6 Site Selection for the New Cebu Port

6.1 Preliminary Evaluation of Candidate Sites for the New Cebu Port

6.1.1 Evaluation Policy

(1) Evaluation Sites

1) The Study on the Cebu Integrated Area Development Master Plan

The Study on the Cebu Integrated Area Development Master Plan was conducted from 1993 to 1994 by a JICA Study Team. Study findings related to the Cebu Baseport were as follows: Cebu Baseport is the lifeline of the Cebu economy. Strengthening of its function is a crucial issue. The existing Cebu Baseport will face a serious shortage in wharf length and space for supporting facilities in the long term by 2010. However the present location has no sufficient space for expansion. Therefore, Cebu Baseport needs to be expanded at an alternative location. This new port should be an international deep-sea port that can cater to container cargoes.

The study nominated five conceivable candidate sites for a new Cebu International Port along the Mactan Channel in Metro Cebu area on the east side of Cebu island and recommended a detailed study for these candidate sites to select the most appropriate site for a new Cebu International Port.

- Consolacion;
- Mactan North reclamation area;
- Mactan South reclamation area;
- The Planned Cebu South Reclamation Area, and
- Minglanilla Reclamation area.

2) Toledo and Balamban

Toledo and Balamban are located at the center of the western seaboard of the Cebu island. They are also considered as candidate sites for a new international port in order to support regional development on the basis of recent studies.

Toledo port is a main port that is connecting Cebu island and Negros Occidental (San Carlos) to accommodate cargo and passenger traffic demand, which forms nationwide RORO routes, such as Panay island – Negros islands – Cebu island – Bohol island – Mindanao island.

In Balamban there is a large industrial estate (West Cebu Industrial Park), which is aiming to function as an Exported Oriented Economic Zone. This is planned for medium and heavy industries, especially for shipbuilding and allied activities. Besides private port facilities in this

industrial park, Balamban has only a small rock mound causeway operated by a private company.

3) Evaluation sites for a new Cebu Port

The most important function required for a new port in the southern part of the nation is as an international container terminal to complement international container terminals in the Manila region in the northern part of the country. This is because containerization is the dominant trend in world shipping and is thus vital to the economic development in Cebu province and Visayas region.

Along with containerization, vessel size is increasing to take advantage of the economy of scale. The existing Cebu Baseport has two major problems in this regard: insufficient water depth and land space for future expansion. The solution is to develop a new international container terminal with sufficiently deep berths, sufficient land space and introduce a modernized cargo handling system within the Cebu Baseport area..

To choose the most suitable site for the new port, several factors such as 1) potential of the hinterland, 2) land transportation network, and 3) natural conditions should be taken into account.

Metro Cebu area has a large potential for container cargoes. Most export container cargoes are produced in the Metro Cebu area. Cebu Baseport and surrounding areas have a large potential for port activities and sea transport demand. The Cebu Baseport area also has many functions related to port activities, such as government agencies, port operators and shipping agencies, which are essential functions for port activities and promotion. A new international container port also needs such functions and it must use these functions which the existing Cebu Baseport possesses.

In addition to these factors, another important factor is functional linkage with the existing Cebu Baseport. RORO vessels network at Cebu Baseport caters for domestic container cargo transport. Therefore a new international container port should keep good linkage with the existing Cebu Baseport to create an effective container transport network in Visayas and Mindanao region.

Metro Cebu area has a problem of road congestion and the land traffic condition needs to be improved for the port development. But this area still has many advantages as the development site of a new international container terminal

Toledo/Balamban area has been developed for industries, especially medium and heavy industries. The basic industrial development policy of Cebu province is that heavy industries should be developed on the west side of the island while light industries should be promoted

on the east side of the island. Therefore, compared to Metro Cebu area, the container cargo potential in this area is small. This area also has a problem in terms of linkage with the existing Cebu Baseport.

In line with these points, a new container port should be located close to the existing Cebu Baseport. A new international port in Toledo/Balamban on the west side of Cebu island should have another function such as an industrial port in order to support the industrial development in this region.

The evaluation sites for a new Cebu Port are as follows;

- Consolacion/Liloan;
- Cebu South;
- Minglanilla;
- Mactan North;
- Mactan South;

(2) Evaluation Method

Before selecting the site for long-term international container port, technical evaluation from various perspectives, specifically the evaluation of the natural and socio-economic conditions of the proposed sites, is required.

Firstly, the candidate sites' port history and basic characteristics are the bases for the evaluation. Below are the items that shall be considered.

1) Natural condition

Natural condition here refers to the design conditions of the port facilities, constraints of construction, sailing condition, future development possibility, and accessibility. The total evaluation of this item is judged using the natural environmental perspective.

101 Available water depth at berth:	required depth is 12 m
102 Available water depth at channel:	required depth is 12 m
103 Oceanographic conditions:	less than 0.5 m is anticipated
104 Soil conditions:	depth and thickness of silty clay are chiefly examined
105 Land availability of port area and future expansion:	area for port and port related industry is required
106 Natural environmental aspects:	assessment on land settlement and natural environmental aspects
107 Accessibility from existing road:	accessibility by land transportation

2) Social-economic condition

Social-economic condition means the navigational safety, required transport and land preparation cost, necessity of port function to industrial development, and other social-economic aspects. The total score related to social-economic conditions is then examined.

201 Accessibility from existing Cebu Port:	examination on transfer cost between domestic and foreign
202 Navigation safety for ship:	checking of safety sailing
203 Navigation safety for aircraft:	checking of influence on air transport
204 Necessity of port function to industrial development:	availability of large size industrial area
205 Easiness of land acquisition:	examination on land acquisition cost
206 Social environmental aspects:	assessment of impacts on villages and fishing industry

Secondarily, criteria assumed for the above items by 5 count corresponding to condition of alternative. Detailed description of each square is referred to the Table attached.

Thirdly, evaluated item shall be examined based on the technical priority of the port development project. In case of the standard type, key points are set for oceanographic condition, environmental consideration, accessibility from existing port, and navigation safety for ship.

