社会開発協力部報告書

No. 8

REPORT
FOR
THE FEASIBILITY STUDY
ON
THE REINFORCEMENT AND EXPANSION PLAN
OF
P.T. IKI MAKASSAR SHIPYARD AT UJUNG PANDANG
IN
THE REPUBLIC OF INDONESIA

MARCH, 1981

JAPAN INTERNATIONAL COOPERATION AGENCY

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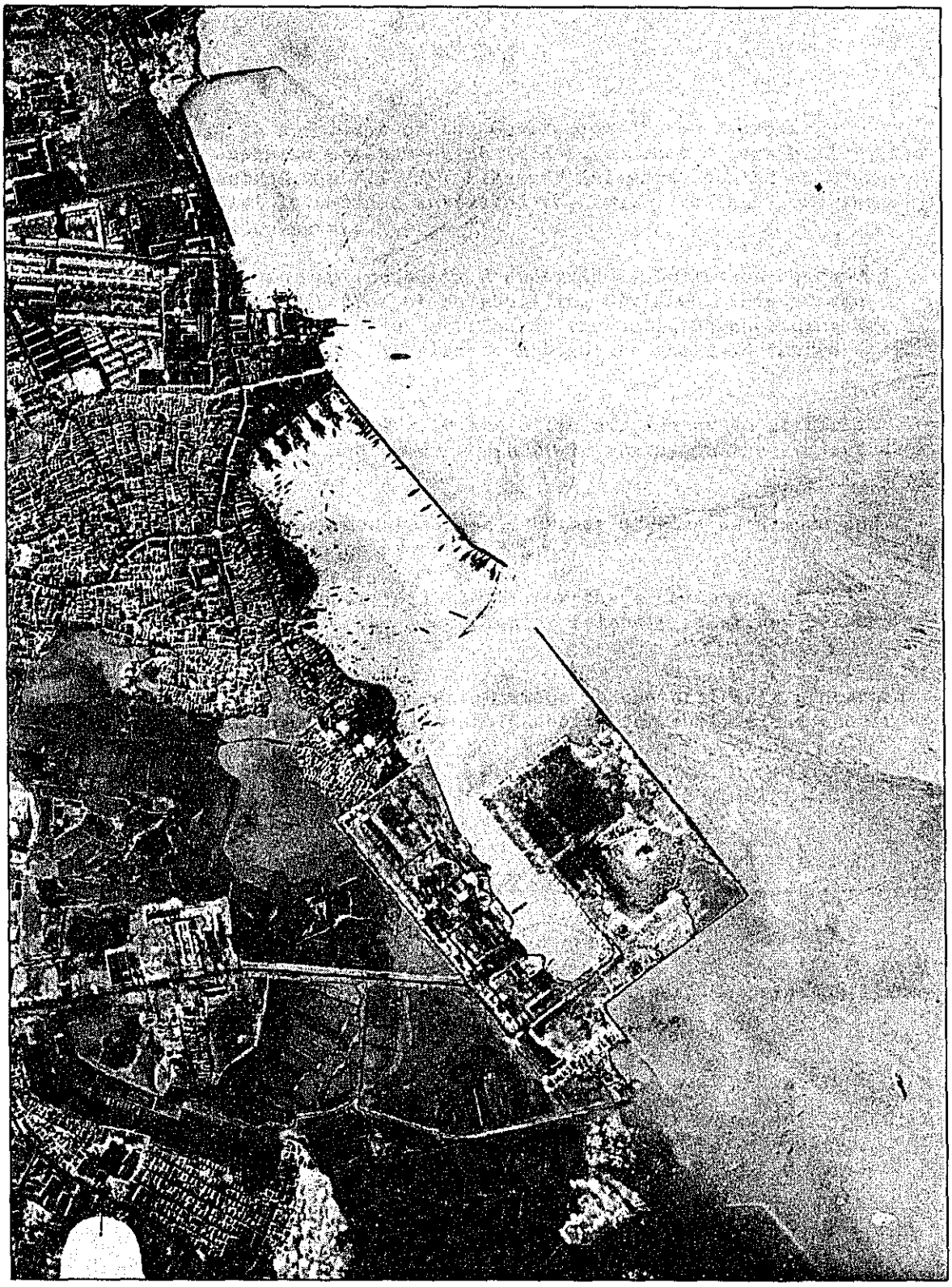

P.T. IKI MAKASSAR SHIPYARD AT UJUNG PANDANG

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ABBREVIATIONS

BAPINDO	Bank Pembangunan Indonesia (State Development Bank)
BKI	Indonesian Classification Bureau
DWT	Deadweight Tonnage
FOB	Free on Board
F.T.	Freight Ton
GT	Gross Tonnage
IERR	Internal Economic Rate of Return
IFRR	Internal Financial Rate of Return
IGGI	Inter-Governmental Group of Indonesia
INL	Indonesian National Line
IRR	Internal Rate of Return
LLC	Level Luffing Crane
LT	Long tons
OECD	Organization for Economic Cooperation and Development
OHC	Over Head Traveling Crane
P.T. PANN	P.T. Pembangunan Armade Niaga Nasional (National Fleet Development Corporation)
PERTAMINA	PERTAM BANGAN MINYAK DAN GAS NASIONAL (National Company of Petroleum & Natural Gas)
RLS	Regular Liner Services of Inter-island Shipping
Rp	Rupiah
SOLAS	The International Convention for the Safety of Life at Sea
UNIDO	United Nations Industrial Development Organization

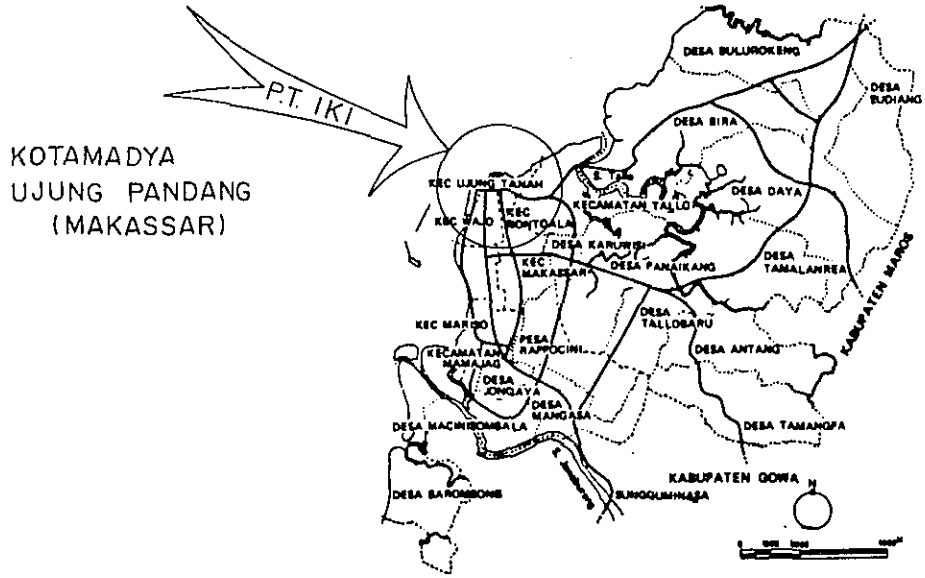
EXCHANGE RATE

The exchange rate of currency used in this report is as follows:

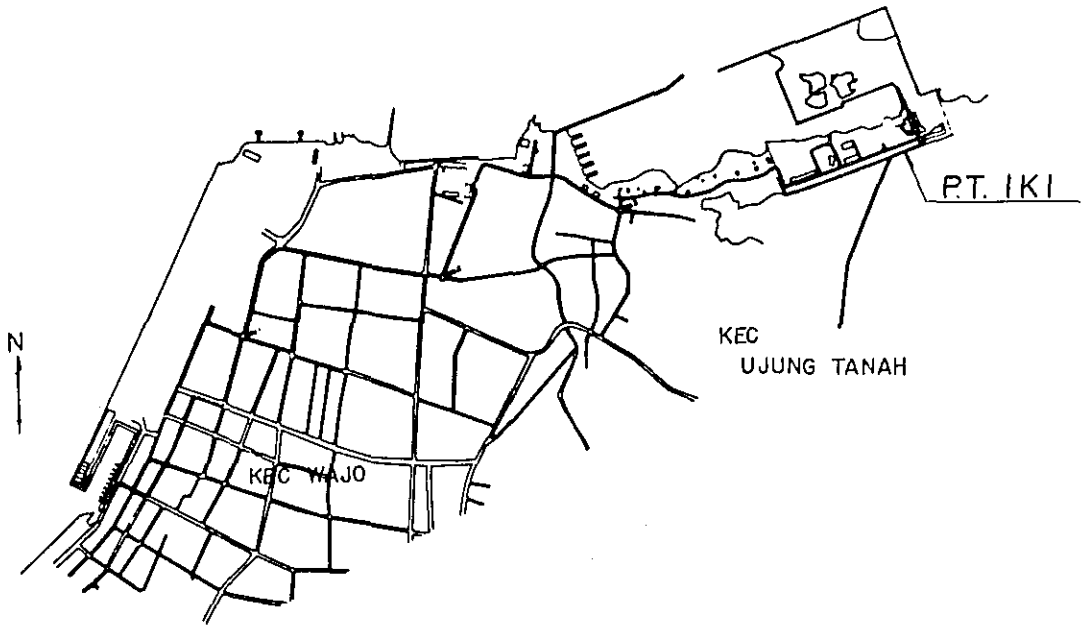
1 yen = 3 Rp

GENERAL MAP OF UJUNG PANDANG

INDONESIA ISLANDS



MAP OF P.T. IKI MAKASSAR SHIPYARD



I CONCLUSION

I. CONCLUSION

The Feasibility Study for the Reinforcement and Expansion Plan of P.T. IKI Makassar (Ujung Pandang) Shipyard in Indonesia has led to the conclusion that this project is feasible on the following plan.

1. [Scale of Shipyard] As regards new shipbuilding and ship repairing facilities, reinforcement of a slipway having the capacity to build vessels of 5,000 DWT and a graving dock having the capacity to repair vessels of 7,000 DWT is suitable to this project.

   The construction period of these facilities is estimated at two years.

   Number of personnel engaged in this shipyard will be about 900.

2. [Investment and Project Cost] The total investment is estimated to be approximately 38 billion Rps. Taking the working capital into consideration, the project cost is estimated at about 42.3 billion Rps, adding the working capital of 4.3 billion Rps to the total investment. The working capital is estimated on the assumption that ratio of borrowed capital is 70% at the interest rate of 8% P.A.

3. [Financial Evaluation] Internal financial rate of return (IFRR) is estimated at 13.39% for the evaluation period of 20 years.

   Taking the financing soundness into consideration, interest rate less than 8% P.A. for a long term loan is indispensable to this project.

4. [Measures to be Taken up] In order not only to secure the amount of work for this shipyard, but also to put this project into smooth sailing, enforcement of the following measures should be taken up by both Indonesian Government and Makassar Shipyard itself.

   1) Measures to be taken up by Government

   - Securement of fund for development of domestic shipbuilding and shipping industry
   - Standardization of ship
   - Exemption of import duty

- Improvement of external environment
- Promotion of "scrap and built"
- Import regulation on ships
- Educational training of personnel
- Invitation of shipbuilding advisors, etc.

2) Measures to be wrestled by Makassar Shipyard

- Solidification in sales activity
- Improvement of technical level and production efficiency
- Maintenance of facilities, etc.

By considering this project from national aspect in the whole Indonesia, it is expected that the implementation of this project will bring about various effects to the Indonesian economy and will play an important role in the enhancement of the economic life of the Indonesian people, that is, increase in national income, development of related industries, savings of foreign currency, expansion of employment, etc.

From both the technical and economical point of view as mentioned above, it is recommendable for Indonesia Government to promote this project.

Ⅱ SUMMARY AND RECOMENDATION

II. SUMMARY AND RECOMMENDATION

The objective of this project is to expand and reinforce the P.T. IKI Makassar Shipyard which is located in Ujung Pandang, Sulauesi, Indonesia. Our study team stayed at the site of the project for 2 months from June, 1980 to carry out the studies which included the geological investigations and surveying the water depths.

From the beginning of the 2nd 5-year plan, the main aim of which was the development of industries, Indonesia had a strong enthusiasm of promoting the development of domestic shipbuilding industries. And in 1977, when the administrative responsibility for the shipbuilding industry was transferred from Sea Communications (hereinafter referred to as Sea Comm.) of the Ministry of Transportation to the Ministry of Industry, the Government of Indonesia requested the Government of Japan to conduct the basic project studies for the promotion and development of the shipbuilding industry of Indonesia. The Government of Japan accepted this request and dispatched in the same year the first study team to Indonesia who visited the sites of 18 major shipyards and investigated the existing situations, and, at the same time, studied the future demands and supplies of shipbuilding and repairing.

As the results of the studies, 4 shipyards were chosen as the potential shipyards, whose shipbuilding facilities shall be expanded or reinforced. And in 1978, the 2nd study team was dispatched for further studies. This project team summarized the reports of the first and second investigations and submitted a report "THE COMPREHENSIVE STUDY FOR SHIPBUILDING INDUSTRY DEVELOPMENT IN INDONESIA" as the basic program for the development of the shipbuilding industry to the Government of Indonesia in 1979. One of the 4 aforementioned shipyards is the Makassar Shipyard.

This Makassar Shipyard was formerly called Galangan Kapal Makassar. In 1977, it merged Gresik, Padang and Bitung shipyards, and was incorporated under P.T. IKI (P.T. Industri Kapal, Indonesia). It is situated in a section of Ujung Pandang Port.

The existing facilities consist of a set of slipway capable of building and repairing vessels up to 500 T.L.C., and at present, the facilities are used mainly for repairing small vessels. In the opposite side of these facilities over creek is a lot of about 15 H.A. of reclaimed area for

expansion. The object of the reinforcement program we will mention hereinafter is to provide the new shipbuilding and repairing facilities capable of handling larger vessels in this area.

The major considerations were given in this feasibility study to the facts that the shipyard possesses an ample space for expansion and there are some related facilities around the shipyard such as a relatively well-equipped professional training center, etc., and has a hinterland, which is the city of Ujung Pandang, the largest city in South Sulawesi, and further, the project is in line with the Indonesian Government policy of transimmigration and decentralization of industries and the newly incorporated P.T. IKI is very enthusiastic of the development of this project.

We have reached our conclusion, as the results of investigations and analyses, that this project will be feasible enough to be taken up and should, by all means, be promoted in view of national economy of Indonesia provided that every effort will be made to the Government policies and shipyard, as explained in later pages. In this case, the investment for one building berth capable of building new ships up to 5,000 DWT and 1 set of dry-dock for repairing vessels up to 7,000 DWT will be justified and a proper number of employee will be 900, and that the total investment of approximately 12.7 billion yen (or 38 billion Rp) will be technically and economically feasible. In the process of our studies which finally led us to the aforesaid conclusion, we have made our evaluations and planning based on the following facts and understandings:

(1) At the current stage, the level of operations of the Makassar Shipyard is generally still low with respect to the administrative control, the production management, and the shipbuilding technology. This is true of the general situation of the shipbuilding industry of Indonesia. It will still take a considerable number of years before the industry will attain an international level, even if various measures will be taken.

(2) The Makassar Shipyard should start with the building and repairing of the small vessels to be used for domestic shipping, and thus by strengthening their capacities and gaining ample experiences, they should gradually proceed to the building and repairing of larger vessels. It is not desirable to have any facilities, the capacities of which are excessively larger than the current administrative, production, and technological capabilities.

(3) In view of high availability of labor in Indonesia, and also from the profitability point of view, the investment for the facilities should be set at the minimum, and therefore, should not consider a high automation or laborsaving device.

Meanwhile, it is the most important in the implementation of this program that the potential demands for shipbuilding and repairing which should derive from the existing domestic shipping industry must be converted into actual works of the Makassar Shipyard. To realize this objective, the Government of Indonesia should not only reinforce the shipbuilding facilities, but also make endeavors to realize the internal and external environments to suit this objective.

From this point of view, we would like to emphasize that, in addition to the summary of the reinforcement program, we made some recommendations as to the various measures to be taken on a national level, on a local level, as well as by Makassar Shipyard itself.

1. THE SUMMARY OF THE STUDY

1-1 Prospect for Demand and Supply of New Shipbuilding and Repairing

1-1-1 Demand for New Shipbuilding

Total amount of demands for new shipbuilding up to 10,000 DWT is expected to reach 129,000 DWT to 184,000 DWT per year on the average between 1986 and 1990, and 177,000 to 283,000 DWT per year on the average between 1991 and 1995, consisting of R.L.S fleet, local shipping fleet, pioneer shipping fleet, industrial carrier (including Pertamina tanker) and fishing boat. The breakdown of the vessel size is as seen in Table II-1-1.

Table II-1-1 Estimated Demand for New Shipbuilding

(Unit: 1,000 DWT/year)

	0-500 DWT	501-2,000 DWT	2,001-5,000 DWT	5,001-10,000 DWT	Total
1981-1985	21 ∿ 27	25 ∿ 30	26 ∿ 30	10 ∿ 11	82 ∿ 98
1986-1990	38 ∿ 54	38 ∿ 58	39 ∿ 56	14 ∿ 16	129 ∿ 184
1991-1995	57 ∿ 96	52 ∿ 87	52 ∿ 81	16 ∿ 19	177 ∿ 283

1-1-2 Demands for Ship Repairing

Required fleet in Indonesia is estimated at 4,807,000 to 5,623,000 DWT in 1990, and 6,417,000 to 8,199,000 DWT in 1995. As to the demands for repairing, two cases are studied taking into consideration the ratio of repairing in other countries. As the maximum demand 2,224,000 to 2,608,000 DWT in 1990, and 3,015,000 to 3,871,000 DWT in 1995 is expected. In the other case that increase in repairing amount of domestic takers and ocean shipping fleet in other countries is considered as compared with the said case, the demand at the minimum is expected at 1,776,000 to 2,085,000 DWT in 1990, and 2,446,000 to 3,159,000 DWT in 1995. The breakdown of demands for repairing is shown in Table II-1-2.

