measured at 2 p.m. This reading was assumed to be the wave causing wind multiplied by the factor 1.5. A value of 1.5 being chosen because the full wind data available at Calapan, opposite Batangas, showed the maximum wind to be generally ten times the average. The fetches used are tabulated below.

Compass point	Effective fetch, nautical mils
S	8
S.S.W.	16
S.W.	13
W.S.W.	8
W.	6

The duration of the wave causing wind was assumed to be 12 hours.

Forecasting using the return period data gave the following results:

Return period years	Fetch Nautical Miles	Duration Hours	Wind Velocity Knots.	Hs1/ M.	Ts2/ Sec.	Probability of occurrence
25	16	1	95	2.6	7.3	0.0001
50	16	1	100	3.4	8.2	0.000054
100	16	1	113	3.4	9.5	0.000027

1/ significant wave height after refraction.

2/ significant wave period.

Forecast were prepared using tropical cyclone data for a typical storm, located over the China Sea West of Batangas. The calculations indicated the generation of waves with characteristic values of Hs = 23.3 m. and Ts = 18.8 sec. in the China Sea, reducing to Hs = 15.1 m., Ts = 15.0 sec. in the Verde Island passage. After diffraction around Maricaban Island the wave height was reduced to 0.6 m. at the port. The probability of occurrence is 0.0039 This is clearly not the worst case, as can be seen from the figures in the preceeding table but is perhaps indicative of the usual conditions to be expected during the passage of a normal storm.

The results for the different methods were plotted on probability paper and a smooth curve drawn through them to obtain the probable maximum significant wave height and period to be expected within 20 years. The return periods of waves of different heights and periods were read off and the probability of their occurrence during 20 years computed.

Significant Wave Height Metres	Encounter probability During 20-year period	Significant Wave Period Sec.	Encounter probability during 20-year period
1	0.999	2	0.999
2	0.997	4	0.999
3	0.558	6	0.993
4	0.143	8	0.405
5	0.044	10	0.111
6	0.022	12	0.028
		14	0.008

The predominant direction of approach wave crests is from the S to SSW in deep water, being refracted to become about SSW to S at the shore line.

2.1.5.3 Currents - The current in the Verde Island Passage beyond Batangas Bay flows in westerly direction from December to June and, it is believed, in the opposite direction for the remainder of the year, though this is not certain. During September to November there may be little or no

current in the passage. There is probably very little steady current in the bay since the westerly current in the Verde Island Passage opposes the formation of the natural anticlockwise circulation. During periods of reversal of the Verde Island Passage current a small anti-clockwise current in the bay can be expected which would reinforce the flood current and oppose the ebb.

2.1.5.4 Sediment Movement - It is evident from aerial photographs and maps that there is a net littoral drift in a northerly direction at the port. This is substantiated by the computed angle of approach of wave crests. The causeway to the piers acts as a groyne and has collected a substantial amount of sand on its up drift side to the South East while erosion is evident on the down drift side.

The formation of a delta at the entrance of the Kalumpang river indicates that the sea current is light in comparison to the silt load of the river. However fine sediment is carried as far as the port area and beyond, where it settles out into a very loose silty sand. In the port area, the layer is believed to be thickest and most extensive at Pier 3 becoming less towards Pier 2 and beyond.

Any dredged area in the Port is liable to fill rapidly as it will act as a settling basin for fine sediment in suspension. In addition the groyne action of the port will gradually move the beach to seaward with a consequent rise in sea bed levels. When the volume on the up drift side of the port causeway is filled, the natural littoral drift regime will be regained with material by-passing the port. In consequence any hole dredged at Pier 3 will form a trap in which this littoral material will accumulate. The condition at Pier No. 1 are a little better since it is further down drift and away from the river mouth. If dredging is carried

out at both Piers 1 and 3, the former will be protected from littoral drift for a short time by the trapping effect of the up drift dredging.

The extent to which accretion can occur at the port will finally be limited by the angle of the sea bed slope. After sedimentation has proceeded to an extent sufficient to make this angle critical, a slip or flow may be expected, removing a large portion of the silt to to the depths of the bay.

2.1.6 Seismicity - No data available

2.1.7 Foundation Conditions - Information about the soil in the vicinity of the port was obtained from a study of borehole data and pile driving results and a consideration of the geological and oceanographical conditions prevailing.

2.1.7.1 Boreholes - Three borings were carried out for the American Army in the vicinity of pier No. 1 prior to it's reconstruction in 1948.

Following the recommendations of the Philipoine Transport Survey (P.T.S.), the B.P.W. entered into a contract for eight borings in an area North of the existing port in 1971. Later, two further borings were requested and carried out as an amendment to the B.P.W. contract in the first half of 1972.

The locations were only approximates and care should be exercised in using the Standard Penetration Test (S.P.T.) results since non standard diameter tubes were used in most boreholes. No soil test data were available from the 1948 borings and unfortunately only limited results from the 1971 and 1972 borings were received from the contractor. The soil descriptions were in some cases doubtful and the data that were obtained were of limited value since no undisturbed samples were recovered.

It is clear, however, that the site consists of layers of very loose silt or clay overlying beds of dense sand.

The silt is thickest and most extensive towards the South and tails off about 300 metres to the North of Pier 2. Laboratory test results on some disturbed samples exhibited the characteristics of recent, underconsolidated clay. Using the Seed and Idris Criteria the silty material was found to be liable to liquification during earthquakes of the intensity which, according to the Philippine National Building Code, may be expected at Batangas while the underlying sand was safe against this type of failure. Triaxial tests on undisturbed and remolded samples of similar silt from a nearby site indicated that the material was sensitive.

2.1.7.2 Pile Driving Results - The pile driving results available from the construction records of piers No. 2 and No. 3 tend to confirm the interpretation of the borehole data. It appears that satisfactory end bearing resistance can be obtained by driving a short distance into the underlying sand.

The site consists of dense sand sloping to seaward, overlain by varying thickness of very loose silty sand or clay. The upper layers are sensitive and subject to liquifaction and any construction must be firmly founded in the underlying sand strata. Steel sheet pile construction is not recommended for the port because of the great depth before firm sand is reached and because of the liability of the upper silt to liquifaction. Piles for any open structure need to be driven sufficiently far into the sand to obtain their full resistance from this strata. No allowance should be made for any resistance from the upper strata because of the following reasons:

- It is liable to liquify and would provide no resistance in that condition.

- If the thickness is built up by siltation, the sea bed slope could become critical and liable to slip or flow down to the deep bay bottom.

2.2 Port Facilities

2.2.1 Wharf

2.2.1.1 Type of Construction - The structure is connected to Pier II and its deck is a reinforced concrete structure having a width of 15.00 m. and a length of 93.00 meters.

2.2.1.2 Structural Condition - The structure is still good.

2.2.1.3 Fendering and Mooring Equipment - The structure is provided with timber waling, mooring fixture, rubber deck fenders and six (6) sets of fender pile clusters.

2.2.2 Pier

2.2.2.1 Type of Construction

Pier I - At present, Pier I, having a width of 15.00 m. and a length of 135 m. is proposed to be extended by 50.00 m. and widening of another 15.00 m.

Pier II - Which is connected to the wharf is a reinforced concrete structure having a width of 12.00 m. and a length of 48.00 m.