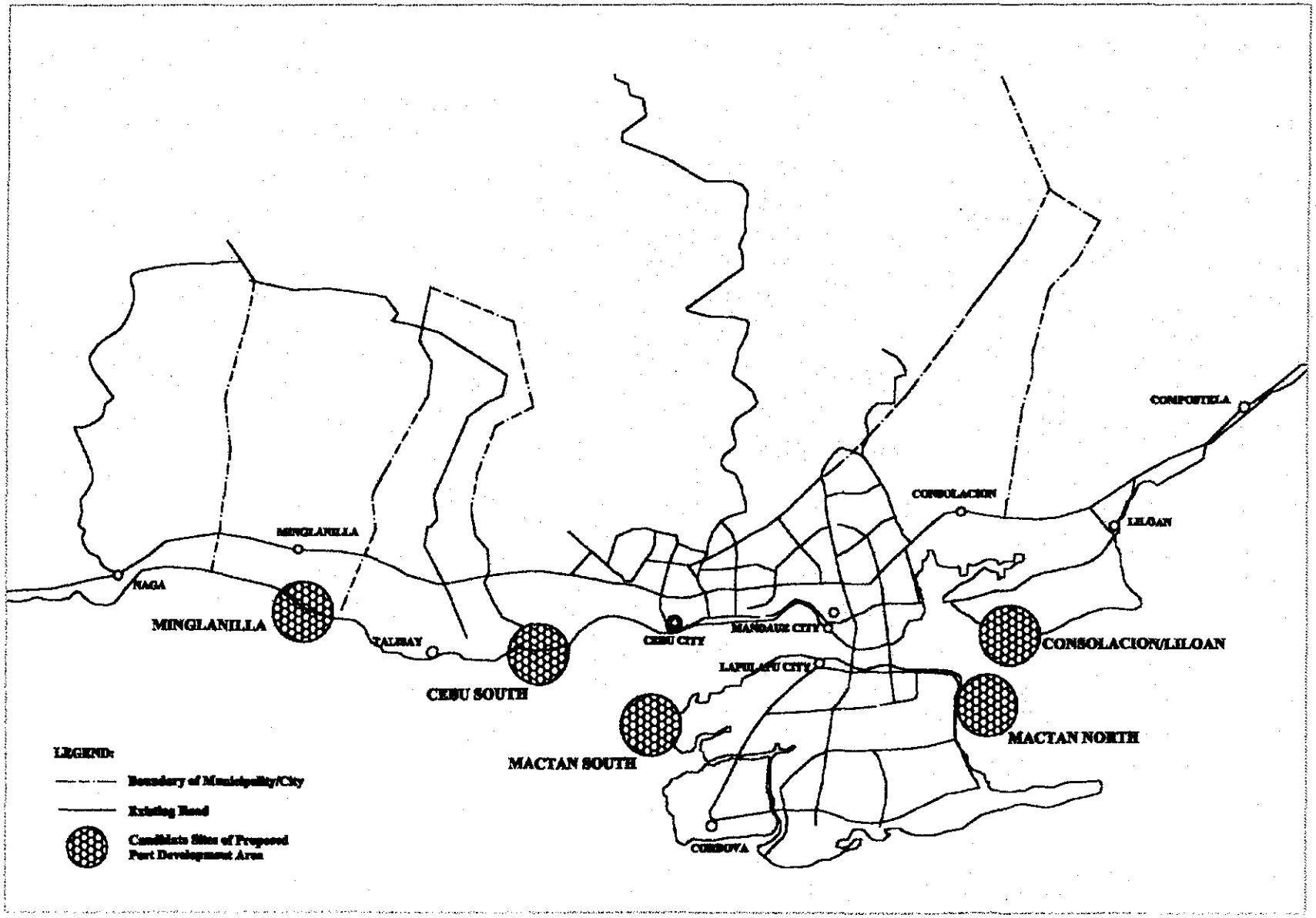

Fig. 6.1.1-1 The Candidate Sites for a New Cebu Port

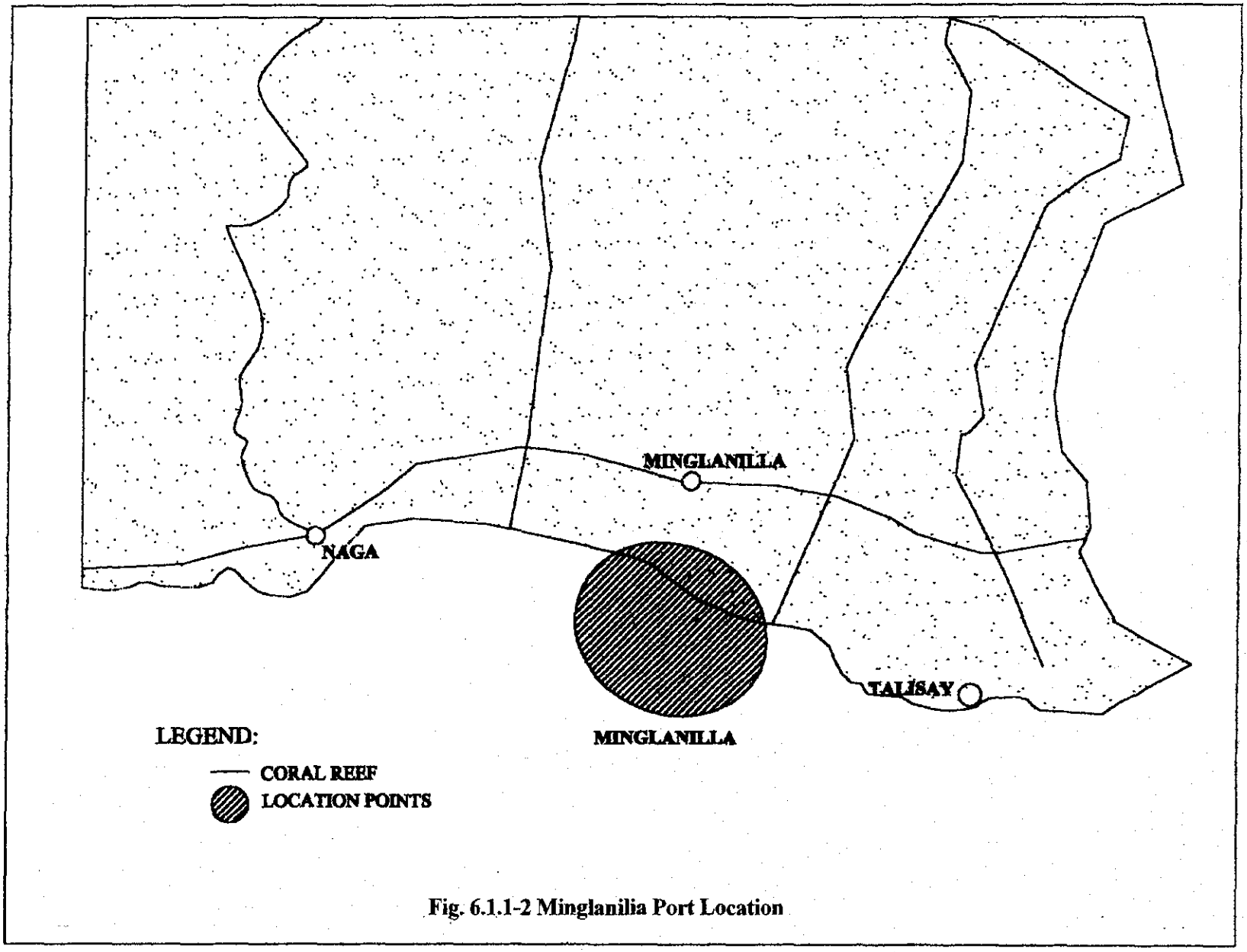

Fig. 6.1.1-2 Minglanilia Port Location

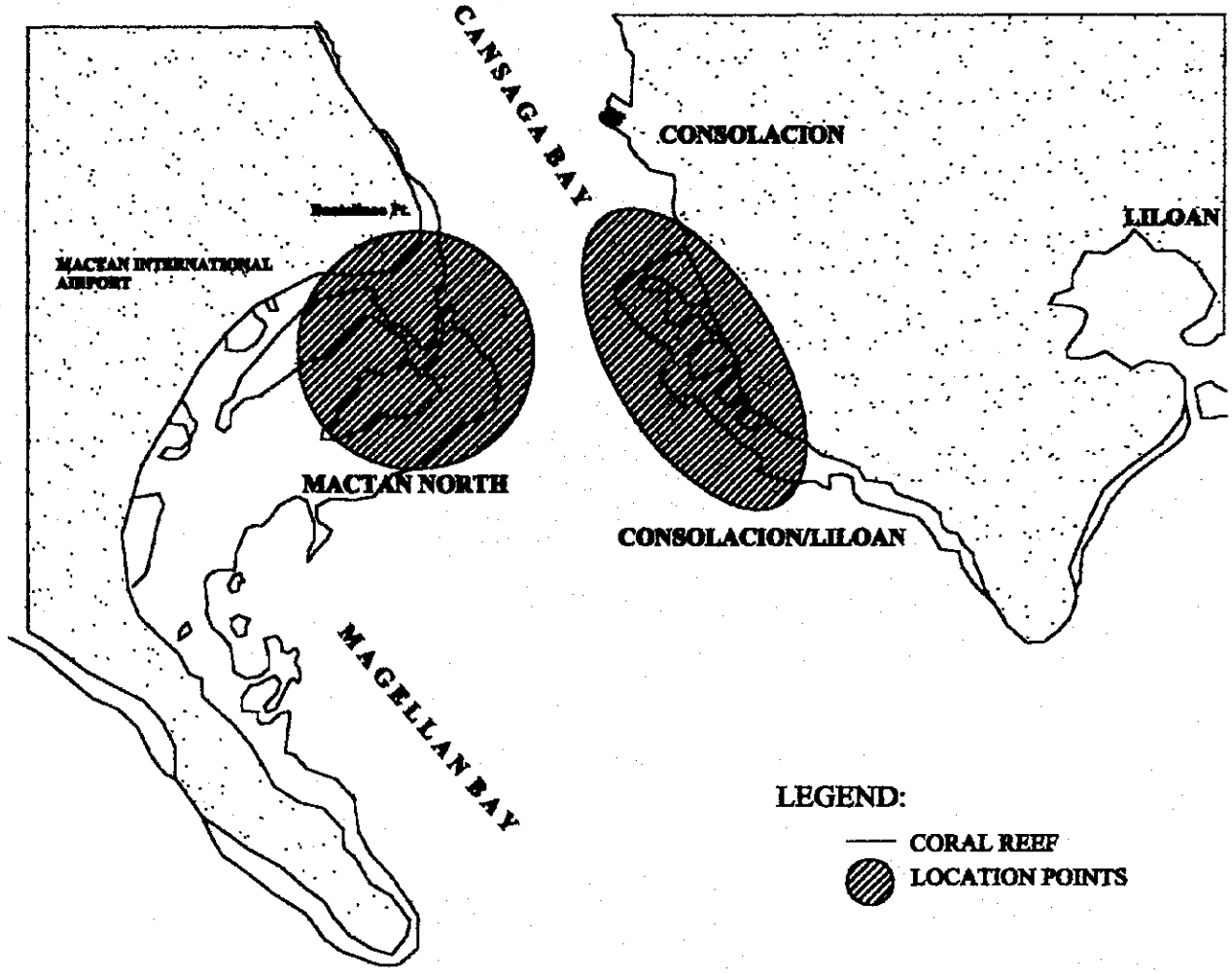

Fig. 6.1.1-3 Mactan North – Cebu North Port Location

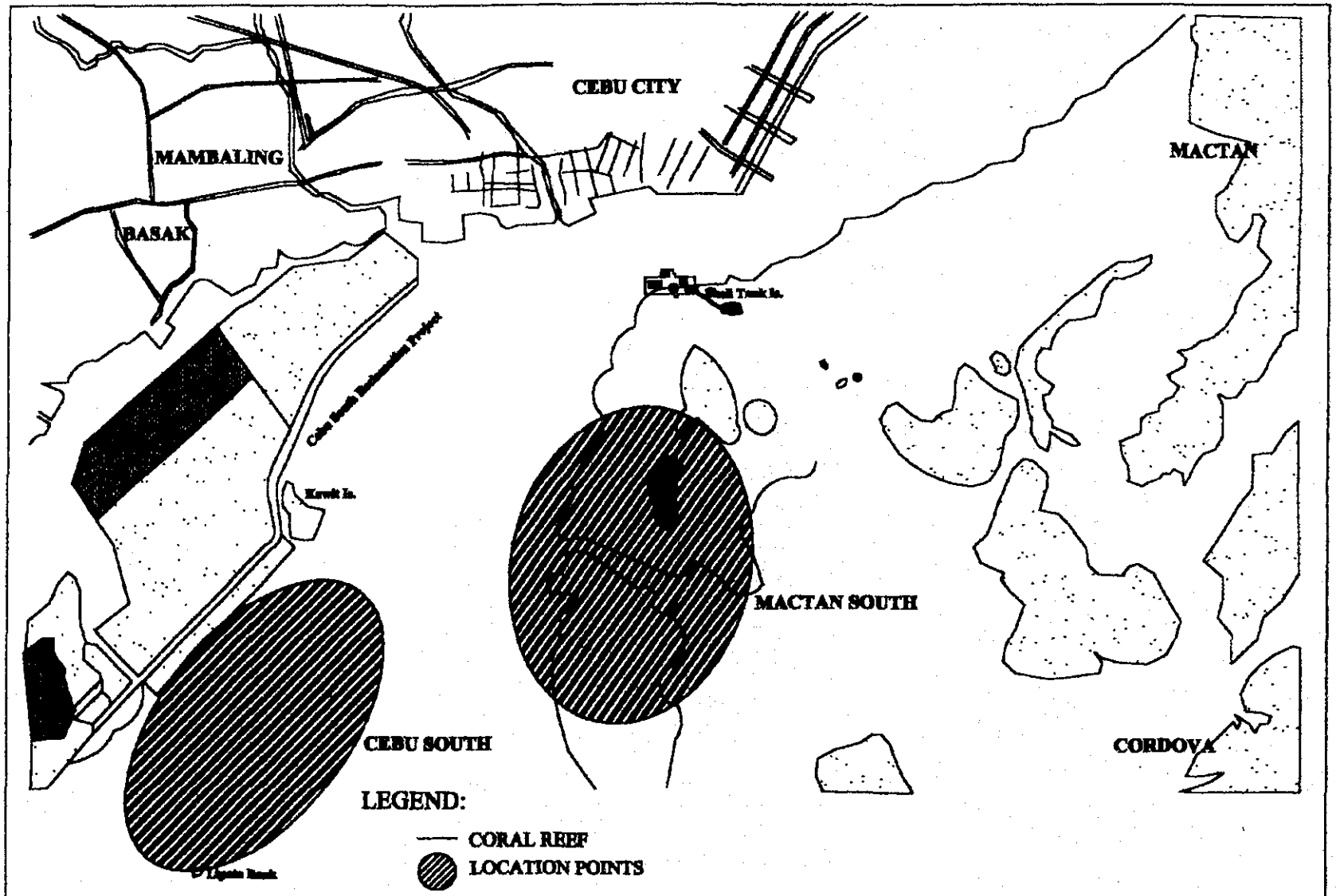

Fig. 6.1.1-4 Cebu South – Mactan South Port Location

Table 6.1.1-1 Criterion for Judgment on Site Condition from Various Points of Views

No.	Item	Judging Point	Score 5	Score 4	Score 3	Score 2	Score 1
101	Availability of Water Depth at Berth	Water Depth	>12 m	>10 m	>8 m	>6 m	<6 m
102	Availability of Water Depth at Access Channel	Water Depth	>12 m	>10 m	>8 m	>6 m	<6 m
103	Oceanographic Conditions	Anticipated Wave Height	<0.5 m	<0.8 m	<1.1 m	<1.5 m	>1.5 m
104	Soil Condition	Softness of Soil and Depth of Bearing Layer	Sea Bed by Sand or Coral	Sea Bed by Silty Clay	Sea Bed by Soft Silty Clay	Silty Clay at Deeper Layer from Sea Bed	Soft Silty Clay at Deeper Layer from Sea Bed
105	Land Availability of Port Area and Future Expansion	Minimum required Area assumed of 50 ha	>100 ha	>70 ha	>50 ha	=50 ha	<50 ha
106	Natural Environmental Aspects	Land Settlement and Impact on Coral and Mangrove	No Damage	Minor Damage	Small Damage	Medium Damage	Big Damage
107	Accessibility from Existing Road	Distance from the Existing National Road	<1 km	<3 km	<5 km	<10 km	>10 km
201	Accessibility from Existing Port	Distance from Cebu Port	<15 min	<30 min	<45 min	<1.0 hour	>1.0 hour
202	Navigation Safety for Ship	Navigation Safety in Port Area and Channel	Easy Approach for Long Term	Easy Approach for Short Term	Coordination is Necessary in the future	Coordination is Necessary at present	Full Use at Present
203	Navigation Safety for Aircraft	Height Limitation of the Airport	No Height Limitation	Under the Influence of Conical Surface	Partly under the Influence of Inner Horizontal Surface	Mostly under the Influence of Inner Horizontal Surface	Under the Influence of Approach Surface
204	Necessity of Port Function to Industrial Development	Available Size for Industrial Area	Adjacent Area>200 ha	Adjacent Area>160 ha, or Remote Area>200 ha	Adjacent Area>120 ha, or Remote Area>160 ha	Adjacent Area>80 ha, or Remote Area>120 ha	Adjacent Area<80 ha, or Remote Area<120 ha
205	Easiness of Land Acquisition	Type and Lot Price of Adjacent Area	Non Developed Area and low cost	Industrial Area and low cost	Industrial Area and Medium Cost	Commercial Area and Medium Cost	Residential Area or High Cost
206	Social Environmental Aspects	Village and Fish Industry	No Village and Fish Industry	Small Scale of Village or Fishing Industry	Small Scale of Village and Fishing Industry	Large Scale of Village or Fishing Industry	Large Scale of Village and Fishing Industry

6.1.2 Results of Evaluation

Five alternative sites are set as follows:
Alternative 1 : Consolacion/Liloan
Alternative 2 : Mactan-North
Alternative 3 : Mactan-South
Alternative 4 : Cebu South
Alternative 5 : Minglanilla

Each site is evaluated by item due to criterion and summarized in Table 6.1.2-1 & -2.

Results of alternative evaluations are reported in attached Table 6.1.2-3.

In recent years, environmental soundness of a project has become a key factor in judging its feasibility. Together with this, construction cost is an equally important item for deliberation. Therefore, three cases are compared basing on obtained score by alternative.

Alternative 4 ranks first followed by Alternative 1. The scores of these alternatives are 6 points higher than the other alternatives in the case of the Standard Type section. In case of the Weighted Environmental Aspects, Alternative 4 again ranks first followed by Alternative 1—each obtained a score of 3 points higher than the others. For Weighted Construction Cost, Alternative 1 ranks first while Alternative 4 is second—their scores are 5 points higher than the others.

Table 6.1.2-1 Design Condition and Estimated Site Condition

Design condition

1. Required Land Area by year 2020	50 ha
2. Required Water Depth	-12 m
3. Calling Vessel (LOA=)	270 m
4. Required Area of Basin (Diameter=)	540 m

Estimated site condition

Note : 101 – Availability of water depth at the berthing area

Consolacion/Liloan :	easy to construct required depth
Mactan-North :	easy to construct required depth
Mactan-South :	easy to construct required depth
Cebu-South :	easy to construct required depth
Minglanilla :	easy to construct required depth

Note : 102 – Availability of water depth at the approach channel

Consolacion/Liloan :	easy to construct required depth
Mactan-North :	easy to construct required depth
Mactan-South :	easy to construct required depth
Cebu-South :	easy to construct required depth
Minglanilla :	easy to construct required depth

Note : 103 – Oceanographic conditions

Consolacion/Liloan :	anticipated wave height on shore is around 1.10 m
Mactan-North :	anticipated wave height on shore is around 1.10 m
Mactan-South :	anticipated wave height on shore is around 1.15 m
Cebu-South :	anticipated wave height on shore is around 1.15 m
Minglanilla :	anticipated wave height on shore is around 1.55 m

Note : 104 – Soil condition

Consolacion/Liloan :	Hard bearing layer with mixing sand/coral reef will be encountered around 20–30 m depth
Mactan-North :	Mixing layers with coral reef from existing sea bed and sand layer for around 40–50 m
Mactan-South :	Bearing layer will be encountered below –35 to 40 m from existing sea bed
Cebu-South :	Soft silty clay layer for more than 40 m depth from existing sea bed
Minglanilla :	Soft silty clay layer for more than 40 m depth from existing sea bed

Note : 105 – Land availability of port area and future expension

Consolacion/Liloan :	50–70 ha is available
Mactan-North :	50–70 ha is available
Mactan-South :	70–100 ha is available
Cebu-South :	50–70 ha is available
Minglanilla :	50–70 ha is available

Note : 106 – Natural environmental aspects

Consolacion/Liloan :	Impact on mangrove
Mactan-North :	Impact on mangrove
Mactan-South :	impact on mangrove
Cebu-South :	no impact
Minglanilla :	land settlement

Note : 107 – Accessibility from existing road

Consolacion/Liloan :	within 3 km
Mactan-North :	within 3 km
Mactan-South :	within 5 km
Cebu-South :	within 3 km
Minglanilla :	within 1 km

Table 6.1.2-1 Design Condition and Estimated Site Condition – continued

Note : 201 – Accessibility from existing port

Consolacion/Liloan :	within 10 km
Mactan-North :	within 13 km
Mactan-South :	within 15 km
Cebu-South :	within 7 km
Minglanilla :	within 25 km

Note : 202 – Navigation safety for ship

Consolacion/Liloan :	small influence to existing channel
Mactan-North :	Reducing width of existing channel
Mactan-South :	Reducing width of existing channel
Cebu-South :	smooth entrance with one turn
Minglanilla :	smooth entrance

Note : 203 – Navigation safety for aircraft

Consolacion/Liloan :	Partly under the Influence of Inner Horizontal Surface
Mactan-North :	Mostly under the Influence of inner horizontal surface
Mactan-South :	No height limitation
Cebu-South :	No height limitation
Minglanilla :	No height limitation

Note : 204 – Available size for industrial area to examine necessity of port function to industrial development

Consolacion/Liloan :	Available adjacent area > 120 ha
Mactan-North :	Available remote area > 160 ha
Mactan-South :	Available adjacent area > 160 ha
Cebu-South :	Available remote area > 160 ha
Minglanilla :	Available adjacent area > 120 ha

Note : 205 – Easiness of land acquisition

Consolacion/Liloan :	Industrial area and low cost
Mactan-North :	Industrial area and medium cost
Mactan-South :	Industrial area and medium cost
Cebu-South :	Industrial area and medium cost
Minglanilla :	Industrial area and low cost

Note : 206 – Social environmental aspects

Consolacion/Liloan :	Some factories, fishing ponds and residents are scattered
Mactan-North :	Fishing ponds and residents are scattered
Mactan-South :	Fishing ponds is scattered
Cebu-South :	Isolated area
Minglanilla :	Fishing ponds and residents are scattered

