13) Ternate

(1) Port of Ternate is situated on the east side of the cone-shaped Ternate Island. The port of Ternate is the main deepwater port for the northern part of Maluku Province. Population of Central Halmahera Regency is 138,000 in 1990.

(2) Volcanic activities are remarkable and eruptions occurred in 1981 and 1987. Tidal range is small, 0.73 m. There are strong current flows in the port. On high water the current flows North and on low water it flows South. On 28-30 November 1992 the revetment parapets, pier floor slabs and transit sheds were damaged by the E waves, height of which was estimated at 2.5 m.

(3) The port comprises public facilities located at two separate places, namely Ternate and Bastiong in addition to a Pertamina owned oil unloading jetty at Jambula. The Main Port at Ternate proper has a 248 m long, 12 m wide quay called the Ahmad Yani Main Quay for interisland vessels and a 200 m long, 10 m wide retaining wall called Sheet Pile for local vessels. Depth of water alongside the former quay is -7 m. Bastiong Port has a T-shaped jetty of 71 m in length and 6 m in width, and has been used for sailing ships and local passenger boats. The port has 900 m^2 of warehouse space and 1,500 m^2 of open storage area. Cargo handling equipment consists of one unit of mobile crane (25 ton) and four units of forklift (2 ton and 3 ton).

(4) The port hardly handles bulk cargo, and is classified as a typical general cargo port with a significant imbalance between incoming and outgoing cargo volume. Perahu and local sectors are reasonably developed at Ternate, which indicates that the port has a distribution/collection function for the northern part of Maluku Province. The public wharves handled 239,243 tons of cargoes in 1992 as shown in Table 5-19, and average annual growth rate is eight percent during 1984 -1992.

Table 5-19 Port Traffic and Utilization (Ternate)

Year	1984	1988	1992	Year	2005
General C.	70,743	72,312	171,981	Other G.C.	307,000
Unitized C.					
Roll C.					
Solid Bulk				Solid Bulk	
Liquid Bulk	49,125	57,369	67,044	Liquid Bulk	78,000
Bag C.	6,180	53,768		Bag C.	54,000
Drum	2,114	8,303		Drum	8,000
Container			218	Container	34,000
Total C.(ton)	128,162	191,752	239,243	Total C.(ton)	481,000
Passenger	35,150	70,964	613,414	Passenger	687,000
B O R (%)	30	38	38		
B T P (ton/m)	393	396	501		

(5) The port also serves as a major transfer point of passengers, arriving and departing to a large extent with cargo vessels. Number of passengers who embarked or disembarked reached 613,414 in 1992. Pelni passenger ships "KM. UMSINI" and "KM. KERINCI" make calls to the port twice a month each. Ferry between Ternate and Bitung commenced its service in May 1993. Monitoring of ferry traffic is necessary to evaluate the possible traffic generation and diversion between the two socioeconomic cores in the northern part of Easter Indonesia.

(6) BOR and BTP of the port were reported to be 38 % and 501 tons/m respectively in 1992, both of which were considerably lower than the normal values.

The standard cargo handling capacity of the existing berths is estimated at around 380,000 tons per year.

(7) Ternate Island itself is a tiny island with an area of 113 km2 and population of 85,689 in 1988. The port of Ternate is functioning as a transfer point serving Halmahera Island and other neighboring islands. Therefore, the port must be adapted to cater for the sequences of the economic development in the hinterland. Halmahera is one of the candidates for industrial zone proposed by the Government. In 2005 the port should have following functions:

a) Provincial distribution center
b) Container handling capability
c) Passenger transition port
d) Tourism base port

(8) Seaborne public cargo is expected to reach nearly half million tons in 2005, and container traffic will be 34,000 tons. Number of passengers at the port will be around 700,000.

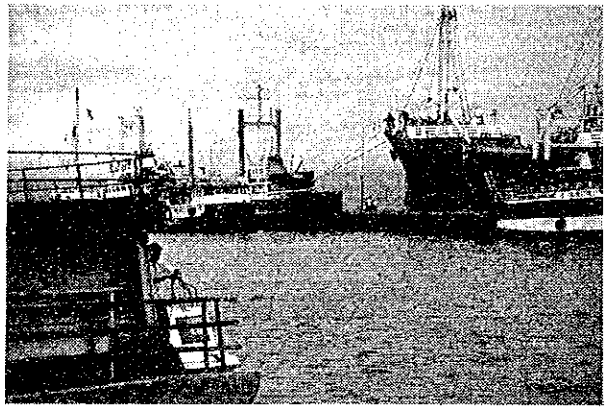
(9) The port will require an additional two berths with a total length of 320 m. A area of 2,000 m2 will be required for a passenger terminal. Container handling facilities should also be prepared.

Conventional cargo berth (-7.5 m)	1 B,	130 m
Passenger ship berth (-7.0 m)	1 B,	190 m
Passenger Terminal		2,000 m^2
Container yard		2,500 m^2

(10) Small scale environmental impact will be anticipated by the port development based on the master plan discussed above in the following facets;

a) Air quality
b) Water quality and bottom contamination
c) Waste management

(11) Tourism development will be pursued to increase living conditions for residents. To foster this development direction of the region, high-speed vessels will be introduced for short or medium distance routes connecting neighboring regions and islands. Redevelopment of waterfront zones between the main port and Bastiong Port should be implemented by 2015.



14) Ambon

(1) Port of Ambon is situated at the center of the east bank of Ambon Bay in Maluku Province. Ambon is the provincial capital of Maluku, total population of which is 1.856 million in 1990. The most striking characteristic of Maluku is its internal distances. Seas cover about 90 percent of the 850,999 km2 within the province's boundaries; consequently, sea transport plays an essential role in the economy.

(2) The port is known as a natural haven sheltered from wave actions, except SW waves observed from November to January. Tidal range is 1.14 m, and the tidal currents are slow. According to the data of soil surveys conducted at the points adjacent to the port area, coarse sand layers exist from the bed surface with elevation of 0 m to the elevation of -5 m. Annual rainfall reaches 3,475 mm.

(3) Public wharves at Ambon are composed of three districts: Yos Soedarso Wharf, Slamet Riwadi Wharf, and Prof. Dr. Siwabessy Wharf. Yos Soedarso Wharf houses the main quays and has a total length of 576 m, width of 15 m, depth of -9 m, and has been utilized for both ocean going and interisland vessels. Slamet Riyadi Wharf is adjacently located to the northeast from the main wharf, and has been used for local vessels and sailing ships. The quay is 100 m long, 3 m wide and 3 m deep alongside. Prof. Dr. Siwabessy Wharf handles bulky cargoes. The port has transit sheds of 3,050 m^2 and open storage of 6,000 m^2 Cargo handling equipment consists of 10 units of forklift (2, 3, and 5 ton) and one unit of mobile crane (25 ton).

(4) The public wharves handled 857,000 tons of cargoes in 1992 as shown in Table 5-20. Average annual growth rate of the pubic cargoes is around seven percent from 1984 - 1992. Regarding the container traffic, the port is a relatively late comer and handled 6,000 tons in 1992.

Table 5-20 Port Traffic and Utilization (Ambon)

Year	1984	1988	1992	Year	2005
General C.	168,000	159,000	576,000	Other G.C.	1,866,000
Unitized C.	185,000	429,000			
Roll C.					
Solid Bulk				Solid Bulk	
Liquid Bulk				Liquid Bulk	
Bag C.	146,000	136,000	275,000	Bag C.	545,000
Drum	7,000	5,000		Drum	10,000
Container			6,000	Container	398,000
Total C.(ton)	506,000	729,000	857,000	Total C.(ton)	2,819,000
Passenger	102,834	168,208	385,285	Passenger	1,180,000
B O R (%)	11	78	87		
B T P (ton/m)	613	987	870		

(5) Number of passengers that embarked or disembarked reached 385,285 in 1992. Pelni's four passenger ships "KM. KERINCI", "KM. RINJANI", "KM. TATAMAILAU", and "KM. SIRIMAU", call the port four times a month each.

(6) Utilization levels of the public berths in the past years are also shown in the form of BOR and BTP in Table 5-20. The former was rather high (87 %) while the latter was moderate (870 tons/m) in 1992. These figures indicate that many passenger ships moor at the quays. The standard cargo handling capacity of the existing berths is estimated at around 1,010,000 tons per year.

(7) The port is geographically located at the center of Eastern Indonesia, and has a rich history in trade and commerce with foreign countries. Therefore, the port is expected to play leading roles to activate maritime transportation in Eastern Indonesia. The port company has built container yards to cope with future development of this maritime transport technology. In 2005, the port will function in the following manners;

a) Distribution function as regional gateway
b) Container terminal candidate
c) Industrial base port
d) Passenger transition port
e) Tourism base port

(8) Seaborne public cargoes are expected to reach about one million tons in 2005, of which 40 % will be containerized. Passenger traffic at the port will exceed one million people.

(9) The port will require an additional five berths with a total length of 950 m for ocean going/interisland vessels as well as additional jetties with a total length of 300 m for local/rakyat shipping. Container handling facilities and equipment should also be prepared.

Heavy cargo/container berth (10-12 m)	1 B.	250 m
Conventional berth (-10 m)	3 B.	510 m
Passenger ship berth (-7 m)	1 B.	190 m
Container yard		50,000 m^2
Cargo handling equipment		one set

(10) Large scale environmental impact will be anticipated by the port development based on the master plan discussed above in the following facets;

a) Visual quality
b) Water quality
c) Waste management

(11) After 2005, the port will ever increasingly become the job center for the region. High speed passenger boats will be plied to connect neighboring islands. Redevelopment and revitalization of the waterfront areas based on the land use plan will be required to attain this goal.

15) Sorong

(1) Port of Sorong is the main deepwater port for western Irian Jaya, and is located at the head of bird-shaped part of the big island. Population of Sorong city is in the neighborhood of 90,000, and total population of Sorong Regency was 199,085 in 1990.

(2) The port is well sheltered by many islands which are located southwest from the port. SW waves are generated during the period from August to November, and estimated wave height is 1.8 m. Tidal range is 0.95 m, and tidal currents of 0.9 m/s are observed around the port. Bed materials are composed of coral and sand, and rock layers are considered to exist at the deeper elevations.

(3) The port comprises public facilities and privately owned facilities. The public berths are 200 m long and -10 m deep alongside, and are utilized by interisland vessels as well as Perintis lines. Extension work of an additional 80 m long quay for interisland passenger ships is underway. Quays with a total length of 280 m will be ready for service at the end of 1992. Area of existing warehouse is 2,000 m^2 About 5,000 to 6,000 m^2 of temporary open storage will be added to the existing 1,080 m^2 Cargo handling equipment which the port company owns is composed of two units of mobile crane of 25 ton and 4.4 ton capacity each and four units of forklift of 2 and 3 ton capacity. The private port facilities at Sorong consist of Pertamina facilities, fishery facilities owned by Usaha Mina, and a cement jetty. Two dockyard facilities are also privately owned and operated.

(4) The public wharf handled 136,660 tons of cargoes in 1992, as shown in Table 5-21, which is eight percent less than in 1991. About 5,000 tons of cargoes were already containerized.

Table 5-21 Port Traffic and Utilization (Sorong)

Year	1984	1988	1992	Year	2005
General C.	130,716	108,232	102,400	Other G.C.	224,000
Unitized C.		5,497	1,003		
Roll C.		27			
Solid Bulk		72	28,556	Solid Bulk	47,000
Liquid Bulk	263,359			Liquid Bulk	
Bag C.				Bag C.	
Drum		3,226		Drum	6,000
Container		644	4,701	Container	25,000
Total C.(ton)	394,075	117,698	136,660	Total C.(ton)	302,000
Passenger	25,057	123,527	168,813	Passenger	447,000
B O R (%)	55	59	86		
B T P (ton/m)	427	607	578		

(5) The port also serves as a transfer point of passengers, arriving and departing to a large extent with cargo vessels. Nearly half of the passenger movement was generated in Sorong, which is the usual port of sea entry in Irian Jaya. Number of passengers who embarked or disembarked at the port reached 154,763 in 1992. Pelni passenger ships "KM. RINJANI" and "KM. UMSINI" make calls to the port seven days a month all together.

(6) Utilization levels of the public berths in the past years are also shown in the form of BOR and BTP in Table 5-21. It is reported that the BOR was 86 % while the BTP was less than 600 tons/m. This indicates that many passenger vessels moor at the quays. The standard cargo handling capacity of the existing berths is

estimated at around 220,000 tons per year.

(7) The port is a good transfer point of cargoes and passengers to both the north coast and south coast of Irian Jaya because the port is situated at the most western part of Irian Jaya. Efforts to improve transportation conditions for the Sorong Regency have been made. The government has placed a very high priority for developing a road link between Sorong and Manokwari, and is expected to commence service by 1995. It is reported that some segment of the road link such as Sorong - Klamono is already open for public use. Inland Sorong Airport is improved in its capacity from handling DHC 6 at the end of Repelita IV to handling minimum F.28 at the end of Repelita V. With improvement of transportation conditions, the port of Sorong will recover as the center of resource-based investment and exports, and use its locational advantage as a transfer point. In 2005 the port should have the following functions;

a) Distribution function as regional gateway
b) Container handling capability
c) Industrial base port
d) Passenger transition port

(8) Seaborne public cargoes are expected to reach about 300,000 tons in 2005, and container traffic will be 25,000 tons.

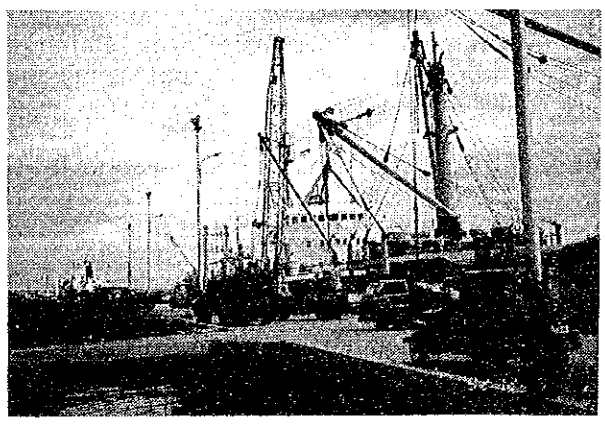
(9) The port will require an additional one berth with 170 m in length which can accommodate 10,000 DWT class vessels in order to accommodate the expected traffic and function. A new passenger terminal should be also built to improve port service to passengers and crews. Container handling facilities should also be prepared.

Heavy cargo/container berth (-10m)	1 B.	170 m
Passenger Terminal		1,800 m^2
Container yard		2,500 m^2
Cargo handling equipment		one set

(10) Small scale environmental impact will be anticipated by the port development based on the master plan discussed above in the following facets;

a) Air quality
b) Water quality and bottom contamination
c) Waste management

(11) After 2005, roles and functions as a regional gateway and an industrial base port will become more and more important for the port of Sorong although the magnitude of the importance of these functions relies on the level of industrialization of the hinterland. As the port will maintain its function as a transition point for passengers, efforts will be required to harmonize and coordinate these various port functions.



16) Biak

(1) Port of Biak is located on the southern coast of the Biak Island, main island of Biak numfor Regency where 90,843 people reside. The port has attracted much attention since the government announced the Eastern Indonesian Policy in 1990.

(2) The port is open to Yapen strait, but sheltered by coral reefs extending offshore for a length of about 750 m. Rainy season covers the period from December to April, and the annual rainfall reaches 2,803 mm. Tidal range is 0.89 and tidal currents are relatively swift. There exist layers of compact sand mixed with coral and shell near the bed surface.

(3) The public wharf is situated at the south of the city center. Pertamina jetty is located about a half km west of the public wharf. A fishery pier and a special port which is owned by a plywood company are also located to the west of the public wharf. The public wharf is 142 m long and 12 m to 20 m wide. The port was originally constructed in 1962, and a 50 m expansion of the pier was implemented in 1992.

(4) As shown in Table 5-22, the public wharf handled 175,949 tons of cargoes in 1992, of which unloaded general cargoes account for a considerable portion. A plywood company located four km from the public port domestically imports logs from its concession in Irian Jaya and exports finished goods to foreign markets. Canned tuna is also exported by containers although its volume is minimal presently. Container traffic at Biak commenced in 1985, and has shown a rapid increase since 1989.

Table 5-22 Port Traffic and Utilization (Biak)

Year	1984	1988	1992	Year	2005
General C.	48,895	26,786	122,141	Other G.C.	211,000
Unitized C.	3,606	2,883	5,902		
Roll C.	629	496			
Solid Bulk	11,798	23,925	7,129	Solid Bulk	63,000
Liquid Bulk				Liquid Bulk	
Bag C.	17,908	6,730	31,106	Bag C.	54,000
Drum	5,135	2,349		Drum	13,000
Container		802	9,671	Container	23,000
Total C.(ton)	79,971	63,971	175,949	Total C.(ton)	364,000
Passenger	8,127	12,642	37,213	Passenger	82,000
B O R (%)	74	86	118		
B T P (ton/m)	437	262	1,141		

(5) Number of passengers who embarked or disembarked reached 39,858 in 1992. The number of passengers jumped up in 1991 when a Pelni passenger ship "KM. SIRIMAU" began to call the port regularly.

(6) Utilization levels of the public berth in the past years are shown in the form of BOR and BTP in Table 5-22. The BOR exceeds 100 %. The standard cargo handling capacity of the existing berths is estimated at around 160,000 tons per year.