Pier III- Is also a reinforced concrete structure having a width of 15.00 m. and a length of 84.00m. supported by series of vertical and batter reinforced concrete piles.

2.2.2.2 Structural Condition:

Pier I - Closed to traffic due to its deteriorated condition but undergoing general repair by re-slabing of the deck and replacement of some deteriorated R.C. piles.

Pier II - Still good but needs under deck repair of cracks.

Pier III - Still in good condition but needs preventive maintenance measures.

2.2.2.3 Fendering and Mooring Equipment

Pier I - The structure is provided by 24 sets of fender cluster at both sides some of which are new. It is also provided with mooring bitt and cleat also on both sides.

Pier II - The structure is provided with six (6) sets of fender clusters and mooring cleats on both sides.

Pier III - The structure is provided with 12 sets of fender cluster and mooring cleats and bitt on both sides,

The bulk-head between the piers is not usable, but ships berth on both sides of all piers.

- Marginal Wharf , 93 x 15 meters
- Passenger shed, 112 square meters
- Seven (7) private warehouses with a total area of 14,193 square meters
- Causeway , 435 meters
- Control depchs Pier I at 4 meters.
  Pier II at 2.7 meters
  Pier III at 7.5 meters

The port is utilized primarily by passenger and cargo ferries serving Calapanjon Mindoro Island. Shallow water sometimes presents a problem.

2.2.3 Back-up Facilities

The port has no cargo shed. The Passenger Waiting Shed is a temporary structure made of wooden column and trusses in the corrugated GI sheets with an approximate floor area of 112 sq. meters. On the other hand, the PPU Office is a one storey building with a floor area of 156 sq.m. and a newly constructed two (2) storey building with a floor area of 196 sq.m. The whole structure is made up of GI sheets roofing and concrete hollow walls, jalousie windows with grills.

Other Port Buildings are as follows:

1. Customs Office - newly renovated two (2) storey building with GI sheet roofing on wooden frames

CHB wallings, jalousie windows and plain cement finish concrete ground flooring. It has a total floor area of 588 sq.m. more or less.

2. Aries Arrastre Office - one storey building constructed in 1976 with corrugated GI sheets roofing on wooden frames, wooden V-cut outside wallings with fixed glass and jalousie windows and plain cement finish concrete flooring. The building is provided with electrical and plumbing facilities and has a floor area of 88 sq. m. more or less.

3. Customs Garage (Bodega) - This is an open shed constructed sometime in 1972 with corrugated GI sheet roofing on wooden frames resting on GI pipe posts and provided with electrical lighting facilities. It is fenced with cyclone wire with floor area of 170 sq.m.

4. Aries Arrastre Garage (Bodega) - An open shed constructed in 1977 with corrugated GI roofing sheets on wooden frames and columns resting on concrete foundations. Total floor area is approximately 50 sq.m.

5. Customs Police H.Q. and Deputy Collector of Customs Office - The structure is a one storey building made up of corrugated GI sheet roofing with plywood ceiling and entirely concrete hollow block wallings, glass jalousie windows with iron grills, cement finish concrete flooring, provided with electrical and plumbing facilities with floor area of 107 sq.m. more or less.

2.2.3.1 Land Access - The total area of the Port of Batangas based on the proposed port zone plan, forwarded by the Authority to the Bureau of Lands seeking Presidential Proclamation, and which includes the area to be reclaimed, is approximately 270,000 sq.m. For the purpose of valuation, however, the total existing land area considered within the proposed port zone is 66,804 sq.m. more or less. This land is located at Bo. Sta. Clara, Batangas City.

2.2.3.2 Navigation Aides - Lighted Beacon Tower - This tower, standing 32 feet from the ground

level, was constructed sometime in 1975 and is made up of reinforced concrete with spiral staircase. The light is a three-group flashing with 5 seconds interval, and which has a visibility of 7 to 8 miles.

2.2.3.3 Anchorages - All vessels entering Batangas Harbor shall show their colors and signal or letters shall be kept flying till the vessel is boarded by proper officials within two (2) miles before/or securing at the Quarantine Anchorage.

Quarantine Anchorage -

Latitude - 13°45'06" North
Longitude -121°02'00" East

Vessel less than 1,000 GRT

Latitude - 13°45'13" North
Longitude -121°02'14" East

Vessels over 1,000 GRT

Latitude - 13°45'13" North
Longitude -121°01'55" East

Vessels over 3,000 GRT

Latitude - 13°45'30" North
Longitude -121°02'55" East

From ship transfer to ship (sts) of dangerous cargo (LPG) -

1. During Northeast Monsoon:

   Latitude - 13°40'42" North
   Longitude - 121°02'36" East

2. During Southwest Monsoon:

   Latitude - 12°44'42" North
   Longitude - 121°57'12" East

From ship transfer to ship (sts) of dangerous cargo (petroleum/crude oil)

Latitude - 13°46'00" North
Longitude -121°00'00" East

2.2.4 The Subports

2.2.4.1 Subport of Balanacan

The Sub-port of Balanacan is found at the northern part of Marinduque province. It consists of two (2) small islands with protected anchorage for moderate size vessels.

Domestic shipping averages to 42 vessels per month. It has an average cargo throughput of 30,722 metric tons per year, which consists of palay and rice, bottled cargo, general cargo, copra and empty bottles.

Physical Facilities:

- A pier of reinforced concrete structure with a length of 13 meters and a width of nine (9) meters
- One (1) transit shed with an area of 72 meters
- A total port area of 5,400 square meters
- A three-meter control depth of water below MLLWL

Service:

a. Cargo Handling

Balanacan Arrastre and Stevedoring Service, Inc.

2.2.4.2 Subport of Calapan

The Sub-port of Calapan is established at Barangay San Antonio which is three (3) kilometers away from the town proper. Being situated in an island province, the port of Calapan plays a crucial role in trade as well mobility of people in Oriental Mindoro.

The Calapan port averages 245 domestic vessels a month. The major commodities transported to this port are general cargo, calamansi, cement, copra, and bottled cargo.

Physical Facilities:

- A marginal wharf of 104 meters in length
- One (1) transit shed with an area of 576 sq.m.

- An open storage area of 3,430 square meters
- A total port area of 10,320 square meters
- An approach length of 90 meters
- A four-meter control depth of water below MLLWL

Service:

a. Cargo Handling

The Calapan Labor Service Cooperative Inc. (CALASCI)

2.2.4.3 Subport of Siain

The Sub-port of Siain which is 186 kilometers south of Manila is positioned facing Lamon Bay in Plaridel, Quezon. It oversees the port requirements of the whole province of Quezon and the sub-province of Aurora.

Siain's average ship call is 78 domestic and five foreign vessels per month. Its average cargo throughput is 9,024 metric tons per year. Major commodities managed at this port are logs and lumber, copra, fish, empty bottles and general cargo.

Physical Facilities:

- A pier of reinforced concrete structure with a length of 115 meters and a width of 8.3 meters.
- A causeway of 40 meters in length
- A three-meter control depth of water below MLLWL

Services:

a. Cargo Handling

Vicente Abuel Stevedoring

b. Pilotage

Pilotage service is compulsory. It is handled by the United Pilots' Association of the Philippines.

c. Watering

Marciano Espiritu

2.2.4.4 Subport of Sta. Cruz

The Sub-port of Sta. Cruz is lodged at Barangay Duyabod, southeast of Sta. Cruz Poblacion. To its west and south

lies the Baguidoiran-Kinalanan mountain while its boundaries to the north and east are sea and river respectively.