Table 6.1.2-2 Evaluation Sheet on Selection of New Port Area from 5 Candidates

	Standard Type										Weighted on Environmental Aspects										Weighted on Construction Cost									
		Alternative 1 Consolacion/ Liloan		Alternative 2 Mactan-North		Alternative 3 Mactan-South		Alternative 4 Cebu-South		Alternative 5 Minglanilla		Alternative 1 Consolacion/ Liloan		Alternative 2 Mactan-North		Alternative 3 Mactan-South		Alternative 4 Cebu-South		Alternative 5 Minglanilla		Alternative 1 Consolacion/ Liloan		Alternative 2 Mactan-North		Alternative 3 Mactan-South		Alternative 4 Cebu-South		Alternative 5 Minglanilla	
	weight	original	weighted	original	weighted	original	weighted	original	weighted	original	weighted	weight	even	weighted	even	weighted	even	weighted	even	weighted	even	weighted	weight	even	weighted	even	weighted	even	weighted	even	weighted	even	weighted
101 Availability of Water Depth at Berth	1	4	4	4	4	3	3	4	4	1	1	1	4	4	4	4	3	3	4	4	1	1	1	4	4	4	4	3	3	4	4	1	1
102 Availability of Water Depth at Access Channel	1	5	5	5	5	5	5	5	5	5	5	1	5	5	5	5	5	5	5	5	5	5	1	5	5	5	5	5	5	5	5	5	5
103 Oceanographic Conditions	3	3	9	3	9	2	6	2	6	1	3	2	3	6	3	9	2	4	2	4	1	3	2	3	6	3	6	2	4	2	4	1	2
104 Soil Condition	1	4	4	3	3	3	3	2	2	2	2	1	4	4	3	3	3	3	2	2	2	2	3	4	12	3	9	3	9	2	6	2	6
105 Land Availability of Port Area and Future Expansion	1	3	3	3	3	4	4	3	3	3	3	1	3	3	3	3	4	4	3	3	3	3	1	3	3	3	3	4	4	3	3	3	3
106 Natural Environmental Aspects	2	4	8	4	8	4	8	5	10	4	8	3	4	12	4	12	4	12	5	15	4	8	1	4	4	4	4	4	4	5	5	4	4
107 Accessibility from Existing Road	1	4	4	4	4	3	3	4	4	5	5	1	4	4	4	4	3	3	4	4	5	5	1	4	4	4	4	3	3	4	4	5	5
Total of Weight on Natural Condition	10											10											10										
Total of Evaluated Score on Natural Conditions		27	37	26	36	24	32	25	34	21	27		27	38	26	37	24	34	25	37	21	27		27	38	26	35	24	32	25	31	21	26
Ranking from Higher Weighted Score on Natural Conditions			1		2		4		3		5			1		2		4		2		5			1		2		3		4		5
201 Accessibility from Existing Port	3	4	12	3	9	3	9	4	12	2	6	2	4	8	3	6	3	6	4	8	2	4	3	4	12	3	9	3	9	4	12	2	6
202 Navigation Safety for Ship	2	4	8	3	6	3	6	4	8	5	10	2	4	8	3	6	3	6	4	8	5	10	2	4	8	3	6	3	6	4	8	5	10
203 Navigation Safety for Aircraft	1	3	3	2	2	5	5	5	5	5	5	1	3	3	2	2	5	5	5	5	5	5	1	3	3	2	2	5	5	5	5	5	5
204 Necessity of Port Function to Industrial Development	1	3	3	3	3	4	4	3	3	3	3	1	3	3	3	3	4	4	3	3	3	3	1	3	3	3	3	4	4	3	3	3	3
205 Easiness of Land Acquisition	1	4	4	3	3	3	3	3	3	4	4	1	4	4	3	3	3	3	3	3	4	4	1	4	4	3	3	3	3	3	3	4	4
206 Social Environmental Aspects	2	3	6	3	6	4	8	5	10	3	6	3	3	9	3	9	4	12	5	15	3	9	2	3	6	3	6	4	8	5	10	3	6
Total of Weight on Social-Economic Condition	10											10											10										
Total of Evaluated Score on Social-Economic Conditions		21	36	17	29	22	35	24	41	22	34		21	35	17	28	22	36	24	42	22	35		21	36	17	29	22	35	24	41	22	34
Ranking from Higher Weighted Score on Social-Economic Conditions			2		5		3		1		4			2		5		2		1		4			2		5		3		1		4
Grand Total of Evaluated Score		48	73	43	65	46	67	49	75	43	61		48	73	43	65	46	70	49	79	43	62		48	74	43	64	46	67	49	72	43	60
Ranking from Higher Weighted Score on Total Conditions			2		4		3		1		5			2		4		3		1		5			1		4		3		2		5

6.1.3 Proposal for Selection of Two Prioritized Development Sites

Based on the evaluation, Alternative 1 and Alternative 4 are identified as reasonable sites for a long-term international container port among the five alternatives.

However, evaluated scores among the alternatives are quite close. Therefore, a detailed evaluation shall be conducted after the soil survey on the selected two sites.

In this preliminary evaluation, Alternative 1 is the selected site from the economical point of view because a breakwater may not be required. Alternative 4 is selected from the environmental point of view because this site is isolated from the existing land area. Alternative 2 and 3 are expected to be developed for the tourism purposes. Alternative 5, on the other hand, is relatively far from the existing Cebu port, demanding more resources for it to establish a close linkage with domestic cargo.

6.2 Evaluation of Two Prioritized Sites for a New Cebu Port

6.2.1 Soil Conditions

(1) Selection of Sites and Points of Soil Investigation

1) Sites Selection of Soil Investigation

Initially, the 5 candidate sites for new Cebu Port Development as suggested in the Cebu comprehensive study by JICA in 1994 were reviewed by the Study team. The study team started the field recommendation survey from the land and sea on the suggested 5 sites. The team has carried out the evaluation of site conditions and established the criteria from the aspects and characteristics as listed below for selection of 2 prioritized sites among the 5 sites for further study including soil investigation.

Table 6.2.1-1 Evaluation Criteria for Selection of Prioritized Sites

Aspect	Characteristics
Natural Condition:	Availability of water depth around the berthing area
	Availability of water depth along the access channel to the port
	Oceanographic conditions, like wave, current,
	Soil conditions, subsequently construction cost
	Land availability of port area and future expansion
	Natural environmental conditions
	Accessibility from the existing road
Socio-Economic Conditions:	Accessibility from the existing Cebu Base port
	Navigation safety for ships.
	Navigation safety for aircraft.
	Necessity of port functions to industrial development.
	Easiness of land acquisition
	Social environmental aspects.

The above criteria items were evaluated by giving count from 1 to 5 corresponding to each condition among alternative sites. These items were weighted score. The three cases by giving different weights on oceanographic conditions, environmental consideration, accessibility from the existing port and navigation safety for ships were further checked. As a result of such exercises, out of 5 alternative sites, Consolacion - Liloan area were listed at top from the economic point and second from the environmental point ranks. Alternatively Cebu South Reclamation Area was listed at top from the environmental point and second from the economic point. The difference in score between 2 sites were small, the soil investigations were carried out at Consolacion- Lilo-an area and Cebu South Reclamation area for further detailed evaluation to select a final site for a new Cebu Port Development. See Fig. 6.2.1-1.

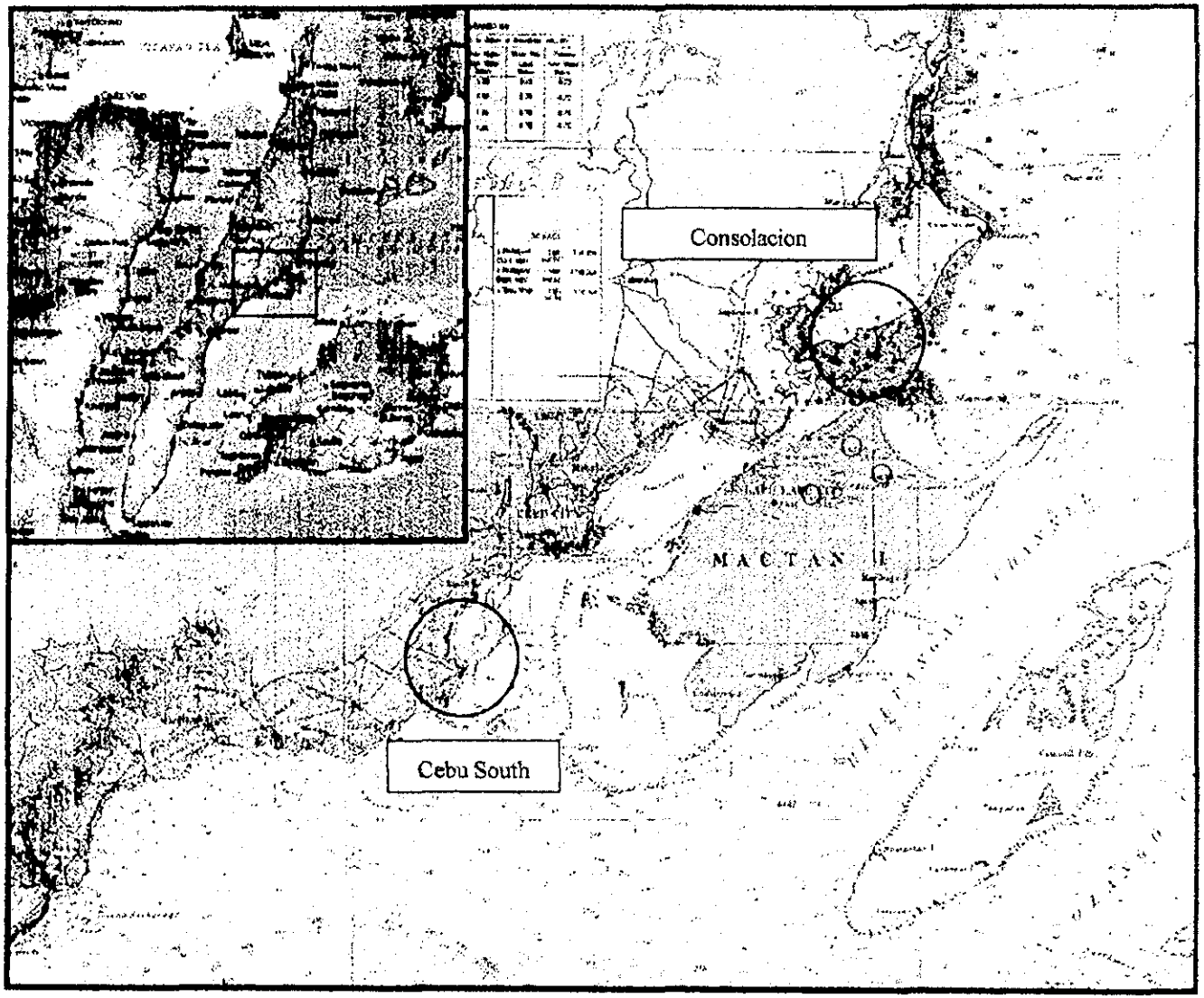

Fig. 6.2.1-1 Location Map of 2 Selected Boring Sites

2) Boring Point at Two Sites

a. Consolacion - Liloan Site

The boring points at this site were selected with the following development concept:
The new Cebu port shall be developed gradually in phases corresponding to the growth of traffic. At present Cebu Baseport is accommodating the average 20,000 - 30,000 DWT size of major class of cargo, container ships, excluding RORO ferry and passenger ships. It is anticipated that the trends of this class of ship size will be the similar size for short-term period. In the first place the new Cebu Port facilities should be developed to accommodate such type of ships to minimize the initial capital investment with reasonable capital return. The port facilities should be upgraded to accommodate larger size of ships.

Therefore the first port facilities would be constructed near from the existing ship repair yard area considering the closer sites to the existing Cebu Port and availability of reasonable water depth. The master plan of a new Cebu port will be planned off shore area for about 1,500 m long of water front facilities with 500 m of back up area.

The boring points were therefore selected 3 points of 300 m interval along the water front facilities area with water depth of 8 - 9 m and 3 points of 300 m interval toward the land side at the depth of -2 to 3 m as shown in Fig. 6.2.1-2

b. Cebu South Reclamation Site

The boring points were selected based on the following development concept of a new port. The new port area is selected off-shore in front of the present reclaimed area considering the new port facilities should not interfere with the safety of navigation through the channel to ships going to and coming from the existing Cebu Base Port.

- The new port facilities will be developed by land reclamation required exclusively for the new port activities in front of the as-built reclamation area. The area between the water front and existing retaining wall of reclamation area will be reclaimed for port back up area.
- The water front facilities will be developed at the depth of -10 ~ 12 m without any dredging.

According to the sea chart, the alignment of planned water front facilities could be developed for 1,000 m long or more corresponding to the contour line of water depth of -10 m, which is obtainable for the necessary land reclamation of port back up area.

The three boring points were selected with intervals of 500 m each on this assumed alignment of water front facilities with the water depth of -8 ~ -9 m and two points along the access road area as shown in Fig. 6.2.1-3 which are located about 600 m away from the existing retaining wall of South Reclamation Area.