Table II-1-2 Estimated Demand for Ship Repairing

1) Case 1

(Unit: 1,000 DWT)

	0-500 DWT	501-2,000 DWT	2,001-5,000 DWT	5,001-10,000 DWT	10,001-30,000 DWT	Total
1980	118 ∿ 121	212 ∿ 215	147 ∿ 148	295 ∿ 300	565 ∿ 566	1,337∿1,350
1985	161 ∿ 184	234 ∿ 254	194 ∿ 207	360 ∿ 386	738 ∿ 785	1,687∿1,816
1990	251 ∿ 327	288 ∿ 362	276 ∿ 329	456 ∿ 520	953∿1,070	2,224∿2,608
1995	403 ∿ 599	380 ∿ 552	390 ∿ 522	575 ∿ 698	1,267∿1,500	3,015∿3,871

2) Case 2

(Unit: 1,000 DWT)

	0-500 DWT	501-2,000 DWT	2,001-5,000 DWT	5,001-10,000 DWT	10,001-30,000 DWT	Total
1980	118 ∿ 121	212 ∿ 215	147 ∿ 148	154 ∿ 157	410 ∿ 410	1,041∿1,051
1985	161 ∿ 184	234 ∿ 254	194 ∿ 207	196 ∿ 206	541 ∿ 570	1,326∿1,421
1990	251 ∿ 327	288 ∿ 362	276 ∿ 329	256 ∿ 292	705 ∿ 775	1,776∿2,085
1995	403 ∿ 599	380 ∿ 552	390 ∿ 522	330 ∿ 400	943∿1,086	2,446∿3,159

Notes: Case 1 (1) Of the vessels over 500 DWT engaged in domestic shipping (including those visiting Singapore), 10% are repaired in Singapore, and they are excluded.

(2) 50% of ocean-going vessels are excluded because they are repaired in other countries.

Case 2 (1) Vessels ranging 500 - 10,000 DWT for domestic shipping are treated in the same way as in Case 1. Of domestic tankers over 10,000 DWT, 20% are repaired in Singapore, and they are excluded.

(2) All of ocean-going vessels over 10,000 DWT and 80% of 5,000 - 10,000 DWT vessels are excluded because they are repaired in other countries.

About 80% of the total number of vessels are sent to repairing docks every two years on the average, and the remaining 20% every year.

1-1-3 New Shipbuilding and Repairing Capacities

The new shipbuilding and repairing capacities of Indonesian shipyards including P.T. Pelita Bahari shipyard under construction and 3 shipyards under contemplation, namely, P.T. Ippa, P.T. Dok Surabaya and P.T. Intan Sengkuyit, are estimated as in Table II-1-3 for new shipbuilding capacities and Table II-1-4 for repairing capacities.

Table II-1-3 Estimated Capacity of New Shipbuilding

(Unit: 1,000 DWT/Year)

	0-500 DWT	501-2,000 DWT	2,001-5,000 DWT	5,001-10,000 DWT	Total
1981-1985	16	30	5	5	56
1986-1990	28	45	16	13	102
1991-1995	28	57	19	17	121

Table II-1-4 Estimated Capacity of Repairing

(Unit: 1,000 DWT/Year)

Vessel by size (DWT)	0 - 500	501-2,000	2,001-5,000	5,001-10,000	10,001-35,000	Total
Until 1985	207	155	175	120	331	988
1986-1995	235	181	202	139	397	1,154

1-1-4 Demand and Supply of New Shipbuilding

It is estimated that there will be an acute shortage of new shipbuilding ranging from 2,000 to 5,000 DWT in the future (Table II-1-5).

As a maximum shipbuilding capacity in the said range is 3,000 DWT even if the proposed ones would be included, particularly vessels of 3,001 to 5,000 DWT will be remarkably short of supply. It is estimated that the average shortage per year of those vessels will be 23,000 to 34,000 DWT annually between 1986 and 1990, and 31,000 to 49,000 DWT annually between 1991 and 1995.

Therefore, it is necessary for Makassar Shipyard to reinforce a building berth of 5,000 DWT class.

If Makassar Shipyard would be reinforced, its planned supply capacity under the normal operations will be approximately 17,000 DWT annually (5,000 DWT × 3.5 vessels). The Makassar Shipyard will be put in the

normal operations at the earliest in 1991 or thereafter, considering the period of 7 years from the commencement of operation to the normal operation. It is, therefore, expected that Makassar Shipyard will have enough order for its capacity, if the after-mentioned measures, namely, establishment of shipbuilding program by the Government, and improvement of technical level by instruction of leading countreis of shipbuilding, etc., would be taken up. Makassar Shipyard, at that stage after 1991, will be expected to be able to supply 6 to 9.6% of the total demands for new shipbuilding in Indonesia. This will account for about 12% share of the total domestic capacities.

Table II-1-5 Demand/Supply Gap of New Shipbuilding

(Unit: 1,000 DWT/Year)

	0-500 DWT	501-2,000 DWT	2,001-5,000 DWT	5,001-10,000 DWT	Total
1981-1985	4 ∿ 11	Δ 5 ∿ 0	21 ∿ 25	5 ∿ 6	25 ∿ 42
1986-1990	10 ∿ 26	Δ 7 ∿ 13	23 ∿ 40	1 ∿ 3	27 ∿ 82
1991-1995	29 ∿ 68	Δ 5 ∿ 30	33 ∿ 62	Δ 1 ∿ 2	56 ∿ 162

Note: Δ mark indicates surplus capacity.

1-1-5 Demands and Supply of Ship Repairing

For 5,000 DWT and over in particular up to 1990 and all groups of vessels after 1991, acute shortage of repairing capacities will be observed (Table II-1-6). Taking size composition of the existing fleet into consideration, there will be a great demand for 7,000 DWT class vessels in the range from 5,001 to 10,000 DWT. Therefore, it is necessary for Makassar Shipyard to reinforce a repairing dock of 7,000 DWT class.

It is planned that Makassar Shipyard will have a repairing capacity of 180,000 DWT per year (average 5,000 DWT × 36 vessels) under a normal operation. The ship size to be repaired in this shipyard is considered to range from 2,000 to 7,000 DWT. It will take three years to attain the normal level of repairing operations. Assuming that the normal operations would be achieved by 1988 - 1989 depending on the start of the construction work, it is expected that Makassar Shipyard will secure the demand enough to satisfy its repairing capacity, supporting that the after-mentioned measures will be taken up.

In realizing this project, the share of Makassar Shipyard of the gross domestic demands is estimated to be 7 to 10% in 1990, and 5 to 7% in 1995. The shipyard's repairing capacity will account for 16% of the whole domestic capacities.

Table II-1-6 Demand/Supply Gap of Ship Repairing

1) Case 1

(Unit: 1,000 DWT/Year)

	0-500 DWT	501-2,000 DWT	2,001-5,000 DWT	5,001-10,000DWT	10,001-30,000DWT	Total
1985	Δ46 ∿ Δ23	79 ∿ 99	19 ∿ 32	240 ∿ 266	407 ∿ 646	699∿1,020
1990	16 ∿ 92	107 ∿ 181	74 ∿ 127	317 ∿ 381	556 ∿ 673	1,070∿1,454
1995	168 ∿ 364	199 ∿ 371	188 ∿ 320	436 ∿ 559	870∿1,103	1,861∿2,717

2) Case 2

(Unit: 1,000 DWT/Year)

	0-500 DWT	501-2,000 DWT	2,001-5,000 DWT	5,001-10,000DWT	10,001-30,000DWT	Total
1985	Δ46 ∿ Δ23	79 ∿ 99	19 ∿ 32	76 ∿ 86	210 ∿ 239	338 ∿ 433
1990	16 ∿ 92	107 ∿ 181	74 ∿ 127	117 ∿ 153	308 ∿ 378	622 ∿ 931
1995	168 ∿ 364	199 ∿ 371	188 ∿ 320	191 ∿ 261	546 ∿ 689	1,292∿2,005

Note: Δ mark indicates surplus capacity.

1-2 Reinforcement Program

1-2-1 Facilities

(1) Reinforcement of New Shipbuilding Facilities

A new building berth with 135 m of length (including working stage 20 m) and 20 m of width and its appendant facilities is constructed ao as to build a vessel up to about 5,000 DWT.

At the first year of operations, one 5,000 DWT vessels, and at the seventh year when normal operation is attained, 3.5 vessels of said size shall be constructed.

(2) Reinforcement of Ship Repairing Facilities

A graving dock with 140 m of length, 18 m of width and 7 m of depth is constructed for the repairing of about 7,000 DWT vessel.

At the first year of operation, 20 vessels and at the third year when normal operation is attained, 36 vessels shall be repaired in the dock.

(3) Characteristics of the Reinforcement

1) The layout of the facilities is illustrated on Fig. II-2-1.

2) A straight line system is adopted from the steel stockyard to the berth to minimize the transportation.

3) Hull block construction system is adopted. Hull blocks up to 12 m x 8 m and 30 tons will be assembled. After outfitting, the 40 ton blocks will be erected using 40 ton cranes.

4) A 1/10 scale drafting system is adopted. By the adoption of this system, a template which is made by another company or made together with other companies can be used. This system is convenient for material purchasing.

5) To avoid rain and strong sunlight, shelters have been provided for fabrication, sub-assembly and assembly shops.

6) The cranes for the fabrication, sub-assembly and assembly are to be gate type cranes which are independent of the shelters.

7) An outfitting quay is to be located along the canal. Because the canal is too narrow for vessels to pass, the quay is to be cut back 28 meters. The quay will have two cranes (10 ton and 6 ton) and outfitting space is located within the crane's reach.

8) Available existing facilities are to be fully utilized. A new carpenter shop is not going to be built. Instead, the present shop is to be remodeled, and a new store is to be added. When the amount of work exceeds the capacity of carpenter shop, it should be subcontracted.

   The existing machine shop is also to be utilized, and only small shop is to be constructed to accommodate the newly furnished large machinery.

9) Outfitting shop such as pipe shop, plate shop, machine shop and galvanizing shop are arranged in a place so that it is convenient to go either to the building berth, outfitting quay or repair dock.

10) Since pubulic facilities can be utilized at a little expenses, a new training center is not necessary to be built. If it becomes necessary in the future to improve skill development, a welding laboratory will be established at the existing facilities.

11) Electric power is to be mainly supplied by the newly-own generator and only from outside sources at night. Outside power is expensive, besides it employs transmission cables and power substation.

12) Ample space is prepared for acetylene gas and oxygen. To obtain low-cost and good-quality acetylene gas and oxygen, a new plant should be furnished either by the shipyard's own investment or by inviting another company to the site.

1-2-2 Personnel

In the first year of operations, the administrators (manager and section chief) of 8, clerks and engineers of 118, indirect workers of 55 and direct workers of 550, with the total number of 701, (including the current personnel of Makassar Shipyard), and on the 7th year, 8 administrators, 153 clerks and engineers, 61 indirect workers, and 680 direct workers with total number of 902 persons shall be needed.

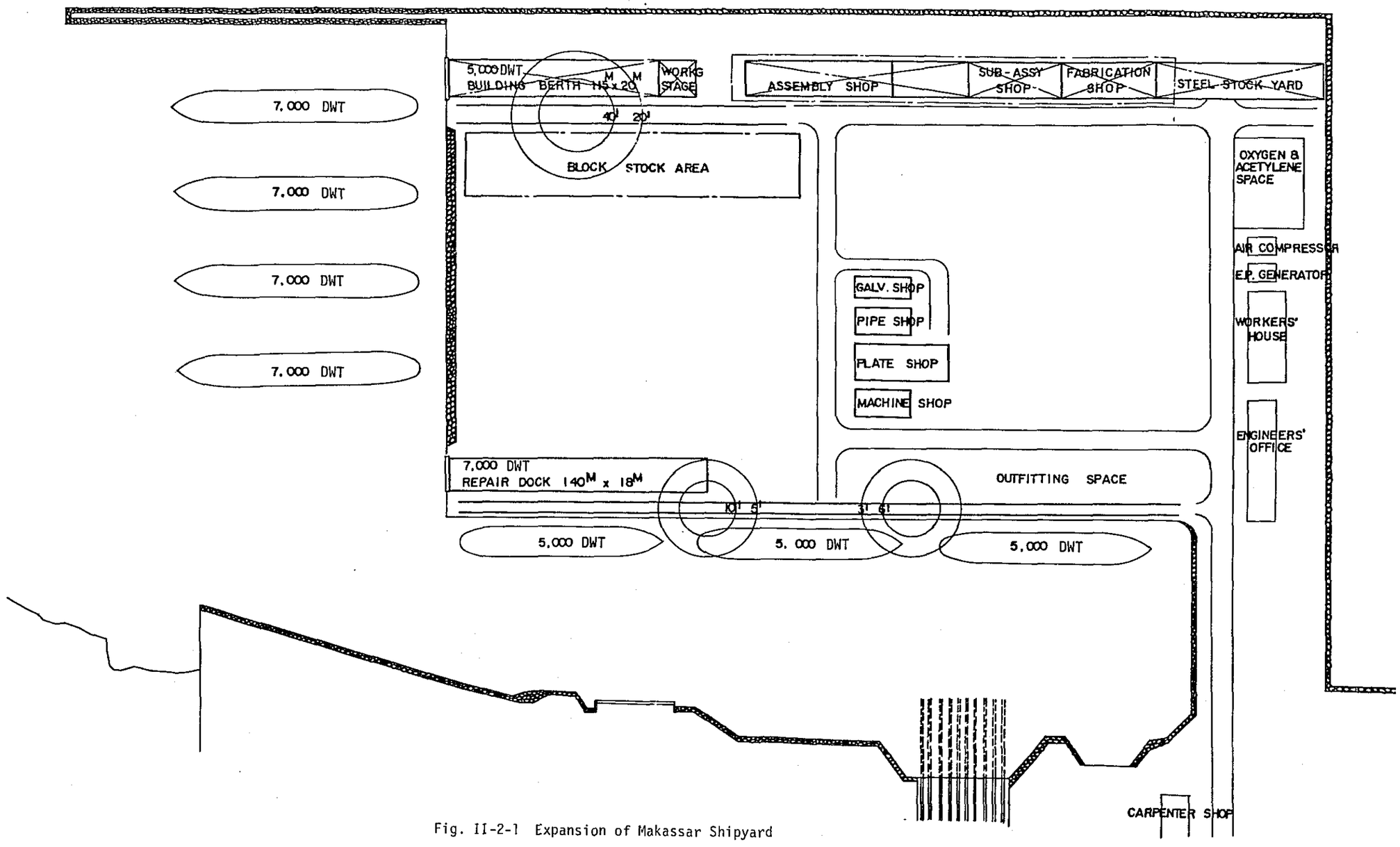


Fig. II-2-1 Expansion of Makassar Shipyard

1-2-3 Total Investment

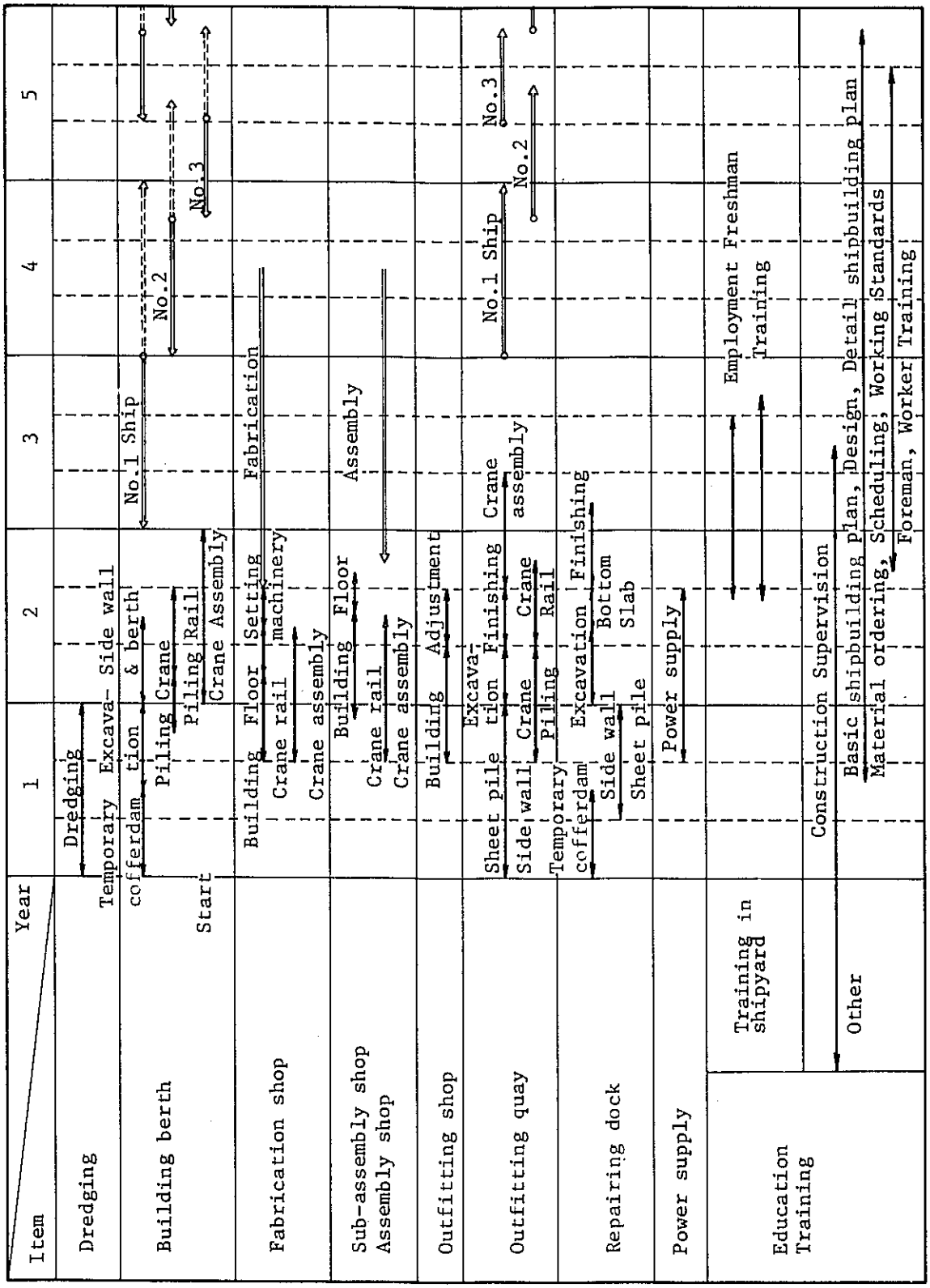
Investment for facilities	29.4 Billion Rps	Foreign currency portion: 20.2 Billion Rps Local currency portion: 9.2 Billion Rps
Engineering fees	2.5 Billion Rps	
Educational and training fees	5.2 Billion Rps	
Contingencies	0.9 Billion Rps	
Total investment	38.0 Billion Rps	

1-2-4 Project Cost

Initial investment	:	38.0 Billion Rps
Working capital (for 4 years from the start of this project)	:	Case 1: 4.3 Billion Rps Case 2: 7.7 Billion Rps
Project cost	:	Case 1: 42.3 Billion Rps Case 2: 45.7 Billion Rps

Notes: Case 1: interest rate for long-term loan, 8% P.A.
Case 2: interest rate for long-term loan, 12% P.A.