(7) Biak island has both a good air transportation infrastructure and a network connecting directly with Guam, Hawaii and Los Angeles. The Biak numfor Regency also has rich tourist attractions such as white sandy beaches with crystal clear water, very pure sea gardens with various species of fish, and interesting traditional

forms of arts and culture. Thus, tourism development will progress, and more seaborne cargoes will be required to support such activities. The port should have the following functions:

a) Provincial distribution center
b) Container handling capability
c) Tourism base port

(8) Seaborne public cargo traffic is expected to reach about 400,000 tons in 2005 as shown in Table 5-. Container traffic will be 23,000 tons , which is 2.4 times larger than the present level.

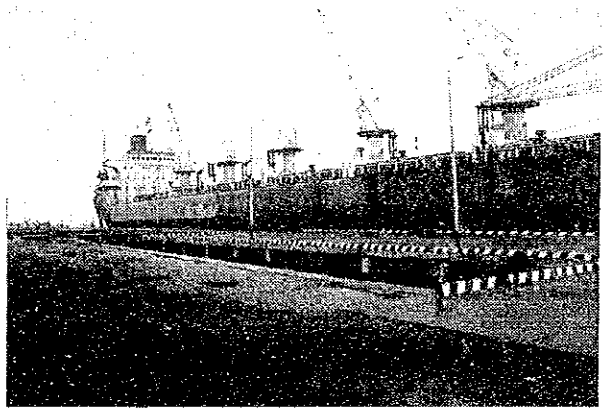
(9) Based on both the standard capacity discussed previously and traffic volume forecast, the port will require an additional one berth of 170 m in length which can accommodate 10,000 DWT class vessels. A new passenger terminal should be also built to improve port service to passengers and crews. Container handling facilities should also be prepared.

Main quay (-10m)	1 B.	170 m
Passenger Terminal		400 m^2
Container yard		2,500 m^2

(10) Small scale environmental impact will be anticipated by the port development based on the master plan discussed above in the following facets;

a) Air quality
b) Water quality and bottom contamination
c) Waste management

(11) With improvement of transportation infrastructures and network, more and more intra- and inter-provincial traffic will be generated in 2015. Biak has a locational advantage in the center of the northern part of Irian Jaya. Therefore, the island should be directed to have mutual network of high-speed boats with coastal towns in the main land of Irian Jaya. Leisure ports such as marinas will also help attract more people to the island.



17) Jayapura

(1) Port of Jayapura is located on the north coast of Irian Jaya and near the border of Papua-New Guinea. The port is situated at the innermost corner of Jayapura Bay. The port's immediate hinterland is the capital of Irian Jaya Province, and population of Jayapura Regency was 246,467 in 1990.

(2) Tidal range of the port is small, 0.64 m, and tidal currents are relatively swift around the port. North wind is prevalent throughout the year. The highest wave is 1 m, and is observed from November to January. According to the data of soil surveys conducted at the points with elevation of 0 m LWS, there exist layers of very soft silty sand mixed with coral gravel with N-value of 6 - 25 from the bed surface to the elevation of -21 m.

(3) The public port Jayapura is composed of two separate places: Jayapura and Apo (or Ota). Jayapura wharf has a 132 m long jetty with access bridges and a 65 m long quay. Water depth alongside the quay is -7 m, and the former is utilized for the handling of larger vessels. There is a covered shed with an area of 2,200 m2. There are palm oil storage tanks with capacity of 4,800 m3 in the port area. A new quay is under construction with domestic finance, and is expected to be completed by the end of 1994. Space for expansion of the Jayapura wharf is topographically very limited because a mountainous steep slope approaches the port area. Apo wharf is situated near the city center. The wharf has a 33 m-long jetty with -5 m water depth alongside, and is utilized by fishing vessels and Perahus. Regarding cargo handling equipment, Persero has two units of mobile crane and five units of forklift.

(4) The public wharf handled 236,541 tons of cargoes in 1992 as shown in Table 5-23. Average annual growth rate of the public cargoes is 9 percent from 1984 to 1992.

Table 5-23 Port Traffic and Utilization (Jayapura)

Year	1984	1988	1992	Year	2005
General C.	65,139	85,684	157,746	Other G.C.	284,000
Unitized C.					
Roll C.					
Solid Bulk			4,603	Solid Bulk	
Liquid Bulk				Liquid Bulk	
Bag C.	44,818	39,168	74,190	Bag C.	157,000
Drum	5,572	5,222		Drum	8,000
Container			2	Container	32,000
Total C.(ton)	115,529	130,074	236,541	Total C.(ton)	481,000
Passenger	22,491	84,730	102,748	Passenger	284,000
B O R (%)	52	50	62		
B T P (ton/m)	162	680	985		

(5) Number of passengers that embarked or disembarked reached 112,988 in 1992. Pelni passenger ships "KM.UMSINI" and "KM. SIRIMAU" make calls to the port twice a month each.

(6) Utilization levels of the public berths in the past years are also shown in Table 5-23 in the form of BOR and BTP. The former was 62 %, and the latter was 985 tons/m.

(7) The port is directly servicing the Jayapura Regency and is functioning as a gateway to the mountainous region of Jayawijaya Regency. The government puts a high priority on developing a road connecting Jayapura and Wamera. The road is expected to be open for service in the very near future. With the widening of the port hinterland, expansion of traffic at the port of Jayapura can be expected. Further, one shipping company has a plan to develop container service between Australian ports and the Jayapura port making use of the locational advantage. Thus, the port has a good potentiality for further development although present port roles are limited. The port's roles and functions in 2005 are conceived as follows;

a) Provincial distribution center
b) Container handling capability
c) Tourism base port

(8) Seaborne traffic is expected to reach about a half million tons in 2005. Container traffic will be 32,000 tons.

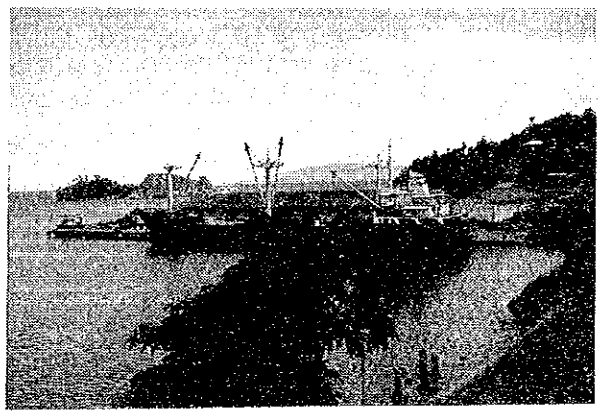
(9) The port will require an additional two berths with a total length of 260 m which can accommodate 5,000 DWT class vessels in order to meet the expected traffic. A new passenger terminal should be also built to improve port service to passengers and crews. Container handling facilities should also be prepared.

Quay (-7.5 m)	2B.	260 m
Passenger Terminal		1,600 m^2
Container yard		2,500 m^2

(10) Small scale environment impact will be anticipated by the port development based on the master plan discussed above in the following facets;

a) Air quality
b) Water quality and bottom contamination
c) Waste management

(11) With the development and improvement of the road system in the hinterland, agro-industry and mining industry will show significant growth, and more and more cargo will be attracted to the port. Regarding tourism development, Jayawijaya Regency has unique tourist objects such as the remains of the stone age culture and unique flora and fauna. Therefore, the port should hold a function to receive cruise ship passengers in 2015. The most important issue to be overcome is physical limitation of the port in regards to future expansion. To meet public expectations for the port, it will be required for the port management body to relocate the port to another site for the further development.



Port management and operation

102. Over middle class commercial ports should be operated based on the following essential principles; namely, autonomy and commercial management methods. Also it is to encourage these principles that status of PERUM was changed to PERSERO as mentioned in chapter 8.E of Part I. This governmental policy should be sustained and this movement should be pushed onward. However there still seems to be some areas where improvement is necessary for realization of PERSERO's sufficient autonomy, as follows.

1) Control over daily operational activities

103. Under Inpres 4/1985, the ADPEL has been given extensive powers to deal with the difficult problems of coordination and control and to ensure streamlining of port operations as mentioned in chapter 8.E of part I. As a result of that, much of the routine decision-making is in the hands, not of the branch office of PERSERO, but of the government-appointed port administrator. PERSERO is responsible for only provisions of facilities but the ADPEL controls overall operations. Therefore, autonomy of PERSERO in matters even of day-to-day management may be in practice minimal in some ports.

104. The role of ADPEL has been valuable in streamlining port activities especially regarding coordination within governmental functions involving ports or administrative overview for port activities requiring governmental power. However, so far as daily operational decisions don't rest with PERSERO it is questioned whether administrative autonomy can be effectively achieved. Daily operational management concerned with port services (such as berth allocation) should be handled by PERSERO to increase their autonomy and responsibility. Also, ADPEL should respect PERSERO's decision as much as possible as regards the daily port operation, and should be intent on only coordination with other governmental agencies or supervision and inspection necessary for governmental power.

2) Reinforcement of marketing function of PERSERO

105. To promote use of port it is essential to establish a more useful and attractive port in terms of berth facilities and management and operations for users such as shipping lines, agents, forwarders, shippers and consignees.

For that purpose, it is necessary to have a real time, broad, systematic grasp of the user's needs and to reflect their needs in the practical development and management of the port. The port should be marketed aggressively, providing users with pertinent information. These functions would become more important after status conversion into PERSERO.

106. The marketing function of existing service division in PERSERO branch office should be reinforced to promote these works. Reinforcing marketing function, externally, it can collect information on port user's requirements, advertise the advantages of the port and attract customers. Internally, the division can function as an advisory organization to other divisions by providing information collected on users' requirements.

3) Reinforcement of monitoring functions of PERSERO

107. If a port is to be operated with efficiency and foresight, the management must be accurately informed all the time about every aspect of port traffic and port operation. This information must be based on correct figures and it should be

available promptly, as otherwise it loses part of its usefulness. A substantial increase in a certain sphere of port traffic may require urgent improvements, additional storage space or more mechanical equipment. A decline may be due to unsatisfactory services or excessive costs, resulting in a deviation of traffic to other ports. However, previous monitoring system in port sector was insufficient and not in practical use.

108. To improve monitoring system in port sector, DGSC introduced SIMOPEL system in January 1993. This system is very helpful and will recover previous drawbacks, when it begins functioning well. Therefore it is important that PERSERO put this system to practical use. For that purpose, head office of PERSERO should responsibly settle the statistics of all ports under jurisdiction as a responsible body to manage and develop ports. They should check and review the statistics reported by branch office to determine if these data are reliable and available for good management or making of port development plan. Also these statistics should be recorded and kept for a long period of time. To grasp not only present conditions but also past conditions is very important. These data are very useful in drafting improvement plans or new plans. Reinforcement of monitoring functions of PERSERO is one of the most important factors for efficient port management and enhancement of ability to develop port facilities independently.

4) Sufficient support of central government

109. It is desirable that commercial ports should be operated based on financial self-sufficiency. However, at the ports in Eastern Indonesia, unprofitable investment for PERSERO is sometimes required from the viewpoint of regional development or necessity for local resident's life. As for this kind of investment, central government should furnish necessary funds so that PERSERO will not be forced to bear undue financial burden. In particular many ports in Eastern Indonesia under PERSERO III and IV show deficit as mentioned in chapter 8.E of part I. These ports cannot fulfill their required function without support and funding by central government.

5) Introduction of flexibility in labor supply system

110. Introduction of negotiable stevedoring charge contributed to higher stevedoring efficiency. However, uniform stevedoring labor supply system should be reexamined. Especially at over middle class ports in Eastern Indonesia, modernization of cargo handling such as introduction of mechanization and progress of containerization will be increasingly required in future. To cope with this modernization, it will be more important to get stable supply of good skilled port labor who can operate complicated cargo handling equipment. For that purpose, some relaxation of labor hiring system at these ports should be considered. For example, a direct employment system for skilled labor such as operator of some equipments (crane, top loader and so on) by cargo handling company might be one method to get capable labor.

Cost estimation

1) Technical standard

111. In estimating the construction cost, the following reference materials were used:

- Cost Estimation Standard for Civil Works for Construction of Port Facilities compiled by the Bureau of Ports and harbours, Ministry of Transport, Japanese Government.

- Analisa Upah dan Bahan (Labor Wage and material Cost Analysis).

112. Unit price of construction materials is based on the latest data collected by the JICA Study Team in December 1992, while the procurement cost of cargo handling equipment is based on the latest data which were available in Japan in May 1993.

113. Physical contingenvcy is expressed in the amount equal to five percent (5%) of the sum of the direct cost of civil and building works and the equipment procurement cost.

114. Consulting fee for engineering design and supervisory services is equal to ten percent (10%) of the direct cost of civil and building works.

115. Value Added Tax (VAT) is presented in the amount equivalent to ten percent (10%) of the sum of the direct cost of civil and building works, equipment procurement cost, physical contingency and consulting fee.

116. Foreign currency portion of the construction cost mainly covers the following:

Construction materials:	Steel pile piles, concrete piles, steel members, fenders and bollards
Work items:	Driving of foundation piles, excluding the piles for berthing facilities for Rakyat and Lokal facilities for Rakyat and Lokal ships. Towage of floating pile driver and attendant bpats.
Consulting fee:	Remuneration for foreign experts.

117. Any price escalation is not considered in the cost estimation.

2) Cost estimation and implementation schedule

118. Estimated costs and implementation schedule for civil works, building works and cargo handling equipment procurement for the 17 study ports are given in Table 5-24 and Table 5-25, respectively.

Table 5-24 Summary of Construction Cost of Over Middle Class Port

(Unit: Billion Rupiah)

Port	Civil Works	Building Works	Equipment Procure-ment	Total	Foreign Currency Portion	Local Currency Portion
Sampit	87.5	0.1		87.6	52.6	35.0
Banjarmasin	638.3	2.0		640.3	416.8	223.5
Lembar	92.0	0.1		92.1	58.5	33.6
Kupang	71.4		1.3	72.7	41.7	31.0
Dilli	34.9			34.9	22.5	12.4
Balikpapan	231.3		1.3	233.4	134.5	98.9
Samarinda	177.1	1.0		178.1	105.7	72.4
Bitung	239.9		1.3	241.2	146.0	95.3
Pantoloan	47.0			46.7	28.7	18.3
Uj.Pandang	270.6		134.7	405.3	296.1	143.7
Pare-Pare	56.3	1.0		57.3	34.7	22.6
Kendari	15.5	1.5		17.0	10.4	6.6
Ternate	31.4	1.4		32.8	19.7	13.1
Ambon	126.4		1.3	127.7	68.1	59.6
Sorong	32.5	1.8	1.3	33.9	19.9	14.0
Biak	27.6	0.4		28.0	17.3	10.7
Jayapura	35.4	1.0		36.4	23.0	13.4
Total	2,215.1	10.3	141.2	2,400.3	1,496.2	904.1

Table 5-25 Implemetation Schedule for Over Middle Class Ports

Unit : Billion Rupiah

Package	Port	Cost in Port	Package Cost	Foreign Currency	Local Currency	1st Stage			2nd Stage			3rd Stage			4th Stage		
						1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
I	Kupang Balikpapan Bitung Uj.Pandang Ambon Biak	26.7 72.7 102.7 212.3 26.7 28.0	442.5	275.5	167.0		29.1 413.4		Engineering and Supervising (E/S) Construction (C)								
II	Sampit Banjarmashin Lember Dilli Samarinda Pantoloan Pare Pare Kendari Ternate Sorong Jayapura	50.1 305.3 37.8 17.4 114.8 16.5 29.6 17.0 1.4 33.9 18.9	642.9	401.5	241.4					46.8 596.1		(E/S) (C)					
III	Kupang Balikpapan Bitung Uj.Pandang Ambon	45.2 160.7 138.5 254.6 101.0	700.0	428.3	271.7								48.1 651.9		(E/S) (C)		
IV	Sampit Banjarmashin Lember Dilli Samarinda Pantoloan Pare Pare Ternate Jayapura	37.5 335.0 54.3 17.5 63.3 30.5 27.7 31.4 17.7	614.9	390.0	224.0											45.3 569.6	(E/S) (C)
Total			2,400.3	1,496.2	904.1	442.5			642.9			700.0			614.9		

D. Standardized Development Plans for Small Class Port

Concept of small class port

119. As discussed earlier, the JICA Study Team picked up the public ports which are under the administration of DGSC as the study ports in this particular study. Based on the scope of work of the study, the Study Team has to classify the study ports into two categories: over middle class ports and small class ports.

120. On the other hand, there exists a general classification system regarding the public ports in Indonesia, namely, commercial ports and non-commercial ports. The former ports are managed by PERSERO, and the latter ports are under direct management of DGSC.

121. A total of 17 ports were selected from the commercial ports in Eastern Indonesia, and nominated as the over middle class ports. Conceptual development plans for 2005 have been proposed for each of the over middle class ports in the previous section. Then, a question arises; "what is a small class port ?"

122. Theoretically, the rest of the commercial ports and all of the non-commercial ports fall into the small class ports. In reality however, these two groups cannot be treated as a single category because they are different with each other both qualitatively and quantitatively.

123. A typical standardized development plan will be presented for the small class ports. This implies that the small class ports have common characteristics and can be standardized.

124. In a general sense, commercial ports have wide range of functions and roles, reflecting socioeconomic activities in its hinterland which usually covers considerable portion of its province. The port comprises several types of facilities, and its magnitude is a reflection of the economic power of each hinterland. Standardization of the commercial ports is neither possible nor worthwhile.