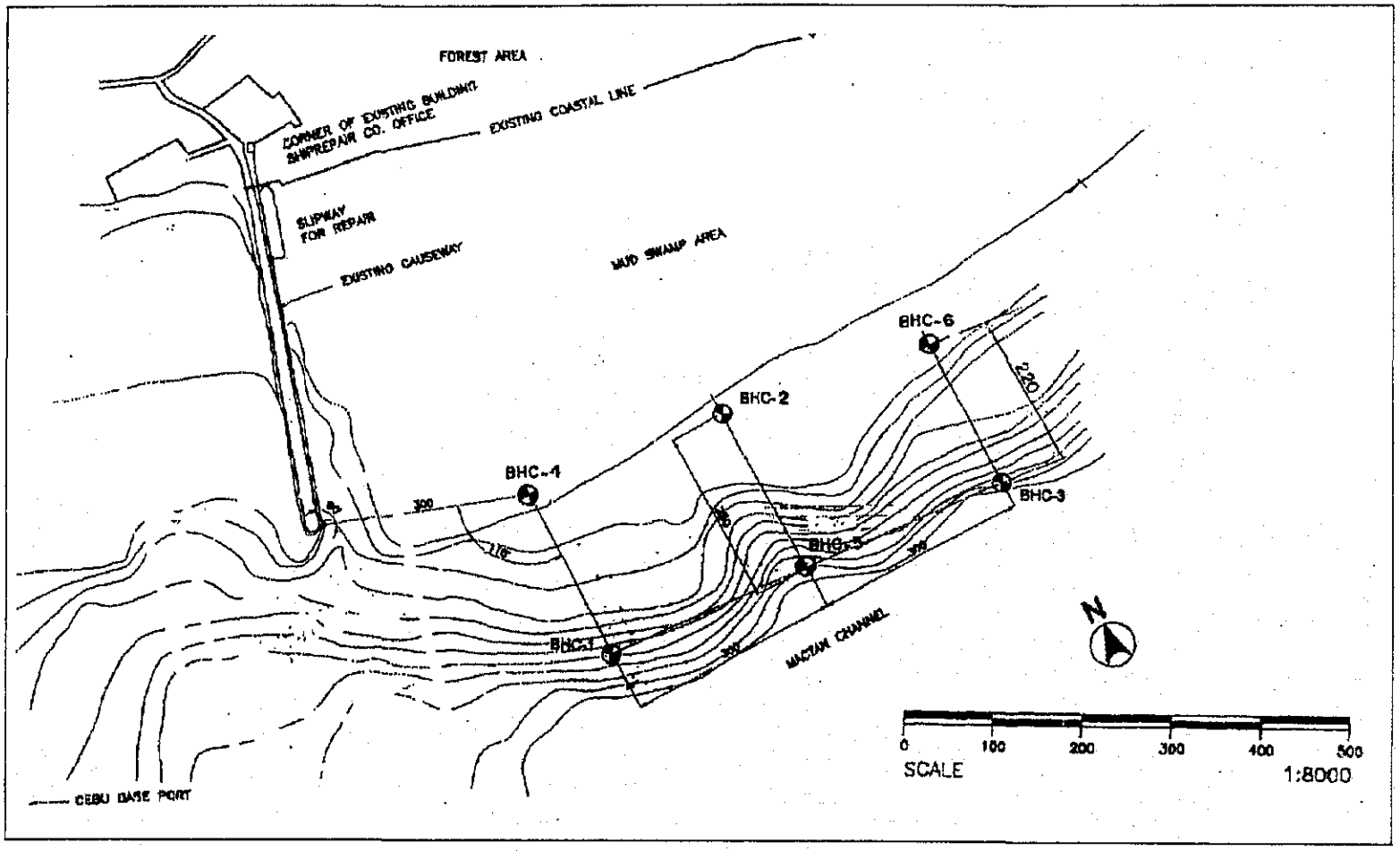

Fig. 6.2.1-2 Boring Points in Consolacion Site

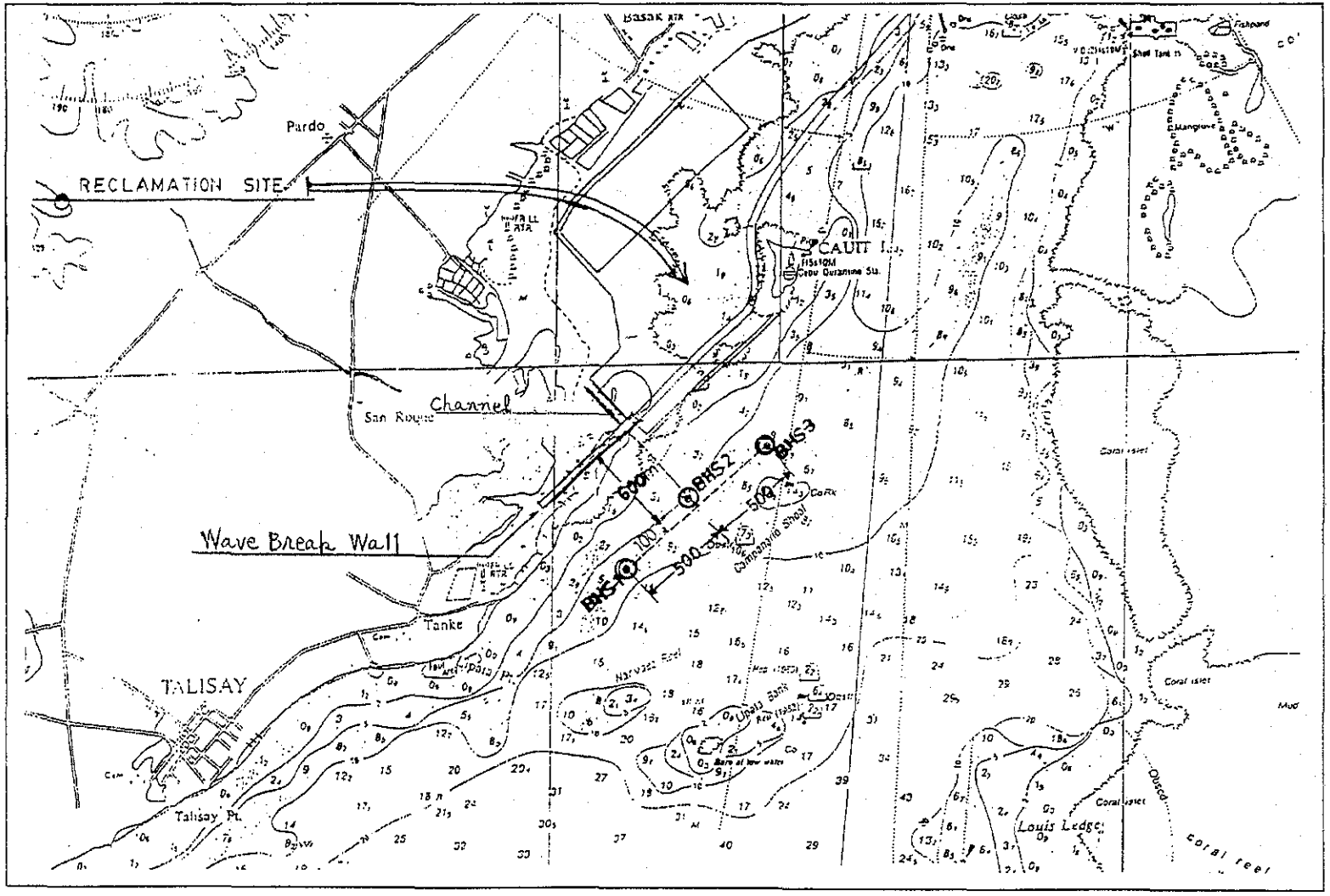

Fig. 6.2.1-3 Boring Point in Cebu South Site

c. Result of Boring

9 borings in total, 6 in Consolacion and 3 in Cebu South, accompanied by Standard Penetration test have been drilled. Actual boring points are shown on the Fig. 6.2.1-2 (Consolacion) / 6.2.1-3 (Cebu South), then samples were tested at a laboratory. The result is summarized as follows in each site. (refer to soil profile as shown in Fig. 6.2.1-4 and 6.2.1-6).

Consolacion Site

- Composition of Soil Layer

  0 m (sea bed) to 10 m deep:
  Loose and Soft sandy clay, N- Value 3 on the average, Partially include coral fragments in which N- Value is counted 6 to 8.
  10 m to 25 m deep:
  Medium hard sandy clay, N-Value 12 on the average Partially include coral boulder 3 to 5 m in size where S.P.T. sampler head rebounds.
  Below 25 m:
  Hard sandy clay, N-Value exceeds 30

- Property Regarding Consolidation

  Upper sandy clay layer up to 10 m deep is soft and highly compressive and consolidation settlement is probably caused by embankment.

- Bearing Layer for Structures

  Hard sandy clay below 25 m deep is regarded as a bearing layer for structures such as pile from the view point of S.P.T. (N-Value larger than 30). Although partially appears gravels around 15 m deep in which n-Value seemingly exceeds 50 by test hammer rebound, it is rolling stone and not regarded as a bearing layer.

Cebu South Site

- Composition of Soil Layer

  0 m (sea bed) to 18 m:
  Very soft clay, S.P.T. N-Value 0 (self settlement of test sampler) and/or 2. This clay, black mud is regarded as marsh origin from hinterland
  18 m to 27 m
  Sand with clay including coral fragments. Medium density, N-Value15 to20. In some parts, N-Value is counted near 30 in which coral fragments are rich.
  27m below
  Sand, high density N-Value is over 40

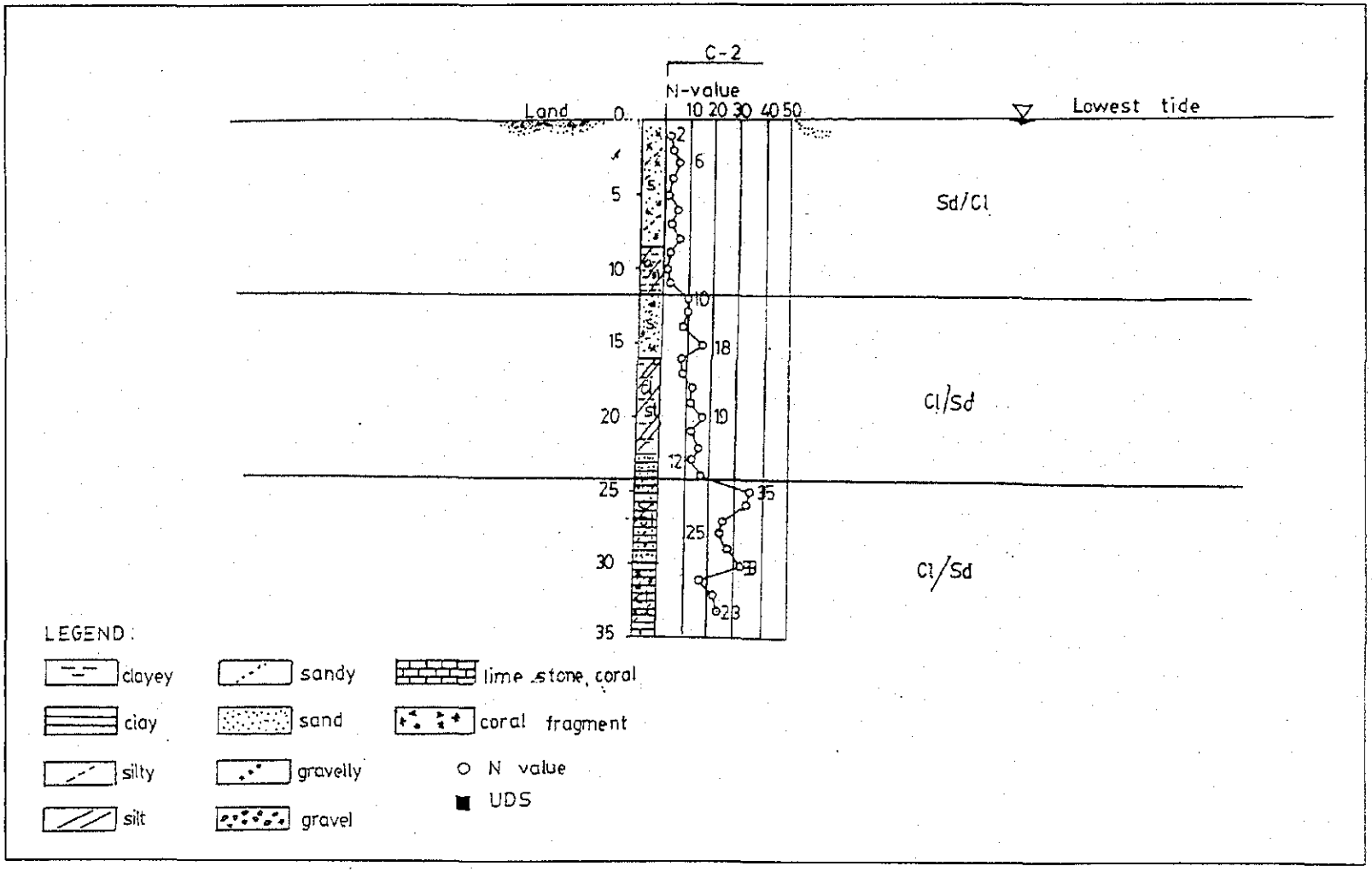

Fig. 6.2.1-4 Soil Profile in Consolacion Site (1/2)

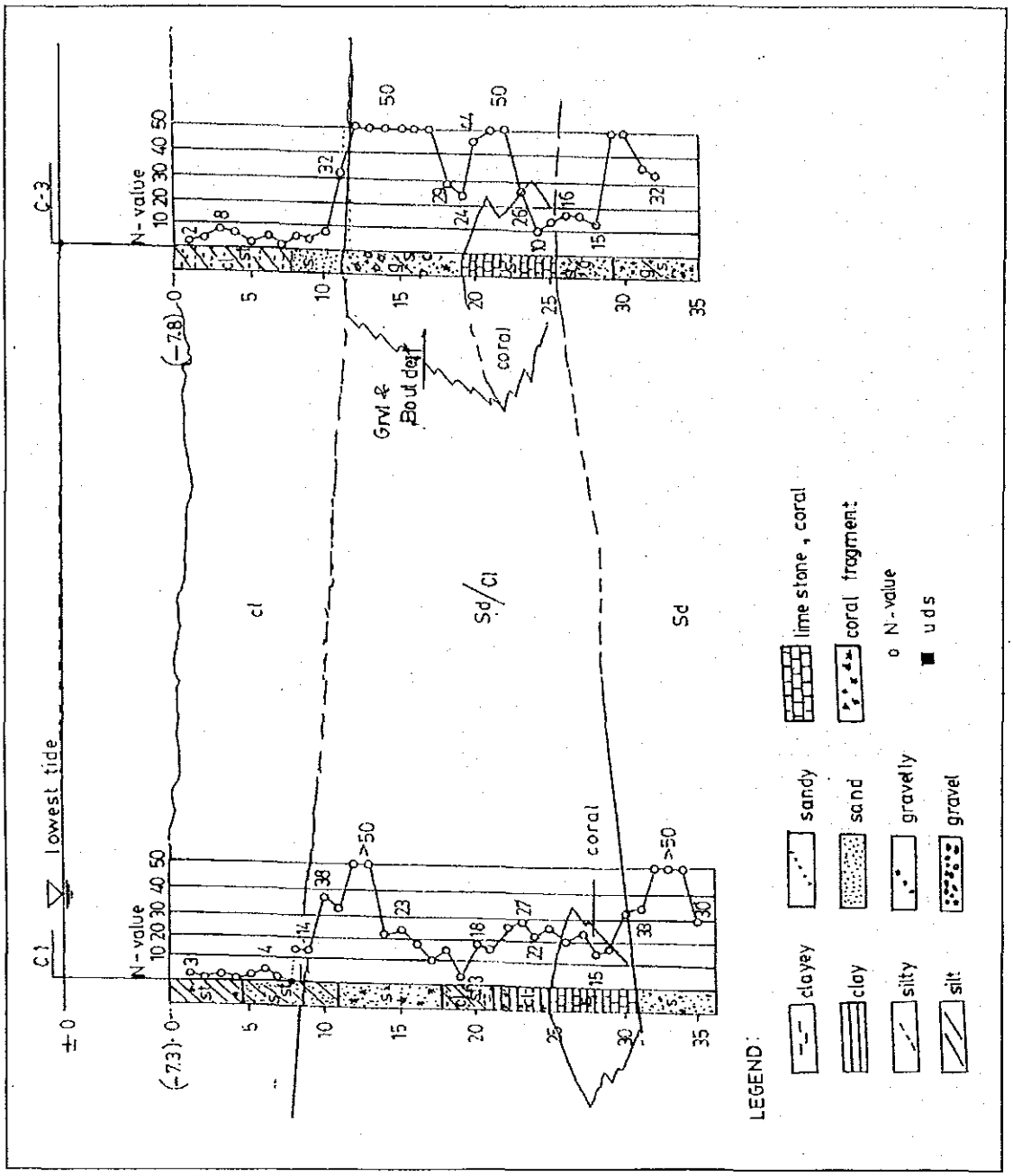

Fig. 6.2.1-5 Soil Profile in Consolacion Site (2/2)

- Property Regarding Consolidation
  The black clay layer up to 18 m deep is very soft clay (N-value 0 to 2) of back marsh mud, and partially presents the liquid condition, therefore large consolidation settlement becomes inevitably serious.
- Bearing Layer for Structures
  Sand layer beneath 27 m depth is regarded as a bearing layer for structure. As well as in the Consolacion area, coral stone around 20 m depth cannot be regarded as a bearing layer, although N-Value apparently exceeds 50 there.