Average ship call is 114 domestic vessels and three foreign vessels per month. Its average cargo throughput is 33,352 metric tons per year involving copra, bottled cargo, empty bottles, general cargo and palay and rice.

Physical Facilities:

- A pier of reinforced concrete structure with a length of 20 meters and a width of 8.5 meters
- One (1) transit shed with an area of 72 square meters
- An open storage area of 149 square meters
- A total port area of 3,904 square meters
- A causeway with a length of 472.12 meters
- A three-meter control depth of water below MLWL

Service:

a. Cargo Handling

Buyabod Arrastre and Allied Workers.

2.2.4.5 Subport of San Jose

The Subport of San Jose is located at Barangay Caminawit approximately 2 kilometers from San Jose Poblacion in the province of Occidental Mindoro.

Physical Facilities:

- A pier of reinforced concrete structure having a width of 15.00 m. and a length of 42.00 m. supported by a series of vertical and batter reinforced concrete piles.
- Cargo Shed
- Passenger Waiting Shed
- Arrastre Building

2.2.5 The Municipal Port of Bauan

Bauan port has a 60-meters pier and is located some seven kilometers northwest from Batangas It handles mainly small craft from Mindoro; some larger ships and barges bring in rice from San Jose Mindoro. The traffic is mainly between Mindoro and the Batangas area. The port is preferred to Batangas partly because the warehouses of Planters Products and the National Food Authority (NFA) are located there. In 1980 Bauan handled 120,000 tons of cargo, and no passengers.

2.3 Port Services

2.3.1 Cargo Handling

Cargoes passing through the government and private ports within the PMU, except the private ports of Caltex and Shell Refineries, are handled by arrastre/stevedoring operators, thirty five (35) of which are duly licensed by PPA.

2.3.2 Pilotage in the Batangas Pilotage District is handled by four (4) harbor pilots of the Batangas Harbor Pilots' Association. The Siain-Hondagua Pilotage District is handled by two (2) harbor pilots.

2.3.3. Tug Assistance is provided by:

- Lusteveco, 250 HP - 450 HP
- Caerlan Shipping and Tug Services, 750 HP-1,000 HP
- Pacific Tow, 1500 HP - 2500 HP
- Malayan Towage, 1500 HP - 2500 HP

available if required by the harbor pilots for mooring/unmooring and docking/undocking of foreign vessels.

2.3.4 Bunker Oil is supplied by local dealers to ferry-boats, batels and foreign vessels calling at the port of Batangas; by PNOC to vessels calling at Philippine Energy Supply Base (PESB) at Mabini, Batangas; and by Shell and Caltex Refineries to those vessels calling at their respective private ports.

2.3.5 Fresh Water is supplied by V. Faytaren Ship Chandlers and Batangas Food Supply to vessels docking at the Port of Batangas; PNOC to vessels docking at PESB; and by Shell, Batangas Bay Terminal, Inc. and Caltex Refinery to vessels docking at their private ports.

2.3.6 Drydock Repair and Shipbuilding Facilities

- Keppel (Phil.) Shipyard -

Drydocking - up to 5,000 DWT
Shipbuilding - Barges up to 700 GRT
Tugboats up to 100 GRT

- PNOC Marine Corporation -

Drydocking - up to 6,000 DWT
Shipbuilding - Barges up to 500 GRT
Tugboats up to 200 GRT

2.3.7 Trucking services provided by:

- Aplaya Haulers Association
- Individual Haulers with one or two units of cargo trucks.
- Shippers'/Consignees' cargo vehicles.

2.3.8 Other Ancillary Services

- Checking Services - Fortunate Batangas Checkers
- Provisioning/Ships Chandling
- Batangas Food Supply
- V. Faytaren Ships Chandler
- Mabel Salva
- Lorna Babao

2.4 Shipping and Traffic Flow

2.4.1 Types of Vessels

- Ferryboats - Cargo/Passenger
- Motorized Batels - Cargo/Passenger
- Cargo Vessels - VLCC, M/T, M/V, & Batels

* Domestic - for palay, rice, cement, fertilizers, lumber, plywood, lawanit, bottled cargoes, various cargoes,
- oil tankers for petroleum products
- barges and tugboats.

* Foreign - M/V, M/S for cement, sugar, soybeans, rice import, wheat and corn import, etc.
- tankers for crude oil, crude coco oil and LPG

2.4.2 Pattern of Shipcalls

	Ave. Daily	Monthly	Annual
- Foreign	1	36	365
- Domestic	36	1,100	13,200

(See table 1)

2.4.3 Hinterland of the Port

- Commercial Area - sources of various commercial products.
- Agricultural Area - sources of rice, vegetables, copra, animals and other agri-products.
- Industrial Area - manufacturing of oil products, coco products, sugar, cement, etc.
- Tourist Area - Puerto Galera, Balanacan and Sta. Cruz - "Moriones"

2.4.4 Cargo Traffic — Ave. Annual - 9,202,320 M.T.

	IN	OUT	TOTAL
- Bulk			
Domestic	797,945	1,613,955	2,401,900
Foreign	5,391,240	425,665	5,816,905
T o t a l	6,179,185	2,039,620	8,218,805
- Break Bulk			
Domestic	465,820	279,795	745,615
Foreign	36,840	201,420	237,900
Total	502,660	481,215	983,515

(See Table 1)

- Container (Insignificant)

2.4.5 Passencer Traffic (Daily Average)

	IN	OUT
Batangas - Calapan - Batangas	600	800
Batangas-P. Galera-Batangas	100	390
Batangas-A. de Ilog-Batangas	20	25
Manila-San Jose-Manila	20	25
Lucena-Marinduque-Lucena	205	205
Pinamalayan-Marinduque - Pinamalayan	35	25
Other Island-to-Island Traffic	25	15
Daily Average Total	1,105	1,535

3. DEVELOPMENT PROFILE OF THE PORT DISTRICT INCLUDING ITS HINTERLAND

3.1 General Socio-Economic Conditions

The population of Southern Tagalog (excluding Palawan) was 5.7 million in 1980, having experienced an average annual growth rate of 3.2 per cent over the preceeding five years period. After the National Capital Region, Southern Tagalog was the most heavily populated region in the country and achieved the highest absolute increase in population between 1970 and 1980. The population of Batangas City was 144,000 in 1980; for Lipa the figure was 121,000.

In the south of the Study Area, the population density is relatively light without especially noticeable peaks around the urban points. In the north, however, definite concentrations are in evidence. Population is particularly dense around the south west edge of Laguna de Bay; indeed it could be said that the lakeshore has the most marked concentration of population in the whole of Luzon south of Metro-Manila.

Region IV has a GRDP per head of 1,598 pesos in 1979, the fifth highest in the Philippines. This relatively high GRDP per head was not however evenly distributed throughout the region. The area within the direct influence of Metro Manila are, as might be expected, more industrialized than those more remote from the capital.