1-3 Outline of Implementing Plan



1-4 Financial Evaluation

The evaluation of this project from a financial point of view was made. The summary of financial evaluation are as follows.

Table II-1-7 Results of Financial Analysis

		Evaluation period	
		20 years	30 years
Internal Financial Rate of Return (IFRR)	Without inflation	5.95%	7.82%
	With inflation of 10%/year	13.39%	16.14%
	Interest rate of the borrowed capital		
	6% P.A.	8% P.A.	12% P.A.
Payback period of initial investment	16.2 years	16.8 years	19.2 years
Peak of short-term loan	1,701 million Rps in a year previous to commencement of operation	2,163 million Rps in a year previous to commencement of operation	3,087 million Rps in a year previous to commencement of operation
Peak of balance of short-term loan	2,874 million Rps in 1st year	4,455 million Rps in 5th year	23,299 million Rps in 11th year
Peak of cumulative losses	10,368 million Rps in 5th year	14,937 million Rps in 5th year	27,501 million Rps in 9th year
Point to break the cumulative losses (Time to start the payment of dividends)	9th year	12th year	17th year

(1) Internal Financial Rate of Return (IFRR)

IFFR of this project are 5.95% in a term of 20 years and 7.82% in a term of 30 years in case of no cost increase being considered, and are 13.39% in a term of 20 years and 16.14% in a term of 30 years in case that the cost inflation of 10% per year are considered.

From these results, it can be said that this project is considered feasible.

The development of the shipbuilding industry as well as the shipping industry should be essential for the Indonesia being islands nation. Further, considering the effects that the project will have on the national economy of Indonesia, the profitability should not be of a decisive factor in evaluating the project.

(2) Recovery of Initial Investment (Payback period)

Payback period of initial investment takes 16.2 years from the start of operation if the interest rate for the borrowed capital is 6% P.A., 16.8 years if 8% P.A. and 19.2 years if 12% P.A. This period is not necessarily short compared with the standard industrial project. However, considering the specific features of the shipbuilding industry, namely, a large investment needed and a relatively longer life of facilities, the payback period within 20 years is considered admissible.

(3) Peak of Cumulative Losses

The cumulative losses will reach 10,368 million Rps in 5th year of operation if the interest rate is 6% P.A., 14,937 million Rps in the 5th year if 8% P.A. and 27,501 million Rps in the 9th year if 12% P.A.

From the view point of the financial stability, it is desired that the peak of the accumulative losses is within the limit of the equity capital which is 11,136 million Rps. Then, the interest rate for the borrowed capital should be less than 6% P.A. to meet this condition.

(4) Point to Break the Cumulative Losses (Time to start the dividends payment)

The break point of the cumulative losses is on 9th year of operation if the interest rate is 6% P.A., on the 12th year if 8% P.A. and on the 17th year if 12% P.A.

If considering this time as the time to start the payment of dividends, from the view point of industry (generally considered as normal is within 10 years), the rate of interest for the borrowed money should be less than 8% P.A.

From a view point of commercial base, the rate of return on the investment of this project is by no means sufficient. However, if long term loan with low interest rate lower than 8% P.A. would be utilized, the financial soundness would be kept and it is possible to reimburse debt and to repay tax and dividends.

This financial analysis was made under the assumptions as follows:

1) The prices of the new shipbuilding and repairing are estimated based on the ratio of operating profit to sales of 10% and 15% respectively which would be considered reasonable profit under the normal operations attained after 8 to 10 years of operations. The reason for this is that, during a period for bringing up the domestic shipbuilding industry, putting it into international competitions on the market prices would not be favorable to its healthy development. For the time being, therefore, setting up the political ship price in Indonesia, by which the shipbuilder should earn the reasonable profit, is seemed to be indispensable.

2) The ratio of increase in the cost, namely, materials cost, labor cost, etc. is assumed at 10% per year.

3) The ratio of the capital structure between the borrowed capital and equity capital is 70 to 30.

4) The borrowed capital shall be repaid over a period of 15 years (with a grace period of 6 years) according to BAPINDO.

5) The rate of interest for the short-term loan is 13.5% P.A.

6) The bank interest for the deposit is 9% P.A.

7) The granting of tax facilities, namely, tax holiday and loss compensation, is applied.

1-5 Economic Analysis

The following are the main effects that this project will have on the Indonesian economy, when it will be implemented.

(1) Increment of National Income

It is expected by the implementation of this project that national income in Indonesia will increase at about 30,600 million Rps per year after 11 to 20 years of operations, and about 44,100 million Rps per year after 21 to 30 years of operations.

(2) Development of Related Industries

The sales of the related industries are expected to reach about 2,900 million Rps per year after 11 to 20 years of operations and 3,850 million Rps per year after 21 to 30 years of operations.

(3) Savings of Foreign Currency

This project will bring on the savings in foreign currency amounting to about 10,440 million Rps per year after 11 to 20 years of operations, and 11,420 million Rps per year after 21 to 30 years of operations. Thus, the total savings in 30 years will reach about 290,000 million Rps.

(4) Expansion of Employment

In realizing this project, about 700 people in the shipyard will be newly employed. If the related industries, general consumer goods industries and service sector are considered, this project is expected to have the effect of creating 4 times the aforesaid number of jobs.

(5) Effects on the Ujung Pandang Region

1) About 11,000 people will earn their livelihood deriving from this project. This number will account for 2% of the present population of the city, 650,000.

2) This project, when implemented, will contribute to the growth of the related industries and to the development of other industries and infrastructure of the region. This will contribute to the decentralization of industries and population, which is the policy of the Indonesian Government.

(6) Internal Economic Rate of Return (IERR)

From the viewpoint of national economy, the internal economic rate of return for this project will be 17.58%. This is better than the indexed rate of 8 - 15% (depending on country and kind of project), which the World Bank considers as the reasonable rate of the opportunity cost of capital. From this point of view, also, this project is considered admissible.

2. RECOMMENDATION-POLICIES TO BE TAKEN

To promote the reinforcement and expansion plan of the Makassar Shipyard smoothly and develop it further, it is necessary to improve the external environment and strengthen the internal attitude of the Yard.

That is, it is necessary to awaken the demand for building and repairing of Indonesian ships considered to be existed much latently and have Indonesian Owner place actual order to the Makassar Shipyard after winning in international competition with foreign shipbuilders or purchase of used ships from foreign countries.

In order to realize this plan, various policies should be taken and enforced in the national view.

2-1 Policies to be Enforced by the Government

2-1-1 Favorable Terms of Fund for Reinforcement and Expansion of Shipbuilding and Shiprepairing Facilities

Total investment amount required for reinforcement and expansion of the Makassar Shipyard is estimated at Rp 38 billion. As a result of Financial analysis, the cost of capital (interest for long-term debt) should be less than 6% per year in order to recover total investment amount in twenty years and also should be less than 8% per year in order to do the same in thirty years in case of no cost change of the shipbuilding and repairing.

Assuming that the capital structure of the Makassar Shipyard consists of equity 30% and borrowed capital 70% with its interest 8% per annum and that the inflation of the material cost and labor cost, etc. is 10% per year, the Makassar Shipyard can break off the cumulative loss at the 12th year, then start to pay dividend and complete the recovery of the total amount of the initial investment at the 17th year.

However, interest of the loans for initial investment and operation cost to shipbuilding industry by the Development Bank of Indonesia (BAPINDO) is now 13.5%.

Therefore, special assistance by the Government is desired so as to make the interest of loans for the Makassar Shipyard within the desired interest.

2-1-2 Educational Training of Managing Staffs, Engineers and Field Workers

As well as improvement of the yard facilities, it is important to educate managing staffs, shipbuilding engineers and field workers.

According to the project plan, five or six middle management staffs engaging in management administration (financial and labor administration), production control (material control, quality control and scheduling) and designing will be despatched to the advanced shipbuilding country and given educational training in respective fields for about one year under technical assistance from the advanced shipbuilding country. These staffs will be the leaders of operation of the Makassar Shipyard in future.

Besides the above, the Indonesian Government has to consider that it will ask the advanced shipbuilding country to send total 22 instructors, 7 for training engineers and 15 for training skilled workers so as to let them give on-the-job instruction until the Makassar Shipyard can build and repair ships by itself from the initial step of operation as a link of economic cooperation from the advanced shipbuilding country. On-the-job instruction is made on ship construction plan, design standard, construction standard, procurement control, scheduling, make-out of construction standard, designing of the standard ships, education of leaders of skilled workers engaging in hull assembly, welding, outfitting, etc., respectively.

This educational training on-the-job should be made for total five years (for the first two years during the construction of the Shipyard and another three years after start-up of the operation).

The cost of the educational training on-the-job is estimated at Rp 5.25 billion.

2-1-3 Standardization of the Ships with Simple Specification

Standardization of ships to be constructed and its continuous construction give advantages to the Shipyards such as uniformalization of materials or smoothness of material procurement, and make it easy to improve and strengthen the production control system of the Makassar Shipyard and effective to elevate the technical level of the shipbuilding in a short term. Furthermore, this brings improvement in ship quality and reduction in production cost to the Shipyard. Uniformation of

material can make the supply of parts of ships already in service smooth and rationalize maintenance and repair of ships, which will give advantage to ship owner.

Therefore, it is desirable to develop and build several kinds of standard ships suitable for the construction in the Makassar Shipyard and for actual condition of domestic shipping in Indonesia, for example, 2,000 DWT cargo boat, 3,000 DWT cargo boat, 5,000 DWT oil tanker with cooperative works of the Shipyard and Shipping companies. Design of standard ships includes initial design, detailed drawings, construction method, construction standard, scheduling and material list, etc.

Instructors to be sent to Indonesia from the advanced shipbuilding country will take part in designing and development of standard ships. However, standard ships to be developed should be such ships that have specification suited for actual condition of Indonesian domestic shipping without consideration of highly developed automation or labor-saving system recently seen in advanced shipping countries.

2-1-4 Exemption of Import Duty of Materials and Equipment for Construction of New Facilities and Smoothness of Import

Reinforcement and expansion of the Makassar Shipyard requires lots of construction fund, so the Shipyard should reduce the initial investment as much as possible from a viewpoint of profitability of this project, which finally will come to the cost-down in shipbuilding and repairing.

Therefore, it is essential to procure materials and equipment necessary for construction of shipbuilding facilities at a lower price, and to take favorable treatment like exemption of import duty of such materials and equipment that cannot be obtained in Indonesia except import from foreign countries.

It is also necessary to examine such a plan that the construction site is designated as bonded area so as to enforce quick entry proceedings of imported materials and equipment.

2-1-5 Request to Public Sector for Improvement of External Environment

The construction cost for reinforcement and expansion of the Makassar Shipyard includes dredging cost of channels from the water course outside the harbor to the water area of the Shipyard and water front of the Yard. The dredging cost is estimated at Rp 1.5 billion. However,

these channels are not only exclusively-used ones of the Makassar Shipyard but also used as a harbor area of small cargo boats and fishing boats.

Then, the above dredging cost should be borne by the Government as harbor construction cost so as to reduce the investment amount of the Shipyard as much as possible.

Road improvement, laying of water supply pipes, electric power supply and telecommunication service supply around the Shipyard as external environment should be made by public sector.

Furthermore, it is desirable to provide residences for the employees of the Shipyard, finally estimated at about 900 persons, under the national or provincial governmental plan of Housings and operate buses as public transportation service.

2-1-6 Exemption of Import Duty of Materials and Equipment for Building and Repairing of the Ships and Simplification of Import Procedures

In Indonesia, almost all materials and equipment for building and repairing of ships such as steels, marine engines, etc. except wooden products, welding rod and paint are imported from foreign countries. Under these circumstances, when the newly reinforced and expanded Makassar Shipyard starts operation, it must be forced to import most of marine engines, machinery and equipment except a part of steel materials and forging goods which will be manufactured in Indonesia.

As material cost, in general, forms nearly 70% of the shipbuilding cost, it is indispensable to get materials and equipment at a lower price as possible in order to reduce the cost of building and repairing.

Then, present favorable treatment like exemption of import duty upon the import materials and equipment for building and repairing of ships must be continued as it is.

Delay in reception of imported materials and equipment will bring a bad influence on the delivery time of building and repairing of ships, so simplification of import procedure and quick pass through customs must be required for the smooth procurement of import goods.

In addition to the above, it must be worth to be considered that all imported materials and equipment would be procured as one package,

so-called, Package Deal, in order to save the labor for procurement.

2-1-7 Supply of Fund for Building and Repairing of the Ships under Favorable Terms

Even if the Makassar Shipyard could supply ships in good quality at a proper price, latent demand for building and repairing of ships would not come as actual working amount if Indonesian domestic shipping companies could not get funds for building and repairing of ships under the favorable terms.

P.T. PANN is taking an important role in acquisition of ships by domestic shipping industry in Indonesia. Financing terms of shipbuilding for ship owners who will place order of the ships for domestic waters through P.T. PANN are; down payment 10%, remaining 90% payable over 15 years at the interest of 10% per annum.

While, in case the Indonesian shipping companies give new ship order to the advanced shipbuilding countries, they can utilize deferred payment by OECD guideline; down payment 20%, remaining 80% payable over 8.5 years at the interest of 8% per annum.

In Singapore, when foreign owners give new ship order to the shipbuilder in Singapore, either foreign owner or shipbuilder can enjoy such a loan with repayment term 8.5 years maximum at the interest of 8% per annum from the Development Bank of Singapore under the ceiling of 80% of the ship price or 20 million Singapore Dollars (approx. Rp 6 billion).

As for the supplying terms of ship building fund, there's little to choose between both cases of lower interest and longer repayment term. However, in order to let domestic shipping industry in Indonesia place a new ship order to Indonesian shipbuilder, it is necessary to supply the terms more favorable than the deferred payment on OECD basis and financial terms of the Development Bank of Singapore.

So, in that particular case that Indonesian domestic shipping companies place a new ship order to shipbuilder in Indonesia, it is necessary to take the drastic measures such as longer repayment term than that of P.T. PANN at a lower interest than that on OECD basis and furthermore, special loans to the shipbuilders in order to compensate the burden which come from the deferred payment required by the ship owner.

Especially, for the Makassar Shipyard, it is necessary to promote the development of the National Shipping Program and fleet expansion of

tankers of PERTAMINA intentionally and provide new ship order preferentially to the Makassar Shipyard so as to secure stable working amount.

2-1-8 Promotion of "Scrap and Built" to the Superannuated and Lower-Ability Ships into Replacement of New Ship

It is a characteristic that there are so many high aged ships in the Indonesian fleet structure.

According to the calculation from the fleet statistics of the Rloyd's Register of Shipping, the average age of the ships less than 4,000 G.T. in 1980 is; world average- a little less than 15 years, Japan- a little less than 10 years, however, Indonesia- a little more than 16 years. The rate of ships of more than 20 years is; world average 27%, Japan- only 3%, however Indonesia- 37%.

In case of Indonesian shipping industry, 49% of 355,700 DWT of RLS fleet and 32% of 67,100 DWT of Local Shipping fleet in 1979 are of age more than 21 years.

Therefore, it is essential to dismantle superannuated and lower ability ships for domestic shipping and promote alternative construction of ships with new and superior performances so as to secure safety navigation and raise total transportation efficiency in the domestic waters. This is also important to secure stable working amount of shipbuilding in Indonesian shipbuilding industry.

So, (1) purchase of superannuated and lower-ability ships for domestic shipping such as ships whose age is over 20 years by the Government at scrap value or proper price, (2) distribution of works of dismantling these ships to shipyards in Indonesia, (3) utilization of expanded iron material or scrap for steel mill, (4) provision of ship building fund to ship owners who sell superannuated ships to the Government under favorable loan terms and recommending new construction at Indonesian shipyards are one of methods to promote the Indonesian shipbuilding industry.

2-1-9 Import Regulation on Ships from Overseas Countries

The above measures such as policies to elevate quality of ships, steps for decreasing building and repairing cost, favorable loan for new shipbuilding are considered to secure demand for shipbuilding in Indonesian shipbuilding industry. However, even if the Makassar Shipyard starts operation with newly reinforced and expanded facilities, it can not always compete fully with shipyards of the advanced shipbuilding countries.