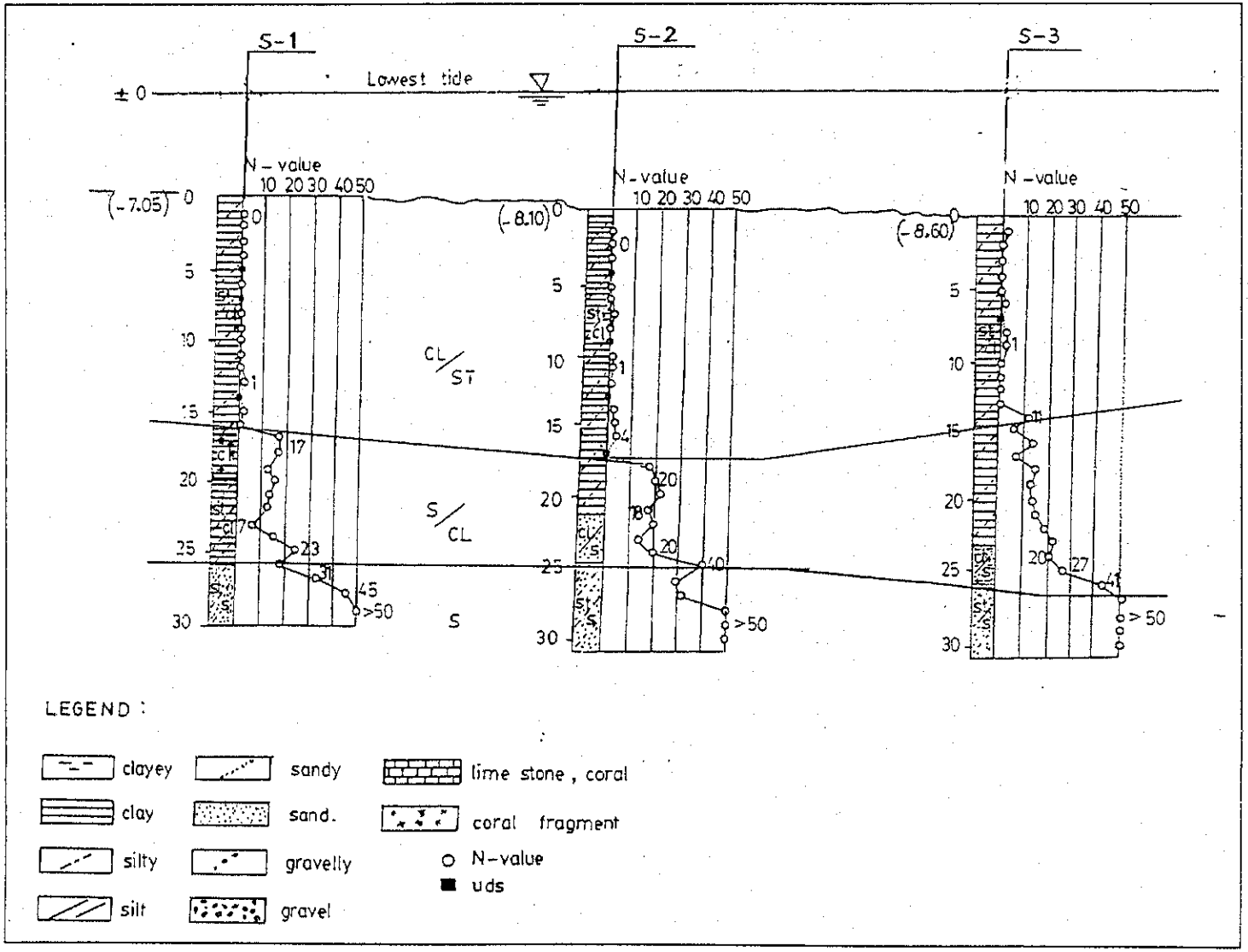

Fig. 6.2.1-6 Soil Profile in Cebu South Site

6.2.2 Wave Conditions Analysis and Other Natural Conditions

(1) Wave Assessment under the normal rough weather conditions

1) The Deepwater Wave height Assessment

The wave assessment analysis is to forecast the maximum deepwater wave height (Ho) at 5 candidate sites for a new Cebu port under the normal rough weather like typhoon, tropical low pressured winds which was analyzed from the wind speed and direction data of 25 years (from 1971 to 1995) collected at the Mactan International Air port.

The average daily wind speed and direction as collected for 25 years were used to tabulate the directional wind speed difference and to check the probability of occurrence.

The average that the probability of the maximum deepwater wave height (Ho) at the Consolacion - Liloan area and Mactan North area will be 1.72 m for 73.1 km away from the planned port area under NNE direction, but the predominant direction is 34.8 % from NE direction. At the CEBU South reclamation area it (Ho) will be 1.56 m for 57.2 km away from the planned port area under the SSW direction, but the predominant direction is 20.4% from SW

2) The Equivalent Deepwater Wave height Assessment at the port site

The equivalent deepwater wave height ($H_{1/3}$) at 5 candidate areas are calculated with the following assumption.

Table 6.2.2-1 Deepwater Wave Condition

Area	Ho (m)	To (sec)	Direction	Fetch (km)	Tide (m)
1 and 2	1.72	4.97	NNE	73	1.48
3 and 4	1.70	4.94	S	57	1.48
5	1.56	4.67	SW	57	1.48

Note: Ho; Max. deepwater wave height (m)
To; Period of Wave (second)
Area 1; Consolacion - Liloan area, Area 2; Mactan North Area, Area 3 ; Mactan South Area, Area 4; Cebu South Reclamation Area 5; Minglanilla. Area
Tide is HWL.

2) The results of calculation is as follows:

Table 6.2.2-2 Equivalent Deepwater Wave Height at 5 Sites

Area	1	2	3	4	5
H 1/3 (m)	0.8-0.84	1.10	1.14	1.18-1.20	1.05
Frequency	Every year	Every year	Every year	Every year	Every year

The equivalent deepwater wave height diagram under the normal rough weather conditions of the above areas are shown in Figs. 6.2.2-1 through 7.

(2) Probability of Deepwater Wave Height in 50 years

1) The Deepwater Wave Height Assessment

The 50 years probability of deepwater wave height at 2 selected sites is assessed by using the hourly recorded wind data (speed and direction) for two years from 1998, Nov. to 2000, Nov. in addition to the average daily wind speed and direction data of 25 years record.

The ultimate wind speed and corresponding direction are selected from the hourly recorded wind data to check the continuity of such extreme speed.

The predominant direction of ultimate wind speed for Consolacion - Liloan area was NE direction and for Cebu South Reclamation area was SW direction. The probability of the max. deepwater wave height is estimated by using SMB method under the predominant wind directions.

The deepwater wave height and period of 10 years, 30 years and 50 years probability are estimated as follows:

Table 6.2.2-3 Deepwater Wave Height of 10, 30 and 50 years Probability

Direction	Area	10 years		30 years		50 years	
		Ho (m)	To (sec)	Ho (m)	To (sec)	Ho (m)	To (sec)
NE	1	4.09	7.0	4.84	7.6	5.17	7.7
NNE	1	3.21	6.3	3.94	6.9	4.26	7.2
S	4	3.53	6.5	4.51	7.4	4.94	7.7
SW	4	4.05	7.0	4.73	7.5	5.03	7.8

The reference of Areas, Ho, To are the same as above.

2) The Equivalent Deepwater Wave Height Assessment at port sites

The equivalent deepwater wave height ($H_{1/3}$) from the deepwater wave height of 50 years probability at the above 2 sites are estimated and the results thereof are shown in the table below.

Table 6.2.2-4 Equivalent Deepwater Wave Height of 2 Sites in 50 Years Probability

Direction	Area	50 Year Probability	
		Ho (m)	$H_{(1/3)}$ (m)
NE	1	5.17	1.64 - 2.03
NNE	1	4.26	1.20 - 1.50
S	4	4.94	4.02 - 4.10
SW	4	5.03	3.20 -3.43

From the above tables under the probability of 50 years, the equivalent deepwater wave height ($H_{1/3}$) at the planned port area at the Consolacion - Liloan area is read from the drawing attached between 1.20 m to 2.03 while the Cebu South area is read between 3.20 m to 4.10 m.

For the selection of a new port site the above table indicates clearly that comparing the case of areas 4 and 1, the area 1 will have the less impacts by the oceanographic conditions and will preferably not be necessary to provide the protection facility for the port operation in the long term period.

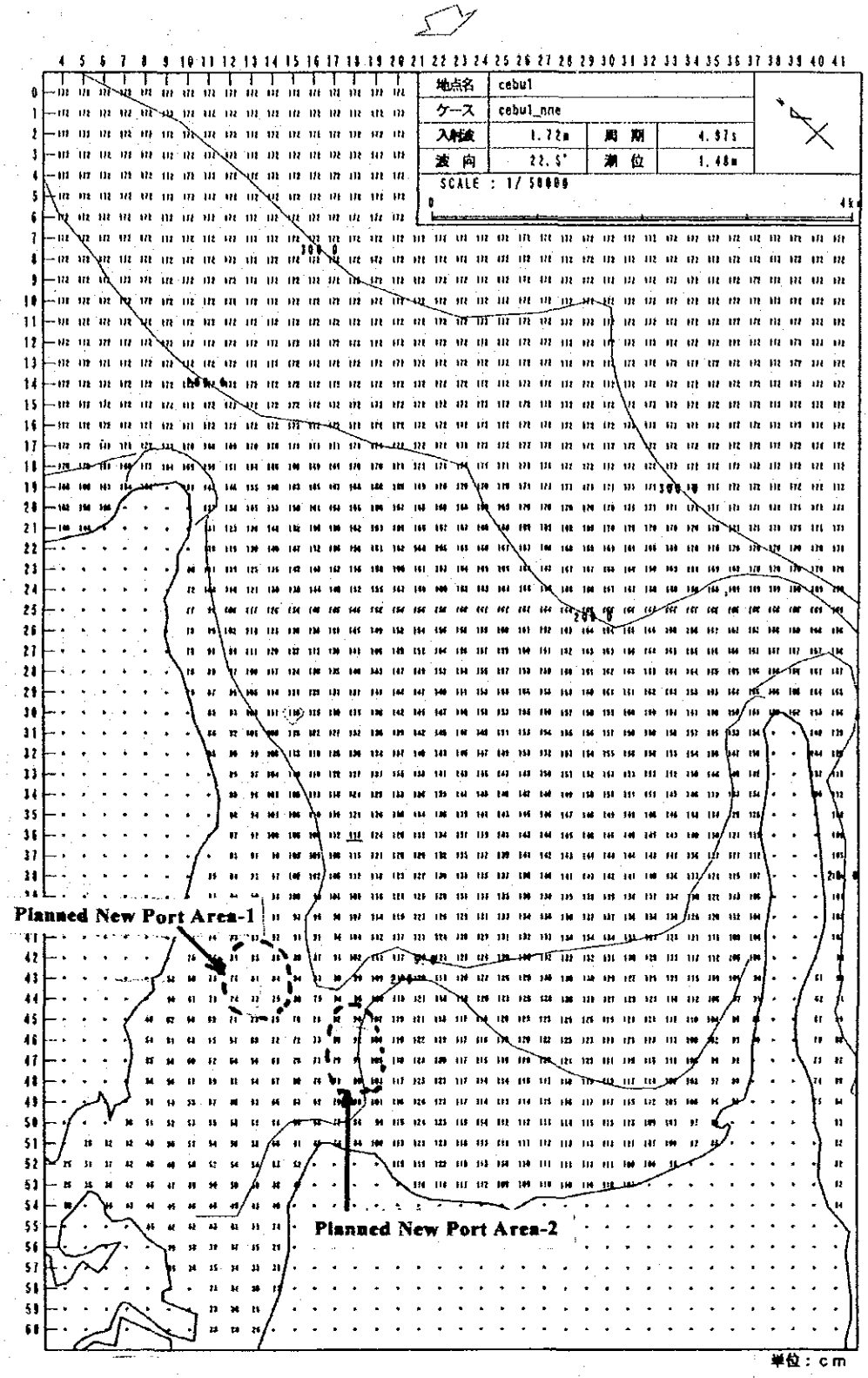

Fig. 6.2.2-1 Equivalent Deepwater Wave Height
Wave height 1.72m, Incoming direction NNE, Unit depth: cm