The Five-Year Development Plan in acknowledging this difference, proposes setting up "growth corridor sub-regions" and "resource sub-regions". The growth corridor sub-regions are intended to take advantage of existing transport infrastructure and are planned to attract industrial expansion away from Metro Manila, thus assisting the decongestion process. The resource sub-regions on the other hand are to be encouraged to expand agricultural productivity to provide the raw materials and foodstuffs required by the growth corridor areas and Metro Manila.

Concurrently, it is hoped that urbanization can be accelerated in the provincial capitals and other selected towns through the development of agro-industrial activities. Such urbanization is deemed an essential condition for the resource sub-regions' development into self-sustained growth areas.

The growth corridor sub-regions are located on a north-south axis from Metro Manila and based around the exist-

ing cities of Calamba, Batangas City, San Pablo City and Lucena City. Coupled with this effort there is planned the integrated development of the tourist potential of Cavite, Batangas and Laguna. The main emphasis in the development of manufacturing will be food processing, garments, chemicals and petrochemicals, textiles, fibers, electrical equipment and wood products. The output of the sector was projected to double in the Ten Year Plan period, 1978-1987

3.2 Economic Forecast

3.2.1 Industrial Development

3.2.1.1 Batangas - industrial plants such as petrochemical, sugar centrals, flour mills, soybeans processing plants, shipyards, cement plants, will have considerable expansions in production within ten years.

3.2.1.2 Oriental and Occidental Mindor - mineral products processing such as barites, silica, talcum and on-shore oil drilling will have substantial developments in ten years.

3.2.1.3 Marinduque - demands for semi-processed and finished copper metal will increase in the domestic and foreign market, during the last half of the decade.

3.2.2 Agricultural Development

3.2.2.1 Sugar cane production is expected to increase considerably to meet the domestic and foreign demands which current trends showing a considerable increase in price and volume demand.

3.2.2.2 Rice production according to NFA with the ten year period will be six million, gradually increasing to ten million cavans of palay in both Oriental and Occidental Mindoro with an expected aggregate estimate of twenty million cavans of palay, 25% to 30% of which will be of export quality, primarily due to NIA supported irrigation projects in the two Mindoro provinces.

3.2.2.3 Copra, coconut oil and other coconut oil products foreign market demand will not increase. However, domestic consumption is expected to increase insignificantly during the decade.

3.2.2.4 Soybeans production in Occidental Mindoro, where the pilot farm is situated in San Jose, has bright prospects. Oriental Mindoro and Batangas area are considered suitable for soybean corporate farming scheme.

3.2.3 Infra-Structure Development

3.2.3.1 Road network linking the two Mindoro provinces and all government ports are expected to be completed before the end of the decade. In Batangas, roads and highways connecting Batangas City - Nasugbu and Tagaytay; the by pass road from highway (to Manila) to the Port of Batangas and the railroad from Batangas City to Manila are all programmed to be completed in 1990 according to MPH development and PMP-Batangas City Plans and Programs.

3.2.3.2 Power distribution will get a substantial boost if the geothermal plants will all be operational. Fifty percent (50%) of the areas covered by the port district will be included in the national power distribution program, with all supports completely enjoying adequate electric power supply towards the end of the decade.

4. TRAFFIC FORECASTS

4.1 Shipping

Expected types of vessels in the next six years are as follows:

- Ferryboats - Cargo/Passenger
- RO-RO Vessels - Cargo/Passenger
- Motorized Batels - Cargo/Passenger
- Cargo Vessels - MB, SBM, Batels

  * Domestic - M/V for Palay, rice, cement, fertilizer, lumber, plywood, etc; FV, FS for fish; LCT, LCM and barges for molasses, minerals & other cargoes; MF; Yacht; military vessels; oil tankers for petroleum products; coco crude oil; methly esther; etc.

* Foreign - M/V & MS for cement, sugar, rice, soybeans, wheat, corn and other import/export products; ~~Tuxto~~ tankers and VLCC & Oil tankers for crude oil & LPG; Barges and Tugboats for import wheat; etc.

There is an expected increase in the number of RO-RO vessels operating in the ports within the district in the next two (2) years (1982-1983) which indicates a need for the construction of more adequate Ro-Ro facilities in the ports of Batangas, Calapan, Balanacan, and Cotta.

A significant increase in shipcalls is expected in the year 1982-1983. However, no substantial increase in shipcalls from 1984-1987 is expected.

4.2 Cargo Throughput

4.2.1 General Cargo- with the increase in Ro-Ro vessels operating within the PMU ports, the ease to the transport of general cargo from island-to-island will enhance waterborne trade resulting in a significant increase in throughput of general cargoes, particularly rice and palay, fertilizer, groceries, fruits and vegetables, etc.

4.2.2 Bulk Cargoes

Wheat imports, sugar, rice, soy beans and other products for export shall be transported in the ports within the port district with no significant increase.

4.2.3 Container Cargo (insignificant)

There is an expected general increase in cargo throughput during the period 1982 and 1983. No significant cargo throughput from 1984 to 1987 is expected.

4.3 Passenger Traffic

There is an expected increase of 150,000 in passenger traffic every year. The increase may be accounted for industrial, agricultural and tourism development to which the province of Marinduque and Mindoro are subjected in the next five years.

5. INDUSTRIAL ACTIVITY AROUND BATANGAS

Batangas Province is an agricultural surplus area producing food and cash crops. The rprincipal commercial crops are sugarcane, coconut, coffee, and fruits. Productivity is relatively low and grazing areas under-utilized. Batangas is a leading area for trading beef cattle; livestock from south in the Archipelago are traded there for the Manila markets. There is, however, no significant activity in meat processing, packing on associated service activities, though there may be potential here. Forestry and fishing are not significant.

During the last five years large-scale industry on the Bay has been represented mainly by the Caltex and Shell oil refineries. Each has its own unloading facilities from crude carriers. Product pipelines connect the refineries with the Manila area. White products are moved from the Shell and Caltex refineries in a 14" pipeline to the terminal at Pandacan; and black products are moved (by Caltex only) in a 16" pipeline, which ends at Sucat.

The pattern of product shipments by transport mode from the two refineries in 1978 was:

	million tons
by sea	3.4
by pipeline	3.0
by road	0.6

The Pacific Flour mill is located on the Bay to the south east of Batangas City. With an annual capacity of just under 100,000 tons of flour processed from imported wheat, the mill primarily serves the Manila market. It has its own pier facility.

Close-by is the Phil-Asia facility for soybean meal production which opened during the third quarter of 1982. The rated plant capacity is currently 410 tons a day for meal and 80 tons a day for soybean oil.

The National Food Authority will import the soybeans from USA directly to its own facility on the Bay. They will arrive at Phil-Asia by conveyor from the NFA Batangas warehouse with an average monthly shipment size of 15,000 tons when plant capacity is achieved. NFA, being the sole buyer of soybean meal, as stipulated in the contract with Phil-Asia, is primarily responsible in organising sales to the feedmillers and in transporting the products to them.

It is expected that soybean meal will reach the millers by truck; 10-20 tons capacity at 50 kg per bag (though use of rail or barging would be considered). Soybeans oil, on the other hand, is expected to be exported to Southeast Asian countries, by ship in bulk, and locally to Metro Manila, by truck in bulk to supply industrial users (soybean oil can be used as a substitute for linseed oil in varied use in the food and cosmetic industries.