125. On the other hand, many of the non-commercial ports are situated in a similar socioeconomic and geographical environment, and have a basic and common function; receiving vessels which bring in daily necessities from the major city, and/or ship out local products to markets. Compositions of port facilities are usually simple. In many cases, the port is the exclusive transportation mode for the local community to communicate with the outer world. Standardization is possible and beneficial for planning work.

126. As seen in the foregoing discussion, the small class ports in this study are defined as the non-commercial ports. A standardized plan will be presented by analyzing the present situation and future roles of the non-commercial ports in Eastern Indonesia.

Present situation of small class port

1) Port facility

127. According to DGSC, there are a total of 363 non-commercial ports in Eastern Indonesia. They are further categorized into two groups; mother ports and working units. 112 ports are classified into the former and 251 ports as the latter.

128. Information on present facilities at each non-commercial port is obtainable through the publication compiled by DGSC although revision may be required to some extent for the latest information. According to the said source, number of ports which have some sort of berthing facility accounts for only 24 percent of the total non-commercial ports in Eastern Indonesia. This implies that three out of four non-commercial ports have only a mooring basin in Eastern Indonesia. By sub-category, about 50 % of the mother ports have berthing facilities, and about 16 % among the working units.

129. Presently, 27 perintis vessels are engaged in shipping services for remote and/or undeveloped areas nationwide. In Eastern Indonesia, a total of about 200 ports are fortunate enough to be called by the perintis ships regularly; by category, 12 % of them fall into the commercial port group, 17 % into the mother port, and 71 % into the working unit. Frequency distributions of quay length at each port which perintis ships call are shown in Figure 5- for the mother port and Figure 5- for the working unit. Average quay length for the mother port is 43 m, and that for the working unit is 10 m. Only some 20 % of the working units have berthing facilities although they are Perintis ship calling ports.

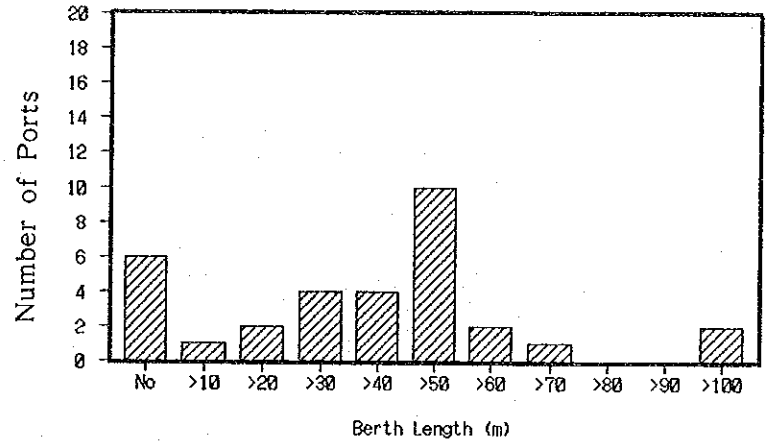


Figure 5-5 Berth Length of Perintis Mother Port

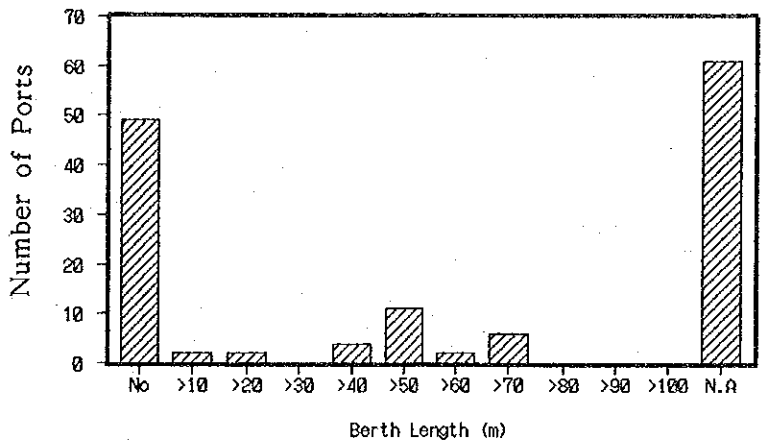


Figure 5-6 Berth Length of Perintis Working Unit

Port traffic

130. Port statistics published from both the Central Bureau of Statistics and Kanwil of the Ministry of Communications do not always reveal accurate information on activities of each small port because information on port traffic at a mother port and at working units under management of the said mother port is combined and published under the name of the mother port. In other words, published port traffic at a mother port includes traffic at working units under the management of the said mother port. Therefore, neither port traffic at mother ports nor that at working units is known.

131. Under the constraints mentioned above, volume of cargo handled at mother ports is shown in Figure 5-7 in the form of histogram. Generally speaking, a mother port, including working units under its management, handles cargoes in the range of 10 - 90 thousand tons annually. Number of passenger who embarked or disembarked at a port in a year also varies from several thousands to hundreds thousands.

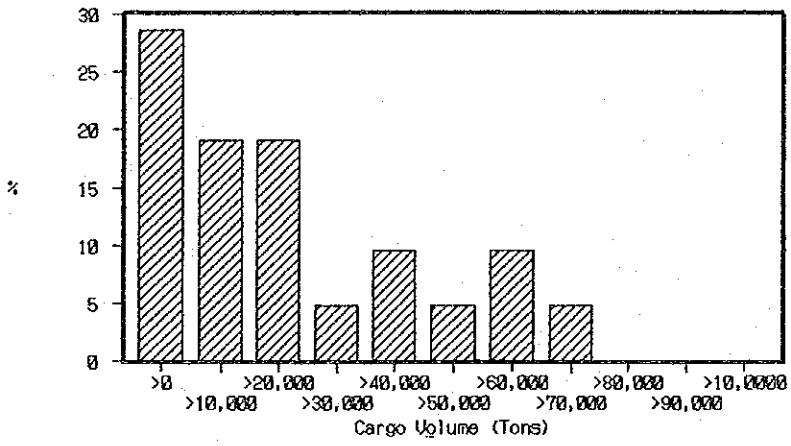


Figure 5-7 Cargo Volume Handled at Mother Ports

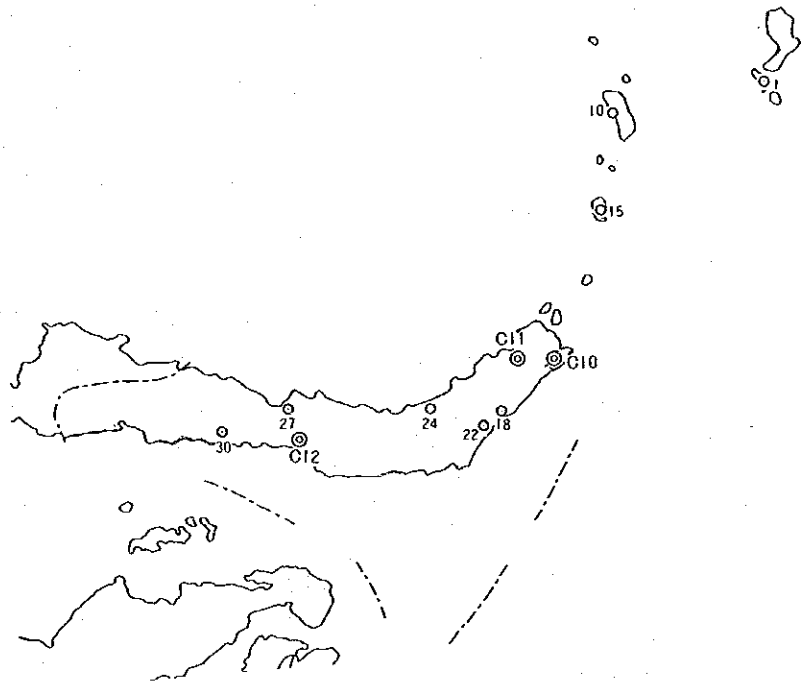
Port hierarchy

132. Analysis of ship call records at small ports was made to examine the shipping links, which may represent port hierarchy, although data for the analysis are limited. Mother ports of North Sulawesi Province are taken for this analysis because this province has many small ports both on the remote islands and on the main island. Locations of the ports in this province are shown in Figure 5-8.

133. Main last ports of call in and next ports of call out for some of the small ports in the North Sulawesi province can be listed as follows:

Small port	Main last/next ports of call
Kotabunan	Gorontalo
Kwandan	Western Indonesia, East Kalimantan, South, Central, and North Sulawesi
Tilamuta	Gorontalo, North Sulawesi
Labuan-Uki	East Kalimantan, Surabaya, Makassar
Lirung	North Sulawesi
Tahuna	Manado, Bitung, North Sulawesi

134. In general, ports on remote islands are tied with major ports in main island, and ports on the main island have their own trading partners. From the analysis shown above, it can be assumed that there is no fixed port hierarchy in the province. Each port has its own trading partners based on the geography, kinds of cargo to be shipped and imported, and so on.



No	Port
C10	Bitung
C11	Manado
C12	Gorontalo
1	Lirung
10	Tahuna
15	Ulu Siau
18	Belang
22	Kotabunan
24	Labuan Uki
27	Kwandang
30	Tilauta

Figure 5-8 Location of the Mother Ports in North Sulawesi

Development priority of small class port

135. Eastern Indonesia in general consists of undeveloped areas, and a considerable portion of the total population lives in remote and isolated areas where sea transportation is the only means to access the market and civilization. Port facilities in such areas however, presently are far from satisfactory.

136. It is reported that only one quarter of the total non-commercial ports in Indonesia have some sort of berthing facility. Loading/unloading of cargoes and embarkation/disembarkation of passengers have been practiced offshore at the rest of the ports. Improvement and development of port facilities to a satisfactory level at every port will require huge a budget and time. Therefore, it is necessary to establish a priority system for the implementation of the entire project.

137. Priority should be given to the Perintis ship calling ports. Perintis lines are forms of the government efforts to provide people who live in remote and isolated areas with daily necessities and opportunities for economic growth. Shipping routes are decided by the government taking into consideration demography, equity, regional development policy, costs and benefits. To support administrative efficiency, higher priority should be given for the improvement or development of port facilities to the Perintis calling ports than to the other ports.

138. Among the Perintis calling ports, priority should be given to the mother ports. The mother ports have been selected from the entire non-commercial ports considering location, port traffic, population of hinterland and so on. Therefore, it can be said that the mother ports in general have a larger socioeconomic impact than the working units.

139. For the non-perintis calling ports, the same principle can be applied. Firstly, port facilities at the mother ports should be developed or improved. The mother ports will provide cores for the development of the regions. Construction works at the working units should follow those at the mother ports.

140. Berthing facility at the small ports should be upgraded to a satisfactory level for users: ships, passengers, cargo handling equipment, and workers. Among the port facilities, berthing facilities are considered to be the most important. Presently, quay length at small ports is so short that a vessels's bow or stern protrudes beyond the quay end. This practice however, is neither safe for the vessels nor efficient for cargo handling. New berthing facilities should have sufficient quay length for the planned vessel.

141. Width of wharf or jetty is also an important element in the planning. Presently, cargo handling at small ports is done manually. In future, more equipment and trucks will be used at ports. Therefore, width of quay should be planned taking into consideration the safe and efficient movement of automobiles.

142. Ro/Ro transportation is an efficient system because cargo handling is not required at ports. With the economic growth and improvement of road system in remote areas, this advanced type of shipping may be introduced gradually in short and middle distance shipping routes. Port facilities related to this type of traffic should be prepared when circumstances are matured. Warehouse, open storage, or passengers shed should be built where necessary.

Standardized development plan

1) Size of vessel

143. Length of calling ships at mother ports in North Sulawesi in 1991, for example, shows that vessels more than 80 m long have a 3 percent share. But it should be remembered that these data also include ship data at special ports (or working units) as mentioned previously. Some ocean going vessels visit these special ports to load/unload special goods such as coconut oil.

144. Perintis ships are the largest ships to call the mother ports regularly in many instances. Ship sizes vary from 192 DWT to 1,750 DWT. Figure 5-9 shows the frequency distribution of ship length of the 27 perintis ships nationwide, and the figure reveals that the range of 55 m to 60 m has the highest frequency and no Perintis vessels are more than 65 m long.

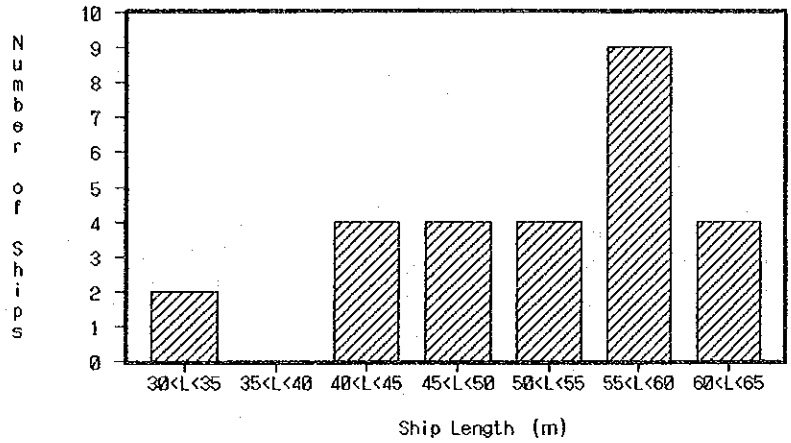


Figure 5-9 Distribution of Perintis Ship Length

145. As discussed in Chapter 3 and 4 of Part II, the JICA study team proposed standard vessels including a type good for Perintis ship, which has 66 m length, 3.8 m draft, and 900 DWT. From the foregoing data, a planned vessel size for the standardized development plan for the small class port should be set as 1,000 DWT.

2) Berthing facilities

146. Width of the pier should be determined taking into consideration workability for cargo handling and vehicle movement, and safety for passengers and workers. At least 12 m is needed to meet the requirements above mentioned. Figure 5-10 shows the relationship between quay length and quay width at selected small ports in Eastern Indonesia.

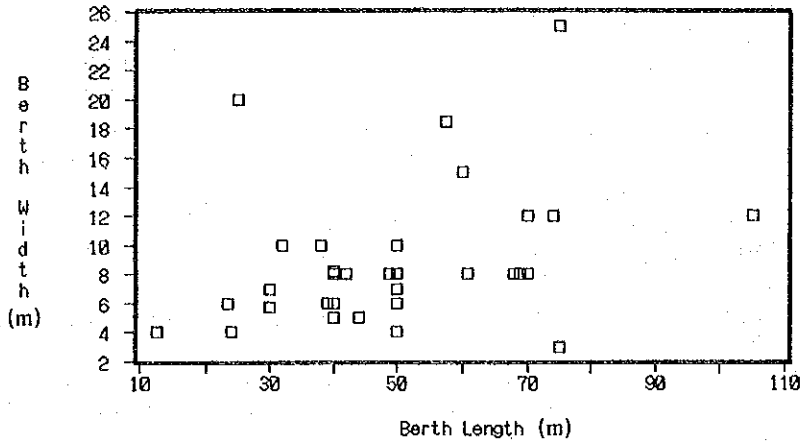


Figure 5-10 Relationship between Quay Length and Width

147. Berthing facility should have the following dimensions, and its standard section of RC pier is shown in Figure 5-11:

Vessel size : 1,000 DWT
Quay length : 80 m
Quay width : 12 m
Water depth : -4.5 m

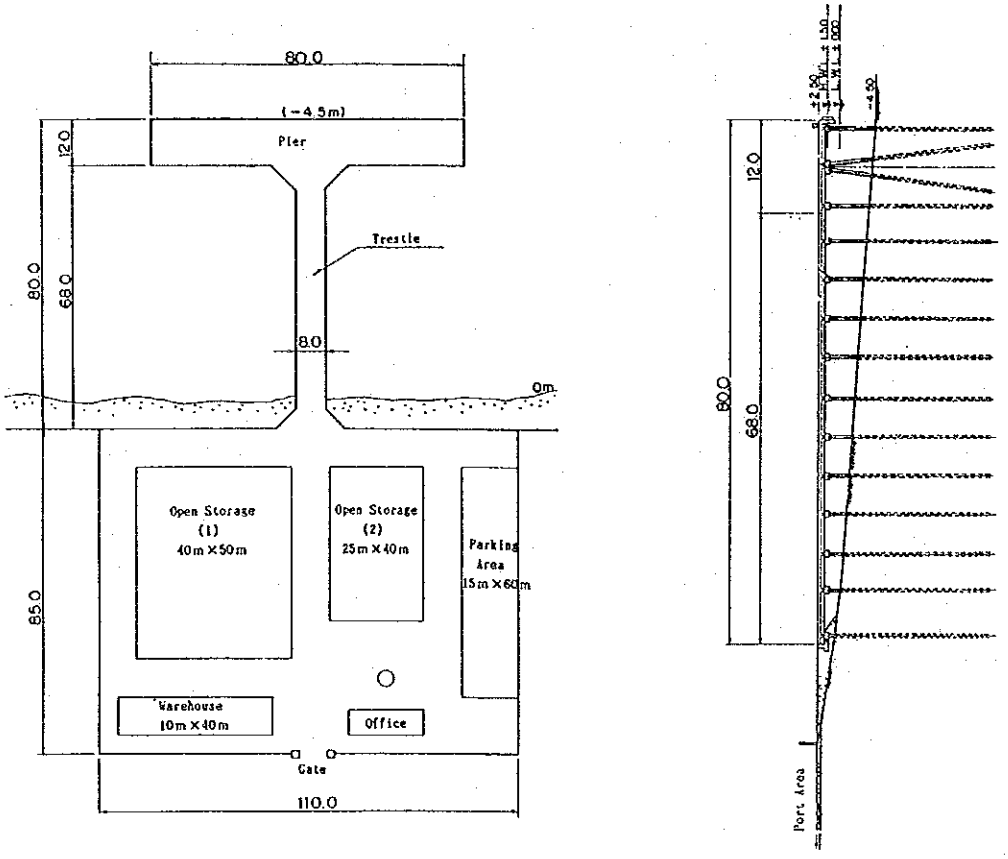


Figure 5-11 General Layout and Side View of Small Class Port

148. Achievement factor of the quay, which is defined as the ratio of the existing quay against the proposed quay standard in terms of quay length or area, is summarized for the perintis calling ports in Eastern Indonesia as follows;

	Mother ports	Working unit
Number of ports	32	137
With quay	26	27
Without quay	6	110
Av. existing quay length	43.0 m	9.8 m
Proposed quay length	80.0 m	80.0 m
Achievement factor	53.8 %	12.3 %
Av. existing quay area	329.0 m2	76.6 m2
Proposed quay area	960.0 m2	960.0 m2
Achievement factor	34.3 %	8.0 %

3) Access way

149. Access way connecting the berthing facility and the main road is provided where necessary. The width of the access way is defined as 8.0 m equivalent to two vehicle lanes (3.5 m x 2) plus a passenger way (1 m).