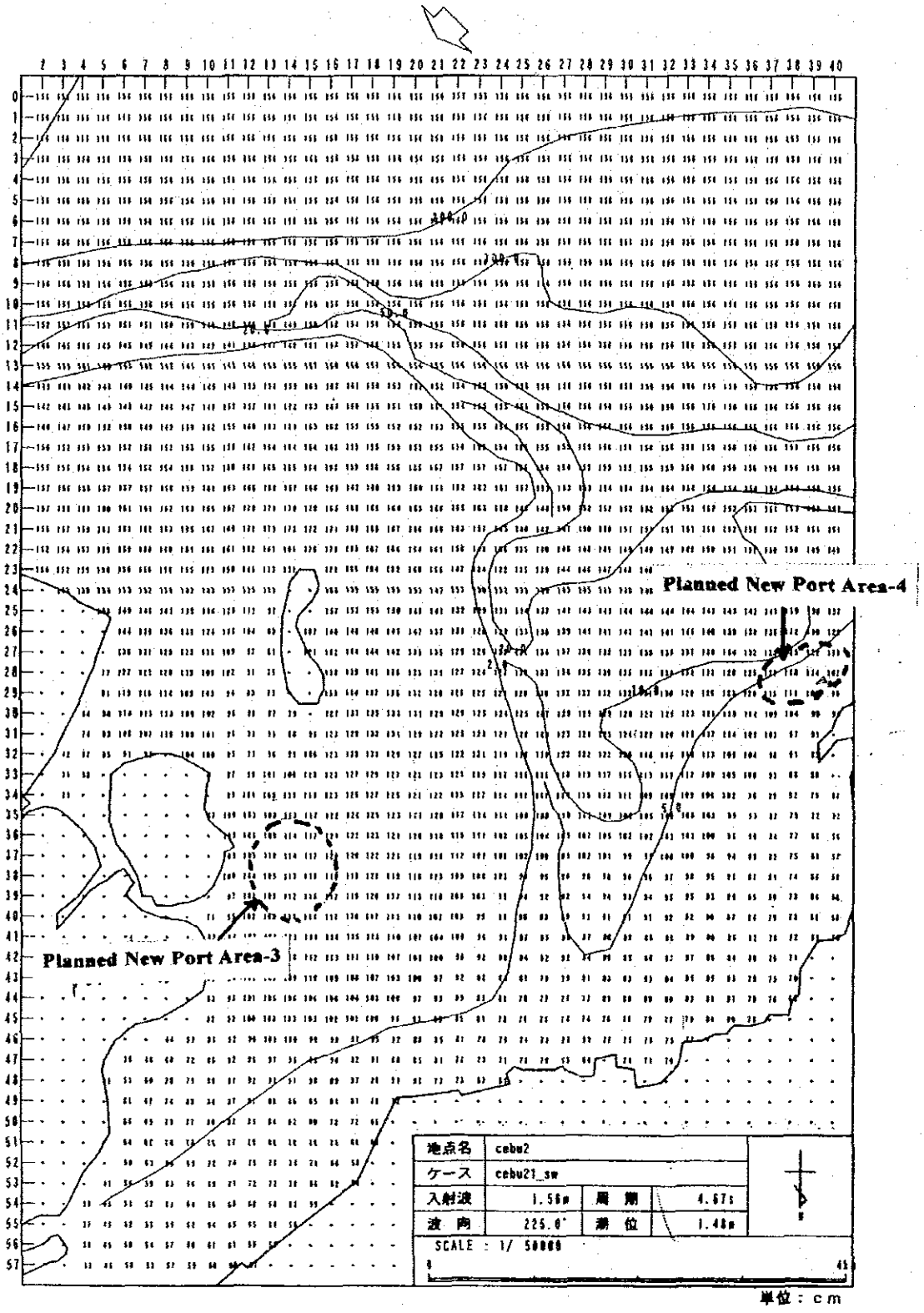

Fig. 6.2.2-2 Equivalent Deepwater Wave Height
Wave height 1.56m, Incoming direction SW, Unit depth: cm

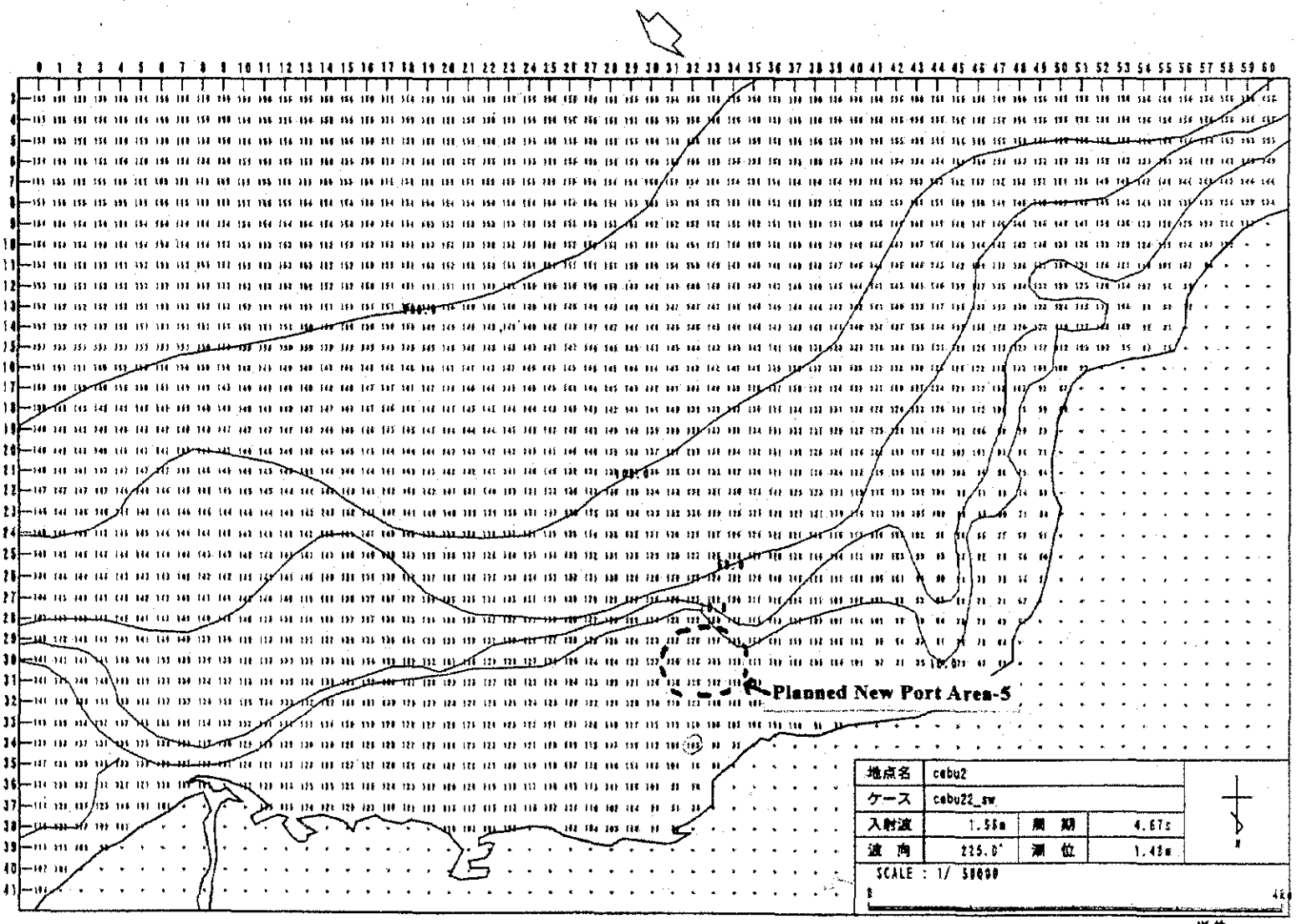

Fig. 6.2.2-3 Equivalent Deepwater Wave Height
Wave height 1.56m, Incoming direction SW, Unit depth: cm

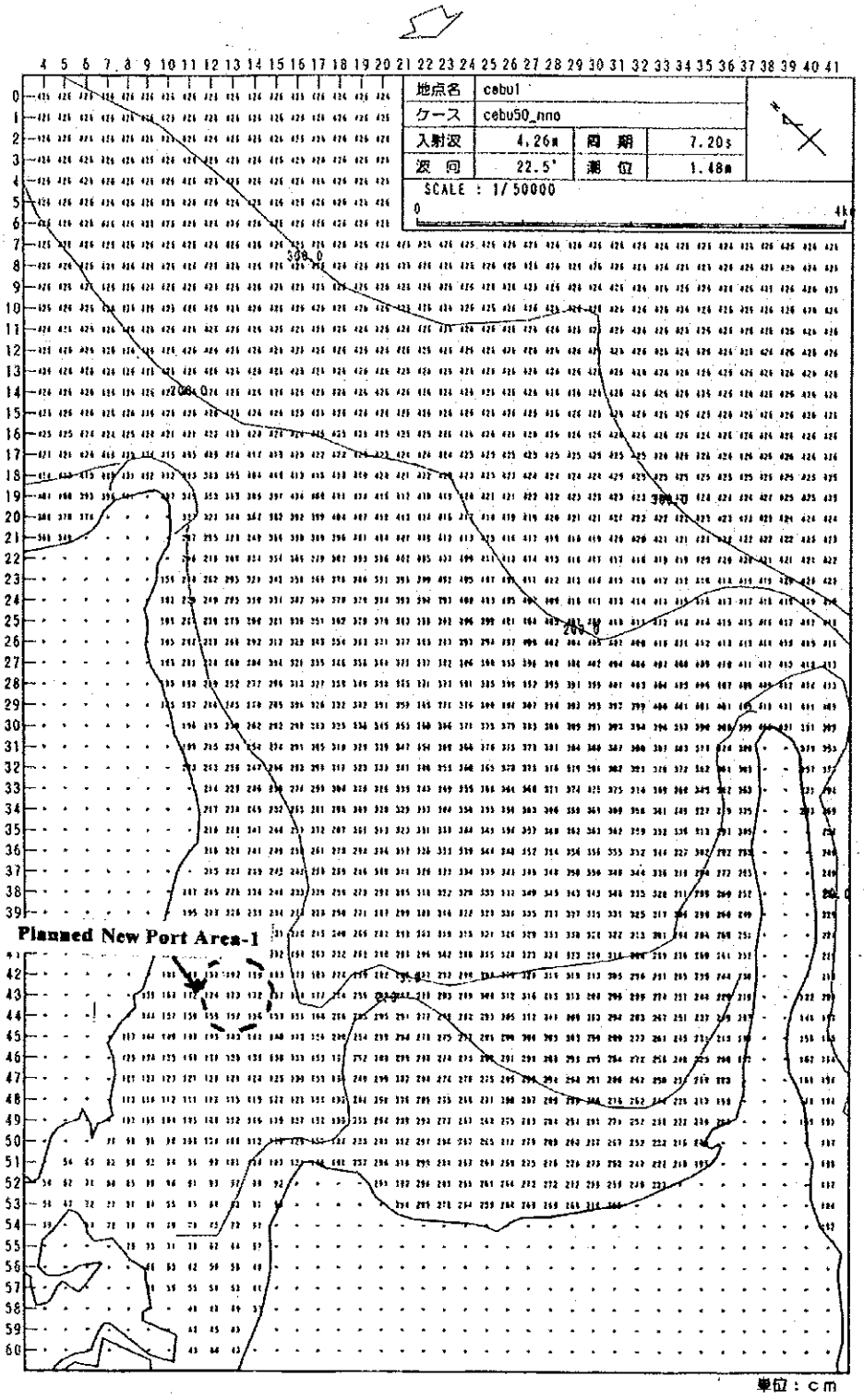

Fig. 6.2.2-4 Equivalent Deepwater Wave Height
Wave height 4.26m, Incoming direction NNE, Unit depth: cm

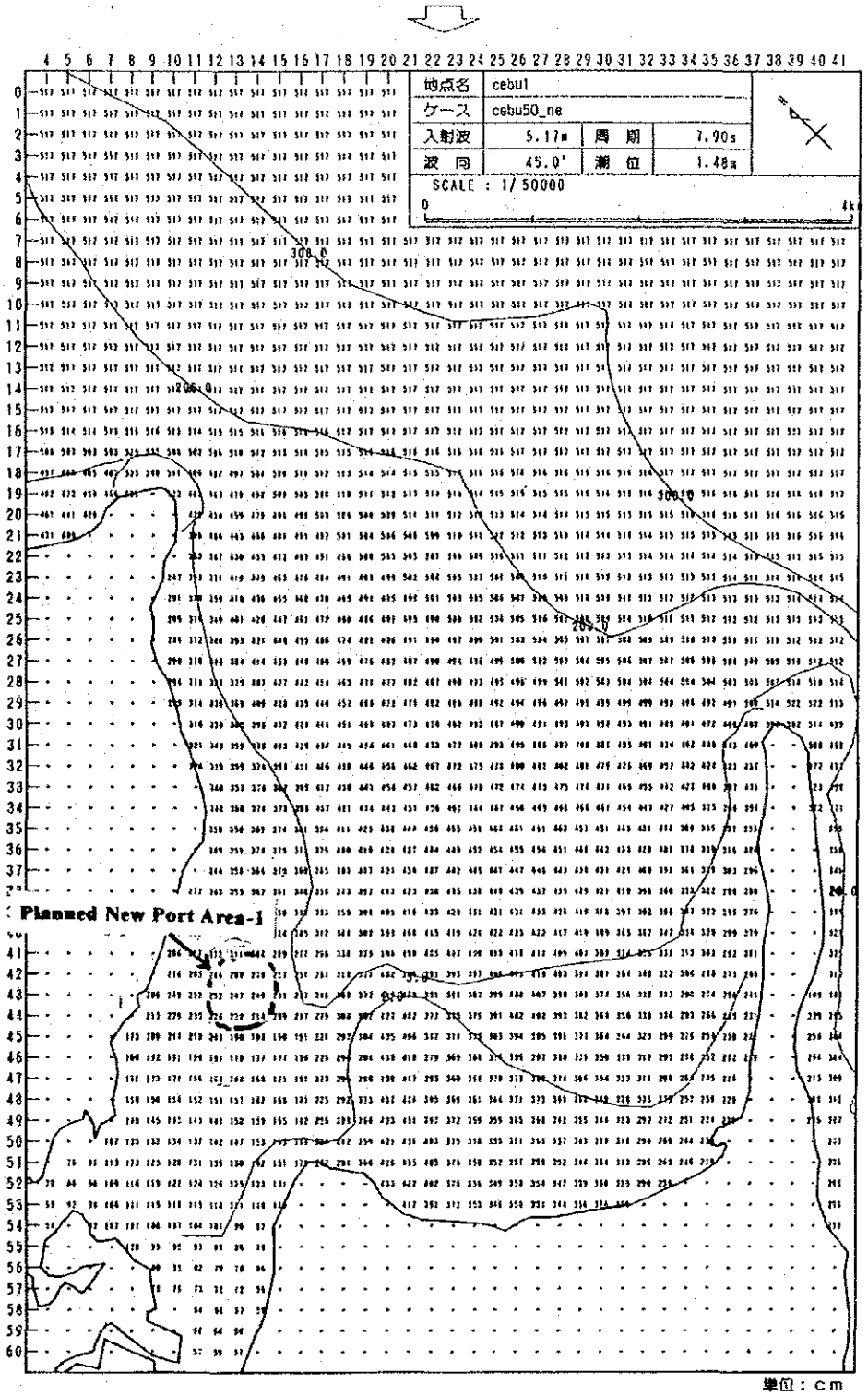

Fig. 6.2.2-5 Equivalent Deepwater Wave Height
Wave height 5.17m, Incoming direction NE, Unit depth: cm