Then, adding to the aforementioned measures, it should be examined to take minimum restriction to import ships from foreign countries.

As one of restriction, adoption of "Import Approval System" to the import of ship from foreign countries is considered. This system could be applied to kind, type and size of ships which Indonesian shipyard have the ability to build and shall be relieved on the both condition that the demand for new building is far over the building ability of Indonesian shipyards and that they cannot deliver those ships until appointed time of delivery. Furthermore, on the above condition, it must be considered that import of new ships has priority over that of used ships, which is limited to such ships of younger age - for example age of less than 5 years from the viewpoint of improvement in ship quality of Indonesian fleet of domestic shipping industry.

The other is to impose import duty on the import of ships from foreign countries so as to adjust the difference between ship prices of Indonesian shipbuilders and foreign shipbuilders.

However, imposition of import duty on imported ships may cause to raise ship price for domestic shipping industry and may also being higher freight in domestic shipping and then rising prices of commodities. Therefore, the application of the above restriction should be carefully examined.

2-2 Measures to be Wrestled by the P.T. IKI Makassar Shipyard

The following items are measures which should be taken by the Makassar Shipyard by itself as well as execution of "policies to be enforced by the Government" mentioned in the above section so that the Makassar shipyard can fully compete with overseas shipyards and strengthen competition power by building such ships as of good quality, reducing building and repairing cost and shortening construction period.

(1) Solidification in Sales Activity

It is necessary to improve the sales activity more than ever to secure working amount corresponding to the reinforced facilities. As concrete problems,

a) conclusion of long-term repair contract with leading ship owners of overseas and domestic shipping industries

b) acquisition of preference order of new shipbuilding in the National Shipping Program

c) establishment of Jakarta office.

The Makassar shipyard must not only depend wholly on the Government's policies and wait orders but also contact positively with ship owners so as to obtain order directly.

(2) Maintenance and Repair of Facilities under Good Equipped Condition

The facilities of the Shipyard, as being worn and superannuated with years, should be adjusted and repaired periodically so as to be always in good condition.

(3) Elevation of Technology

As the technology for building and repairing of ships is rising up every year, the Makassar shipyard must not only receive technical instruction from overseas advanced shipyards but also prepare technical standard and execute educational training of engineers and skilled workers, and establish a spirit of transfer of technology to juniors from seniors.

(4) Elevation of Production Efficiency

Efficient proceeding of building and repairing of the ship will cause improvement in quality of works besides superior efficiency. Promotion of desire for works of staffs also should be considered as well as improvement in production system.

(5) Restoration of Profits to Improvement of Facilities, Elevation of Technology and Fulfilment of Welfare

Profits produced by management of the Shipyard should be used not only for distribution to external parties as dividend of investment but for restoration for improvement of facilities, elevation of technology, measures to elevate efficiency and fulfilment of welfare of working staffs.

2-3 Invitation of Shipbuilding Advisors

In order to practise reinforcement and expansion of the Makassar Shipyard smoothly and make it a "Rising Sun" of Indonesian shipbuilding industry, positive assistance of the Government of Indonesia, serious effort of the Yard itself, and technical assistance and economic cooperation from the advanced shipbuilding country will be important points.

So, it is effective to invite some "advisors on planning of development of shipbuilding industry" to the Ministry of Industry under the technical assistance from the advanced shipbuilding country so that they take part in preparation of enforcement plan and technical instruction, and advise inquiry to the Government on the policies to be taken thereby with responsible persons of the government and the Makassar Shipyard.

As works of advisors, the followings are considered:

1) planning of development of shipbuilding industry
2) educational training of engineers and skilled workers
3) shipbuilding technology.

Ⅲ PROJECT INVESTIGATION

1. DEVELOPMENT CIRCUMSTANCES OF PROJECT

1-1 Development Circumstances

The Republic of Indonesia has been publishing the five-year Economic Development Plan since 1969, and is now carrying out its Third Plan starting in April, 1979. In this Plan, industrial development, especially shipbuilding development has been taken as one of the most important targets.

Indonesian Government has, under this national project, requested the Government of Japan a technical cooperation on shipbuilding development plan. In reply to this request, the Government of Japan has sent investigation commission twice in 1977 and 1978 from the Japan International Cooperation Agency to examine the Indonesian shipbuilding development plan.

The Commission visited 18 shipyards at their first visit and 4 shipyards out of the 18 shipyards at the second visit so as to study the actual conditions of shipbuilding industry and the domestic conditions concerned in view of technical assistance to the shipbuilding development program. In February, 1978, the Commission submitted the first report on the results of the investigation concerning various factors behind Indonesian shipbuilding industry, and in March, 1979, filed the final report to the Government of Indonesia.

Upon studying these reports, the Government of Indonesia took a priority to the reinforcement and expansion plan of P.T. IKI Makassar Sipyard in Sulawesi Island as a link of the Third Five-Year Economic Development Plan and requested a feasibility study to the Government of Japan.

The Government of Japan dispatched an investigation commission from Japan International Cooperation Agency to Indoensia. The Commission fixed the scope of work in March, 1980, and carried out the 2-month feasibility investigation of P.T. IKI Makassar Shipyard reinforcement and expansion plan in June. The investigation covered the general and background conditions of shipbuilding industry of Indonesia and also the soil survey for the site of new expansion construction of P.T. IKI Makassar Shipyard.

The followings are a report compiled from the investigation results.

1-2 Composition of the Survey Team

Member of Advisory Committee and Survey Team

Advisory Committee

Nobutaka Nambu	Chairman	Deputy Director of Shipbuilding Division, Ministry of Transport
Akira Otake	F.A. Analysis	Ministry of Transport
Daisuke Kiuchi	Management Plan Training Plan	ditto
Minoru Kitahara	Civil Engineering	ditto
Yoichi Seki	Coordinator	Japan International Cooperation Agency

Advisory Committee held in Jakarta

Kenji Ogawa	Field Survey	Director of International Affairs, Ministry of Transport
Hiroyuki Ozaki	- ditto -	Ministry of Transport

Survey Team

Teruji Akaiwa	Project Manager Market Demand	The Shipbuilding Research Centre of Japan
Hiroshi Akiyoshi	Assistant P.M. Training Plan	ditto
Shinya Harada	Financial Analysis Economic Analysis Market Demand	ditto
Takao Suzuki	Shipbuilding Facilities Management Plan Training Plan	ditto
Katsutoshi Suzuki	Civil Engineering	ditto
Masanori Usami	Civil Engineering	ditto
Jiro Takahashi	Whole (Internal work) Market Demand	ditto
Mitsuo Itani	Facilities Plan (Internal work)	ditto
Koichiro Kakehi	Operation Plan (Internal work)	ditto

Member of Indonesian Side Counterpart

Ir. Eman Yogasara	Directur Penyiapan Program
Ir. Ayub Yunus	Directur Utama P.T. IKI Makassar Shipyard
Ir. H.A. Hutagalung	Kasub Dit. Industri Alat Augkutan Directur Penyiapan Program
Drs. Davy Hutabarat	Directur Keuangan P.T. IKI Makassar Shipyard
Ir. Hari Ananda	Directur Teknik P.T. IKI Makassar Shipyard
Iman Soebandi	Kepala Seksi Penilajan Pelaksanaan Program/Proyak, Sub. Dit. Industri Alat Augkutan
Juwano Muljomihardjo	Kepala Seksi Penyusushan Program Sub. Dit. Industri Alat Angkutan
Oetomo Soehoed Notowidjojo	Staff Direkterat Penyiapan Program
Shahbandi Hassan	Staff Direkterat Penyiapan Program
Aem Suleiman	Staff Direkterat Penyiapan Program
Ir. Yus'an	Staff Direkterat Penyiapan Program
Abdul Munir	Staff Direkterat Penyiapan Program
Harimulyo Asman	Staff P.T. IKI Makassar Shipyard

2. BACKGROUND OF THE PROJECT

2-1 Economic Situation

2-1-1 General Trends

During a period of the Second Five-Year Development Plan started in 1974, the Indonesian economy showed an average annual growth rate of 6.8% in terms of GDP. This growth was mainly due to an increased income which was brought about by a rise in crude oil prices. As a results, the GNP per capita grew three-fold to US$367.00 (in nominal terms) in 1978 from a mere US$121.00 in 1974. The percentage of the gross domestic fixed capital formation to the GDP also grew from 19.8% in 1974 to 24.2% in 1978, with the expansion of the Governmental development expenditures, as be seen in Table III-2-1.

Table III-2-1 Expenditure on Gross Domestic Product at Constant 1973 Market Prices

(Unit: Billion Rps)

	1974	1975	1976	1977	1978
Private consumption expenditure	5,454	5,679	6,032	6,372	6,755
General government consumption expenditure	641	836	897	1,014	1,065
Gross domestic fixed capital formation	1,440	1,650	1,749	2,010	2,272
Trade { Exports	1,403	1,267	1,425	1,744	1,619
Trade { Imports (-)	1,669	1,801	1,946	2,378	2,318
Gross domestic production	7,269	7,631	8,156	8,761	9,392
Net income from abroad (-)	369	360	367	423	486
Gross national product	6,900	7,271	7,790	8,338	8,906

Source: Statistik Indonesia

The source of such development funds came from the income of the oil department and foreign aids. Particularly the rate of economic growth in 1978 was 7.2% up, being higher than the average in the past five years. It deemed to be approximately 7% in 1979.

In addition to the oil price increases, the growth of exports of non-oil commodities which was mainly due to the devaluation of the Indonesian rupiah in 1978 contributed to this smooth sailing of the Indonesian economy.

However, this favorable situation from the macro-economic point of view seems not to be identified with the general living condition of the Indonesian people as viewed micro-economically.

The advance of inflation and unemployment problem are a serious problem in the national life. Inflation subsided in 1978. But in 1979, the consumers' prices showed 20% up from the preceding year reflecting a rise in prices of agricultural products.

Taking into consideration increases in prices of oil products, electricity, transportation and other public utilities in 1980, further inflationary pressure will build up gradually from now on. It is said that the rate of unemployment in urban areas is 20% and 30% in agricultural sector.

Judging from these circumstances, contrary to the favorable situation from the macro-economic point of view, it is hardly said that the Indonesian economy in the national life level has turned in a good direction.

2-1-2 Industrial and Job Structure

The industrial structures of Indonesia, as broken down on the basis of the gross domestic product, are 34.1% of agriculture, forestry and fishery, 11.1% of mining, 12.3% of manufacturing industries, 10.1% of construction, transportation and communication, and 32.4% of the reset.

These shares have been more or less constant for the past three years with a slight decline shown in the agriculture, forestry and fishery. (Table III-2-2)

Table III-2-2 Gross Domestic Production by Sector at Constant 1973 Market Prices

(Unit: Billion Rps)

	1974	1975	1976	1977	1978
Agriculture, forestry and fishery	2,811	2,811	2,944	2,990	3,204
Mining and quarrying	859	828	952	1,070	1,040
Manufacturing industry	755	848	930	1,010	1,159
Construction	320	365	384	457	494
Electricity, gas and water supply	37	41	46	49	53
Transportation and communication	288	303	343	404	451
Trade and finance	2,199	2,435	2,557	2,781	2,991
Gross domestic production	7,269	7,631	8,156	8,761	9,392

Source: Statistik Indonesia

However, the job structure taken from the census of 1976 shows the share of agriculture, forestry and fishery sector of 66%, mining of 0.1%, manufacturing of 6.7% and others of 27.2%. These figures characterize the facts that while 66% of the total work force are engaged in the agriculture, forestry and fishery, the share of this sector in GDP is only 36%, showing a low productivity of this sector, and the mining sector, which is the prime mover of the economic growth of the country, has a low job-creating capacity.

The trends of production of major products is shown in table III-2-3.

2-1-3 Finance

The Indonesian government receipts for the three-year period (1976 - 1978) consists of 57% stemming from direct taxes, 20% from indirect taxes and 19% from foreign assistances. 78% of the direct tax receipts (45% of the gross income) comes from the oil companies. The characteristic of the Indonesian finance is a very small proportion of non-oil income occupying in the direct tax receipts.

On the other hand, the expenditure comprises of routine and development expenditures. The shares between the said two sectors for the said three-year period are 49 to 51. The foreign assistances provide an average 36% of the development expenditures.

The development expenditures are financed by the government surplus (government receipts minus (-) routine expenditures) and foreign assistances. This means, in effect, the Indonesian developments are maintained by their oil-income and foreign assistances. (Table III-2-4)

Table III-2-3 Production Trends of Major Products

	1975	1976	1977	1978
1. Agriculture/Plantation (x 1000 tons)				
Rice	15,187	15,842	15,941	17,598
Maize	2,638	2,572	3,030	3,855
Casaba	12,546	12,191	12,488	12,961
Sugar cane	2,433	2,381	2,460	2,235
Rubber	880	810	818	841
Palm oil	411	439	497	514
2. Mining (x 1000 tons)				
Crude oil (1000 barrels)	476,855	550,319	615,123	596,698
Gas (1000 MCF)	222,256	312,368	542,784	820,130
Tin (inconcentrate)	24	22	24	24
Coal	207	183	231	264
Bauxite	993	940	1,301	1,008
Nickel ore	801	1,102	1,303	1,257
3. Industry				
Textile (x 1 million meters)	1,029	1,175	1,247	1,333
Weaving yarn (x 1000bales)	445	487	630	678
Fertilizer/urea (x 1000 tons)	397	366	733	990
Cement (x 1000 tons)	1,089	1,813	1,979	2,879
Paper (x 1000 tons)	51	50	54	84

Source: · Economic & Financial statistics of Indonesia
· Indikator Ikonomi

Table III-2-4 Actual Government Receipts and Expenditures

(Unit: Billion Rps)

	1974	1975	1976	1977	1978
Receipts					
1. Routine Receipts	1,754	2,242	2,906	3,535	4,266
Direct taxes (oil companies corporation taxes)	(973)	(1,249)	(1,619)	(1,949)	(2,309)
Indirect taxes	458	539	741	881	1,078
Other	15	110	119	144	191
2. Development Receipts	232	492	784	774	1,036
Program aids	36	20	10	36	48
Project aids	196	471	774	738	987
Total	1,986	2,734	3,690	4,309	5,302
Expenditures					
1. Routine Expenditures	1,016	1,333	1,630	2,149	2,744
Personnel expenditures	420	594	637	894	1,022
Material expenditures	175	305	340	377	420
Subsidies to autonomous regions	202	285	313	478	522
Interest and debt repayment	74	79	190	228	534
Other	145	71	151	172	266
2. Development Expenditures	962	1,398	2,055	2,157	2,556
Total	1,978	2,730	3,684	4,306	5,300

Source: Statistik Indonesia

2-1-4 Monetary System

The banking is the center of the monetary system of Indonesia. The monetary market has expanded in parallel with the economic expansion.

The total bank credits as of the end of the year 1978 including that stemming from the foreign loans stood at 5,394.2 billion Rp., up 37% from the previous year.

The interest level has been high, showing that the interest rate for a time-deposit, for example, since January 1977 has been 6 - 15% P.A. (for 6 - 18 months deposit), and the loan interest rate of the national bank has been 9 - 21% (Table III-2-5). Most of the loans, therefore,

are used for short-term operating capital. There is practically a little loan made for medium and long-term. Therefore, the government is setting up various means of institutional financing by allocating the resources coming mainly from the foreign assistances and the income from oil.

Table III-2-5 Lending and Deposits Interest Rates

1. Lending Interest Rates

a. Short-term loans

Annually rates in %

Effective as from:	Category			
	I	II	III	IV
May 31, 1972	12	15 - 18	21 - 24	24 - 36
Apr. 12, 1973	12 - 15	18	18 - 24	
Apr. 9, 1974	12 - 15	18 - 21	24	
Dec. 28, 1974	12 - 15	18 - 21	24	
Dec. 30, 1977	9	12	13.5-15	18 - 21

b. Investment loans (effective as from December 30, 1977)

Category: (in million Rps.)		Annually rates in %
I	up to 75	10.5%
II	over 75 up to 200	12.5%
III	over 200 up to 500	13.5%
IV	over 500	13.5%

Only BAPINDO is authorized to finance the projects in Category-IV which is above Rp. 1.5 billions and the term of credit is up to 15 years included its grace-period of 6 years.

c. Small scale loans (effective as from December 30, 1977)

	Annually rates in %
Investment	10.5%
Permanent working capital	12.0%

2. Deposits Interest Rates

Annually rates in %

Effective as from:	Less than 3 months	3 months	6 months	12 months	18 months	24 months
May 31, 1972	9%	12%	15%	18%		
Apr. 12, 1973	6%	9%	12%	15%		
Apr. 9, 1974	6%	9%	12%	18%	24%	30%
Dec. 28, 1974	6%	9%	12%	15%	21%	24%
Jan. 13, 1977	3%	6%	9%	12%	18%	
Dec. 30, 1977	Up to the State Bank itself		6%	9%		

i. 15% for deposits up to Rp. 2.5 mill.
ii. 12% for deposits above Rp. 2.5 mill.

One of the institutional financing is the fleet development program which is centered on R.L.S (regular liner service). This financing program provided 25.5 billion Rp through P.T. Pann during the period of 1974 to March, 1980 to line up 54 vessels (29 were secondhand vessels) with the total gross tonnage of 90,448 DWT.

In the case of new shipbuilding, the lending interest rate is 10% P.A. and the term of credit is up to 15 years included a grace period of 6 months after delivery. For the secondhand vessels under the age of 10 years, the lending interest rate is 10% P.A. and the term of credit is up to 10 years (including a grace period of 6 months after delivery). As noted, the lending interest rate and term of credit are more favorable than what are generally offered.

There is no particular financing system for shipbuilding industry. But the said fleet development program will be considered to promote the development of shipbuilding industry.