4) Shed and storage

150. Passengers and cargo passing through the port shall be provided with adequate shelter in times of adverse weather conditions. A multi-purpose shed shall serve this purpose whenever necessary, and shall be about 400 m2 although actual size will depend on the expected traffic level.

151. Open storage area shall be provided where bulky cargoes are expected to load/unload, and its location should be as much as possible within the immediate vicinity of the pier for convenient and easy handling. This back up area can be utilized as a parking lot for vehicle. Standard land area for this purpose is about 3,000 m2. Actual size however, will depend on specific port conditions.

5) Environmental consideration

152. According to this standardized development plan of small class port, the scale of development is rather smaller than that of the over middle class ports. But there are some natural environmental resources which should be preserved around small class ports in Eastern Indonesia. Therefore, it seems important to do the environmental consideration concerning the small class port development.

153. In the first place, site selection of port development area is the most important factor regarding environmental consideration. When a detailed development plan of a small class port is formulated, natural environmental conditions must be taken into consideration regarding the site selection.

154. When the site selection of the port development area is made, it is very important to conduct a preliminary study regarding the following marine/coastal ecology.

a) Coral reef
b) Mangrove

155. The areas where above living things live must be avoided for the port development areas. And if the port development areas exist near the above areas, at the port construction stage, it must be noted that the water quality should be maintained present condition.

156. Finally, at the port management stage, it must be noted that "Bilge water" from ships should be treated properly.

6) Port management and operation

157. At many small ports in Eastern Indonesia, port facilities do not seem to be maintained in good condition and cannot fulfill their functions sufficiently. Therefore good maintenance of port facilities is one of the urgent subjects for small ports in Eastern Indonesia. But at present shortage of funds seem to be a bottleneck for this problem. These small ports are non-profitable, therefore maintenance tends to be irregular and insufficient. However, these ports are indispensable for local residents in Eastern Indonesia. Central government should play an important role in solving this problem.

158. As mentioned in chapter 8.C of Part I, in statistics of non-commercial ports, traffic of working units is aggregated under the name of mother ports which manage them. Also port traffic data of non-commercial ports sometimes include that of special ports located nearby, and this causes confusion in many cases. It is desirable that port statistics should be distinguished by individual port, because it cannot be said that port statistics provide useful information for planning and management if port throughput of individual port is not obtainable.

Cost estimation

1) Basis and assumption for the Cost estimation

159. Cost estimation for the small class ports is based on Disain Konstruksi Standar Pelabuhan Kecil (Standard Construction Design for Small Ports) recommended by the Directorate General of Sea Communications, Ministry of Communications, Indonesian Government.

160. In estimating the construction cost, the following reference materials were used:

- Cost Estimation Standard for Civil Works for Construction of Port Facilities compiled by the Bureau of Ports and Harbours, Ministry of Transport, Japanese Government.
- Analisa Upah dan Bahan (Labor Wage and Material Cost Analysis.)

161. Unit price of construction materials is based on the latest data collected by the JICA Study Team in December 1992.

162. Physical contingency is expressed in the amount equal to five percent (5%) of the sum of direct cost of civil and building works.

163. Consulting fee for engineering design and supervisory services is equal to ten percent (10%) of the direct cost of civil and building works.

164. Value Added Tax (VAT) is presented in the amount equivalent to ten percent

(10%) of the sum of the direct cost of civil and building works. physical contingency and consulting fee.

165. Foreign currency portion of the construction cost for the small class ports manly covers the following:

Construction materials	:	Concrete piles, steel members, fenders and bollards.
Consulting fee	:	Remuneration for foreign experts.

166. Any price escalation is not considered in the cost estimation.

2) Cost estimation and implementation schedule

167. Cost estimation for construction of port facilities for small class ports was made based on the Standardized Development Plan described in the preceding section. The construction cost of small class ports is estimated at Rp.6.46 billion/port comprising foreign currency portion of Rp.0.78 billion and local currency portion of Rp.5.68 billion.

168. Estimation of total construction cost for small class ports was made based on the said estimated cost per port, and the construction cost required under the present project was obtained by applying the non-achievement factor. The estimation results are shown in Table 5-26.

Table 5-26 Estimated Construction Cost of Small Class Ports

Unit:Billion Rupiah

Description	Mother Port	Working Unit	Total	Foreign Currency Portion	Local Currency Portion
Number of Ports	32	137	169	-	-
Construction Cost Per Port	6.46	6.46	-	-	-
Total Construction Cost	206.7	885.0	-	-	-
Achievement Factor (%)	34.3	8.0	-	-	-
Non-Achievement Factor (%)	65.7	92.0	-	-	-
Construction Cost	135.8	814.2	950	114.8	835.2

169. In working out the implementation schedule for small class ports as shown in Table 5-27, the first priority was given to the construction of mother ports and second priority to the construction of working unit ports, and all of the ports were scheduled to the completed in the target year.

Table 5-27 Implementation Schedule for Small Class Port

Unit : Billion Rupiah

Package	Project Cost	Foreign Currency	Local Currency	1st Stage			2nd Stage			3rd Stage			4th Stage		
				1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
I Mother Port	135.8	16.4	119.4		9.0 63.4	63.4	Engineering and Supervising (E/S) Construction (C)				(E/S)				
II Working Unit - 1	271.4	32.8	238.6					18.0 126.7	126.7	(E/S) (C)					
III Working Unit - 2	271.4	32.8	238.6								18.0 126.7	126.7	(E/S) (C)		
IV Working Unit - 3	271.4	32.8	238.6											18.0 126.7	(E/S) 126.7 (C)
Total	950.0	114.8	835.3	135.8			271.4			271.4			271.4		

E. Selection of Feasibility Study Ports

170. Among the over middle class ports, feasibility study ports should be selected, taking into consideration various elements. An agreement has been reached between the Japanese Preparatory Study Team and the Indonesian counterpart that the tentative candidate ports are Bitung, Biak, Ambon, Kupang in order of priority. Basic indices about socioeconomic conditions of the hinterland and port activities are summarized in Table 5-28.

Table 5-28 Performance of F/S Candidate Ports

		Bitung (N.Sulawesi)	Biak (I.Jaya)	Ambon (Maluku)	Kupang (NTT)
Population	(Level I, '000)	2,478	1,649	1,856	3,269
	(Level II, '000)	92	88	247	493
Per Capita GRDP	'89 ex. Oil, '000. Rp.	515	866	748	314
Growth Rate,	%, ('83 – '89)	2.8	4.1	5.4	3.3
Public Cargo	'92, ('000)	1,177	176	857	308
Growth Rate,	%, ('84 – '92)	7.9	10.4	6.8	11.5
Container	Ton, '92	70,226	9,671	6,000	1,320
Passenger	'92 ('000)	198	37	385	53
Berth Length	(m)	1,313	142	676	323
B.O.R.	%, '92	64	118	87	61
B.T.P	Ton/m, '92	784	1,141	870	921

Remarks: Sources of BOR and BTP are PERSERO III and IV.

171. As discussed in Chapter I and II, Part II, the JICA study team set the study framework that Eastern Indonesian economy should catch up with the rest of the nation, probably through regional industrialization. From this point of view, priority for the development should be given to the economic slump areas. East Nusa Tenggara province (Kupang Port) and North Sulawesi province (Bitung Port) show both lower per capita GRDP and annual growth rate than the other candidates.

172. Size of the provincial population is an important indicator to show both development potential of the region and magnitude of possible development effects. Again, East Nusa Tenggara and North Sulawesi have larger populations.

173. Locational advantage should also be considered. Kupang is situated at the south of Eastern Indonesia, Bitung and Biak are situated at the north end of the study area. These three ports are located at the "Pacific Rim". Taking into consideration the factors mentioned above, among others, Bitung and Kupang were proposed and agreed upon as the feasibility study ports.

F. Recommendations for the Implementation of the Port Subsector Development Program

For the over middle class ports

174. Port throughput at the public wharves in 2005 will be about three times larger than that in 1990, provided that the economy in Eastern Indonesia is going to grow at an annual GRDP growth rate of 6.5 percent. Existing port facilities at many ports are pressed under inadequate level even to accommodate the present port traffic. They can no longer accommodate the traffic in 2005.

175. Every effort should be made to develop and improve port facilities to meet the port traffic forecast. Otherwise, ports will become bottle necks for the economic development, social stability, welfare promotion, and realization of equity in the nation, especially in Eastern Indonesia.

176. Acquisition of lands is urgently needed for development of port facilities. As ports cannot function alone, they should get more involved in city planning and regional development planning works so that they can protect their benefits from outside, and make their future development plan clearer to the public and other institutions as well as contribute to economic growth in general.

177. Containerization of general cargo and introduction of bulk transportation for bagged cargo such as cement are recommended to accommodate the ever increasing traffic at ports. Continuation of break-bulk cargo handling at ports requires a seemingly unrealistic number of berths and workers. To minimize the required areas for port development, ports should adapt themselves to the advanced level of maritime transportation technology.

178. Feasibility studies for the over middle class ports should be implemented as soon as possible. BORs of most of the ports show more than 80 %, and BTPs exceed 1,100 ton/m in 1992. There would be excessive ship waiting and lightering of cargo at ports if effective countermeasures are not taken. Nearly ten years have passed since the master plans of the collector ports were formulated, and socioeconomic conditions and national policies for maritime transportation and ports have changed substantially. These facts support the necessity of implementation of the feasibility studies. Ports which currently handle large volumes of cargo and are expected to play the major roles in the port network should be given higher priority because their performance will affect directly and with great extent the economic activities in Eastern Indonesia.

For small class port

179. It is recommended that the achievement factor of quay at perintis ship calling ports should be 100 % by 2005.

180. Latest information on port facilities and activities as well as socioeconomic conditions of hinterland of non-commercial ports should be collected and compiled into data base. Renewal of this information is crucial for planning and monitoring of these ports.

Chapter 6 MARITIME SAFETY SUB-SECTOR DEVELOPMENT PLAN

A. Aids to Navigation Development Plan

Background for planning works

1. Development of aids to navigation (or ATN) has recently made progress in the nationwide schedule of Indonesia.

2. According to the development situation between 1987 and 1991, the share of the lighthouse/lightbeacon installed anew in Eastern Indonesia runs up to 59% of all new installations in the whole of Indonesia. At the same time, the percentage of rehabilitation works undertaken in Eastern Indonesia is 48% of total works.

3. As for all the existing facilities, 39% of the lighthouse and 40% of the lightbeacons are in operation in Eastern Indonesia except for those in Kalimantan east coast where the development is reaching to same level of western area as of 1992.

4. Even though the coastal length of Eastern Indonesia is much longer than that of Western Indonesia, not to mention that there are more islands as well, the development level of the former is still low. In comparison with Western Indonesia including Kalimantan east coast, the number of lighthouses/beacons and lighted buoys in Eastern Indonesia in the same distance are two-thirds and one-sixth, respectively.

5. Therefore, it seems that Eastern Indonesia is still behind in the development of ATN. In line with the development of maritime transportation, the development of ATN should be facilitated.

6. There are 67 units of lightbeacons and 116 units of lighted buoys along Kalimantan east coast which belong to other institutions such as the PERTAMINA.

7. Concerning the maritime accidents from year 1988 to 1990, the Malacca Strait, Java Sea, Bali Sea, Makassar Strait, and Flores Sea are regarded as accident prone areas. These areas are located westwards from 120°E. Especially the accidents occurring in the areas of Surabaya, Jakarta, Sunda Strait, and Malacca Strait are very remarkable in proportion to traffic volume.

8. As a result of the analysis classifying all accidents (500 cases) by its cause, the number of collisions and groundings in Indonesian waters during the 3-year period of 1988 to 1990 attributable to deficiencies of ATN are 90 cases. This figures means 18% of all accidents which occurred due to sinking, fire, and others in addition to collision and grounding.

9. The development of Aids to Navigation in the accident high density areas has been advanced compared with that in Eastern Indonesia. However, the development status in such areas is still unsatisfactory taking into consideration the higher magnitude of maritime traffic. To cope with future traffic as well as to prevent accidents at the current level, the ATN development same level as existing Western Indonesia is the minimum requirement in Eastern Indonesia.

10. The Indonesian Government conceives of the "Sea Lane" idea. There are two lanes in the Eastern Indonesia, one is a route from Makassar Strait to Lombok or Sape Strait and the other is a route from Molucca Sea to Banda Sea.

11. To secure maritime safety in the sea lanes, IALA recommended the terrestrial system as the domestic self-development aids for fixing accurate positions on real time such as large-sized lighthouses for land falls and suitable Radio navaids.

12. Serious traffic incidents have been occurring in the Malacca Strait recently. Therefore, it is necessary to consider the introduction of vessel traffic service (VTS) and the most suitable ATN around Malacca Strait and other critical areas in Eastern Indonesia.

Basic concept of implementation plan

13. Development and improvement of ATN will be considered based on the observation of existing facilities and the preparation of the selection criteria.

14. The locations of ATN development and improvement for Eastern Indonesia are selected paying much attention to primary, secondary, tertiary and pioneer shipping as traffic routes and fishing grounds.

15. The areas having economically close relation with Eastern Indonesia may be included even though they are outside Eastern Indonesia. Sea lane route areas should also be considered.

16. Development and improvement of workshop and/or supporting facilities will be minimized as much as necessary, to simplify the maintenance of ATN. The 1st class District Navigation offices in Surabaya, Samarinda and Sorong are responsible for not only their territory but for the whole Eastern Indonesia.

1) Visual ATN

17. Selection factors for the visual ATN are considered as follows:

(a) Lighthouse (on-land)
- (i) Location, capable of covering 20NM or more
- (ii) Landfall from oceanwards
- (iii) Isolated island in open area
- (iv) Important turning point
- (v) Landfall for port
- (vi) Entrance to strait
- (vii) Other navaids sparse area

(b) Lighthouse (off-shore): Critically dangerous areas within important navigation areas requiring long luminous range

(c) Lightbeacon (on-land): Similar location such as where a lighthouse stands, and where easy maintenance can be expected from near-by Aids to Navigation Office or a place to be supported from the lighthouse

(d) Lightbeacon (dangers on land): Tiny islands, rocks in traffic routes or their vicinity

(e) Lightbeacon (dangers off-shore): Sunken dangers in traffic routes or their vicinity

(f) Resilient lightbeacon: Long approach channels to ports, where entrance to that need to be shown

(g) Lighted Buoy
  (i) Entrance to approach channels and cardinal marks
  (ii) Dangers within port area and other areas
  (iii) Other areas supplementary to other main aids

18. To formulate the visual ATN development plan strategically, cardinal points should be identified and prioritized. They are dangerous and important points for navigation such as islands, straits and ports. In these areas, it is ideal that navigating officers could enjoy using the two-way cross bearing position fixing method at least with two visual ATN. However, it is not practicable to service the cross bearing area on all waters in terms of cost versus performance.

19. Under such circumstances, two policies are employed for planning works up to 2005. Firstly, a navigation officer can confirm at least one light from anywhere on the coastal main routes which are approximately 5 n.m. from the shore. Secondary, the cross bearing area will be served around the cardinal points.