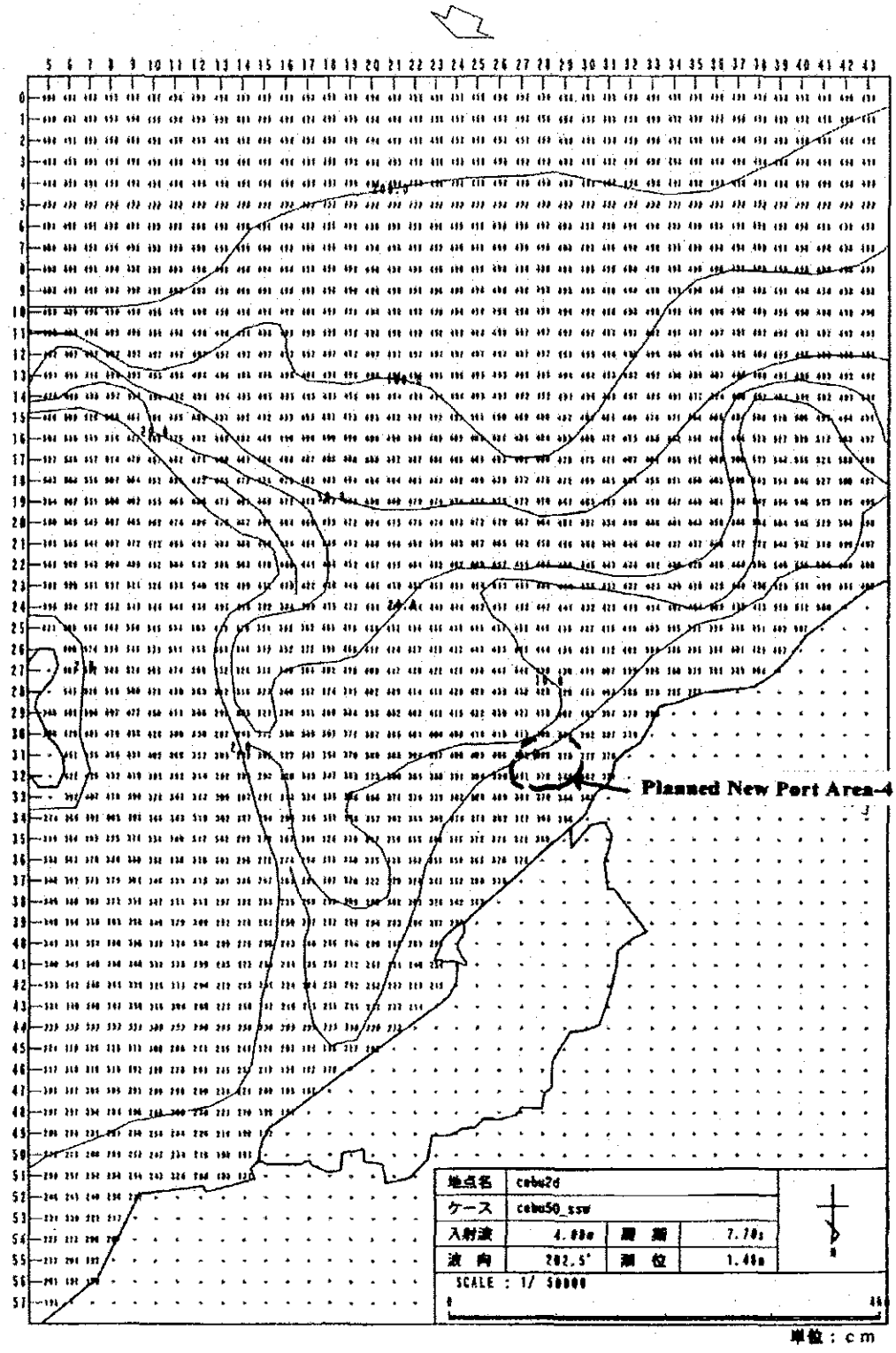

Fig. 6.2.2-6 Equivalent Deepwater Wave Height
Wave height 4.98m, Incoming direction SSW, Unit depth: cm

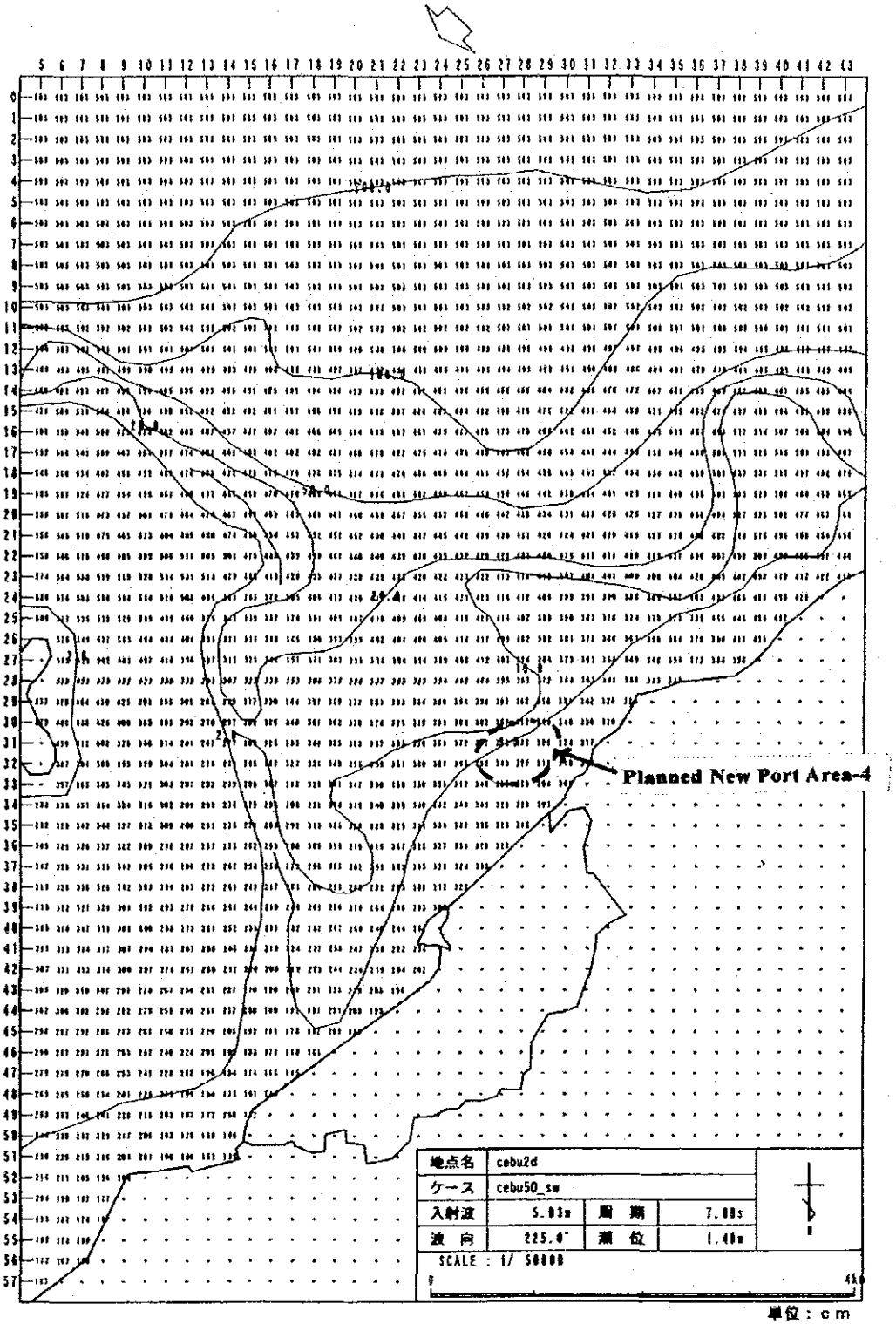

Fig. 6.2.2-7 Equivalent Deepwater Wave Height
Wave height 5.03m, Incoming direction SW, Unit depth: cm

(3) Other Natural Conditions

1) Siltation and Drift Soil

In case there is marsh and/or river which drains out sediments, quantity of siltation and/or drift soil becomes much. Such aspect is investigated by the field observation.

a) Consolacion Area

Topographical morphology is comparatively long inside bay and rather closed to the outer sea. In addition in the hinterland small marsh is formed. As a result of both field surveys and soil investigation, a little amount of siltation and drift sand are found out.

b) Cebu South Area

Compared to Consolacion area, this area is more serious from the view point of siltation/drift soil. This is the reason why the said area have wider and longer back marsh spreads. In addition Linao River and other drain out considerable amount of sediment material to this area. As a result of boring investigation, about 4 m thick liquid like clay has been discovered.

2) Ocean Current

With regard to ocean current impact, both areas are in the same situation. Relevant current is littoral tide flow caused by the tidal flood and ebb speed ranging from 0.7 m to 1 m per second as observed in the Cebu Base port.

3) Seismology

As mentioned in Chapter 3, it is foreseen that in Cebu region, large scale of earthquake (magnitude > 6) will hardly occur based on the epicenter distribution map (Refer to Fig. 3.1.7-2).

6.2.3 Recommendation on the Site of a New Cebu Port

(1) Evaluation on Two Candidate Sites (Consolacion-Liloan area and Cebu South area)

Based on the findings the site reconnaissance survey and natural environmental aspect, the Study Team had conducted technical and environmental evaluation of five (5) candidate sites for a new port development and subsequently proposed two appropriate sites, Consolacion-Liloan area and Cebu South area, for further study to determine one site. (See chapter 6.1)

Upon the approval of the proposed two sites by the steering committee meeting on January 23, 2001, the study team proceeded to conduct soil investigation at two sites from January 24 and wave assessment analysis and natural/social environmental survey at two sites in details among the five (5) candidate sites.

Soil condition is one of the most important factors to evaluate a new port site because soil condition effects structure design and construction cost directly. Therefore, the Study Team carried out soil boring tests at the above two sites. The results show that the soil condition in Consolacion area is better than Cebu South area. Soil improvement work is required to reclaim at Cebu South area and it increases construction cost.

To attract foreign container vessels at a new port, the port should provide stable water conditions for the vessels. Based on the wave assessment analysis, Consolacion area is better in wave condition than Cebu South area.

The Study Team re-evaluate two sites with the same method of chapter 10 based on the further detail surveys, including above soil investigation and wave assessment analysis, and the settlement of the detail proposed. Revised points are as follows;

	point
Consolacion-Liloan :	
- Land Availability of Port Area and Future Expansion	3 → 5
Cebu South :	
-Soil Condition	2 → 1
- Land Availability of Port Area and Future Expansion	3 → 5
- Accessibility from Existing Road	4 → 5

Table 6.2.3-1 Evaluation Sheet on Selection of New Port Area from 2 Candidates

	Standard Type					Weighted on Environmental			Weighted on Construction		
		Alternative 1		Alternative 2	Cebu-South		Alternative 1	Alternative 2		Alternative 1	Alternative 2
	weight	original	weighted	original	weighted	weight	weighted	weighted	weight	weighted	weighted
Availability of Water Depth at Berth	1	4	4	4	4	1	4	4	1	4	4
Availability of Water Depth at Access Channel	1	5	5	5	5	1	5	5	1	5	5
Oceanographic Conditions	3	3	9	2	6	2	6	4	2	6	4
Soil Condition	1	4	4	**1**	**1**	1	4	**1**	3	12	**3**
Land Availability of Port Area and Future Expansion	1	**5**	**5**	**5**	**5**	1	**5**	**5**	1	**5**	**5**
Natural Environmental Aspects	2	4	8	5	10	3	12	15	1	4	5
Accessibility from Existing Road	1	4	4	**5**	**5**	1	4	**5**	1	4	**5**
Total of Weight	10					10			10		
Total of Evaluated Score on Natural Conditions		**29**	**39**	**27**	**36**		**40**	**39**		**40**	**31**
Conditions			1		2		1	2		1	2
Accessibility from Existing Port	3	4	12	4	12	2	8	8	3	12	12
Navigation Safety for Ship	2	4	8	4	8	2	8	8	2	8	8
Navigation Safety for Aircraft	1	3	3	5	5	1	3	5	1	3	5
Necessity of Port Function to Industrial Development	1	3	3	3	3	1	3	3	1	3	3
Easiness of Land Acquisition	1	4	4	3	3	1	4	3	1	4	3
Social Environmental Aspects	2	3	6	5	10	3	9	15	2	6	10
Total of Weight	10					10			10		
Conditions		22	37	24	41		36	42		37	41
Ranking from Higher Weighted Score on Social-economic Conditions			2		1		2	1		2	1
Grand Total of Evaluated Score		**51**	**75**	**51**	**77**		**75**	**81**		**76**	**72**
Conditions			2		1		2	1		1	2

The result shows that the total suitability potentials for a new port development of the two sites are almost same. Weight on the natural/social environmental aspects, Cebu South area has advantage while Consolacion-Liloan area has advantage in construction cost due to the better natural condition (oceanographic and soil condition). The detail evaluation of the soil investigation, wave assessment analysis, and natural/social environmental are mentioned in the next section.

(2) Site Selection

The following technical points by respective survey and investigation which will affect the financial implication of the proposed project implementation are found.

1) Soil Investigation

a). According to the detailed description of soil profit of Chapter 11, the present soil profit of seabed, (-8 m depth –9m) at Cebu South offshore of reclamation area indicates very soft with silt clay of SPT = 0, till depth of around –20m which are observed the sedimentation materials discharged from the rivers. The clay of SPT 24 – 28 is encountered below –20 m depth. It is considered necessary to make improvement of such soil to be used for foundation of breakwater and reclamation works.

b) The present soil profile of seabed (-8m) at Consolacion-Liloan area indicates sand clay with SPT of 5 – 10 from the seabed to –20m depth, SPT is gradually increased by getting harder soil conditions in depth. It is encountered medium hard clay layer below the depth of –25 m.