2-1-5 Taxation

The Indonesian taxation system was reformed in 1970. This resulted in a reduction of tax rate and an improvement of facilities and incentives for investors. The new system was much simplified, but there are still many indirect taxes making it still complicated.

(1) Taxes

The major taxes are summarized as follows:

1) Corporate tax

There are general tax rates and special tax rates. Special tax rates are applied to companies audited by the certified public accountant and obtaining a clean opinion.

a) General tax rates

i)	The taxable profit up to 25 million Rp	20%
ii)	The following taxable profit up to 50 million Rp	30%
iii)	The remaining taxable profit	45%

b) Special tax rates

i)	The taxable profit up to 100 million Rp	20%

ii) The following taxable profit up to 250 million Rp 30%

iii) The remaining taxable profit 45%

2) Income tax

The progressive tax rate of 10 - 15% is imposed on an income after a certain deduction.

3) Tax on interest, dividend, royalty

In principle, 20% is withheld.

4) Sales tax

The sales tax is not only a tax on goods from manufactures delivery but it is also a tax on services rendered by enterpreneurs of such service and also on the import of goods into the Indonesian customs area. The rate which will be applied ranges from 0 to 20%, depending goods and services. There is no sales tax on all kinds of vessels.

5) Local taxes

There are development tax and assets tax. The former is included in the bills of hotels and restaurants, which is 10% of the amount. The latter is imposed on an amount exceeding certain predetermined values on real estate, financial assets, automobiles, etc.

6) Duties

Import duties are imposed on the basis of following criteria:

0%	on very essential goods (mostly for government purpose)
5%	on essential raw materials
10 - 20%	on raw materials and capital goods business equipments
20 - 30%	on intermediate goods and half products, semi-processed materials
40 - 50%	on ordinary finished consumption goods
60 - 80%	on luxury finished consumption goods

Export duty of 10%, in principle, is imposed. But in many cases, the export duty is exempted.

(2) Investment Promotion System

The following facilities and incentives are granted to promote investments:

1) Tax holiday

New enterprises which invest their capital in fields of goods and services which have been given priority by the Government may be granted a tax holiday of at most 6 (six) years counted from the start of commercial production by the enterprise concerned, according to the following rules:

- Basic holiday	+ 2 years
- Earning and saving of foreign exchange	+ 1 year
- Large amount of capital invested (foreign investment exceeding 15 million US dollars or domestic investment exceeding 625 million Rp)	+ 1 year
- Investment location outside Java	+ 1 year
- Special priority given by the Government	+ 1 year

The construction of a shipyard is one of the special priority projects of the Indonesian Government. This Makassar shipyard project is eligible for a 6-year tax holiday.

2) Investment allowance

The basic for calculating the investment allowance facility is the amount invested in fixed capital. The size of the investment allowance facility is 20% of fixed capital spread over 4 (four) years at 5% a year. To calculate the tax due in a particular year, this 5% total can be deducted from taxable income, while the remainder is subject to tax according to prevailing regulations and tariffs. If said deduction results in a loss, such loss may be compensated for by profits in succeeding years without limit of time.

3) Loss compensation

Losses suffered in any year during the tax holiday may be compensated for/deducted from profits earned during the ensuing 4 (four) years. Losses suffered during the first 6 (six) years after establishment of an enterprise (initial losses) may be compensated for/deducted from the profits in succeeding years,

without limit in time.

4) Accelerated depreciation

In addition to ordinary depreciation, an enterprise may conduct accelerated depreciation one year only within a period of 4 (four) years, beginning with the year in which the expenditures are made, and amounts to;

a) 10% of the amount of expenditures on immovable assets
b) 25% of expenditures on business equipments

With respect to an enterprise that is granted a tax holiday, the beginning of the 4 (four) years period commences as of the year following the tax holiday period.

2-1-6 The Third Five-Year Plan

The Five-Year Development Plan of Indonesia was first launched in 1969, and in April, 1979, entered the period of the Third Five-Year Plan.

The objective of the Third Five-Year plan is to advance the standard of living and technical skill of the people and to enhance the social benefits in uniform and equal proportion.

As the measures to achieve this objective, an equal job opportunity, the priority investment in labor-intensive projects, the expansion of job opportunities in provincial areas are programmed. Particularly, the industrial development program of Indonesia through this plan aims at the fulfilment of basic consumer commodities, the promotion of exports and an increased productivity of the existing industries, and further to lay the foundation of heavy industries which will occupy an important position in the Fourth Five-Year Plan started in 1984.

The projected growth rate in this program is 6.5% per year, which is quite conservative in view of the performances in the past several years. This conservative projection is deemed to reflect the facts that the basis of the Indonesian economy have no reason for optimism as be shown in the situation that the foreign investments have been retarded since 1975 and there have been a decline in the oil production for the past several years. The projected growth rates by sector are shown in Table III-2-6.

Table III-2-6 Projected Growth Rate of the Third Five-Year Plan by Sector

Average Annual Growth Rate		Ratio to GDP
3.3%	Agriculture, Forestry and Fishery	31%
3.5%		27%
5.7%	Mining	19%
4.0%		17%
12.0%	Manufacturing	10%
11.0%		12%
10.3%	Construction	5%
9.0%		5%
11.1%	Transportation Communication	5%
10.0%		5%
8.5%	Others	30%
8%		34%

: The Second Five-Year Plan

: The Third Five-Year Plan

2-2 The Present Situation of the Shipping Industry

2-2-1 Outline

Indonesia is an archipelagic country extending 5,110 km from east to west and 1,880 km from north to south. The development and reinforcement of its shipping industry is indispensable to ensure well balanced economic activities. Particularly, to secure the efficient utilization of the natural resources spread throughout the islands so as to achieve an effective economic development of the country, creating a sound shipping industry is the primary requirement. It goes without saying that the maintenance of smooth operation on shipping route between the Java island, which is the political and economic center of this country, and other islands is required to keep the national unity.

Thus, the domestic shipping, forming an important infrastructure of Indonesia, is classified as follows by the form of their operations:

1) Regular Liner Service (R.L.S.): Serving the domestic arterial routes between the islands.
2) Local Shipping : Serving the local routes
3) Pioneer Shipping : Serving specific routes of remote areas
4) Industrial Carrier (including tankers) : Owned by producers of goods

Since the inauguration of the First Five-Year Plan, the Indonesian government has endeavored to renew and rehabilitate vessels centering on R.L.S fleet in cooperation with member nations of IGGI, the World Bank, and the Asian Development Bank, but to date any of the problems, such as renewal and rehabilitation of the vessels, has not yet been solved satisfactorily contrary to the original expectations.
The circumstances are complicated, but what should be indicated for such a tardy development are chronic shortage of national capital, financial difficulties, frailty of management, want of technologies, excessive competition, and institutional drawbacks that make it hard to acquire marine equipment and parts, etc. Also cited as a major reason is the fact that the domestic shipbuilding industry which has an inseparable relationship with the shipping is not mature enough.

In the field of international shipping, both regular liners and trampers (log carriers) subscribe to international shipping cartels to be operated in a good order. This shipping service is judged to have been

doing fairly well, except for the regular liners which have yet to be upgraded concerning the quality of ship.

With respect to the ocean-going tankers, the number of vessels is being reduced due to the policy of Peltamina that all the oil-exports will be made on F.O.B basis in the future.

Table III-2-7 shows the Indonesian fleet in the past four years.

Table III-2-7 Summary of Indonesian Fleet

		1975		1976		1977		1978	
		No. of vessels	DWT	No. of vessels	DWT	No. of vessels	DWT	No. of vessels	DWT
Domestic shipping	R L S	305	312,000	319	330,400	316	310,600	355	355,700
	Local shipping	858	92,800 GT	1,277	132,100 GT	1,348	147,900 GT	1,448	155,700 GT
	Pioneer shipping	13	8,400	19	11,500	20	12,900	21	11,200
	Industrial carriers (incl. tankers)	1,010	809,700 140,000 GT 7,000 M^3 68,100 HP	1,352	899,000 145,400 GT 8,800 M^3 225,100 HP	1,665	1,104,700 225,600 GT 111,100 M^3 104,800 HP	2,029	1,234,300 273,400 GT 16,300 M^3 270,600 HP
	Total	2,186	1,130,100 232,800 GT 7,000 M^3 68,100 HP	2,967	1,240,900 277,500 GT 8,800 M^3 225,100 HP	3,349	1,428,200 373,500 GT 111,100 M^3 104,800 HP	3,853	1,601,200 429,100 GT 16,300 M^3 270,600 HP
International shipping	Regular liners	56	475,600	55	496,400	59	534,100	52	512,700
	Trampers Tankers	28	2,441,000	25	2,058,300	25	2,058,300	11	737,300
	Trampers Log-carriers	44	293,900	53	370,200	63	438,000	90	634,700
	Trampers Others	5	17,300	-	-	2	52,000	2	52,000
	Total	77	2,752,200	78	2,428,500	90	2,548,300	103	1,424,000

Source: Sea Comm., annual report

2-2-2 Regular Liner Service (R.L.S.)

R.L.S fleet are serving the domestic arterial routes between major islands including Singapore.

The achievements of R.L.S fleet operations in 1977 and 1978 are shown in Table III-2-8.

Table III-2-8 Operation of R.L.S. Fleet

	1977	1978
Cargo tonnage (FT)	3,635,000 (703,000)	3,534,000 (727,000)
Fleet tonnage (DWT)	310,600	313,000
Transport efficiency (Ton/DWT/Year)	11.7	11.3

Source: Sea Comm.

Note 1: Figures in parenthesis show the cargo carried by Singapore vessels.

Note 2: In 1978, 42,700 DWT of non-liner vessels in addition to the above-stated tonnage was put in service and carried 393,000 tons.

The total operating days in 1978 were 288 days, which means a low level, showing an operating rate of 79%. The ratio of voyage days to days in ports is 1 : 1.8. The days in ports are unusually long.

Table III-2-9 shows the age structure of R.L.S fleet. Noted is the fact that vessels with older than 21 years of age occupy nearly 50%.

Table III-2-9 Age Structure of R.L.S. Fleet

(As of the end of 1978)

Age (year)	No. of vessels	DWT	Ratio (%)
0 - 5	39	19,600	5.5
6 - 10	35	19,900	5.6
11 - 15	48	49,400	13.9
16 - 20	81	93,900	26.4
21 or older	152	172,900	48.6
Total	355	355,700	100.0

Source: Sea Comm., D.P.P INSA

Table III-2-10 shows the size structure of vessels, indicating the fact that the vessel sizes are getting larger.

Table III-2-10 Size Structure of R.L.S Fleet

	1977		1978	
	No. of vessels	DWT	No. of vessels	DWT
500 DWT or less	99	36,000	111	41,300
501 - 1000	111	80,500	125	92,100
1001 - 2000	78	107,700	88	123,400
2001 or larger	28	86,400	31	98,900
Total	316	310,600	355	355,700

Source: Sea Comm., D.P.P INSA

2-2-3 Local Shipping

The local shipping serves the regional local routes. While R.L.S serves as an artery, local shipping is regarded as capillaries and plays an important role in domestic transportation. The operating condition of the local shipping for the recent two years is shown in Table III-2-11.

Table III-2-11 Operating Condition of Local Shipping

	1977	1978
Cargo tonnage (FT)	1,823,000	1,900,000
Fleet tonnage (GT)	147,900	155,700
Transport efficiency (Ton/GT/year)	12.3	12.2

Source: Sea Comm.

The age structure of the local shipping fleet (Table III-2-12) shows about 25% of ships aging 17 years or older, which is better than the structure of R.L.S. However, 57% of the whole vessels are made of wood. The average vessels size is 108GT and most of the vessels out of the total 1,447 vessels are smaller than 300GT.

Table III-2-12 Age Structure of Local Shipping

(as at the end of 1978)

Age (year)	Steel vessel		Wooden vessel		Total		%
	No. of vessels	GT	No. of vessels	GT	No. of vessels	GT	
0 - 4	26	4,747	324	26,900	350	31,647	20.3
5 - 8	79	13,280	394	29,268	473	42,548	27.3
9 - 10	44	6,303	220	16,055	264	22,358	14.4
13 - 16	58	13,503	96	7,346	154	20,849	13.4
17 - 20	32	7,845	46	3,341	78	11,186	7.2
21 or older	86	21,453	42	5,629	128	27,082	17.4
Total	325	67,131	1,122	88,539	1,447	155,670	100

Source: Sea Comm.

2-2-4 Pioneer Shipping

The operation of pioneer shipping began in 1974. This shipping is operating for the purpose of keeping the minimum communications necessary for the social benefits of local inhabitants in the sparsely populated areas, including the eastern islands (Nussa-Tenggara, Maluk, Hal Mahera, Irian) and Nisa island of West Sumatra. In 1978, the vessels in service were 21 with 11,200 DWT, and they carried 48,400 tons in cargo and 102,700 passengers.

2-2-5 Industrial Carriers

All the industrial carriers except general cargo vessels are owned by producers of goods, forming their own fleet. The fleet composition of industrial carriers, except oil tanker, as of the end of 1977 and 1978 is shown in Table III-2-13. These vessels in 1977 carried 4,000,000 tons of dry cargoes and 88,000 tons of vegetable oil, and in 1978, carried 6,452,000 tons of dry cargoes and 97,000 tons of vegetable oil.

Table III-2-13 Industrial Carriers

	1977	1978	
	Tonnage	No. of vessels	Tonnage
General cargo	22,993 DWT 15,175 GT 10,963 HP	51	22,993 DWT 20,868 GT 15,553 HP
Offshore	32,118 DWT 43,817 GT 62,955 HP	360	36,818 DWT 76,086 GT 87,184 HP
Mineral products	3,096 DWT 13,571 GT 5,193 M^3 8,620 HP	219	9,296 DWT 20,941 GT 5,193 M^3 11,150 HP
Log	11,981 DWT 28,566 GT 8,959 M^3 22,278 HP	413	16,533 DWT 40,066 GT 10,177 M^3 25,768 HP
Cereals	9,344 DWT 956 M^3		8,742 DWT 956 M^3
Salt	11,100 DWT	8	11,100 DWT
Fertilizer	22,500 DWT	4	34,851 DWT
Others	203 DWT 34,443 GT 169 M^3		203 DWT 34,664 GT 150 M^3
Total	113,305 DWT 135,572 GT 15,277 M^3 104,816 HP	1,068	140,506 DWT 192,625 GT 16,476 M^3 139,655 HP

Source: Sea Comm.

2-2-6 Tankers

The domestic transports of oil in 1978 (including the shipments from/to Singapore) were 24,554,000 LT., and the fleet tonnage of domestic tankers was 2,100,000 DWT. On the other hand, the international trade for the same year was 65,740,000 LT, out of which only 423,000 LT were carried by the Indonesian tankers, representing only 0.6% of the total oil trade. The number of Indonesian tankers operated for the international trade was only 11 units with 740,000 DWT. This is due to PERTAMINA's policy that all oil exports would be made on FOB basis in the future, as a part of reconstruction plan for the financial crisis disclosed in 1975.

Table III-2-14 shows the fleet composition of Pertamina's tankers.

Table III-2-14 Pertamina Tanker Fleet

	1975	1976	1977	1978
Owned tankers				
Numbers	51	50	32	29
DWT	593,000	574,000	313,000	386,000
Hire purchase				
Numbers	52	58	42	44
DWT	2,522,000	2,575,000	634,000	769,000
Time-charter				
Numbers	50	33	48	52
DWT	1,473,000	681,000	759,000	1,262,000
Total				
Numbers	153	141	122	125
DWT	4,588,000	3,830,000	1,705,000	2,417,000

Source: Pertamina

The fleet composition of the Pertamina tankers as at the middle of the year 1979 are as shown in Table III-2-15.

Table III-2-15 Fleet Composition of Pertamina Tankers

(as of the middle of 1979)

	(Average size)	Owned	Hire purchase	Time charter	Total
Lighter	(950 DWT)				
	Numbers	8		17	25
	DWT	6,100		17,700	23,800
Small tanker	(3,700 DWT)				
	Numbers	11	6	19	36
	DWT	46,200	32,100	54,200	132,500
General purpose	(19,000 DWT)				
	Numbers	10	23	14	37
	DWT	131,900	309,100	252,500	693,500
Medium range	(37,000 DWT)				
	Numbers	3	5	5	13
	DWT	85,800	178,200	217,900	481,900
Long range	(90,000 DWT)				
	Numbers	1	1	1	3
	DWT	53,200	83,400	134,000	270,600
VLCC	(226,000 DWT)				
	Numbers			4	4
	DWT			904,100	904,100
Storage tanker	(60,000 DWT)				
	Numbers	2	2		4
	DWT	100,000	135,000		235,000
LPG tanker	(500 DWT)				
	Numbers	3		2	5
	DWT	1,500		1,000	2,500
Total	Numbers	38	37	62	137
	DWT	424,700	737,800	1,581,400	2,743,900

Source: Pertamina

2-2-7 Regular Liner

The regular liners are operated to and from Japan, Europe, North America (incl. Canada), and Hong Kong. Six shipping companies including P.T. Jakarta Lloyd joint international shipping cartel, and are operated under the name of Indonesia National Line (I.N.L). Table III-2-16 shows the operating condition of the regular liners in 1977 and 1978.

Table III-2-16 Operating Condition of Regular Liners

	1977				1978			
	Cargo tonnage (ton)	Tonnage ratio (%)	DWT	Transport efficiency Ton/DWT/year	Cargo tonnage (ton)	Tonnage ratio (%)	DWT	Transport efficiency Ton/DWT/year
Europe	656,000	49	171,000	3.8	696,000	58	178,000	3.9
Japan	1,308,000	44	237,000	5.5	1,180,000	41	237,000	5.0
North America	173,000	13	69,000	2.5	209,000	21	90,000	2.3
Hong Kong	97,000	49	14,000	6.7	48,000	39	8,000	6.2
Total	2,234,000	39	491,000	4.6	2,133,000	41	513,000	4.2

Source: Sea Comm.