2) Radio ATN

20. Selection factors for Radio ATN are considered as follows:

(a) Radar Beacon
  (i) It shall be installed in important lighthouses and/or lightbeacons such as landfall, sunken dangers, approach channels to ports, etc.
  (ii) Structural obstacles on shore such as base of bridge which blocks the passage of sea way
(b) Medium Wave Radio Beacon
  (i) Coverage area of major ports to ports
  (ii) Major fishing grounds
  (iii) Some area requiring homing function
(c) Differential Omega
  (i) It shall be installed in Medium Wave Radio Beacon Station
  (ii) Coverage area of major ports to ports where suitable navaids may not properly be developed
(d) Loran-C System
  (i) Coverage area of major sea way
  (ii) Coverage area of major fishing grounds
  (iii) Location and area where accurate position shall be needed, for example, development area of natural resources
(e) Vessel Traffic Service
  (i) Congested narrow channels
  (ii) Entrance of major ports

21. The comparative evaluation of Terrestrial based Radio Aids to Navigation is shown in Appendix 6-5.

22. Table 6-1 gives the evaluation standard concerning traffic routes and navaids.

Table 6-1 Evaluation Standard Concerning Traffic Routes and ATN

ATN type	Location / Traffic route	Prime routes	Secondary routes	Tertiary routes	Sea lane	Pioneer	Others
COASTAL AIDS L. House MWRB DF Omega Loran-C	Landfalls from oceanwards	a	b	c	c	c	
	Landfalls for ports and harbours	a	b	b	c	b	
	Coast where no light established for 30 NM or over	b	b	c	b	c	
	Important turning point	b	b	c	b	c	
	Coast where fishing ground exist	b	b	c	c	c	
	Entrance to strait	b	b	c	c	c	
	Sides of entrance to strait and channel	c	c	c	c	c	
	Other navaids sparse area	c	c	c	b	c	
DANGERS AIDS L. Beacon Racon L. Buoy	Navigational dangers	b	c	c	b	c	
	Rocks and tiny islands	b	c	c	b	c	
	Isolated island in open area	b	b	b	b	b	
POSITIONING AIDS DF Omega Loran-C	Traffic routes finding	a	b	c	a	c	
	Navigational dangers	b	c	c	b	c	
	Fishing grounds	b	b	c	c	c	a *1
	Boundary	a	b	c	a	c	
	Survey	b	c	c	b	c	a *2
	Search and rescue	b	b	b	b	b	

Evaluation method: a --- Most necessary b --- Necessary c --- Convenient

Notes : Prime routes-More than 400 trips per year. Secondary routes-Between 200 and 400 trips per year.
Tertiary routes-Less than 200 trips per year.
Pioneer-Pioneer ship service.
*1 - Fishery. *2 - Hydrographic & Oceanographic

3) Technical aspect of ATN

23. Both visual and radio ATN are required for the reliability and quality of safe navigation and for easy maintenance. Especially the basic device such as the lantern and power source must be simplified.

24. Lighthouses and/or lightbeacons shall be designed with appropriate materials in accordance with height and other local conditions, due consideration being paid to manufacturing fabrication and installation costs.

25. Lighted buoys shall be of the short-tail type in order to utilize the limited space of buoy tender effectively with vertical standing positions for buoys.

26. Lanterns shall be strong enough to withstand wind and wave pressures.

27. The power source shall be designed for easy maintenance and for efficient operation. Solar panels will be used to tap natural energy for economical and maintenance reasons.

4) Supporting vessels

28. Hydrographic survey vessels should be placed only for its original purpose of making full use of their abilities.

29. The allocated buoy tenders in Eastern Indonesia are only two. One named "Mithuna" which is deployed in Samarinda and the other named "Pradawara" deployed in Sorong. They were built in 1975 and 1979, respectively.

30. Supply vessels, aids tenders and inspection boats are also old and, therefore, should be replaced one after another as previously planned. At the same time, the introduction of multi-purpose vessels should be taken into consideration.

5) Workshop and base

31. ATN supporting facilities such as workshops in Eastern Indonesia shall be developed and improved as the essential units for maintenance and logistics of ATN.

6) Training

32. The overseas special ATN training shall be carried out for the senior personnel even though they might have already been qualified as engineers, navigators, or administrators to enhance the specialized tasks of ATN. The domestic special ATN training shall be carried out primarily for the junior personnel. Most importantly, overseas/domestic training shall not be held to increase technical skills but it must be implemented to provide the ATN personnel with fundamental expertise knowledge on maritime safety and also to inculcate the maintenance and repair policy in mind of each and every one of the personnel.

Implementation plan

33. The ATN implementation plan is formulated with the target year of 2005 and 2015, respectively, in accordance with the basic concept of implementation plan in the previous section and due reviewing of the designated ATN Masterplan of 1985.

34. The implementation plan is divided into four (4) stages of every three years until 2005, namely 1994/1996, 1997/1999, 2000/2002 and 2003/2005. As for further development between 2006 and 2015, its directions are indicated.

1) Visual ATN

35. Figure 6-1 illustrates the installation quantity of visual aids required up to 2015 from existing Indonesia conditions on the assumption that the development rate of navaid units per 100 n.m. coast line should reach 8 units, the same level as current situation in Malaysia. The length of total coastal line in Indonesia is assumed to be 33,000 n.m.

36. Figure 6-2 and Table 6-2 indicate further detailed development plan of visual ATN by stage in Eastern Indonesia. Accordingly density of visual ATN will be 4.3 units per 100 n.m. in 2005. It will be slightly less than the nation-wide one (4.8 units). It is noted that the length of total coast line in Eastern Indonesia is estimated at 22,000 n.m.

37. The geographic location of existing and planned visual ATN is sketched in Figure 6-3. Appendix 6-1 comprises the data of individual location.

2) Radio ATN

(a) Radar beacon (Racon)

38. Racons have been installed at narrow channels, main ports, etc. They can be installed at the sites of lighthouses and lightbeacons as well as solo sites.

39. Under current urgent situation, around twenty (20) racons should be annually installed. After the racon development comes up to the standard of minimum requirement, the development trend will decrease gradually. Finally one racon will be attached to cardinal place of a new visual ATN.

(b) Medium wave radiobeacon station

40. Rehabilitation and improvement works should be prioritized at the existing eighteen (18) medium wave radiobeacon stations while new construction will be withheld for a while. Appendix 6-6 Comprises rihabilitation program for MWRB.

(c) Differential omega

41. Checking of differential omegas is to be carried out in parallel with maintenance work for the relevant medium wave radiobeacon stations.

(d) Loran-C system

42. Two (2) chains are planned to cover the two sea lanes in Eastern Indonesia and also the main shipping routes and the fishing areas in the regions. One is the Sulawesi Chain covering Lombok Strait to Makassar Strait through to Molucca Sea and Banda Sea and the other is the Irian Jaya Chain covering Arafura Sea and Halmahera Sea. Appendix 6-2 comprises allocation data of the two chains.

43. The Sulawesi Chain will be developed during the second stage (1997-1999) in light of traffic volume. On the other hand, the Irian Jaya Chain will be developed either in the third stage (2000-2002) or the fourth stage (2003-2005) with due consideration of the magnitude of economic activity.

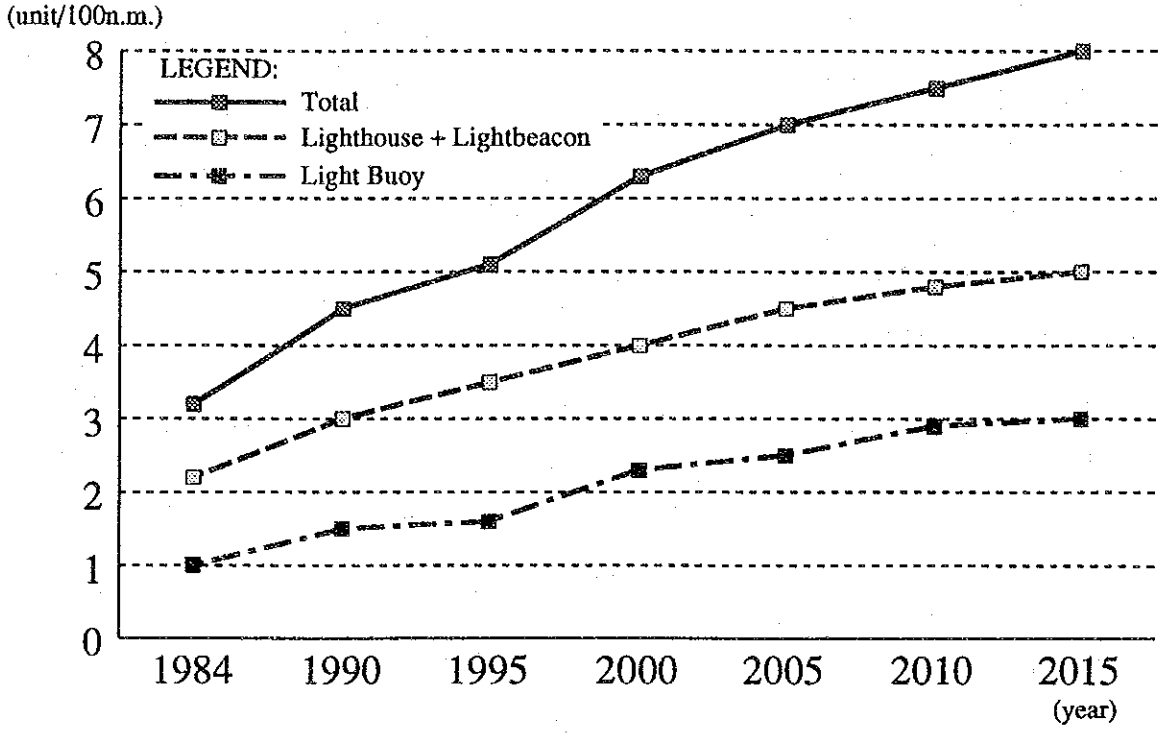


Figure 6-1 Visual ATN Development Density in Indonesia

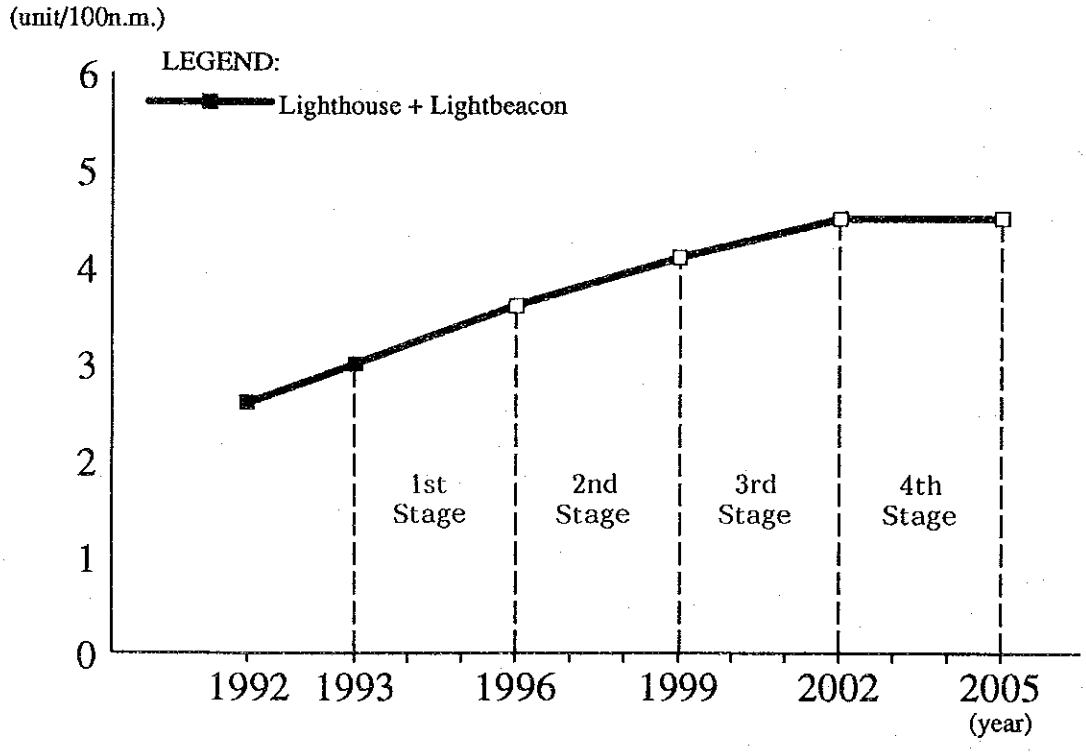


Figure 6-2 Visual ATN Development Density in Eastern Indonesia by Stage

Table 6-2 Visual ATN Development Plan in Eastern Indonesia by Stage

ATN TYPE	LIGHTHOUSE						LIGHTBEACON																		LIGHTHOUSE + LIGHTBEACON						
	40M						30M						20M						10M												
STAGE / DISNAV BASE	ON-GOING	1ST STAGE	2ND STAGE	3RD STAGE	4TH STAGE	TOTAL	ON-GOING	1ST STAGE	2ND STAGE	3RD STAGE	4TH STAGE	TOTAL	ON-GOING	1ST STAGE	2ND STAGE	3RD STAGE	4TH STAGE	TOTAL	ON-GOING	1ST STAGE	2ND STAGE	3RD STAGE	4TH STAGE	TOTAL	EXIS-TING	ON-GOING	1ST STAGE	2ND STAGE	3RD STAGE	4TH STAGE	TOTAL
BENOA (SUB)	0	0	0	0	0	0	2	0	0	0	0	2	1	0	0	0	0	1	0	0	0	0	0	0	56	3	0	0	0	0	59
KUPANG (SUB)	0	2	0	2	0	4	5	1	0	0	0	6	5	3	0	0	0	8	0	10	10	6	0	26	50	10	16	10	8	0	94
SAMARINDA (I)	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	1	6	3	0	0	10	46	2	6	3	0	0	57
BANJARMASIN (SUB)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	51	0	0	0	0	0	51
BALIKPAPAN (SUB)	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	2	14	1	1	1	0	0	17
UJ. PANDANG (II)	0	2	0	0	2	4	2	1	0	0	0	3	3	3	3	0	0	9	5	10	7	5	0	27	48	10	16	10	5	2	91
KENDARI (SUB)	2	2	0	2	0	6	3	0	0	0	0	3	1	2	0	0	0	3	2	7	5	5	0	19	45	8	11	5	7	0	76
MANADO/ BITUNG (II)	2	2	2	0	0	6	4	0	0	0	0	4	2	0	0	0	0	2	3	10	10	9	0	32	99	11	12	12	9	0	143
AMBON (II)	5	4	3	2	1	15	2	3	6	3	0	14	5	3	2	0	0	10	3	30	20	16	0	69	68	15	40	31	21	1	176
SORONG (I)	0	1	0	0	0	1	2	3	2	2	0	9	1	2	2	0	0	5	3	20	12	0	0	35	52	6	26	16	2	0	102
JAYAPURA (SUB)	2	0	0	0	0	2	0	2	0	0	0	2	1	0	2	0	0	3	2	10	9	0	0	21	32	5	12	11	0	0	60
MERAUKE (SUB)	1	0	0	0	0	1	0	3	0	0	0	3	0	0	1	0	0	1	2	1	0	0	0	3	18	3	4	1	0	0	26
TOTAL	12	13	6	6	3	40	21	13	8	5	0	47	19	13	10	0	0	42	22	105	76	41	0	244	579	74	144	100	52	3	952

Note) ON-GOING : 1991 - 1993 1ST STAGE: 1994 - 1996 2ND STAGE: 1997 - 1999 3RD STAGE: 2000 - 2002 4TH STAGE: 2003 - 2005

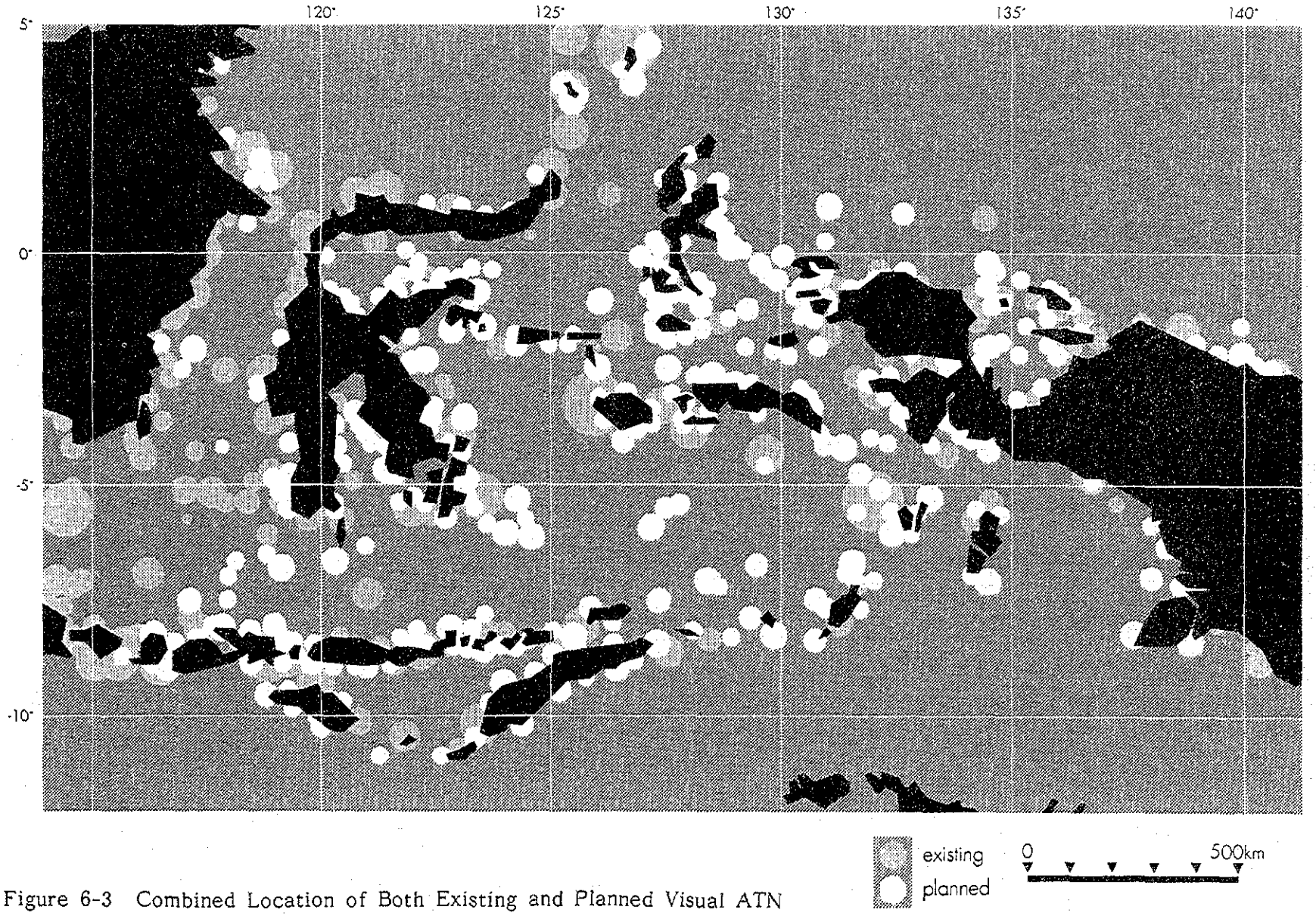


Figure 6-3 Combined Location of Both Existing and Planned Visual ATN

3) Vessel Traffic Service (VTS)

44. Surabaya port as an origin port to Eastern Indonesia and Banjarmasin and Ujung Pandang ports need the operation of VTS system in the future. As for Surabaya, it will be of importance to introduce VTS system at its west channel in the fourth stage (2003-2005). Regarding Banjarmasin and Ujung Pandang, VTS system will be developed after 2005 corresponding to economic development.