In its long-term perspective, Phil-Asia foresees a doubling of its existing output to 1000 tons a day and the production of other csoybean-based products, e.g. textured vegetable protein.

The Fortune Cement Plant is located at Taysan. Approximately 85 per cent of cement consumption in Southern Tagalog is supplied by the company. In 1980 the plant produced 354,000 tons (more than 90 per cent capacity). Of this 170,000 tons were exported through BCNP. Past sales are shown below:

	Domestic ('000 tons)	Export ('000 tons)
1975	194	93
1976	169	121
1977	190	117
1978	191	149
1979	224	43
1980	184	170

Source: Philcemcor.

Distribution of cement in Southern Tagalog is by truck. Ten-wheelers carrying 500 bags, or 20 tons, are typical.

Planters Products control nearly three-quarters of the national fertilizer distribution. Southern Tagalog requirements are supplied from the Batan warehouse which has a capacity of 7,700 tons. Annual turn-over at Batan is about 27,000 tons, and most of this comes by truck from Manila and Limay. Much of the fertilizer supply involves deliveries of relatively short distances within the 110 kilometer Manila-Batangas corridor.

Two sugar refineries are situated at Balayan and Nasugbu. The combined milling capacity is given as 10,000 tons of sugarcane a day. In 1979-80 they produced 170,000 tons of raw sugar. The refinery locations are not on Batangas Bay, and they are far from the route of the new railway.

6. PREVIOUS PORT DEVELOPMENT PROPOSALS AT BATANGAS

The 1972 Southeast Asian Transport Survey represented the general tenor during the first half of the 1970's of what was felt to be a necessary development to keep Metro-Manila of the future accessible to international and domestic trade by sea. The keynote issue was the impending traffic saturation of the Port of Manila and its land access. The solution was seen to be an additional sea-gateway at Batangas.

There is an abundance of references that could be used to show this general trepidation at work. For example, Memorandum Order No. 329 of December 1972 created a committee "to study the feasibility of transferring the domestic shipping port from North Harbor, Manila, to an alternative site in Southern Luzon, in view of the increasingly felt need to decongest the port facilities in Greater Manila". The committee took account of existing studies by TAMS, Metra, UN consultant views, and carried out its own assessment before duly concluding that:

- Existing berthing facilities in North Harbor are adequate to meet the present traffic volume and, after completion of Pier 14 and 16, the port facilities are sufficient up to 1980.;
- Land access to the Port of Manila is inadequate.
- Shore facilities are completely overcrowded and the port has no sufficient back-up area.
- It is desireable to develop in the immediate future an alternate port, somewhere south of Manila.

After reviewing four possible sites, the committee recommended that the most feasible location was in Batangas Bay, and that a "thorough study for selecting the best suitable site in Batangas Bay be started soonest. To preclude more acute shipping problems, it is deemed imperative to develop in the near future a relieving port to handle domestic shipping in anticipation of the time when North Harbor will become fully saturated".

In fact, such a study was not carried out until 1975/1976. This was the Van Houten Study, which has been given to National Transportation Planning Project II to review as the main focus of its work.

REFERENCES:

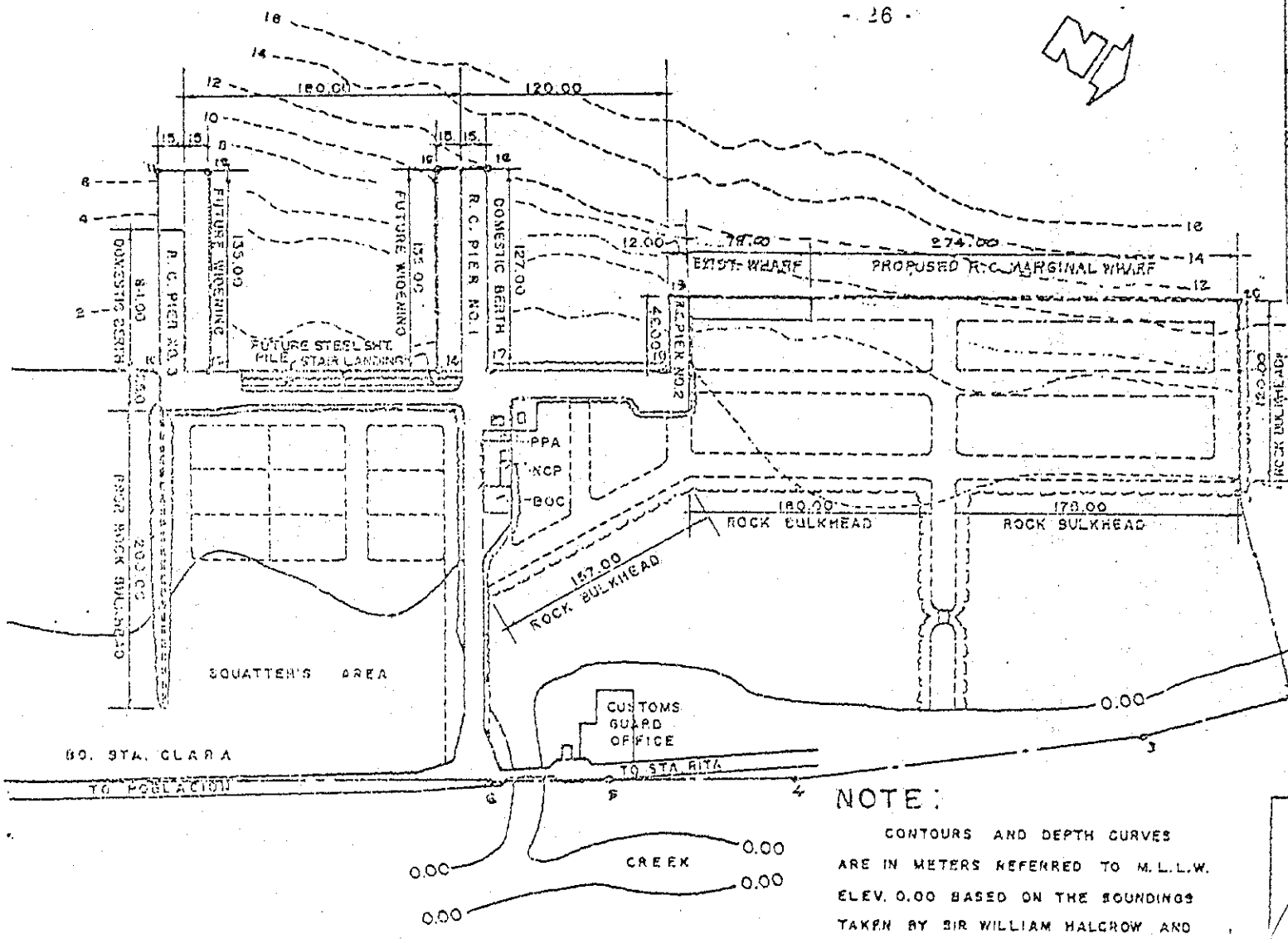
Philippine Ports Feasibility Study, Sir William Halcrow and Partners, July 1975