The great majority of the fleet is accounted for by overage vessels, showing that 75% of them are 16 years of age or older. Because of this, the operating conditions are not so satisfactory. As to the ratio of the cargo carried by the Indonesia liners, Indonesian shipping companies are struggling for a fair share of the markets. As can be seen in the table, they have achieved a considerable results with the routes to Japan, Europe and Hong Kong.

2-2-8 Trampers

At present, the trampers are log carriers and Pertamina's tankers, and there are few others.

Since Pertamina's tankers have already been described, the operating condition of log carrier alone is shown in Table III-2-17.

Table III-2-17 Operating Condition of Log Carrier

	1977	1978
Cargo tonnage (ton)	6,813,000	8,798,000
Ratio of tonnage carried by Indonesian fleet (%)	37	44
Fleet tonnage (Numbers)	63	90
(DWT)	438,000	635,000
Transport efficiency (Ton/DWT/year)	15.6	13.9

Source: Sea Comm.

With respect to the age structure of the log carrier, as at the end of 1978, 83% of the total fleet are occupied by the vessels up to 10 years old. As compared with the regular liners, this conditions seem to be more favorable.

2-2-9 Fishing Boats

The trends of the number of fishing boats are shown in Table III-2-18. Noted are the trends that the non-powered boats were reduced in number since 1973 toward 1978. On the other hand, the number of powered fishing boats have rapidly increased during the same period reflecting the governmental policy for promotion of mechanization. The average increase rate in the number of the powered boat in the past five years was 16.2% per year. Production of sea fish for the said period increased from 888,000 tons in 1973 to 1,227,400 tons in 1978. This was an average growth rate of 6.7% per year.

The size structure of fishing boats powered by diesel engined in 1978 are shown below:

Size group	Numbers
5GT or less	7,305 units
5 - 20GT	4,193 "
20 - 50GT	1,012 "
50 - 100GT	128 "
100 - 200GT	78 "
200GT or over	50 "
Total	12,766 units

Table III-2-18 Fishing Boats

	Total	Non-powered boats	Powered boats		
			Total	Outboard engine	Diesel engine
1973	242,882	230,615	12,267	5,019	7,248
1974	270,369	257,164	13,205	5,931	7,274
1975	257,152	242,221	14,931	6,771	8,160
1976	245,725	228,244	17,481	7,746	9,735
1977	248,544	228,228	20,316	9,601	10,715
1978	248,113	222,121	25,992	13,226	12,766

Source: Bureau of fishery

3. DEMAND ESTIMATION FOR SHIPBUILDING

3-1 Demand Estimation for Vessels

3-1-1 Outline

In this survey, demand for shipbuilding and ship repairing in Indonesia up to 1995 has been estimated in view of the latest economic situation, transport volume and the existing fleet and on the basis of the Third Five-Year Development Plan (PELITA III) and of the reinforcement plan for vessels in PELITA III which was made by Sea Communications and PERTAMINA.

Target vessels in the estimation are as follows:

(1) Domestic shipping
- Regular Liner Services (R.L.S)
- Local shipping
- Pioneer shipping
- Industrial carrier
- Tanker

(2) Ocean shipping
- Regular liner
- Tramper

(3) Fishing boat

The basic concept in this estimation work is as follows:

(1) Economic Growth Rate

Average growth rate of real gross domestic product (GDP) of Indonesia during the period of the Second Five-Year Development Plan (1974/75 - 1978/79) was 6.8% per year. In 1977 and 1978, the high growth rates of 7.4% and 7.2% respectively were achieved due to increases in international prices such as those of petroleum, lumber and other export commodities. Judging from this, it is considered possible to achieve the target growth rate of 6.5% per year in the Third Five-Year Plan. In this estimation, therefore, average economic growth rate between 1980 and 1985 is set at 6.5% - 7.0% per year, and a more range is given to the rate after 1985 which is set at 6.0% - 8.0% per year.

(2) Regular Liner Service (R.L.S)

In Indonesia which comprises many islands, the increase of the transport volume on regular liner service on domestic arterial routes connecting major islands is greater than the increase of the gross domestic product. For example, the average annual growth rate of R.L.S transport volume to that of GDP (GDP elasticity value) was 1.32 during the period of the Second Five-Year Plan. Since Indonesia is emphasizing the regional development as a major policy, this trend is likely to continue hereafter. In this estimation, therefore, the GDP elasticity value of the R.L.S transport volume increase is set at 1.3 - 1.4 during the estimation period.

(3) Local Shipping

While R.L.S serves as an artery, local shipping is regarded as capillaries and plays an important role in domestic transportation. In this respect, along with the increase of R.L.S transport volume resulting from the promotion of regional development, local shipping volume is also expected to increase. In reality, the increase of local shipping volume has been greater than that of R.L.S during the period of the Second Five-Year Plan. Accordingly, average increase rate of transport volume in local shipping is estimated at 10 - 13% per year.

(4) Pioneer Shipping

The average annual increase of transport volume in pioneer shipping is estimated at 15 - 20%. The estimation is made by taking into account the past trend and the predictions made by Sea Comm.

(5) Industrial Carrier

All the industrial carriers except general cargo vessels are owned by products goods, forming their own fleet. Main cargoes are mining resources, cement, fertilizers, salt, cereals, lumber, etc., and some of them are also transported by regular liner services. Transport demand by industrial carrier is expected to increase further in view of the stepped-up efforts to develop coal and other mining resources in the Third Five-Year Plan and

increase in domestic consumption of cement, fertilizers, etc.
In this report, the increase rate of transport demand and required fleet for industrial carriers is estimated to be the same as the case of R.L. fleet.

(6) Domestic Tanker

Average annual increase rate of oil consumption in the Third Five-Year Plan is estimated at about 8%, which is lower than the increase rate of about 12% for the 1971 - 1976 period on the ground that the utilization of non-oil fuels will be promoted. In this respect, the annual increase rate of 6.5% for domestic tankers in PERTAMINA's tanker reinforcement plan for 1980 - 1984 is considered reasonable. In this report, some margin is given to PERTAMINA's figure, and the average annual increase rate of domestic tanker demand is estimated at 6 - 7%.

(7) Regular Liner

Regular liners are operating on the routes to Japan, Europe, North America, Australia and Hong Kong. Loading ratio of Indonesian vessels increased to about 40% in 1978. Because Indonesia tries to maintain the fare share on the regular routes and in view of the Third Five-Year Plan, the average annual increase rate of transport volume by Indonesian vessels is estimated at 5 - 7%.

(8) Tramper

The trampers excluding PERTAMINA's ocean going tankers are log carriers alone and there are few others. For Indonesia, logs are one of the important export products. The average annual increase rate of log exports is predicted at about 4.6% in the Third Five-Year Plan. In this report, the rate is estimated at 4 - 5%.

(9) Fishing Boat

Production of sea fish has increased by 6.7% on the annual average during the period of the Second Five-Year Plan. During the Third Plan, the average increase rate is estimated at 5.5%. In this report, it is estimated at 5 - 6%.

3-1-2 R.L.S Shipping

Indonesian has formulated a plan on the basis of R.L.S.fleet plus non-liners. In line with this system, required fleet and new shipbuilding demand have been predicted. The Flow Chart is shown in Fig. III-3-1. Estimation results are as follows:

Table III-3-1 Required Fleet in R.L.S.

Year	Transport Demand (1,000 tons)	Productivity (ton/DWT/year)	Required Fleet (1,000 DWT)
1980	5,160 - 5,200	15	344 - 347
1985	7,740 - 8,300	20	387 - 415
1990	11,270 - 14,110	23	490 - 614
1995	16,410 - 23,990	25	656 - 960

Table III-3-2 New Shipbuilding Demand in R.L.S.

(Unit: 1,000 DWT)

	Fleet Increased	Scrapped Tonnage	Average Annual Demand for New Shipbuilding
1981 - 1985	44 - 68	87	27 - 31
1986 - 1990	102 - 198	103	41 - 59
1991 - 1995	166 - 346	97	53 - 88

Of the existing fleet in 1978, all of the vessels more than 11 years old (316,200 DWT) are supposed to be scrapped by 1995.

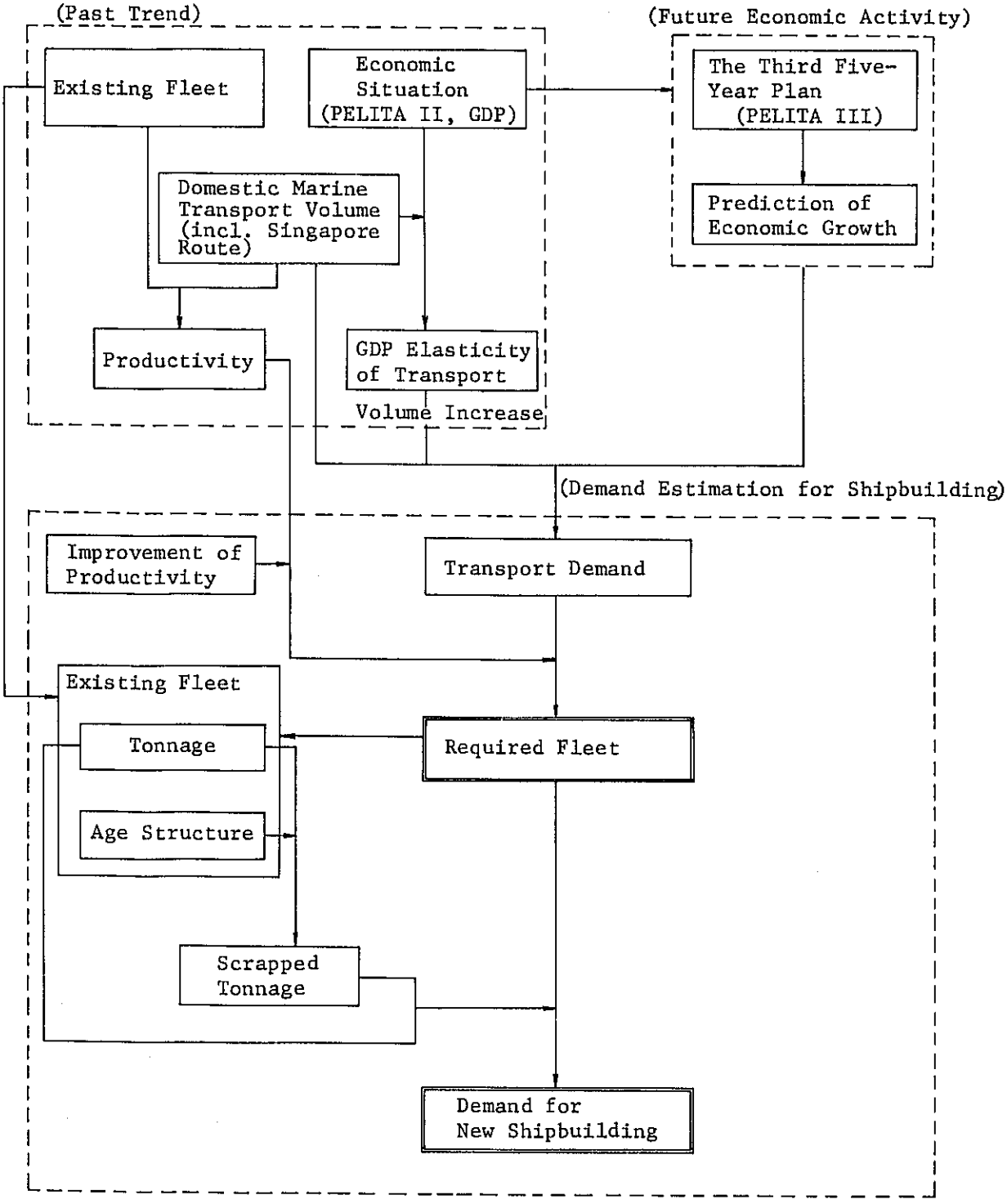


Fig. III-3-1 Flowchart of Demand Estimation for Shipbuilding (R.L.S.)

As regards sizes of vessels for the future fleet replacement and reinforcement plan, enlargement of cargo lot, improvement of shipping routes and improvement of port capacity have been taken into account. Fleet composition and new shipbuilding demand by size are predicted as in Table III-3-3 and Table III-3-4.

Table III-3-3 Required Fleet by Size in R.L.S.

(Unit: 1,000 DWT)

Year	0-500 DWT	501-2,000 DWT	2,001-5,000 DWT	Total
1980	38-38(11%)	203-205(59%)	103-104(30%)	344-347(100%)
1985	41-44(10.5%)	210-226(54.5%)	136-145(35%)	387-415(100%)
1990	49-61(10%)	245-307(50%)	196-246(40%)	490-614(100%)
1995	59-86(9%)	302-442(46%)	295-432(45%)	656-960(100%)

Note: Percentages in parentheses indicate tonnage composition rate.

Table III-3-4 Average Annual New Shipbuilding Demand by Size in R.L.S.

(Unit: 1,000 DWT/year)

	0-500 DWT	501-2,000 DWT	2,001-5,000 DWT	Total
1981-1985	3 - 3	12 - 15	12 - 13	27 - 31
1986-1990	4 - 5	19 - 28	18 - 26	41 - 59
1991-1995	4 - 7	23 - 38	26 - 43	53 - 88

3-1-3 Local Shipping

Required fleet and new shipbuilding demand in local shipping are predicted as in Table III-3-5 and Table III-3-6.

Table III-3-5 Required Fleet in Local Shipping

	Transport Demand (1,000 tons)	Productivity (ton/GT/year)	Required Fleet (1,000GT)
1980	2,290 - 2,380	15	153(69)-159(72)
1985	3,690 - 4,390	18	205(102)-244(122)
1990	5,960 - 8,080	20	297(178)-404(242)
1995	9,570 -14,880	22	435(304)-676(473)

Note: Values in parentheses indicate demand for steel vessels.

Table III-3-6 New Shipbuilding Demand in Local Shipping

(Unit: 1,000 GT)

	Fleet Increased	Scrapped Tonnage	Average Annual Demand for New Shipbuilding
1981 - 1985	52 - 85	24	15(9) - 22(12)
1986 - 1990	92 - 160	24	23(18) - 37(26)
1991 - 1995	138 - 272	24	32(27) - 59(48)

Note: Values in parentheses indicate demand for steel vessels.

As regards scrapped tonnage, vessels over 9 years old (81,475 DWT) out of the existing fleet in 1978 is assumed to be scrapped until 1995.

Average size of local shipping fleet in 1978 was 108 GT. In view of the characteristics of local shipping, enlargement of the ship size cannot be expected. Therefore, all ships are estimated to be less than 500 GT.

3-1-4 Pioneer Shipping

Required fleet and new shipbuilding demand in pioneer shipping are predicted as in Table III-3-7 and Table III-3-8.

Table III-3-7 Required Fleet in Pioneer Shipping

Year	Transport Demand (1,000 tons)	Productivity (ton/GT/year)	Required Fleet (1,000 DWT)
1980	69	4.5	15
1985	139 - 172	7.0	20 - 25
1990	279 - 427	8.5	33 - 50
1995	561 - 1,050	10.0	56 - 105

Table III-3-8 New Shipbuilding Demand in Pioneer Shipping

(Unit: 1,000 DWT)

	Fleet Increased	Scrapped Tonnage	Average Annual Demand for New Shipbuilding
1981 - 1985	5 - 10	2	1.4 - 2.4
1986 - 1990	13 - 25	2	3.0 - 5.0
1991 - 1995	23 - 55	2	5.0 - 11.0

A half of the existing fleet in 1978 is assumed to be scrapped until 1995.

Average size of pioneer shipping fleet in 1978 was 530 DWT. As for the fleet composition by size, vessels less than 500 DWT are estimated at 50% and those between 500 and 1,000 DWT at 50%.

3-1-5 Industrial Carrier (including general cargo vessels)

Required fleet and new shipbuilding demand have been predicted concerning vessels engaged in dry cargo transport, excluding oil tankers and those engaged chiefly in oil development. Vessels with HP figures are considered as tug boats and other work vessels and excluded from the vessels for this estimation. Vessels with m^3 have also been excluded since their volume is small. Demand estimation have been made on the DWT base by using conversion rate of 1.4 DWT = 1 GT.

The existing fleet in 1978 is estimated at 280,000 DWT by using the said conversion rate.

The estimation results are as follows:

Table III-3-9 Required Fleet of Industrial Carrier

(Unit: 1,000 DWT)

Year	Required Fleet
1980	310 - 315
1985	356 - 387
1990	450 - 570
1995	620 - 900

Table III-3-10 New Shipbuilding Demand for Industrial Carrier

	Fleet Increased	Scrapped Tonnage	Average Annual Demand for New Shipbuilding
1981 - 1985	46 - 68	50	19 - 24
1986 - 1990	94 - 183	50	29 - 47
1991 - 1995	170 - 330	50	44 - 76

Note: On the assumption that the 60% of vessels in 1978 are scrapped by 1995.

Fleet composition by size as shown in Table III-3-11 are estimated on the basis of the present composition of industrial carrier served on domestic and neighboring water. Accordingly, future fleet composition and new shipbuilding demand by size are estimated as in Table III-3-12 and Table III-3-13.