4) Supporting vessel

45. Table 6-3 shows the deployment plan of supporting vessels including replaced and additional ones. It is assumed that existing vessels would be replaced at the age of 25 and above. In addition to existing vessels, additional ones will be newly built to cope with the growing needs derived from the above-mentioned ATN development plan.

46. Particularly in Kupang and Bitung, the large-scale reinforcement of port facilities is a pressing task to catch up with traffic demand. In this connection, both a supply and aids tender and a multi-purpose buoy tender will be newly deployed to these ports, respectively.

47. Concerning the trend in supporting vessels, multi-functional ones will be preferred compared with conventional single purpose ones. Therefore the following renewal directions can be set up.

(a) A buoy tender: To reinforce the operational performance as a provisional work shop.
(b) A large aids tender: To add operational capability as a supply vessel.
(c) A coasting aids tender: To equip with positioning system, echo sounder, etc. in order to conduct general hydrographic surveys in ports and at narrow channels.

48. Accordingly a large survey vessel like "Bimasakti" type will not be allocated to Eastern Indonesia. In addition, inspection boats are equipped with electronic positioning system in order to survey the accurate positions of buoys which have been placed by buoy tender vessel.

5) Workshop and buoy base

49. The 1st Class District of Navigation (DISNAV) located in Samarinda and Sorong in Eastern Indonesia, are responsible for buoy maintenance by means of buoy tenders as well as offshore facilities. The maintenance capability should be strengthened in line with increase in buoys.

50. The 2nd Class DISNAV and Sub-DISNAV have workshops for maintenance works except buoy laying and replacement. The main facilities and devices are machines and tools for mechanical maintenance, test/measuring and maintenance, electronic positioning and hydrographic surveys. Priority should be given to Manado-Bitung (2nd Class DISNAV) and Kupang (Sub-DISNAV).

Table 6-3 Supporting Vessel Deployment Plan in Eastern Indonesia by Stage

Stage / DISNAV Base	On going			1st Stage			2nd Stage			3rd Stage			4th Stage			Total
	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	
BENOA (SUB)				*AT1			SA1									*AT1,SA1
KUPANG (SUB)			*AT1		SA1				MB1							*AT1,SA1,MB1
SAMARINDA (I)				*AT1		*SA1		*MB1		IB1				MB1		*AT1,*SA1,*MB1,IB1,MB1
BANJARMASIN(SUB)						*IB1		*SA1			AT1					*IB1,*SA1,AT1
BALIKPAPAN (SUB)				*AT1							SA1					*AT1,SA1
UJ.PANDANG (II)	*AT2				AT1				SA1							*AT2,AT1,SA1
KENDARI (SUB)		*AT1							SA1							*AT1,SA1
MANADO /BITUNG (II)	*AT2						*SA1			MB1			IB1			*AT2,*SA1,MB1,IB1
AMBON (II)		*AT1			SA1	*AT1										*AT2,SA1
SORONG (I)		*AT1	*SA1			SA1	*MB1					MB1				*SA1,SA1,*MB1,,MB1 *AT1
JAYAPURA (SUB)			*AT1		*SA1					*SA1						*AT1,*SA2
MERAUKE (SUB)				*SA1			*SA1	IB1								*SA2,IB1
TOTAL	4	3	3	4	4	4	4	3	3	3	2	1	1	1	0	40

Note) * : Replacement
MB : Multi-purpose Buoy tender vessel
SA : Supply and Aids tender vessel
AT : Aids Tender
IB : Inspection Boat

6) Training of ATN personnel

51. Aids to Navigation (ATN) training programs consist primarily of domestic and overseas courses. These courses will be held at least triennially between 1994 and 2005. The number of trainees will be arranged taking into account the overall workload of maintenance and operation. The training period for the overseas and domestic courses is designed to be three (3) months and two (2) months, respectively.

52. Curriculum of domestic training will be made up as follows:

(a) Maritime safety
(b) Organization
(c) Administration
(d) Marine Aids to Navigation
- Basic policy and theory
- Use of equipment and devices
- Safety
- Routine maintenance
- Fault finding
- Work at sea
- Practical applications of study

53. Curriculum of overseas training will be made up as follows:

(a) Service background
- International standardization of aids to navigation systems
- Overall organization
- Specific tasks
- Cooperation between the organization

(b) Maritime safety
- International organization
- Prevention of marine accidents
- Pollution
- Oceanography

(c) Organization
- International organization
- Establishing operation and maintenance procedures
- Establishing operation and maintenance programme
- Organization staff resources
- Budgetary planning and control
- Future planning
- Recruitment and training

(d) Administration tasks
- Maintenance plan and execution
- Procurement plan
- Data and records publications
- Budgetary procedures

(e) Navigational warnings
- Notification of casualties
- General notice to mariners
- Navigational warnings
- Casualty records

(f) Vessel of navaids system evaluation
- Purpose of measurement
- Measuring instrument

54. For further training requirement after 2006, a stationary training school shall be established at somewhere in Indonesia not only to improve skill of engineering works but also to acquire synthetic knowledge for administrative leaders. It will be directly managed by DGSC as an educational institution of two (2) years period.

B. Maritime Search and Rescue System Development Plan

Review of relevant plans

55. The Study on Maritime Safety Plan Concerning Search and Rescue was conducted between 1987 and 1989 by DGSC with the technical assistance of JICA. This study formulated the development plan including maritime search and rescue system, prevention measures for maritime disasters, maritime safety and SAR communication system, harbor traffic control system, education system and training program, and organizational improvement. Likewise, it forged the short-term development plan which corresponds to Repelita V and the long-term development targeted for the year of 2005.

56. "FST-12 phase I and II" as a communication system development program in DGSC has completed and its phase III will be implemented by 1996. "F-TA-308" on Maritime SAR Communication and Information System was submitted in 1988 and is still a report worthy of careful study.

57. This study reviewed the above-mentioned previous plans and amended properly in order to formulate the development plan of maritime SAR system in Eastern Indonesia.

Framework of the proposed plan

58. The deployment of additional SAR vessels and aircraft is proposed to execute SAR operations in Eastern Indonesia where there are a number of islands spread out over vast seas. This should be designed to bear not only within territorial waters but on open seas.

59. To facilitate efficient and effective SAR operations, the development of maritime communication system such as GMDSS and its related facilities, upgrade of communication network and preparation of emergency electric power are proposed.

60. From a long term viewpoint, training system for all personnel of DGSC will be necessary. In the first place, the construction of Maritime Safety Training Center is proposed to provide newcomers and active officers with basic knowledge and specialized technique.

61. It is said that navigators cause around 70% of all maritime accidents. To prevent accidents by the human error, dissemination of safety philosophy is an important means which should be conducted by public and private sectors co-operatively and constantly.

62. For the convenience of effective planning formulation, territorial waters of Benoa and Surabaya (Java East) are regarded as Eastern Indonesia sea waters.

SAR operation plan

1) SAR ship

63. Figure 6-4 shows bases and deployed vessels of KPLP in Eastern Indonesia. The KPLP fleet at Tanjung Priok has the sole responsibility for the SAR operations on open seas. The above base has nine (9) SAR vessels while other KPLP bases have some ships which operate in ports and coasts within 20 miles. Generally the vessels are insufficient in number and obsolete in quality.

64. In addition, a maritime SAR aircraft is not deployed yet. Under such circumstances, patrol activities and SAR operations must face with difficulties.

65. As effective measures in Eastern Indonesia with a vast expanse of waters, it is necessary to designate the responsible area of each KPLP base and to reinforce SAR resources. Figure 6-5 indicates the proposed responsible areas of existing KPLP bases.

66. SAR ships deployment plan is formulated by KPLP base as shown in Table 6-4 and summarized in Table 6-5. This plan is set out based on the analyses on both occurrence of maritime accidents and possible coverage of SAR operations, with the following considerations.

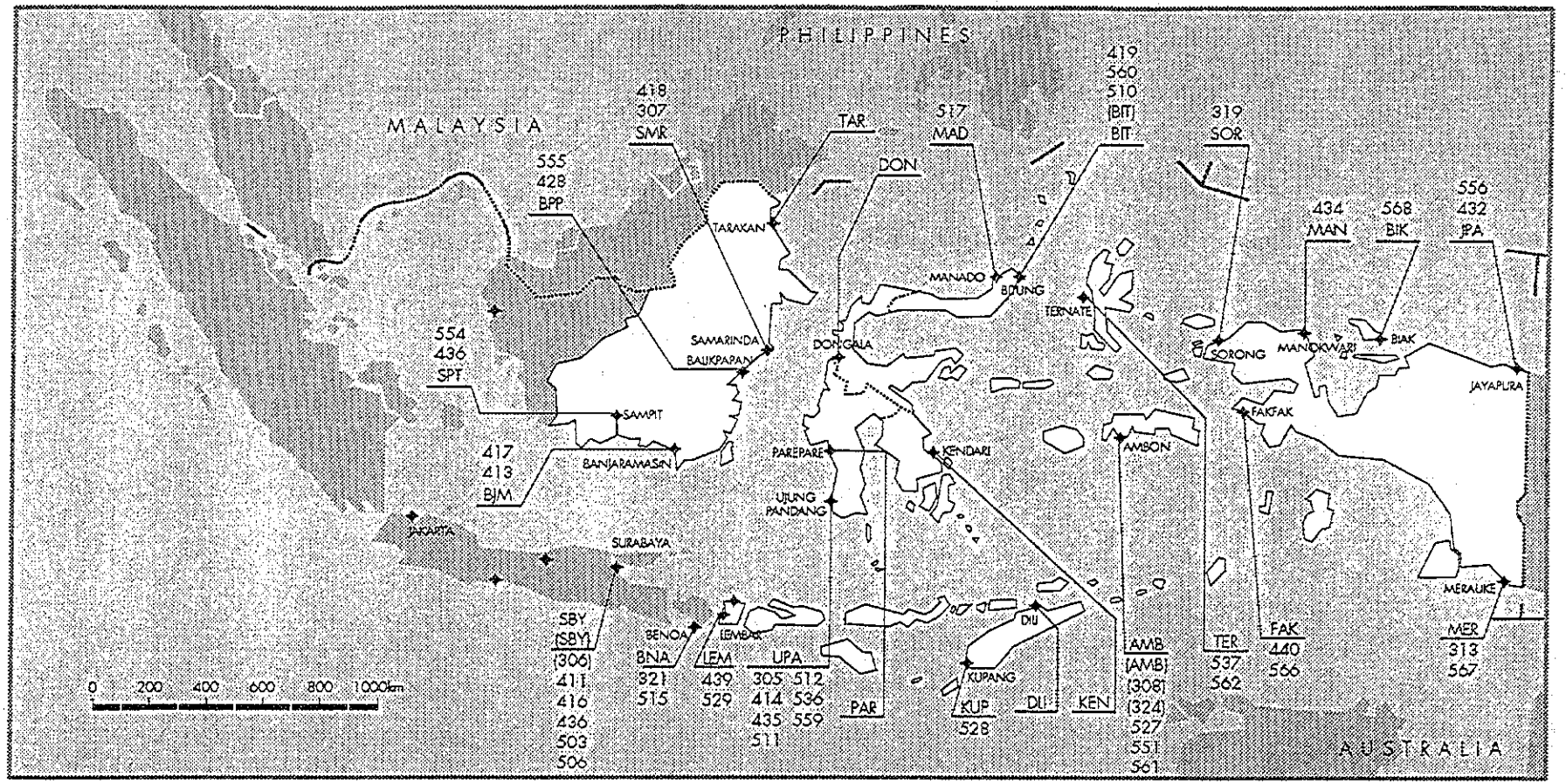
(a) deployment of class I ships
  (i) to serve even outside the coverage of land-based helicopters
  (ii) to serve on open seas in the case of international SAR operations
  (iii) to fill the operational gap area caused by class II ships

(b) deployment of class II ships: They are planned for effective service with due consideration of multi-purpose service, readiness, types and quantity of existing fleet, number of personnel and relations with neighbor bases.

(c) deployment of class III, IV, V ships: They are determined by port size, maritime accident prone area and other factors.

Table 6-4 Summary of SAR Ships Improvement Plan

Ship Class	Required (A)	Existing (B)	Scrapped by 2005 (C)	Newly Built by 2005 (A)-(B)+(C)
I - A	4	0	0	4
I - B	3	0	0	3
II	11	0	0	11
III	27	8	1	20
IV	32	15	0	17
V	58	23	2	37
Total	135	46	3	92