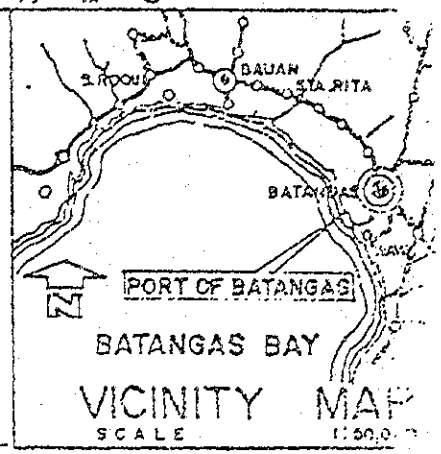
PMU Batangas Proposed Masterplan for 1982 - 1987, April 1981

Batangas Port Development and the New Railway, NTPP II, February 1983

PHILIPPINE PORTS AUTHORITY
METRO MANILA PHILIPPINES

BATANGAS BAY





LEGEND:

- EXISTING
- UNDER CONSTRUCTI
- PRIORITY DEVELOPM
- FUTURE DEVELOPM

NOTE:

CONTOURS AND DEPTH CURVES ARE IN METERS REFERRED TO M.L.L.W. ELEV. 0.00 BASED ON THE SOUNDINGS TAKEN BY SIR WILLIAM HALCROW AND PARTNER DATED 1972.

ALL DIMENSIONS ARE IN METERS.

DEVELOPMENT PLAN
PORT OF BATANGA
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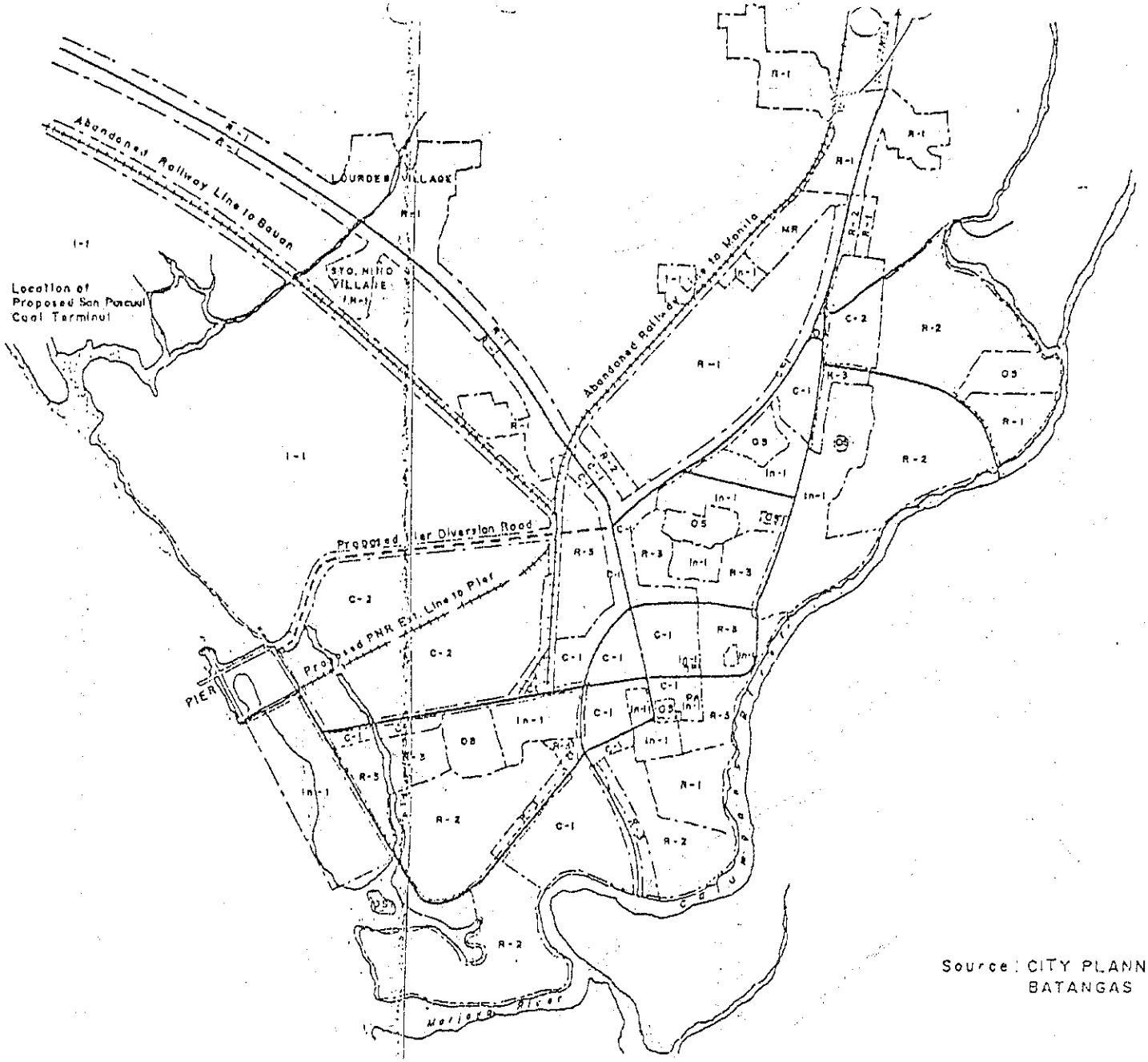
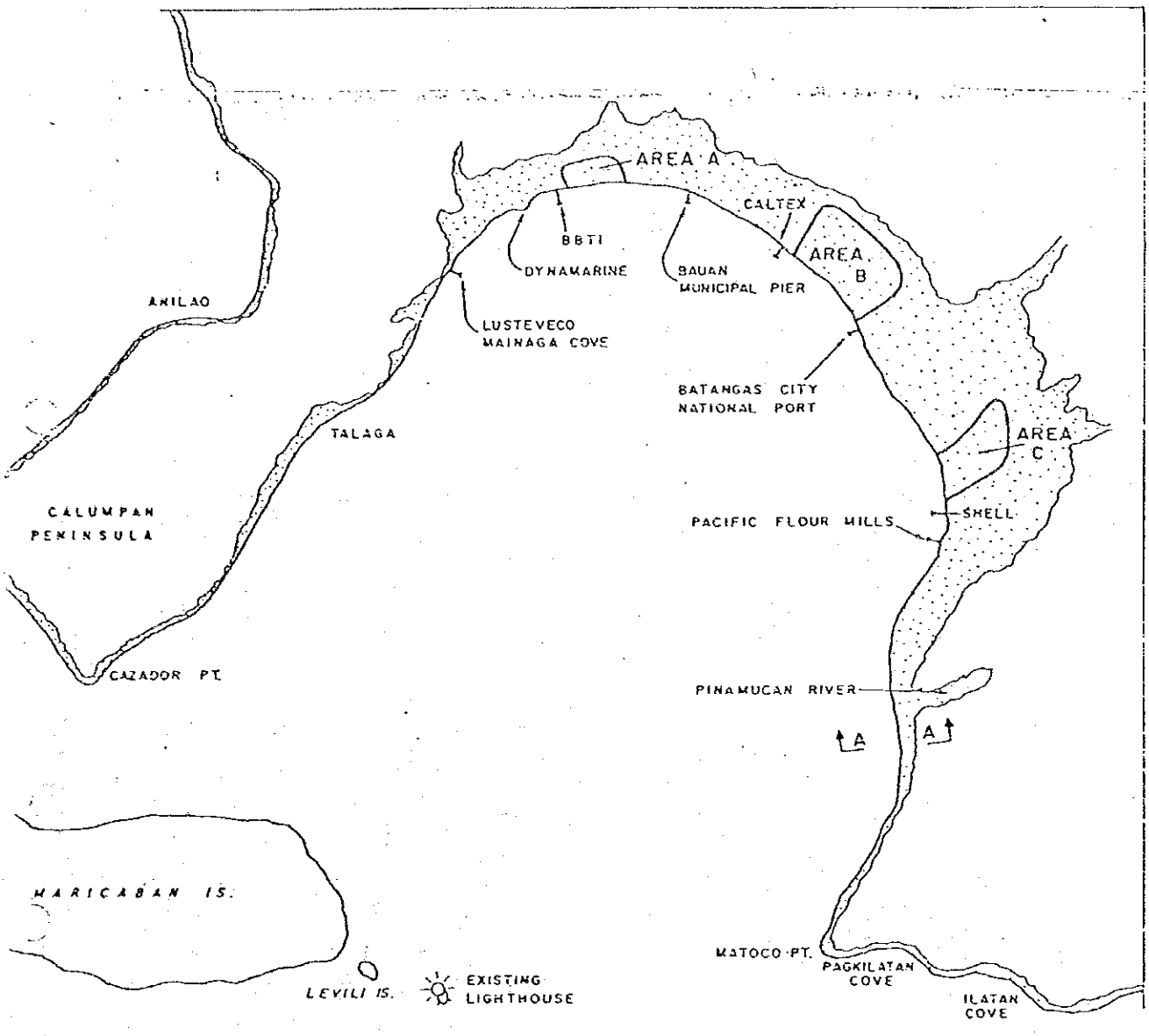