Table III-3-11 Fleet Composition by Size (Industrial Carrier)

Class (DWT)	Composition Ratio
0 - 500	16%
501 - 2,000	52%
2,001 - 5,000	22%
5,001 - 10,000	10%
Total	100%

Table III-3-12 Required Fleet of Industrial Carrier by Size

(Unit: 1,000 DWT)

	0-500DWT	501-2,000DWT	2,001-5,000DWT	5,001-10,000DWT	Total
1980	50 - 50	161 - 164	68 - 69	31 - 32	310 - 315
1985	57 - 62	185 - 201	78 - 85	36 - 39	356 - 387
1990	72 - 91	234 - 296	99 - 125	45 - 57	450 - 570
1995	99 - 144	322 - 468	136 - 198	62 - 90	620 - 900

Table III-3-13 Average Annual New Shipbuilding Demand for Industrial Carrier

(Unit: 1,000 DWT/year)

	0-500DWT	501-2,000DWT	2,001-5,000DWT	5,001-10,000DWT	Total
1981-1985	3 - 4	10 - 12	4 - 5	2 - 3	19 - 24
1986-1990	5 - 8	15 - 24	6 - 10	3 - 5	29 - 47
1991-1995	7 - 12	23 - 39	10 - 17	4 - 8	44 - 76

3-1-6 Domestic Tanker

In accordance with the fleet expansion plan of PERTAMINA (1880/81 - 1983/84), vessels below General Purpose-2 (27,000 DWT type) are expected to take part in domestic shipping, and the required fleet of domestic tankers (excluding time charter) is estimated as in Table III-3-14.

Table III-3-14 Required Fleet of Domestic Tanker

(Unit: 1,000 DWT)

Year	BULK LIGHTER 700 - 2,000 DWT	SMALL - 1 2,001 - 4,000 DWT	SMALL - 2 4,001 - 10,000DWT	G.P. - 1 10,001 - 15,000DWT	G.P. - 2 15,001 - 30,000DWT	Total
1980	21	79	110	529	326	1065
1985	29 - 30	114 - 120	157 - 164	713- 747	413 - 433	1426-1494
1990	38 - 42	171 - 188	229 - 251	934-1027	534 - 587	1906-2095
1995	51 - 59	230 - 265	306 - 353	1250-1440	715 - 823	2552-2940

Note: G.P.: General Purpose

New shipbuilding demand by size is estimated as in Table III-3-15 according to ship size classes of R.L.S. As for Small-2 tankers, about 20% of Small-2 tankers are supposed to be 4,000 - 5,000 DWT (mainly 5,000 DWT). The scrapped tonnage is calculated based on the existing fleet of 527,000 DWT (owned and hire purchase) as of the middle of 1979, by using estimated scrapping rate of 4.5% per year. In estimating the scrapped tonnage, the composition rate of SMALL-1 to SMALL-2 of the SMALL tankers is assumed to be 17 to 83 based on the PERTAMINA data.

Table III-3-15 Average Annual New Shipbuilding Demand for Domestic Tanker

(Unit: 1,000 DWT/year)

	501 - 2,000 DWT	2,001 - 5,000 DWT	5,001 - 10,000 DWT	10,001 - 30,000 DWT	Total
1981 - 1985	2 - 2	10 - 12	10 - 11	73 - 84	95 - 109
1986 - 1990	2 - 3	15 - 19	14 - 16	87 - 106	118 - 144
1991 - 1995	3 - 4	16 - 20	16 - 19	118 - 149	153 - 192

3-1-7 Ocean-going Liner

On the basis of the liner replacement plan in the Third Five-Year Plan, the increase rate of transport demand is estimated at 5 - 7% per year, and required fleet is predicted as in Table III-3-16.

Table III-3-16 Required Fleet of Ocean-going Liners

Year	Transport Demand (1,000 tons)	Productivity (ton/DWT/year)	Required Fleet (1,000 DWT)
1980	2,350 - 2,390	4.8	490 - 498
1985	3,000 - 3,350	4.9	612 - 683
1990	3,830 - 4,698	5.0	766 - 939
1995	4,890 - 6,589	5.0	978 - 1,317

Size composition of the required fleet is estimated below on the basis of the 1978 fleet composition.

Table III-3-17 Required Fleet of Ocean-going Liners by Size

(unit: 1,000 DWT)

Year	5,001 - 10,000 DWT	10,001 DWT & over
1980	147 - 149	343 - 349
1985	184 - 205	428 - 478
1990	230 - 282	536 - 657
1995	293 - 395	685 - 922

3-1-8 Ocean-going Tramper

Based on the Third Five-Year Plan, the growth rate of log exports is estimated at 4 - 5% per year, and the required fleet is predicted as in Table III-3-18.

Table III-3-18 Required Fleet of Ocean-going Trampers

Year	Transport Demand (1,000 ton)	Productivity (ton/DWT/year)	Required Fleet (1,000 DWT)
1980	9,518 - 9,702	15	635 - 647
1985	11,580 - 12,382	16	724 - 774
1990	14,089 - 15,804	16	881 - 988
1995	17,141 - 20,170	16	1,071 - 1,261

In the light of the present average ship size (7,000 DWT) and cargo characteristics, log carriers will mostly be 5,000 - 10,000 DWT in the future.

3-1-9 Fishing Boat

Only fishing boats powered by diesel engines are considered. All of the fishing boats below 50 GT and half of 50 - 100 GT class boats are deemed to be probably wooden boats, and these are excluded. The average annual increase rate of fishing boats is estimated at 12 - 14%. The estimation has been made on the basis of production target of sea fish (average annual growth rate 5.5%) of the Third Five-Year Plan and also in view of the increase rate of fishing boats with diesel engine (12.0% per year) during the period of the Second Five-Year Plan and the latest trend of replacing wooden boats with steel ones. Required fleet and new shipbuilding demand are estimated in Table III-3-19 and Table III-3-20.

Table III-3-19 Required Fleet of Fishing Boat with Diesel Engine

(Unit: 1,000 GT)

Year	51 - 100 GT (Ave. 75 GT)	101 GT & over (Ave. 170 GT)	Total
1980	6 - 6	27 - 28	33 - 34
1985	11 - 12	48 - 54	59 - 66
1990	19 - 22	84 - 104	103 - 126
1995	33 - 43	148 - 200	181 - 243

Table III-3-20 Average Annual New Shipbuilding Demand for Fishing Boat with Diesel Engine

	Average Annual New Shipbuilding Demand (1,000GT)		
	51 - 100 GT	101 GT & over	Total
1981 - 1985	1 - 1	5 - 6	6 - 7
1986 - 1990	2 - 2	8 - 11	10 - 13
1991 - 1995	3 - 4	14 - 20	17 - 24

The scrap ratio is assumed at 4% per year.

3-1-10 Summary of Required Fleet Estimation

Required fleet of various types of vessels are summarized in Table III-3-21. GT-DWT conversion ratio for local shipping fleet and fishing boats is 1 DWT ≒ 1 GT.

The following marks are used in the table:

R: R.L.S. shipping
L: Local shipping
P: Pioneer shipping
I: Industrial carrier
T: Domestic tanker
F: Fishing boat with diesel engine
O_1: Ocean-going regular liner
O_2: Ocean-going tramper

3-1-11 Summary of New Shipbuilding Demand Estimation

As regards tankers of more than 10,000 DWT, ocean-going regular liners and trampers, and a part of industrial carriers (namely, fertilizer carriers, etc.) it seems not to be advantageous for Indonesia to build them within 10 - 15 years from the technical and economic point of view. In this report, therefore, demand for vessels other than the above is analyzed. Estimation results are summarized in Table III-3-22.

Table III-3-21 Summary of Required Fleet Estimation

(Unit: 1,000 DWT)

		0-500 DWT	501 - 2,000 DWT	2,001 - 5,000 DWT	5,001 - 10,000 DWT	10,001 - 30,000 DWT	Total
	R	38 - 38	203 - 205	103 - 104			344 - 347
	L	69 - 72					69 - 72
	P	7 - 7	8 - 8				15 - 15
	I	50 - 50	161 - 164	68 - 69	31 - 32		310 - 315
1980	T		21 - 21	101 - 101	81 - 81	855 - 855	1,058 - 1,058
	F	33 - 34					33 - 34
	O_1				147 - 149	343 - 349	490 - 498
	O_2				635 - 647		635 - 647
Total		197 - 201	393 - 398	272 - 274	894 - 909	1,198 - 1,204	2,954 - 2,986
	R	41 - 44	210 - 226	136 - 145			387 - 415
	L	102 - 122					102 - 122
	P	10 - 12	10 - 13				20 - 25
	I	57 - 62	185 - 201	78 - 85	36 - 39		356 - 387
1985	T		29 - 30	145 - 153	126 - 131	1,128 - 1,188	1,428 - 1,502
	F	59 - 66					59 - 66
	O_1				184 - 205	428 - 479	612 - 684
	O_2				724 - 774		724 - 774
Total		269 - 306	434 - 470	359 - 383	1,070-1,149	1,556 - 1,667	3,688 - 3,975
	R	49 - 61	245 - 307	196 - 246			490 - 614
	L	178 - 242					178 - 242
	P	16 - 25	17 - 25				33 - 50
	I	72 - 91	234 - 296	99 - 125	45 - 57		450 - 569
1990	T		38 - 42	217 - 238	183 - 201	1,468 - 1,614	1,906 - 2,095
	F	103 - 126					103 - 126
	O_1				230 - 282	536 - 658	766 - 940
	O_2				881 - 988		881 - 988
Total		418 - 545	534 - 670	512 - 609	1,339-1,528	2,004 - 2,272	4,807 - 5,624
	R	59 - 86	302 - 442	295 - 432			656 - 960
	L	304 - 473					304 - 473
	P	28 - 52	28 - 53				56 - 105
	I	99 - 144	322 - 468	136 - 198	62 - 90		619 - 900
1995	T		51 - 59	291 - 336	245 - 282	1,965 - 2,263	2,552 - 2,940
	F	181 - 243					181 - 243
	O_1				293 - 395	685 - 923	978 - 1,318
	O_2				1,071-1,261		1,071 - 1,261
Total		671 - 998	702-1,022	722 - 966	1,671-2,028	2,650 - 3,186	6,417 - 8,200

Table III-3-22 Summary of Estimated Demand for New Shipbuilding

(Unit: 1,000 DWT/Year)

		0-500DWT	501-2,000DWT	2,001-5,000DWT	5,001-10,000DWT	Total
1981-1985	R	3 - 3	12 - 15	12 - 13		27 - 31
	L	9 - 12				9 - 12
	P	0 - 1	1 - 1			1 - 2
	I	3 - 4	10 - 12	4 - 5		17 - 21
	T		2 - 2	10 - 12	10 - 11	22 - 25
	F	6 - 7				6 - 7
	Total	21 - 27	25 - 30	26 - 30	10 - 11	82 - 98
1986-1990	R	4 - 5	19 - 28	18 - 27		41 - 60
	L	18 - 26				18 - 26
	P	1 - 2	2 - 3			3 - 5
	I	5 - 8	15 - 24	6 - 10		26 - 42
	T		2 - 3	15 - 19	14 - 16	31 - 38
	F	10 - 13				10 - 13
	Total	38 - 54	38 - 58	39 - 56	14 - 16	129 - 184
1991-1995	R	4 - 7	23 - 38	26 - 44		53 - 89
	L	27 - 48				27 - 48
	P	2 - 5	3 - 6			5 - 11
	I	7 - 12	23 - 39	10 - 17		40 - 68
	T		3 - 4	16 - 20	16 - 19	35 - 43
	F	17 - 24				17 - 24
	Total	57 - 96	52 - 87	52 - 81	16 - 19	177 - 283

Note: R: R.L.S Shipping
L: Local shipping
P: Pioneer shipping
I: Industrial carrier
T: Domestic tanker
F: Fishing boat with diesel engine

3-1-12 Estimation of Ship Repairing Demand

In view of large repairing facilities available as compared with building berths, some large-size vessels may be repaired in Indonesia. About 80% of the total number of vessels are sent to repairing docks every two years on the average, and the remaining 20% every year. According to the required fleet (Table III-3-21), repairing demand is predicted for the following two cases:

Case 1 (1) Of the vessels over 500 DWT engaged in domestic shipping (including those visiting Singapore), 10% are repaired in Singapore, and they are excluded.

(2) 50% of ocean-going vessels are excluded because they are repaired in other countries.

Case 2 (1) Vessels ranging 500 - 10,000 DWT for domestic shipping are treated in the same way as in Case 1. Of domestic tankers over 10,000 DWT, 20% are repaired in Singapore, and they are excluded.

(2) All of ocean-going vessels over 10,000 DWT and 80% of 5,000 - 10,000 DWT vessels are excluded because they are repaired in other countries.

Results of the demand estimation in Case 1 and Case 2 are shown Table III-3-23 and Table III-3-24.

Table III-3-23 Estimated Demand for Ship Repairing (Case 1)

(Unit: 1,000 DWT)

	0-500DWT	501-2,000DWT	2,001-5,000DWT	5,001-10,000DWT	10,001-30,000DWT	Total
1980	118 - 121	212 - 215	147 - 148	295 - 300	565 - 566	1,337 - 1,350
1985	161 - 184	234 - 254	194 - 207	360 - 386	738 - 785	1,687 - 1,816
1990	251 - 327	288 - 362	276 - 329	456 - 520	953 - 1,070	2,224 - 2,608
1995	403 - 599	380 - 552	390 - 522	575 - 698	1,267 - 1,500	3,015 - 3,871

Table III-3-24 Estimated Demand for Ship Repairing (Case 2)

(Unit: 1,000 DWT)

	0-500DWT	501-2,000DWT	2,001-5,000DWT	5,001-10,000DWT	10,001-30,000DWT	Total
1980	Same as in Case 1			154 - 157	410 - 410	1,041 - 1,051
1985				196 - 206	541 - 570	1,326 - 1,421
1990				256 - 292	705 - 775	1,776 - 2,085
1995				330 - 400	943 - 1,086	2,446 - 3,159

3-2 Present Condition of Shipbuilding Capacity and Future Prospect

3-2-1 Present Condition of Shipbuilding Capacity

(1) Capacity of Shipyards

At present, there are 72 shipyards for steel vessels in Indonesia. Total capacity of new shipbuilding berths in Indonesia is estimated as in Table III-3-25, based on the data of Sea Communications and on the "Comprehensive Study for Shipbuilding Industry Development in Indonesia" compiled by the Japan International Cooperation Agency (JICA).

Total capacity of repairing dock in Indonesia is estimated as in Table III-3-26.

Table III-3-25 Capacity of Berth for New Shipbuilding

	0 - 500	501-2,000	2,001-5,000	5,001-10,000	Total
Total DWT	13,200	28,300	3,000	10,000	54,500
No. of berth	72	26	1	1	100

Table III-3-26 Capacity of Repairing Dock

Class (DWT)	0-500	501-2,000	2,001-5,000	5,001-10,000	10,001-35,000	Total
Total DWT	17,600	18,500	19,000	13,000	62,000	130,100
No. of Dock	105	20	6	2	3	136

(2) Annual Production Capacity

1) New Shipbuilding

Annual production capabilities of new shipbuilding can be estimated in the procedure as shown in Fig. III-3-2, by presuming the occupancy ratio (average dimensions of the ships to be built to the full size of the building berths) and the construction period.

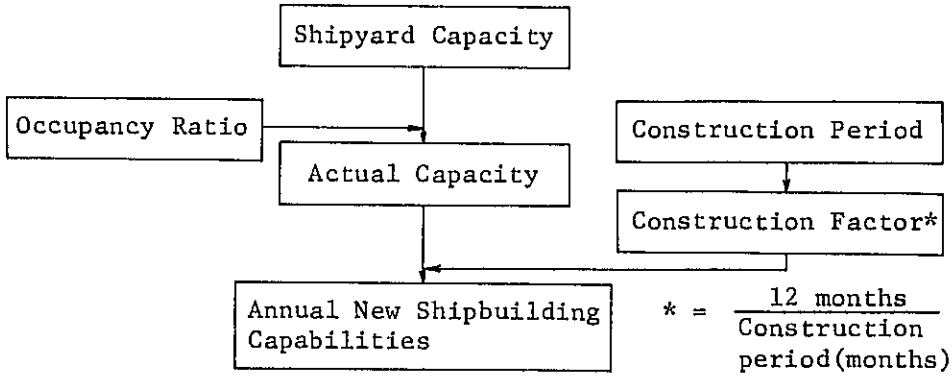


Fig. III-3-2 Procedure of Estimating Annual New Shipbuilding Capabilities

There are not many examples of building steel vessels and no example at all about large-size vessels. In this report, the present production capabilities of Indonesian shipyards is estimated as in Table III-3-27 on the basis of the aforementioned JICA report and in view of the present technological standard and working efficiency.

Table III-3-27 Annual Production Capabilities of New Shipbuilding

Berth Size (DWT)	0 - 500	501-2,000	2,001-5,000	5,001-10,000	Total
Total Capacity (DWT)	13,200	28,300	3,000	10,000	54,500
Occupancy Ratio (%)	40	60	30	-	
Actual Capacity (DWT)	5,280	16,980	900	-	23,160
Construction Period (Months)	5	7	9	12	
Construction Factor	2.4	1.7	1.3	1.0	
Annual Production Capabilities (DWT)	12,672	28,866	1,170	-	42,708

2) Ship Repairing

Annual docking capacity of repairing is estimated in the procedure as shown in Fig. III-3-3. It is based on the dock occupancy ratio and average repairing period.