( ) Bases and ships belong to KPLP Fleet

Figure 6-4 Locational Distribution of KPLP Bases and SAR Ships

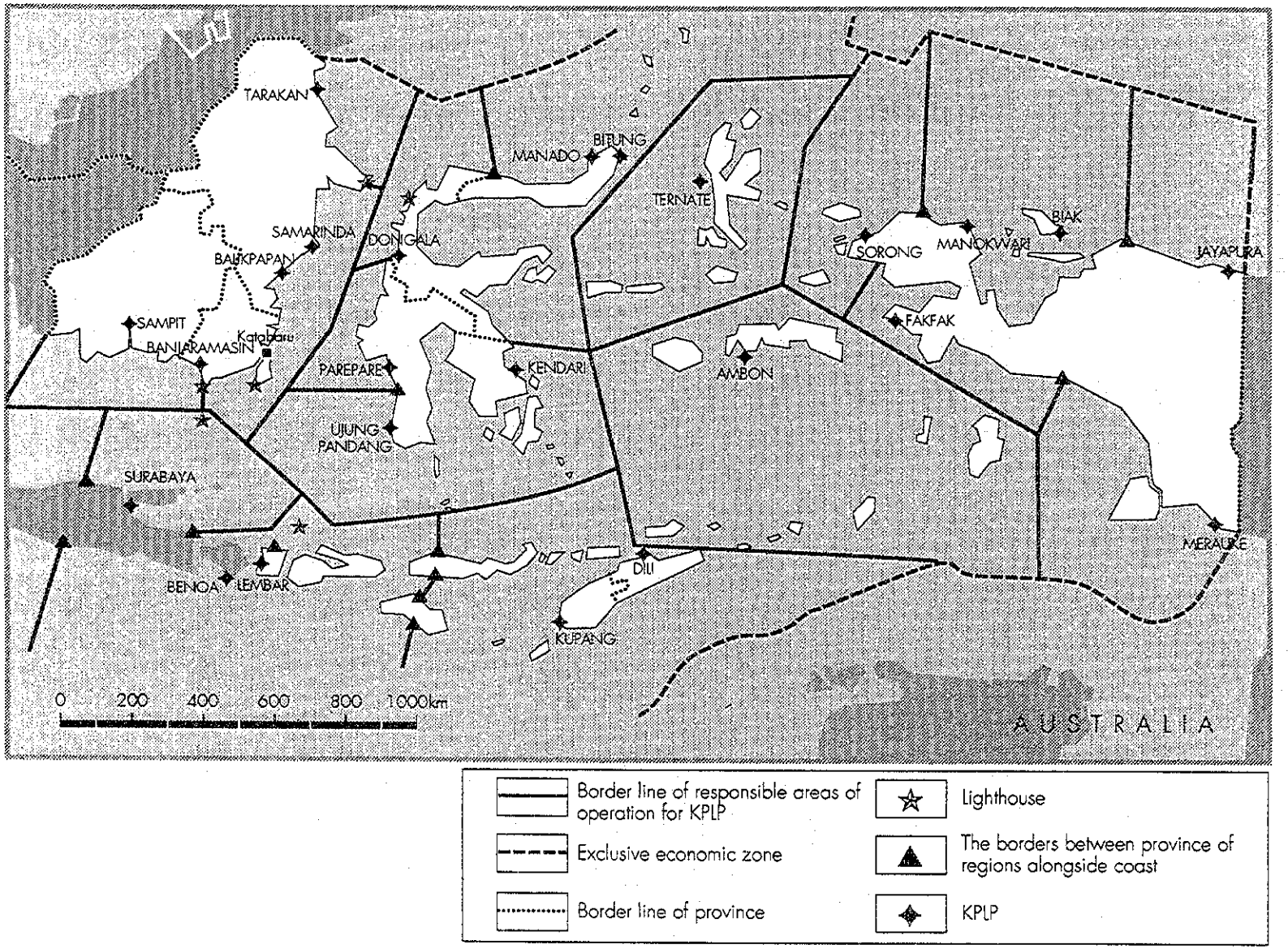


Figure 6-5 Responsible Area by KPLP Base

Table 6-5 SAR Ships Deployment Plan by KPLP Base

No.	KPLP BASE	Ship Class						ADPEL CLASS	Relevant Province
		I-A	I-B	II	III	IV	V		
*1	SAMPIT(SPT)				1	(1)	(1)	IV	KALIMANTAN TENGAH
2	BANJARMASIN(BJM)				1	1(2)	1	III	KALIMANTAN SELATAN
*3	SAMARINDA(SMR)				1(1)	1(1)	1	III	KALIMANTAN TIMUR
4	BALIKPAPAN(BPP)			1		2(1)	4(1)	III	KALIMANTAN SELATAN
5	TARAKAN(TAR)				1		1	IV	KALIMANTAN TIMUR
6	DONGGALA(DON)				1		1		SULAWESI TENGAH
*7	MANADO(MAD)				1	2	1(1)	V	SULAWESI TENGAH
8	BITUNG(BIT)		1	1		1(1)	3(2)	III	SULAWESI UTARA
*9	UJUNG PANDANG(UPA)	2		1	(1)	3(2)	2(4)	I	SULAWESI TENGGARA
10	KENDARI(KEN)				1		2	IV	SULAWESI SELATAN
11	PARE-PARE(PAR)				1		1	V	SULAWESI SELATAN
12	AMBON(AMB)		1	1	(2)	2	3(3)	III	MALUKU
13	TERNATE(TER)				1		1(2)	IV	
14	JAYAPURA(JPA)		1	1	1	2(1)	3(1)	III	IRIAN JAYA
*15	BIAK(BIK)				1		1(1)	IV	
16	MANOKWARI(MAK)				1	(1)	2	V	
17	FAK-FAK(FAK)				1	(1)	1(1)	V	
18	SORONG(SOR)				1(1)	1	1	III	
19	MERAUKE(MER)			1	1(1)		(1)	IV	
*20	KUPANG(KUP)			1	1		1(1)		NUSA TENGGARA TIMUR
21	DILI(DIL)				1		1	V	TIMOR TIMUR
*22	LEMBAR(LEM)				1	(1)	1(1)	IV	NUSA TENGGARA BARAT NUSA TENGGARA TIMUR
23	BENOA(BNA)			1	1(1)		(1)	IV	BALI JAWA TIMUR
24	SURABAYA	2		3	(1)	2(3)	3(2)	I	JAWA TIMUR
	TOTAL	4	3	11	19(8)	17(15)	35(23)		

NOTE: Numbers in ( ) indicate the present number of maritime SAR ships.
* shows the responsible area of joint operation

67. Table 6-6 gives principal particulars of the proposed SAR ships. In regard to I-A and I-B classes, conceptual designs are illustrated in Figure 6-6 and 6-7.

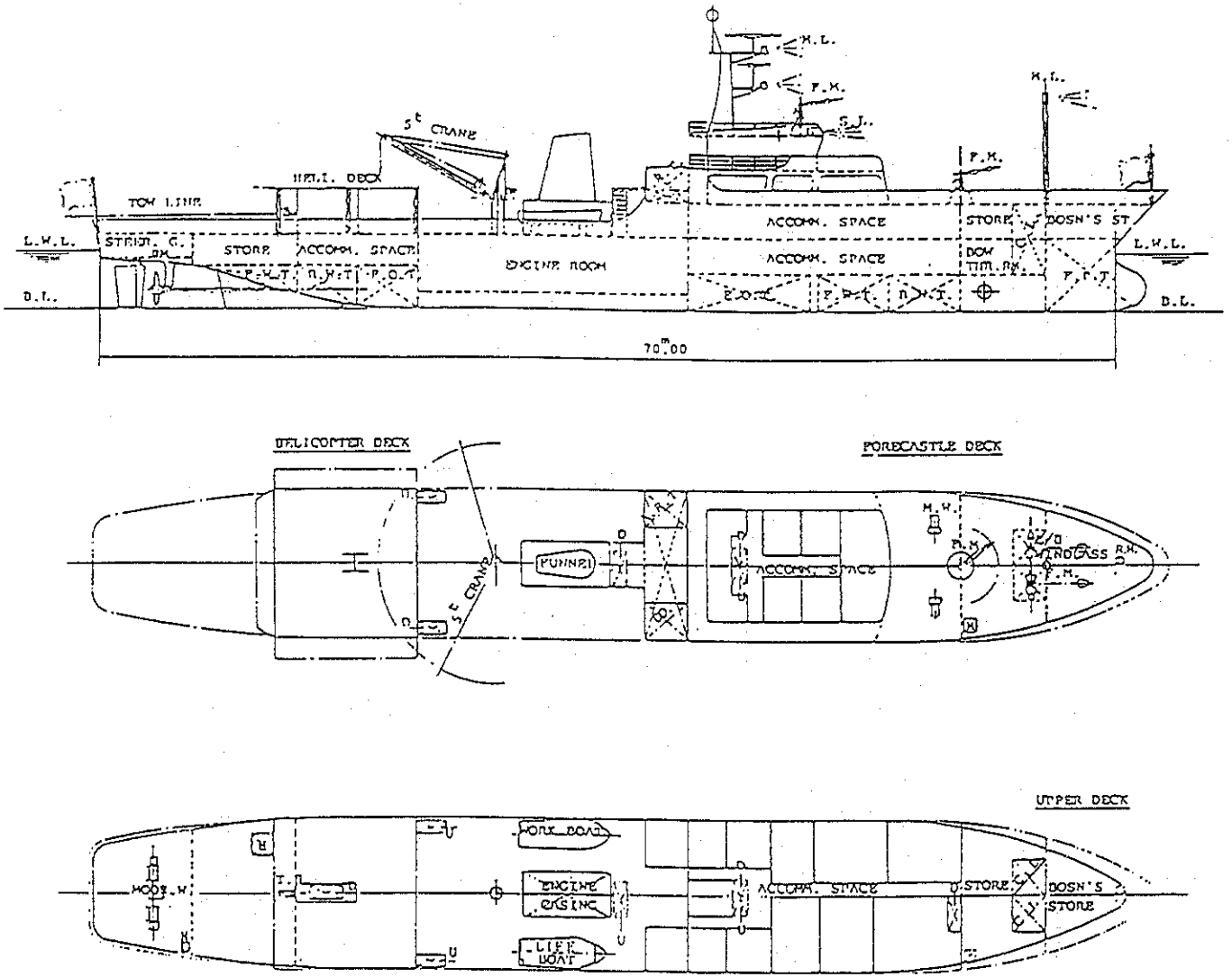
Table 6-6 Principal Particulars of SAR ships

Item / Class	I - A	I - B	II	III	IV
Coverage	All water	All water	All water	Coastal water	Coastal water
Cruising range (mile)	5,000	3,000	520	350	200
L (m)	74	59	35	24	18
B (m)	10	8	6.3	6	4.3
D (m)	5	4.5	3.4	2.85	2.3
G/T (ton)	1,000	500	100	93	37
Main Engine (PS)	1,500 x 2	1,300 x 2	2,400 x 2	540 x 2	450 x 2
Speed (knot)	15	15	26	16	21
Others	helicopter deck & stabilizing tanks				

68. These ships are required to install the various equipments in order to cope with multi-purpose operations. Therefore the ships of I-A and I-B classes are equipped with towing gears and a chemical extinguisher. In addition, the ships of II class and above have the following equipments:

Table 6-7 List of Equipments

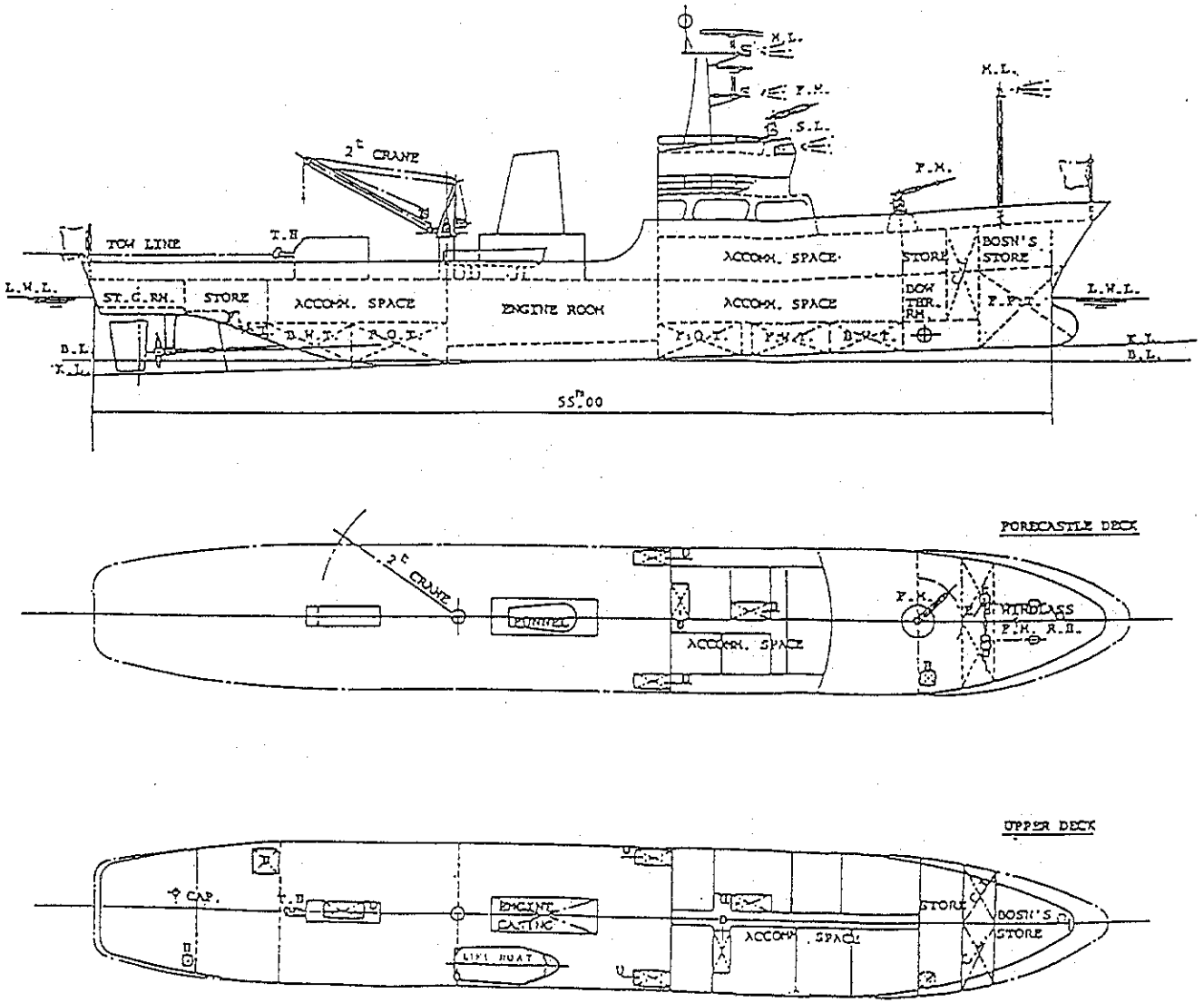
SAR Ship Class / Equipment	I - A	I - B	II
Foam concentrate	2 kl	2 kl	-
Fire-fighting devices	30 set	30 set	10 set
Oil boom	400 m	200 m	-
Chemical dispersant	2 kl	2 kl	-
Handy oil recovery devices	10 set	10 set	5 set
Safety devices for dangerous chemicals	3 set	3 set	2 set
Gas indicators	2 set	2 set	2 set



PRINCIPAL PARTICULARS OF 1000 GROSS TONNAGE TYPE RESCUE SHIP

LENGTH (O.A.)	abt. 74.40m
LENGTH (L.W.L.)	70.00m
BREADTH (W.L.D.)	10.00m
DEPTH (W.L.D.)	5.20m
DRAFT (DESIGNED) (W.L.D.)	3.60m
MAIN ENGINE	1500PS × 2 SETS
SPEED	abt. 15.0 kts.
COMPLEMENT	70 PERSONS

Figure 6-6 Conceptual Design of Class I-A Type (scale 1:300)



PRINCIPAL PARTICULARS OF 500 GROSS TONNAGE TYPE RESCUE SHIP

LENGTH (O.A.)	abt. 59.20m
LENGTH (L.W.L.)	55.00m
BREADTH (M.L.D.)	8.00m
DEPTH (M.L.D.)	4.50m
DRAFT (DESIGNED) (M.L.D.)	3.30m
MAIN ENGINE	1300PS × 2 SETS
SPEED	abt. 15.0 kts.
COMPLEMENT	55 PERSONS

Figure 6-7 Conceptual Design of Class I-B Type (scale 1:300)

69. Piers for exclusive use of SAR ships are to be constructed at the bases of Class I-A and I-B ships. They are Surabaya, Ujung Pandang, Bitung, Ambon and Jayapura. In these bases, the piers in dimensions are designed as shown in Table 6-8.

Table 6-8 Principal Dimensions of Piers for SAR Ships

SAR Ship Class	Length(m)	Width(m)	Deck Thickness(m)
Class I - A	95	6	0.25
Class I - B	75	5	0.20

2) SAR aircraft and helicopter

70. It is necessary to make use of highly mobile aircraft in case of need for quick dispatch and rescue or lifting up sufferers on the waters of Eastern Indonesia where maritime accidents have occurred increasingly but scattered.

71. Table 6-9 indicates the aircraft and helicopter deployment plan with due consideration of the following policies:

(a) to cover whole Indonesia waters by fixed wing aircraft
(b) to cover accident prone area by helicopters
(c) to expand coverage area by refueling
(d) to be engaged in international SAR operations on occasion, and
(e) to organize two fixed wing aircraft and two helicopters in one unit in order to make preparation for 24-hour operation

Table 6-9 Aircraft and Helicopter Deployment Plan

Type	Air Base KPLP	Airport	Quantity
Aircraft	Ujung Pandang	Ujung Pandang	2
Helicopter	Ujung Pandang	Ujung Pandang	2
	Ambon	Ambon	2
	Surabaya	Surabaya	2
	Sub-total		6
	Total		8

72. Designed performance of aircraft and helicopters are shown in Table 6-10.

73. Airbases shall be constructed and improved with the related facilities such as operation room, hangars, fuel tanks, communication facilities and administrative offices in line with the deployment of fixed wing aircraft and helicopters.

Table 6-10 Designed Performance of Aircraft and Helicopter

	Aircraft	Helicopter
Operational Conditions	Operational Radius 1,000 miles & over w/ search hour 2.5 hr	3-3.5 operational hrs. with max. capacity of 15 people
Cruising Speed	250 kt	135 kt
Endurance	2,700 miles and over	450 miles and over
Operation Radius	1,000 miles	170 miles

3) Special rescue team

74. Special rescue teams have been organized on bases in Surabaya, Ambon and Bitung in order to carry out the following missions:

(a) to rescue the vessels with dangerous cargoes such as high pressure gas, toxic substances, etc.

(b) to rescue survivors from capsized or sunk vessels by means of skilled technique such as scuba diving, etc.

(c) to conduct rescue operations by sending down a rescuer from a helicopter where a SAR ship cannot approach.

75. Under existing conditions, however, it is noted that sufficient training cannot be undertaken due to shortage of necessary equipments, for example, diving units.

76. Although one team is ordered to stand-by in Bitung, it is advisable that this team will be transferred to Ujung Pandang because of the convenience of routine training and rescue operation with a helicopter which will be deployed in Ujung Pandang not in Bitung.

77. One team consists of five (5) persons, that is, one leader and four members. Four (4) teams, total 20 persons, are to be stationed at one base in the light of readiness and training.

78. Appendix 6-3 comprises main equipments for a special rescue team and architectural drawings for a special rescue station building.

Maritime SAR communication system

1) GMDSS communication facilities

79. Within the sea area A2 served by MF radio coverage, DSC on 2187.5 kHz is used for distress alerting. And subsequent communication including SAR co-ordination communication and on-scene communication are conducted by means of radio telephony on 2182 kHz or NBDP on 2174.5 kHz. Therefore DSC and NBDP system will be established for the purpose of medium-range SAR communication.

80. The sea area A2 aims to provide communication services to the ships engaged in international voyage. Its commutable area, however, is around 150 nautical miles. Then considerable coastal radio stations which operate night and day would be necessary.

81. Within the sea area A1 served by VHF range, the limited ships engaged in international voyage can enjoy this service due to short commutable area of around 25 n.m. In this connection, a large number of stations as well as operators would be required to function in 24-hour service.

82. In fact, some areas are impossible of communication, and what is worse, they are technically impracticable to be solved. Therefore, it is considered that the establishment of sea area A1 is and will be nearly impossible in Indonesia.