2) Wave Assessment Analysis

a) According to the wave assessment analysis of 2 sites under the ordinary typhoon condition, the maximum wave height at the offshore area is estimated at 1.72m for the Consolacion-Liloan, and the wave height of 1.56 m for Cebu-South which will occur once a year. These wave height will be attenuated to around 0.80 – 0.95 m at the Consolacion-Liloan planned port area at depth of –12 m and around 1.20 – 1.29 m at Cebu South planned port area at the depth of –12m.

b) According to the probability of occurrence of deepwater wave height in the 10 – 50 years period, the maximum deepwater wave height is estimated at 5.17 m from NE direction at Consolacion-Liloan in the probability of occurrence of once in 50 years, which will be attenuated to 2.20 m to 2.57 m.

c) While the maximum deepwater wave height of 5.03 m from SW direction is estimated at Cebu South area in the probability of occurrence of once in 50 years, which will be

attenuated to 3.38 to 3.43 m at the planned area., but from the wind direction of S the maximum deepwater wave height thereof is estimated at 4.94 m but the attenuated wave height is estimated 4.04 to 4.08 m..

d) The breakwater facilities may be required to protect ship maneuvering and berthing / cargo handling operation in case a new port is constructed at Cebu South area since the attenuated deepwater wave height is reduced to 3.38 m to 4.08 m.

e) Regarding the Consolacion-Liloan area, in case a new port is planned closer to the Cansaga Bay the breakwater facilities may not be necessary, since the probability of occurrence of the attenuated deepwater wave height of 1.70 m to 2.50 m is once in 50 years. However port facilities are extended toward the Bagacay point of Liloan area the protection facility will be preferable to protect he probable wave height of 2.50 to 3.0 m to be occurred once in 50 years period..

3) Natural / Social Environmental Condition Survey

a) Regarding the Cebu South area

According to the natural and social environmental survey of Cebu South area, it was informed that it would be very difficult to utilize the presently made reclamation area for the port facilities. The port facility shall be developed in the self-sufficient manner with necessary land reclamation at offshore area for the backup area of a new port facility.

It was also reminded that since the national road accessing to this reclamation area from the hinterland were heavily damaged due to transportation of filling material from the mountains. It should be considered that the filling material shall be transported and supplied from the seaside.

b) Regarding the Consolacion-Liloan area

There are shipyard, houses and factories along the coast, the port area will therefore be planned to be developed by the reclamation separated from the present coastal area to avoid the relocation of existing residents. This port area needs an access road from the planned Cebu North coastal road to be developed. The land acquisition for such access road construction is required.

c) Financial Implication by the Findings of Soil Investigation and wave Assessment

The project cost of port development at respective areas will be implicated depending on the natural soil condition and wave impacts. Consequently the tentative project cost of each area for constructing the following required principle infrastructures for the port facilities are estimated based on the findings of soil investigation and wave assessment analysis.

Table 6.2.3-2 Required Principle Infrastructure of Port Facilities at each site

	Cebu South area	Consolacion-Liloan area
Type of structure of Waterfront facilities 1,000 m long, -12 m depth	Steel pipe pile support wharf	Steel pipe sheet pile wharf
Reclamation requirement for back up area 1,000 m x 500 m	Soil improvement by paper drain piles of entire area up to depth of –15m is required	No soil improvement is required
Access Road requirement from the port to the existing national road	The presently constructing south coastal road will be used. The approach road between the port area and the existing land is required	About 1 km distance with 25 m width of access road is required. The approach road between the port area and existing land area is required
Breakwater requirement against 3.5m to 4.0m wave height	The breakwater of concrete caisson type is required to be constructed at the depth of –12 m.. The existing seabed for foundation is required for improvement before placement of rock mound foundation. For caisson installation	Not Required.

According to the experiences of soil improvement and breakwater works in this region, the cost of soil improvement works by paper drain at the reclamation area will be estimated around 300 Peso per meter. The cost of the off shore concrete caisson breakwater will be around 2 million peso per meter and the sand compaction piles for improvement of breakwater foundation will be 1.5 million peso per meter including a large barges and floating crane equipment.

Considering the above cost of soil improvement and break water construction it is obvious that the construction cost of such required principle infrastructures at the Cebu South area will be more expensive than the case at Consolacion-Liloan area.

Considering the above financial implications due to the latest findings of soil investigation and deepwater wave height assessment analysis, the Consolacion-Liloan area will be more advantageous than the Cebu South area.

(3) Recommendation on the site of a new Cebu Port

The Study Team evaluated the candidate sites for a new port development from the various viewpoints based on the site surveys and technical analyses. The final candidate sites, Consolacion-Liloan area and Cebu South area, have both advantage and disadvantage in various aspects. However, they have no critical factors that might make a new port development seriously difficult. Generally, Cebu South area has advantage in natural/social environmental aspects while Consolacion-Liloan area has advantage in natural condition (oceanographic and soil condition).

Considering the integrated feasibility of the project from various aspects, including engineering and social aspects, Consolacion- Liloan area is recommended for the site of a new Cebu port, and the initial development for a new port at Consolacion (barangay Tayud) area should be commenced.

In order to develop a new Cebu port in Consolacion-Liloan area, North Coastal Road Project (See chapter 2.1.5), including a new bridge over Cansaga Bay, must be promoted together with in accordance with a new port development. This road is essential for a new port development as a main access road. Therefore, it is necessary to coordinate the implementation schedule of both projects.

APPENDIX

Appendix Table 4.1.2-1 Cargo Flow by Sea Transport To and From Region 7, 1995-1998

Unit: 1000 kilograms

Region	Name	From Region 7						To Region 7						%
		1995	1996	1997	1998	Total	%	1995	1996	1997	1998	Total	%	
Luson														
NCR	National Capital	525	441	304	285	1,555	15.7%	751	911	836	742	3,240	20.4%	18.1%
Region 1	Ilocos	2	0	0	0	2	0.0%	0	3	0	7	10	0.1%	0.0%
Region 2	Cagayan Valley	0	319	0	0	319	3.2%	0	0	0	0	0	0.0%	1.6%
Region 3	C. Luzon	4	0	0	0	4	0.0%	240	415	502	294	1,451	9.1%	4.6%
Region 4	S. Tagalog	21	26	14	11	72	0.7%	54	185	73	342	654	4.1%	2.4%
Sub-Total							19.8%						33.7%	26.7%
Region 5	Bicol	48	33	60	57	198	2.0%	252	27	31	29	339	2.1%	2.1%
Visaya														
Region 6	W. Visayas	270	8	238	111	627	6.4%	283	308	221	218	1,030	6.5%	6.4%
Region 7	C. Visayas	485	328	247	297	1,357	13.7%	485	328	247	297	1,357	8.5%	11.1%
Region 8	E. Visayas	282	360	721	311	1,674	17.0%	121	138	162	182	603	3.8%	10.4%
Mindanao														
W. Mindanao	Region 9	81	84	96	100	361	3.7%	76	120	82	86	364	2.3%	3.0%
N. Mindanao	Region 10	819	1,165	548	288	2,820	28.6%	644	616	502	462	2,224	14.0%	21.3%
S. Mindanao	Region 11	76	97	61	63	297	3.0%	553	564	463	441	2,021	12.7%	7.9%
C. Mindanao	Region 12	111	98	65	53	327	3.3%	369	592	857	283	2,101	13.2%	8.3%
Caraga	Region 13			99	93	192	1.9%			271	178	449	2.8%	2.4%
ARMM	ARMM	14.36	16	14	23	67	0.7%	11	18	9	7	45	0.3%	0.5%
Sub-Total							41.2%						45.3%	43.3%
Total		2,739	2,975	2,467	1,692	9,873	100.0%	3,837	4,225	4,256	3,568	15,886	100.0%	100.0%

Source: Philippine Statistical Year Book, 1998, 1999, 2000 (p 13 - 26, 29)

NCR: National Capital Region

CAR: Cordillera Administrative

ARMM: Autonomous Region in Muslim Mindanao

Appendix Table 4.1.2-2 Cargo Ratio of Cebu Oriented Cargo in Hinterland Region, 1995-1998

Unit: 1000 kg

Region		Total Cargo Flow by Region									Share of Region 7	
		1) Cargo Outflow				2) Cargo Inflow				Total	To/From Region.7	%
		1995	1996	1997	1998	1995	1996	1997	1998			
Region 10	N.Mindanao	2,445	2,615	1,966	1,877	1,871	2,582	1,709	1,209	16,274	5,043	31%
NCR	National Capital R.	2,437	2,812	2,823	3,015	5,417	7,164	8,168	5,926	37,762	4,795	13%
Region 7	C. Visaya	2,739	2,975	2,467	1,692	3,839	4,225	4,255	3,568	25,760	2,714	11%
Region 8	E. Visaya	460	1,532	786	620	1,216	1,308	1,734	1,118	8,774	2,277	26%
Region 12	C. Mindanao	1,195	2,009	4,513	2,142	552	627	494	443	11,975	2,428	20%
Region 11	S. Mindanao	2,135	2,809	2,262	2,466	2,059	1,345	1,658	1,301	16,035	2,318	14%
Region 6	W. Visayas	1,954	2,051	1,561	1,545	2,018	2,047	3,101	2,872	17,149	1,657	10%
Region 3	C. Luzon	6,838	5,246	6,337	4,730	3,380	195	244	186	27,157	1,455	5%
Region 9	W. Mindanao	450	571	554	574	847	1,018	1,055	1,614	6,683	725	11%
Region 4	S. Tagalog	1,044	2,184	1,185	1,631	1,637	1,469	1,604	1,362	12,116	725	6%
Region 13	Caraga	NA	NA	1,328	1,141	NA	NA	657	450	3,576	641	9%
Region 5	Bicol	1,892	253	366	314	632	811	776	700	5,744	537	9%
Region 2	Cagayan Valley	1	0	1	0	47	1,951	61	86	2,147	319	15%
ARMM	ARMM	158.58	207	222	225	256	368	403	317	2,157	112	5%
Region 1	Ilocos	190	115	102	112	168	1,167	554	935	3,342	12	0%
Total		23,938	25,379	26,473	22,084	23,938	26,277	26,473	22,087	196,649	25,759	13%

Source: National Statistics Office

Appendix Table 4.1.2-3 Destination of Passenger Originated from Cebu City, 1999

Unit: Passenger

	22110 CEBU CITY (Origin)	2,639,664	100%
	Destination:		
1	02150 MASAO GOVT. PIER, LUMBOCAN,City	60	0.0%
2	02555 NASIPIT GOVT. (R.C.) WHARF,NASIPIT	115,365	4.4%
3	12310 TAGBILARAN CITY	154,399	5.8%
4	12500 OTHER OTHER NATIONAL PORTS (BOHOL)	8,479	0.3%
5	12700 OTHER MUNICIPAL PORTS (BOHOL	220	0.0%
6	12725 DEMIAO CAUSEWAY, BOHOL	42	0.0%
7	12735 JETAFE CAUSEWAY, BOHOL	25,231	1.0%
8		260	0.0%
9	12770 TALIBON CAUSEWAY	110,447	4.2%
10		45	0.0%
11	12780 TUBIGON CAUSEWAY/PIER, BOHOL	254,477	9.6%
12	12790 UBAY CAUSEWAY, BOHOL	82,360	3.1%
13		87	0.0%
14		82	0.0%
15	19520 CULASI, ROXAS CITY, CAPIZ	12,294	0.5%
16	22710 BANTAYAN CAUSEWAY, BANTAYAN, Cebu	2,146	0.1%
17	22755 PILAR (PONSON IS.) CAUSEWAY/Camotes Island, C	26,348	1.0%
18		187	0.0%
19	22775 STA. FE CAUSEWAY/LANDING, ST Bantayan Island,	22,679	0.9%
20	22912 BAIGAD CAUSEWAY/PIER, BANTAYAN, CEBU	3,496	0.1%
21	24170 SASA GOVERNMENT WHARF SASA, DAVAO CITY	7,013	0.3%
22	30135 ILOILO, ILOILO CITY	107,477	4.1%
23	35140 ILIGAN CITY	73,397	2.8%
24	35770 TUBOD CAUSEWAY/PIER TUBOD, L Norte	17,028	0.6%
25	37175 TACLOBAN, LEYTE DEL NORTE	24,322	0.9%
26	37560 PALOMPON, LEYTE	26,924	1.0%
27	37700 OTHER MUNICIPAL PORTS (LEYTE	52,288	2.0%
28	37710 BAYBAY CAUSEWAY/PIER, LEYTEDEL NORTE	43,810	1.7%
29	37730 HILONGOS CAUSEWAY/PIER, LEYT	122,424	4.6%
30	37753 NAVAL, BILIRAN, LEYTE	17,793	0.7%
31	37758 ORMOC, ORMOC CITY CAUSEWAY/P Del Norte	196,674	7.5%
32		48	0.0%
33	37958 PASAR, ISABEL, LEYTE	39,207	1.5%
34	39150 MANILA (FIRST DISTRICT) NORTH HARBOR	232,909	8.8%
35	41150 MASBATE, MASBATE	25,558	1.0%
36	41715 CATAINGAN CAUSEWAY/PIER CATA Masbate	21,468	0.8%
37	42160 OZAMIS, OZAMIS CITY	149,610	5.7%
38		15	0.0%
39	43110 CAGAYAN DE ORO	317,525	12.0%
40	43715 BALBAGON PORT, MAMBAJAO CAMIGUIN	6,055	0.2%
41		195	0.0%
42	45725 DAAN BANWA,BACOLOD CITY	8,206	0.3%
43	46130 DUMAGUETE CITY	110,792	4.2%
44	60115 CATBALOGAN, WESTERN SAMAR	4,727	0.2%
45	60515 CALBAYOG, WESTERN SAMAR	34,505	1.3%
46	61740 LARENA, SIQUIJOR	15,726	0.6%
47	64175 MAASIN, SOUTHERN LEYTE	66,920	2.5%
48	64500 OTHER OTHER NATIONAL PORTS S Layte	12,851	0.5%
49	67170 SURIGAO CITY, SURIGAO DEL NORTE	66,677	2.5%
50	72500 OTHER OTHER NATIONAL PORTS Z Del Norte	12,489	0.5%
51	72700 OTHER MUNICIPAL PORTS ZAMBOA Norte	6,092	0.2%
52	73960 PHIL. INTERNATIONAL DEVELOPM Zamboanga Cit	235	0.0%
	TOTAL	2,639,664	100.0%

Source: National Statistics Office