LEGEND:

R - 1	RESIDENTIAL - 1
R - 2	RESIDENTIAL - 2
R - 3	RESIDENTIAL - 3
C - 1	COMMERCIAL - 1
C - 2	COMMERCIAL - 2
C - 3	COMMERCIAL - 3
In - 1	INSTITUTIONAL - 1
I - 1	INDUSTRIAL - 1
OS	OPEN SPACE
MR	MILITARY RESERVATION

Source : CITY PLANNING & DEVELOPMENT STAFF
BATANGAS CITY

THREE CRITICAL AREAS FOR BATANGAS PORT FACILITY EXPANSION



Area Less Than 10 Meters Elevation

Source : Batangas Bay Port Fecsibility Study ; Van Houten Associates , 1976

TABLE SUMMARY SHIPPING & TRADE STATISTICS
PORT DISTRICT OF BATANGAS
1981

PARTICULARS	TOTAL	BASE PORT	SUB-PORTS	MUNICIPAL PORTS	PRIVATE PORTS	ANCHORAGE (SAN JOSE)
DOMESTIC SHIPPING						
1. Number of Vessels	11442	3737	4690	1571	1362	82
2. Gross Registered Tonnage	4089860	712999	877806	74353	2382668	42034
3. Net Registered Tonnage	2602379	415414	485657	51113	1624683	25512
4. Deadweight Tonnage	6223744	1000365	1228934	102040	3835084	57331
5. Length Overall (m.)	412201	139167	162955	26155	79537	4387
6. Maximum Length (m.)	266	105	165	117	266	99
7. Beam (m.)	78637	25464	31703	6073	14481	916
8. Maximum Beam (m.)	65	17	17	30	65	16
9. Waiting Time to Berth (hrs.)	54931	739	11416	4694	38082	-
10. Service Time (hrs.)	416533	90026	128729	82782	108867	6129
11. Cargo Tonnage Handled	3013709	223294	338409	86499	2351955	12552
Inward	1251069	154468	141100	57420	889640	8441
Outward	1761640	68826	197309	29079	1462315	4111
12. Passenger Traffic	1320294	592665	727629	NIL	NIL	NIL
Disembarked	680434	309133	371281			
Embarked	639585	283532	351553			
Transient						
FOREIGN SHIPPING						
1. Number of Vessels	317	60	NIL	NIL	257	NIL
2. Gross Registered Tonnage	5266032	296939			4969093	
3. Net Registered Tonnage	3456971	192343			3264628	
4. Deadweight Tonnage	9394293	506368			8887925	
5. Length Overall (m.)	44184	5387			38797	
6. Maximum Length (m.)	409	325			409	
7. Beam (m.)	7084	744			6340	
8. Maximum Beam (m.)	88	47			88	
9. Waiting Time to Berth (hrs.)	7633	2948			4685	
10. Service Time (hrs.)	19751	8010			11741	
11. Cargo Tonnage Handled	5157140	162403			4994737	
Import	4624324	6056			4618268	
Export	532816	156347			376469	

TABLE SHIPPING AND TRADE STATISTICS
PORT OF BATANGAS
AT BERTH - 1981

PARTICULARS	1981	PARTICULARS	1981
1. Number of Vessels	3797	11. Waiting Time to Berth (hrs.)	3687
Domestic	3737	Domestic	739
Foreign	60	Foreign	2948
2. Gross Registered Tonnage	1009938	12. Service Time (hrs.)	98036
Domestic	712999	Domestic	90026
Foreign	296939	Foreign	8010
3. Net Registered Tonnage	607757	13. Berth Occupancy Rate (%)	90
Domestic	415414		
Foreign	192343	CARGO AND PASSENGER TRAFFIC	
4. Deadweigth Tonnage	1506733	1. CARGO FLOW	
Domestic	1000365		
Foreign	506368	a. Cargo Throughput	385697
		Discharged	160524
5. Length (m.)	144554	Loaded	225173
Domestic	139167		
Foreign	5387	b. Domestic Trade	223294
		Inward	154468
6. Maximum Length (m.)	325	Outward	68826
Domestic	105		
Foreign	325	c. Foreign Trade	162403
		Import	6056
7. Beam (m.)	26208	Export	156347
Domestic	25464		
Foreign	744	2. AVE. TONNAGE HANDLED PER METRIC RUN	726
8. Maximum Beam (m.)	47		
Domestic	17	3. PASSENGER TRAFFIC	592665
Foreign	47	DISEMBARKED	309133
		EMBARKED	283532
9. Draft (m.)	9475		
Domestic	9134		
Foreign	341		
10. Maximum Draft (m.)	26		
Domestic	7		
Foreign	26		