83. It is true that VHF system is highly evaluated in the world in respect of high quality and easy access to telephone network on land. Although the establishment of sea area A1 served by VHF is impractical, it is recommendable that VHF DSC system on ch70 will be introduced to serve only international port area.

2) Enhancement of communication network

84. The TDMA network once installed by FST-12 (IP275) will be extended to the areas where the network has not covered as well as the network should be intensified, especially to the offices which do not accommodate it.

85. Teletype message switcher is presently installed only at Jakarta area. This system will be introduced at other areas to improve message handling works.

86. DGSC's internal communication network is formed by the fixed radio network among Jakarta central radio station, regional major CRSs and their branch stations. It is hoped that further improvement be made with respect to the communication quality, stability and traffic handling capability of the said radio system with due consideration of the following two kinds of network.

(a) Central fix radio communication network

87. Although radio telephony and radio teletype on HF are currently used, they should be swiftly replaced by the satellite communication system due to the unstable nature of HF. Therefore, more dependable communication network system can be established by connecting with the TDMA network which has been already implemented by FST-12 (IP 275). However, taking into account the operational cost of satellite communication system, its joint utilization should be considered among related offices of the Ministry of Communications.

(b) Regional fix radio communication network

88. Existing manually-operated regional fix radio communication system should be improved by replacing it with automated radio teletype for efficient information processing.

89. Future designation of GMDSS Sea area A2 and enlargement of VHF service coverage should be implemented by a 24-hour operated CRS which remotely controls and supervises the regional stations through microwave multiplex fix-link. Furthermore the system should be connected with the satellite communication system.

3) Emergency power supply arrangement

90. Existing emergency power supply system at communication stations have passed some 20 years since their installation. But they are left out of the on-going equipment renovation program except some stations. They are too old to run long time operation and it is hard to secure spare parts. In addition, they are liable to provide insufficient power to communication equipments.

91. As for commercial power supply, it falls routinely short and sometimes has blackout. And voltage fluctuations is another problem. Electric companies have invested but can not catch up with demand by now. Therefore emergency power supply is indispensable.

92. Modern radio communication equipments use micro-computers for automatic control including antenna matching etc. Therefore even a momentary blackout is harmful to the equipments. In order that coast radio stations can maintain their proper functions, emergency generators and blackout-free constant voltage power supplies should be urgently introduced.

4) EPIRBs

93. COSPAS-SARSAT ground segment (LUT) is operated by the National SAR Agency (BASARNAS). Reception of distress alerts transmitted from satellite EPIRBs and relayed via COSPAS-SARSAT satellites enables SAR operations to grasp the location of vessels in distress instantly and accurately.

94. It is required that passenger ships and cargo vessels which take a leading role of inter-island shipping should be equipped with the satellite EPIRBs initially. Then they will be diffused to other small ships gradually.

95. The satellite EPIRBs comprises two type, namely, 406 MHz type and 121.5/243 MHz type. The 406 MHz type EPIRB has a positioning accuracy of 5 km radius and can transmit the identification code of the ship. Therefore it is to be advisable that the 406 MHz type EPIRB would be compulsorily equipped on passenger ships and cargo ships. On the other hand, the 121.5/243 MHz type EPIRB can not transmit the ship's ID and its accuracy is also poor (around 17 kms). But its characteristics such as low cost and compact size are attractive for small ships.

96. It is considered that the compulsory equipment of the EPIRBs on ships can significantly contribute to maritime safety in Indonesia. In this connection, the compulsory scheme should be examined in terms of ship size, ship usage corresponding to the EPIRB types.

Maritime Safety Training Center

1) Necessity

97. Although the personnel engaged in duties of maritime safety and SAR operation are supposed to have expertise and special skills, unfortunately, the DGSC possesses neither their own courses nor facilities for enough training. From a long-term viewpoint, it is necessary that proper education and training system should be developed in order to train the DGSC personnel systematically and continuously. But from a short-term viewpoint, a Maritime Safety Training Center (MSTC) is proposed in order to train both newly recruited and active personnel swiftly.

2) Function

(a) General training for maritime safety personel

98. To cope with complicated and diversified maritime accidents in recent years and to properly accomplish international and expansive duties of maritime safety, it is necessary to train newcomers and active personnel.

99. For that purpose, two programs are prepared. One is for newcomers and the other is for active personnel as follows:

(i) Initial training for newcomers: Fundamental training shall be provided to all newcomers of DGSC in order to recognize attitude of public servants and their missions as well as to master basic knowledge of SAR activities.

(ii) Retraining for active personnel: In order to upgrade their knowledge and technique, retraining shall be provided to the selected personnel who have practically experienced in DGSC for several years.

(b) Special training for Special Rescue Teams, etc.

100. The special training aims to raise the special technical personnel who can make full use of advanced technique in the case of vessels in distress such as leaking, capsizing, sinking, etc. In addition to Special Rescue Teams, it is necessary to cultivate special technical personnel in every field related to SAR. The following programs shall be formulated:

(i) training for special rescue operation
(ii) training for diving technique
(iii) training for disaster preventing measures, and
(iv) training for communication technique

(c) Research and development

101. To conduct SAR operations safely and efficiently, their technique and equipments will be studied based on accident analyses. If necessary, existing equipments will be improved or optimal ones will be newly developed.

3) Management

102. The MSTC will offer the above-mentioned programs with a group of trainees around 40 for three to six months' period. And the MSTC's capacity will be designed for 200 trainees. Accordingly, annual output is expected to be around 550.

103. The MSTC will physically consist of buildings, facilities and equipments. These hardware must support all activities on the MSTC such as lectures, practices, researches, administration works and livings with favorable environment.

104. The MSTC will be directly managed by the DGSC. Instructors will be mainly sent from each division of the DGSC but some experts will be invited from outside. To foster instructors is also of importance. For that purpose, studying abroad and invitation of foreign experts will be encouraged.

Dissemination of maritime safety philosophy

1) Necessity

105. Among 1,152 accidents between 1987 and 1992 on Indonesian waters, 36.2% of them were caused by human errors and 44.5% of them were caused by natural phenomena, both of which were summed up approximately 80%.

106. The human errors are specified as insufficient watch-keeping, neglect of a ship's position, inadequate shiphandling, inappropriate cargo loading, and careless handling of fire, flammable goods and engines. On the other hand, the natural phenomena mean insufficient attention to meteorological and oceanographical conditions, inadequate preparation against rough weather and improper timing of refuge. Therefore, the natural phenomena are also closely related to human errors in a broad sense.

107. Although some accidents must occur by inevitable reasons, human errors occupy the largest ratio of accident cause beyond dispute. According to the statistics of maritime accidents published by the Maritime Safety Agency of Japan, accidents caused by human errors in Japan came up 69.2% in 1991.

108. In order to prevent these accidents by human errors, it is necessary to disseminate preventive measures and maritime safety philosophy to the mariners concerned.

2) Summary of proposed activities

109. The activities for maritime safety shall be conducted effectively by ADPEL in cooperation with shipping operators and local maritime communities. They can be divided into two parts, namely: preventive measures for large vessels and small ships.

110. As for large vessels, preventive measures shall be undertaken by operators mainly. The following measures are proposed:

(a) Preparation of the safe operation manuals (which are closely described in Chapter 3 of Part II)
(b) A company's training: maritime accident analyses, safe operation, related rules and regulations in class and simulated dangerous situations at drill.
(c) Technical advice from experts who visit vessels and diagnose safety aspects.

111. As for small ships, the seafarers concerned shall attend the following training opportunities.

(a) Maritime safety training courses held by ADPEL as follows:
    (i) characteristics of local meteorology and local accidents
    (ii) observance of the international regulation for preventing collisions at sea
    (iii) strict enforcement of watch keeping and confirmation of a ship's position
    (iv) handling of a lifeboat and a fire extinguisher
    (v) inspect of hull and engines prior to navigation

(b) Engine maintenance training: Training for exclusive engine maintenance shall be held by ADPEL under the sponsorship of engine manufacturers. At the same time, engine conditions of small ships shall be inspected.

112. Such various information as meteorology, accident preventing measures, notices for maritime safety shall be broadcast for the convenience of small ships over the radio.

C. Cost Estimation

113. The proposed projects by 2005 are preliminarily estimated based on the relevant experiences in Indonesia and neighbouring countries. Therefore the project costs should be re-examined in a detailed engineering study phase. Especially, quotations for ATN exclude construction cost.

114. Costs are estimated in 1993 fixed price. Foreign exchange rate is assumed as at 1:19.75 for Japanese Yen to Indonesia Rupiahs.

1) Costs for ATN development

115. A quotation for constructing every type of a ATN unit is estimated as follows and its breakdown is refered to Appendix 6-4.

(a)	Lighthouse (40m)		:	Rp 1,442 millions
(b)	Light beacon (30m)		:	535
(c)	Light beacon (20m)		:	277
(d)	Light beacon (10m)		:	230
(e)	Light buoy		:	177
(f)	Radar beacon		:	199
(g)	Lorand-C System	(Sulawesi Chain)	:	141,801
		(Irian Jaya Chain)	:	93,215
(h)	Vessel traffic service (VTS)		:	78,901
(h)	Multi-purpose buoy tender vessel(MB)		:	25,675
(i)	Supply and aids tender vessel(SA)		:	12,640
(j)	Aids tender (AT)		:	11,850
(k)	Inspection boat (IB)		:	6,913

116. In accordance with the proposed development plan, the triennial development schedule and its cost estimation are shown in Table 6-11.

2) Costs for maritime SAR system development

117. Among the proposed projects as already described, maritime SAR ships and special rescue teams should be prioritized in order to conduct prompt and proper rescue activities and to cooperate with international SAR operations. Therefore both of the projects will be implemented by 2005.

118. The triennial development schedule and its cost estimation are shown in Table 6-12.

Table 6-11 Cost Estimation for ATN Development

ATN Type	1st Stage (1994/1996)	2nd Stage (1997/1999)	3rd Stage (2000/2002)	4th Stage (2003/2005)	TOTAL (1994/2005)
DEVELOPMENT SCHEDULE (unit)					
Lighthouse (40m)	13	6	6	3	28
Lightbeacon (30m)	13	8	5	0	26
Lightbeacon (20m)	13	10	0	0	23
Lightbeacon (10m)	105	76	41	0	222
Light Buoy	65	65	65	58	253
Radar Beacon	86	73	58	44	261
Loran-C System	0	1	0	1	2
Vessel Traffic Service (VTS)	0	0	0	1	1
Multi-purpose Buoy Tender Vessel (MB)	0	3	2	1	6
Supply and Aids Tender Vessel (SA)	6	6	2	0	14
Aids Tender (AT)	5	0	1	0	6
Inspection Boat (IB)	1	1	1	1	4
TOTAL AMOUNT (Rp. mil.)	224,074	360,793	139,197	228,052	952,116

Table 6-12 Cost Estimation for Maritime SAR System

	Development Schedule (unit/base)				Cost (Rp mil.)	
	1st Stage (1994/96)	2nd Stage (1997/99)	3rd Stage (2000/02)	4th Stage (2003/05	Unit Cost	Total Cost
SAR Ship of Class I-A	1/Surabaya	0	1/U.Pandang	0	56,860	113,720
SAR Ship of Class I-B	0	1/Ambon	0	1/Bitung	38,070	76,140
SAR Ship of Class II	1/Jayapura	1/Kupang	1/Balikpapan	0	17,140	51,420
Exclusive Pier for Class I-A Ship	1/Surabaya	0	1/U.Pandang	0	170	340
Exclusive Pier for Class I-B Ship	0	1/Ambon	0	1/Bitung	130	260
Special Rescue Team - Accommodation - Communication - Equipments	1/Surabaya	1Ambon	1/U.Pandang	0	5,810 (2,530) (2,220) (1,060)	17,430 (7,590) (6,660) (3,180)
Total Amount (Rp. mil.)	79,980	61,150	79,980	38,200	-	259,310

Chapter 7 SEAFARER EDUCATION SUB-SECTOR DEVELOPMENT PLAN

A. Assessment of Seafarer Education System

Assessment method

1. The seafarer education system in Indonesia is assessed in comparison with international standards. The capability of Indonesia seafarers is also assessed with due consideration of the international reputation of graduates from public Merchant Marine Academies (MMAs).

2. Assessment was carried out for the entire education system and each aspects of the system. The system consists of the education phase (in class and on-board), the examination phase, and the retraining phase.

3. Seafarers can be categorized by shipping trade type. In fact, a big company that is engaged in international trade and major inter-island route can also employ qualified seafarers. For the assessment, seafarers are categorized into three types as shown in Table 7-1.

Table 7-1 Seafarers Categories

Category Type		Category A	Category B	Category C
Trade Route Type		Int'l/inter-island	Inter-island	Coastal
Vessel Size		over 1,600 GRT and over 3,000 KW	200 to 1,600 GRT and 750 to 3,000KW	below 200 GRT and below 750 KW
Certificate	officer	MPB level	MPI level	MPT LEVEL
	rating	SKPD	SKPD	SKPD
School	officer	public MMA/private MMA	BPLPD/MMMS	BPLPD/Harbor Master
	rating	BPLPD/Harbor Master	Harbor Master	Harbor Master

Note: MPB : Officer's certificate for ocean-going service
MPI : officer's certificate for inter-island service
MPT : officer's certificate for local service
SKPD : rating certificate
MMA : Merchant Marine Academy
BPLPD : rating school
MMMS : Merchant Marine Middle School
Harbor Master, who is appointed to hold a training course for ratings.

General description

4. The seafarer education system in Indonesia can be considerably valued compared with international standards. Moreover, the graduates from public MMAs have gained good reputation with the domestic operators.

5. On the other hand, foreign operators sometimes point out the lack of basic and expert knowledge while their discipline is appreciated enough. The difference of opinion between domestic and foreign operators is rooted in the job functions required and the vessel size/type operated.

6. The number of seafarers working overseas is about 10% that of the Philippines. Therefore, the international demand of Indonesian seafarers is not so high. The evaluation gap between domestic and foreign operators should be offset with the reconsideration of seafarers' policy and its administration system.

7. In general, the maritime schools in Indonesia never take care of their graduates systematically in finding and changing jobs.

Education (in class) phase

8. The graduates from PLAP (MMA in Jakarta) and BPLP (MMA in Semarang, and Ujung Pandang) become mainly officers in Category A. These schools have dense curriculum consisting of compulsory subjects and optional ones (114 credits) in three years, inclusive of one-year sea project. This curriculum seems to cram students and the shortage of full-time teachers affects their study.

9. Private MMAs and private MMMSs are expected to supplement public MMAs. As a matter of fact, both teachers and equipments are too poor to meet international standards.

10. Only BPLPD Barombong and BPLPD Surabaya have the formal course to raise officers for domestic shipping which is equal to Category B and C.

11. As for rating education, BPLPD Barombong provide students with a formal course in a favorable situation. BPLPD Surabaya has the plan to provide the necessary training equipments for the course in the near future. This curriculum is good and suited for Category A. However, many graduates prefer upper education courses such as PD-II and PD-III or international shipping to becoming ratings in domestic shipping.

12. The result of employment by PT. PELNI shown in Table 7-2 indicates that Pelni has employed 2,167 persons designated as a rating or a purser. Prior to employment, they attended the training course for ratings which was held by rating schools and appointed Harbor Masters on occasion. A Harbor Master who has various tasks does not seem to spend much time for the training course.

Education (on-board) phase

13. As a rule, merchant vessels on inter-island routes accept cadets from public MMAs. This on-board training system, however, does not function well except for PLAP. As a result, the cadets, except those in PLAP, are on the long list of applicants.

14. On the other hand, the quality and opportunity of on-board training for the students in private MMAs and private MMMSs are far inferior than those from public MMAs.

Table 7-2 Result of Employment by PT. PELNI

A.M. / Designation	Public Maritime School	Private Maritime School	Special Course for Rating	Total
Officer				
Deck (MPB I-III)	224	0	0	224
Eng. (AMK C-A)	160	0	0	160
Radio	0	93	0	93
MPI	17	53	0	70
MPT	0	66	0	66
AMK-PI	14	91	0	105
AMK-PT	0	125	0	125
Rating & Purser	0	0	2,167	2,167
Total	415	428	2,167	3,010

Examination phase

15. In general, school period is divided into in-class and on-board. However, maritime schools in Indonesia adopt the so-called "Sandwich System" which consists of in-class, on-board, and in-class by turns. This system brings about inconvenience to both students and shipping companies to a great extent. The examination scheme is, therefore, formulated to address the deficiencies in this system.

16. The certificate system in Indonesia, more precisely, the minimum requirements of certificate for officers on-board merchant ships differ from the international customary requirements. For example, the MPB certificates are regarded as the officer's license on ocean-going vessels with unrestricted voyage. However, it is strange that a MPB-II holder can work as designated chief mate on neither a passenger ship above 5,000 GRT or a cargo ship above 7,500 GRT.

Retraining phase

17. The existing education system gives a wide chance for seafarers in active service to get higher position certificate in several ways. For instance, they can join the academic stream for getting MPB-II/AMK-B at Jakarta MMA (PLAP). Besides, they can join the professional/non-academic stream for getting from MPT/AMK-PT to MPB-I/AMK-C coordinated by the Institute of Maritime Refreshing and Advanced Course (BP3IP) in Jakarta.

18. Concerning the special training for STCW Compliance, all public MMAs, rating schools, and the authorized private training institutions such as the state-owned oil company, PERTAMINA, give the training chance for seafarers individually.