TABLE CARGO STATISTICS BY COMMODITY CLASSIFICATION
PORT OF BATANGAS
AT BERTH - 1981

Commodity Classification	1981	Commodity Classification	1981
TOTAL CARGO THROUGHPUT	385697	Palay and Rice	9
		Other Consumer Goods	6073
TOTAL DOMESTIC TRADE	223294	Empty Bottles	6
		Animal Feeds	1019
Total Inward Cargo	25474	Sugar	2983
Other General Cargo	25474	Other Cereals	1731
Corn	4162	Plywood and Veneer	107
Oil and Oil Products	6	Live Animals	11
Copra	13406	Cement	11990
Other Consumer Goods	263	Logs and Lumber	47
Cement	8	Metal and Metal Products	424
Palay & Rice	32414	Oil and Oil Products	27
Logs and Lumber	14046	Chemicals	1310
Empty Bottles	3203	Bananas	2
Other Cereals	181	Fruits and Vegetables	1729
Metal and Metal Products	15	Fertilizer	2901
Fertilizer	12	Minerals	1
Plywood and Veneer	3057	Fish	107
Animal Feeds	2895		
Minerals	8997	TOTAL FOREIGN TRADE	162403
Other Chemicals	3284		
Live Animals	9409	Total Import	6056
Fruits and Vegetables	5821	Chemicals	5250
Calamansi	17905	General Cargo	806
Bananas	9105		
Fish	805	Total Export	156347
		Sugar	24050
Total Outward Cargo	68826	Cement	132141
Corn	10	Bottled Cargo	40
Other General Cargo	30502	Chemicals	82
Copra	100	General Cargo	34
Bottled Cargo	7737		

TABLE SHIPPING AND TRADE STATISTICS
SUB-PORTS OF PMO BATANGAS
AT BERTH - 1981

PARTICULARS	TOTAL	CALAPAN	STA. CRUZ	SIAIN	BALANACAN	SAN JOSE
DOMESTIC SHIPPING						
1. Number of Vessels	4608	2657	706	208	552	485
2. Gross Registered Tonnage	835772	624679	36945	3910	77257	92981
3. Net Registered Tonnage	460145	352872	22758	2100	29524	52891
4. Dead-weight Tonnage	1171593	871091	52172	5437	109286	133607
5. Length Overall (m.)	158568	110434	15794	1538	16953	13849
6. Maximum Length (m.)	165	165	39	30	66	66
7. Beam (m.)	30787	21220	3169	324	3162	2912
8. Maximum Beam (m.)	17	16	6	9	12	17
9. Waiting Time to Berth (hrs.)	11416					11416
10. Service Time at Berth (hrs.)	122600	46174	23424	6750	12654	33598
11. Cargo Tonnage Handled:	325857	194072	24641	1673	14457	91014
Inward	132659	82010	14066	1450	9778	25355
Outward	193198	112062	10575	223	4679	65659
12. Passenger Traffic:	727629	554290	56619	NIL	91676	25044
Disembarked	371281	292855	22477		44874	11075
Embarked	351553	261435	34142		46802	9174
Transient	4795					4795

QUESTIONNAIRE

June, 1984

Japanese Preliminary Study Team on the Development

Project of the Port of Batangas

In the Republic of the Philippines

The Japan International Cooperation Agency

To achieve the study on the development project of the Port of Batangas, the preliminary study team would like to obtain the following data and informations.

The preliminary study team would like to obtain general informations on the following.

a) The role of Region IV in the national economy
b) The role of the Port of Batangas in Region IV
c) The relation between the development of the Port of Batangas and the development of Growth Corridor Sub-region
d) Export Processing Zone in Region IV

The preliminary study team has already consulted the following materials intending to gain general information on the Port of Batangas.

"Five Year Philippine Development Plan; NEDA, May 1982"
"Port District of Batangas A Study Report; The Port Planning Dept., May 1983"
"Pre-feasibility Study on Port of Batangas Philippine Ports Authority"

Would you submit us them during our stay in the Republic of Philippines, in case the additional data and informations or revised ones exist since the implementation of the project of the Port of San Fernand or the publishment of the materials above.

I. Social / Economic Data

1. Present Situation and Forecasting

(1) Annual report/year book/statistics on national economy and economic indicators and those in Region IV, such as (a) GNP, (b) consumption, (c) population, (d) outputs of agriculture, (e) mining products, (f) manufacturing products, (g) transportation activities (commodity flow, modal split of passenger and cargo traffic, traffic volumes and number of vehicles and rolling stocks).

(2) Materials of latest national/regional economic development plans/programs and those in Region IV

(a) Authorized development plans

(b) Development programs of transportation facilities (road, railways, ports, etc.)

(c) Long term forecast of economic indicators

II. Data/Information of the Port of Batangas

1. Existing port facilities

(1) Maps

1) Layout of existing port facilities

2) Port plan (past, present and future)

(2) Latest data of accomodations

1) Depth, width and length of channels and basins

2) Depth, length, width and construction year of each pier

3) Area and informations about transit sheds, ware-house and open storage areas

4) Type, capacity and manufacturing year of cargo handling equipment

5) Type, capacity and some other major information of port facilities not mentioned above

2. Port activities

(1) Activities in the hinterland

1) Area (present and future)

2) Economic indicators concerned with above area

(2) Cargo traffic (annual data for recent five years)

1) Cargo traffic by export/import, by main routes and by commodity

2) Cargo traffic by inward/outwad (domestic) by commodity

3) Cargo traffic by commodity and by berth

4) Cargo traffic between the port and its hinterland by mode and by commodity

5) Containerized cargo traffic

(3) Ship arrivals (for recent five years)
Number by ship tonnage, by ship type and by berth

3. Surroudning conditions

(1) City plan or Land use plan in the vicinity of the Port of Batangas

(2) Fishery acitivities and fishery right at the Port of Batangas and its vicinity

(3) Environmental factors to be considered

(4) Existing road facilities connected with the Port of Batangas

(5) Existing railroads facilities connected with the Port of Batangas

4. Data / Information of port administration and port operation

(1) Organization, function and the number of personnels in each section concerning the Port of Batangas

(2) Annual budget (income and expenditure) for recent five years (including subsidy from the government, if any)

(3) Relating government offices and relating enterprises

(4) Procedures to use port

(5) Map of port district, port limits and area

5. Authorized plan of the Port of Batangas

(1) Its content

(2) Construction schedule

(3) Relation between the plan above and the scope of this study required

III. Data / Information of other ports

1. Cargo traffic by export/import (and outward/inward), by main routes and by commodity of ports in Port district of Batangas and the port of Manila

2. Maps and Port existing facilities of the ports

IV. Tables of the organization of the Government and Secretary of Communication and Transport

V. List of existing reports on the Port of Batangas

VI. Ports to be referred as model ports in examining the development of the Port of Batangas

QUESTIONNAIRE
ON
NATURAL CONDITIONS OF PORT OF BATANGAS

June, 1984

Japanese Preliminary Study Team on the Development
Project of the Port of Batangas
The Republic of Philippines

The Japan International Cooperation Agency

Would you supply the data on the natural conditions during our stay in the Republic of Philippines?

(1) Meteorogical Conditions

1) Location of meteorogical station near Batangas.
2) Content and record period of the materials of meteorogical observation data as follow:
   i) Weather
   ii) Wind data
   iii) Weather chart
3) Data on other special meteorogical phenomena (cyclone and earthquake) if available.

(2) Hydrographical Conditions

1) Location of tide station in Batangas.
2) Content and record period of the materials of tidal observation data.
3) Tidal range and tidal level of HHWL, HWL, LWL, LLW in Batangas.
4) Data on storm tide if available.
5) Current speed if available.
6) Littoral drift (quantities maintenance dredgings and river discharges) if available.

(3) Topographical Conditions

1) Topographical map
2) Coastal topographical map (including sea area)

(4) Geological Conditions

1) Records of soil investigation
2) Locations of boring holes.
3) Results and locations of sea bottom soil sampling.