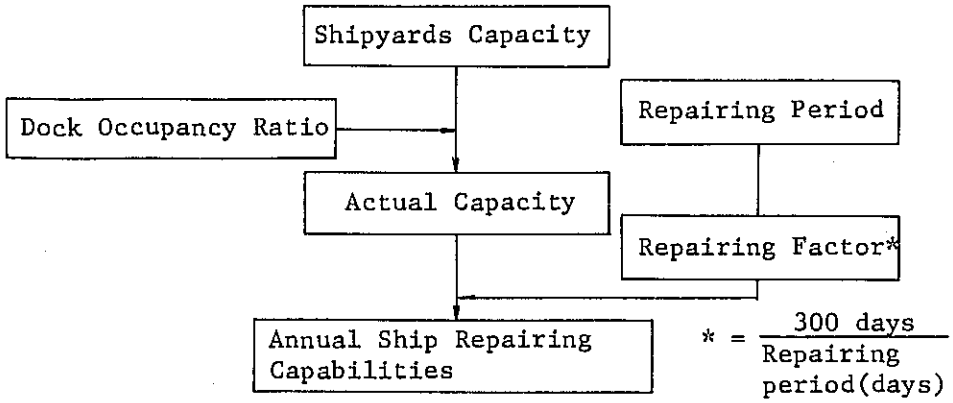


Fig. III-3-3 Procedure of Estimating Annual Ship Repairing Capabilities

The dock occupancy ratio has been estimated based on the data of P.T. Dok Tanjung Priok and a few Japanese shipyards. The factor of repairing is calculated on the basis of the repairing period estimated in accordance with the data of Indonesia's two

leading shipyards (P.T. Dok Surabaya and P.T. Dok Tanjung Priok). Dock operating days in a year is estimated to be 300 days. Table III-3-28 shows the annual docking capacity of repairing in Indonesia shipyards.

Table III-3-28 Annual Docking Capacity of Ship Repairing

Size of Dock (DWT)	0 - 500	501 - 2,000	2,001- 5,000	5,001- 10,000	10,001- 30,000	Total
Total Capacity (DWT)	17,600	18,500	19,000	13,000	62,000	130,100
Dock Occupancy Ratio (%)	30	40	40	40	40	
Actual Capacity (DWT)	5,280	7,400	7,600	5,200	24,800	50,280
Repairing Period (Days)	10	16	16	16	18	
Repairing Factor	30	18.8	18.8	18.8	16.7	
Annual Docking Capacity (DWT)	158,400	139,120	142,880	97,760	414,160	952,320

3-2-2 Prospect of Shipbuilding Capacity

(1) New Shipbuilding

1) Shipbuilding facility

New shipbuilding facility is estimated in Table III-3-29 by considering 3,000 DWT berth of P.T. Pelita Bahari under construction and three (3) shipyards under contemplation, namely, 3,000 DWT of P.T. Ippa, 6,000 DWT of P.T. Dok Surabaya and 3,000 DWT of P.T. Intan Sengkunyit, in addition to the present facility.

Table III-3-29 Estimated Capacity of New Shipbuilding Facility

		0 - 500DWT	501 - 2,000DWT	2,001 - 5,000DWT	5,001 - 10,000DWT	Total
1981 (1985	Total DWT	13,200	28,300	6,000	10,000	57,500
	No. of Berth	72	26	2	1	101
1986 and after	Total DWT	13,200	28,300	12,000	16,000	69,500
	No. of Berth	72	26	4	2	104

2) Berth occupancy ratio

Berth occupancy ratio depends on an actual supply-demand relation of the shipping market and shipyards. If new shipbuilding orders are properly allocated to shipyards corresponding with their capacity in proportion as the shipbuilding demand will increase, berth occupancy ratio will be higher. For the estimation of actual shipbuilding capacity, the berth occupancy ratio is estimated as in Table III-3-30.

Table III-3-30 Estimation of Berth Occupancy Ratio

	0 - 500 DWT	501-2,000DWT	2,001-5,000DWT	5,001-10,000DWT
1981 - 1985	40%	70%	60%	50%
1986 - 1995	60%	80%	80%	70%

3) Construction factor

Construction factor is estimated in Table III-3-31 since a gradual increase of working efficiency may be expected from advanced level of workers' skill in the future.

Table III-3-31 Estimation of Construction Factor

	0 - 500 DWT	501-2,000DWT	2,001-5,000DWT	5,001-10,000DWT
1981 - 1985	3.0	1.5	1.3	1.0
1986 - 1990	3.5	2.0	1.7	1.2
1991 - 1995	3.5	2.5	2.0	1.5

4) Annual production capacity

By using the berth occupancy ratio and construction factor, the annual production capabilities of new shipbuilding is estimated as in Table III-3-32.

Table III-3-32 Estimation of Annual Production Capabilities of New Shipbuilding

(Unit: DWT/Year)

	0 - 500 DWT	501 - 2,000DWT	2,001 - 5,000DWT	5,001 - 10,000DWT	Total
1981-1985	15,840	29,715	4,680	5,000	55,235
1986-1990	27,720	45,280	16,320	13,440	102,760
1991-1995	27,720	56,600	19,200	16,800	120,320

The above shows annual production capabilities of new shipbuilding for various berths. As mentioned earlier, ships are expected to be allocated properly to various berths along with demand increase, figures in Table III-3-32 are considered as new shipbuilding capacity for each size group of vessels.

(2) Ship Repairing

1) Repairing facility

Future ship repairing facility is identified with the present facility.

2) Dock occupancy ratio

The dock occupancy ratio in Table III-3-28 is considered to be changeless in the future, so the ratio is also used as an estimation figure. Composition of repaired ships in various docks is as follows:

Table III-3-33 Estimation of Repaired Ship Composition for Dock Size

Dock size / Vessel (DWT) by size(DWT)	0-500	501-2,000	2,001-5,000	5,001-10,000	10,001-35,000
0 - 500	100%	20%			
501 - 2,000		80%	20%		
2,001 - 5,000			80%	20%	10%
5,001 - 10,000				80%	10%
10,001 & over					80%
	100%	100%	100%	100%	100%

3) Repairing factor

The repairing factor is estimated as follows by considering increase in working efficiency.

Table III-3-34 Estimation of Repairing Factor

	0 - 500DWT	501 - 2,000DWT	2,001 - 5,000DWT	5,001 - 10,000DWT	10,001DWT & over
Until 1985	33.3	21.4	18.8	18.8	16.7
1986-1995	37.5	25.0	21.4	21.4	20.0

4) Repairing capacity

Table III-3-35 shows the result of estimation of repairing capacity in various berths.

Table III-3-35 Estimated Capacity of Repairing by Dock Size

Dock Size (DWT)		0 - 500	501 - 2,000	2,001- 5,000	5,001- 10,000	10,001- 35,000
Total Capacity (DWT)		17,600	18,500	19,000	13,000	62,000
Dock Occupancy Ratio		30	40	40	40	40
Repairing Factor	Until 1985	33.3	21.4	18.8	18.8	16.7
	1986-1995	37.5	25.0	21.4	21.4	20.0
Annual Docking Capacity (DWT)	Until 1985	175,800	158,400	142,900	97,800	414,200
	1986-1995	198,000	185,000	162,600	111,300	496,000

Repairing capacity for each size group of vessels is estimated as below in accordance with Table III-3-33 and Table III-3-35.

Table III-3-36 Estimated Capacity of Repairing by Vessel Size

(Unit: DWT/Year)

Vessel by Size (DWT)	0 - 500	501-2,000	2,001 - 5,000	5,001 - 10,000	10,001 - 35,000	Total
Until 1985	207,000	155,000	175,000	120,000	331,000	988,000
1986 - 1995	235,000	181,000	202,000	139,000	397,000	1,154,000

3-3 Prospect of Shipbuilding Demand and Supply

3-3-1 Prospect of New Shipbuilding Demand and Supply

A gap between demand and supply is calculated on the basis of the estimated demand for new shipbuilding of Table III-3-22 and the estimated capacity of new shipbuilding of Table III-3-32. (Table III-3-37)

Table III-3-37 Demand/Supply Gap of New Shipbuilding

(Unit: 1,000DWT/Year)

	0 - 500DWT	501-2,000DWT	2,001-5,000DWT	5,001-10,000DWT	Total
1981-1985	4 - 11	Δ 5 - 0	21 - 25	5 - 6	25 - 42
1986-1990	10 - 26	Δ 7 - 13	23 - 40	1 - 3	27 - 82
1991-1995	29 - 68	Δ 5 - 30	33 - 62	Δ 1 - 2	56 - 162

Note: Δ mark indicates surplus capacity.

If demand remains on a low level, surplus capacity of 501 - 2,000 DWT vessels can be transferred to those below 500 DWT. In that case, the demand-supply situation of 0 - 2,000 DWT vessels is likely to be balanced until 1990. However, an acute shortage of supply will occur for 2,001 to 5,000 DWT vessels all through the estimation period.

If demand continues on a higher level, all groups of vessels will be short of supply. In order to maintain the balance of demand and supply, it will be necessary to import vessels of 44% of the total demand between 1985 and 1990 and about 57% between 1990 and 1995.

Further study is made concerning 2,001 - 5,000 DWT vessels for which a sharp demand-supply gap is feared.

At present, there is only one 3,000 DWT berth that can construct ships in the scale of 2,001 - 5,000 DWT. Construction of 3,000 DWT berths are being planned at P.T. Pelita Bahari, P.T. IPPA and P.T. Intan Sengkunyit shipyards. Even if the proposed ones would be included, the maximum facility capacity in the range of 2,001 to 5,000 DWT is 3,000 DWT. Demand for new shipbuilding in this range are R.L.S., industrial carriers and domestic tankers (average 3,500 DWT Small-2 and 5,000 DWT General Purpose-1).

Of these vessels, 40% of R.L.S., industrial carriers and Small-2 tankers may be included in the demand range between 2,001 and 3,000 DWT. Then demand-supply relations in 2,001 - 3,000 DWT and 3,001 - 5,000 DWT ranges can be estimated as in Table III-3-38.

Table III-3-38 Estimation of Demand/Supply of New Shipbuilding (2,001 - 5,000 DWT)

(Unit: 1,000 DWT/Year)

	2,001 - 3,000 DWT			3,001 - 5,000 DWT		
	Demand	Production Capacity	Gap of Demand/ Supply	Demand	Production Capacity	Gap of Demand/ Supply
1981-1985	10 - 12	5	5 - 7	16 - 18	0	16 - 18
1986-1990	16 - 22	16	0 - 6	23 - 34	0	23 - 34
1991-1995	21 - 32	19	2 - 13	31 - 49	0	31 - 49

As a result of the above analysis, reinforcement of 5,000 DWT class shipyards will have to be established.

Therefore, it is necessary for Makassar Shipyard to reinforce facility having the capacity for building vessels of 5,000 DWT.

In this project, Makassar Shipyard will have one building berth capable of 5,000 DWT vessel and its planned supply capacity under normal operation will approximately 17,000 DWT annually (5,000 DWT x 3.5 vessels). This shipyard will be put in to the normal operation at the earliest in 1991 or thereafter, considering the period of 7 years from the commencement of operation to the normal operation. It is, therefore, expected that there will be enough order for Makassar Shipyard, if suitable measures and efforts would be taken by the Government and the shipyard itself.

Makassar Shipyard, at that stage after 1991, will be expected to supply 6 to 9.6% of the total domestic demand for new shipbuilding. That will account for about 12% of the total domestic capacities.

3-3-2 Prospect of Ship Repairing Demand and Supply

Table III-3-39 (Case 1) and Table III-3-40 (Case 2) show the demand-supply gap calculated from the repairing demand of Table III-3-23 (Case 1) and Table III-3-24 (Case 2) and the estimated capacity of repairing of Table III-3-36.

Table III-3-39 Demand/Supply Gap of Ship Repairing (Case 1)

(Unit: 1,000 DWT/Year)

	0 - 500DWT	501- 2,000 DWT	2,001 - 5,000 DWT	5,001 - 10,000 DWT	10,001 - 30,000 DWT
1985	Δ46 - Δ23	79 - 99	19 - 32	240 - 266	407 - 646
1990	16 - 92	107 - 181	74 - 127	317 - 381	556 - 673
1995	168 - 364	199 - 371	188 - 320	436 - 559	870 - 1,103

Note: Δ mark indicates surplus capacity.

Table III-3-40 Demand/Supply Gap of Ship Repairing (Case 2)

(Unit: 1,000 DWT/Year)

	0-500DWT	501 - 2,000 DWT	2,001 - 5,000 DWT	5,001 - 10,000 DWT	10,001 - 30,000 DWT
1985	Same as in Case 1.			76 - 86	210 - 239
1990				117 - 153	308 - 378
1995				191 - 261	546 - 689

According to the above analysis, it can be said that emphasis must be placed on 500 - 2,000 DWT and over 5,000 DWT groups in reinforcing the repairing docks in Indonesia. For the reinforcement of repairing docks for over 5,000 DWT, special efforts are needed for 7,000 DWT class in the 5,000 - 10,000 DWT group and for 15,000 - 20,000 DWT class for the 10,000 - 30,000 DWT group.

Therefore, it is necessary for Makassar Shipyard to reinforce repairing facility capable of 7,000 DWT vessel.

It it planned that Makassar Shipyard, when it will attain a normal operation, will have a repairing capacity of 180,000 DWT per year (average 5,000 DWT x 36 vessels). The ship size to be repaired in this shipyard is considered to range from 2,000 to 7,000 DWT. According to the production schedule mentioned after, it will take three years to attain the normal level of repairing operations. Assuming that the

normal operations would be achieved by 1988 - 1989 (this will depend on the start of the construction work), it is expected that Makassar Shipyard will secure the demand enough to satisfy its repairing capacity, taking suitable measures and efforts by the Government and the shipyard itself. In realizing this project, the share of Makassar Shipyard of the gross domestic demands is estimated to be 7 to 10% in 1990, and 5 to 7% in 1995. The shipyard's repairing capacity will account for 16% of the whole domestic capacities.

4. PRESENT CONDITIONS AND SURROUNDING OF P.T. IKI MAKASSAR SHIPYARD

4-1 Present Condition of Shipyard

4-1-1 History

In 1962, two shipyards projects, namely, Paotere and Tallo shipyard projects were launched in the city of Ujung Pandang.

At that time the Paotere project was under the control of the Ministry of Industry and Mining. The purpose of the project was to produce the steel-structure products and 2,500 tons vessels.

The Tallo project was undertaken by the Ministry of War Veterans. The project was aimed at the construction of 300 tons wooden vessels. The shipyard had a pull-slipway (with 500-ton capacity) of 45 meters of length.

In 1963, the government, due to the financial reason, consolidated the two shipyards which were 2 km away from each other, and incorporated them under Makassar Shipyard Project. Under the Presidential Proclamation No. 225, 1963, the said project was classified as an important project. At this time, the Tallo Shipyard was dismantled and was transferred to the site alongside the Paotere Shipyard.

And after the 7-years development program, the first-term construction work of Makassar Shipyard was completed in March, 1970, and the operation was started.

In 1977, Makassar Shipyard was conglomerated with Gresik Shipyard, situated in the south-east of Surabaya and Padang Shipyard situated on the Indian ocean of Sumatra and Bitung Shipyard in the northern tip of Sulawesi, which, then, were incorporated under P.T. IKI (Industri Kapal Indonesia), as it is today.

4-1-2 Environment

(1) Climate

The Makassar Shipyard is located in the northeastern part of Ujung Pandang City, the largest city in the eastern Indonesia, situated in the southwestern part of Sulawesi Island of the Republic of Indonesia.

It is in 5°7' of south latitude and 119°25' of east longitude and in a tropical zone with oceanic climate. Average temperature is 26.8°C (maximum 34°C and minimum 21°C), and average humidity 80%.

One year consists of a dry season (April - October) and a rainy season (November - March), and rainfall is about 2,700 mm in a year. Especially in January and February, there are much rain. Refer to Table III-4-1.

(2) Wind

Throughout a year, wind is not strong and always breezing 3 - 5 m/sec. In the past decade, the maximum wind was 10 m/sec. For this reason, they moor the ships to trees. Refer to Fig. III-4-1.

(3) Tides

Tides are also not strong, and the water level between low and high tides varys only 1.2 m. Therefore, even a large vessel can be operated easily. Refer to Fig. III-4-2.

(4) Seaway

Because the Ujung Pandang port and the shipyard are surrounded by many coral reefs and shallow waters, seaway is not so wide enough as to sail freely. However, shipyard is not so far from the port, and the extent of dredging is not so great.

(5) Environment

As illustrated in Fig. III-4-5, the shipyard is surrounded by shallow seas on two sides and a small harbor on one side. Small boats are aground in the shallow seas on two sides. Large-scale dredging is required to make it easier for vessels to reach the berths for unloading commodities.

At the harbor on one side, sea room is very small and the horbor is crowded with many small vessels. Even if the harbor is dredged, about 25,000 DWT vessels at the maximum would be operated.

The present shipyard is located along a canal constructed in the small harbor.

(6) Economical Advantage

Ujung Pandang City has a port for ocean-going vessels and is also convenient as a base for repairing fishing boats. Therefore, they have the advantage of contract of those repairing works.

Table III-4-1 Rainfall and Temperature

1) Rainfall

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
1972	870	526	322	170	57	-	-	9	-	-	2	130	2,086
1973	315	120	230	121	174	55	41	59	132	62	676	464	2,449
1974	250	733	576	35	158	33	83	-	161	241	226	587	3,083
1975	356	278	431	432	136	68	108	63	58	277	367	510	3,084
1976	838	456	451	10	56	21	16	-	-	117	297	450	2,712
1979	741	662	506	110	111	201	-	-	5	51	222	544	3,153
1980	764	612	430	217	52	46	-	-	-	-	-	-	2,121
Average	591	484	421	156	106	61	41	22	59	125	298	448	

2) Temperature

Maximum temperature

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
1975	28.3	29.6	29.3	30.2	30.8	30.9	30.4	31.4	31.7	31.1	30.4	28.9
1979	29.8	30.0	30.5	31.8	32.1	31.6	32.3	33.4	34.2	34.1	33.0	30.1
1980	30.2	28.9	30.5	31.4	32.1	32.6	-	-	-	-	-	-

Minimum temperature

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
1975	23.0	22.8	23.1	23.0	23.5	22.4	21.4	21.5	22.8	22.8	22.7	22.9
1979	23.4	23.3	23.3	23.1	23.2	22.5	19.9	19.6	21.7	22.3	23.6	23.4
1980	24.0	23.4	23.4	23.7	23.1	22.3	-	-	-	-	-	-

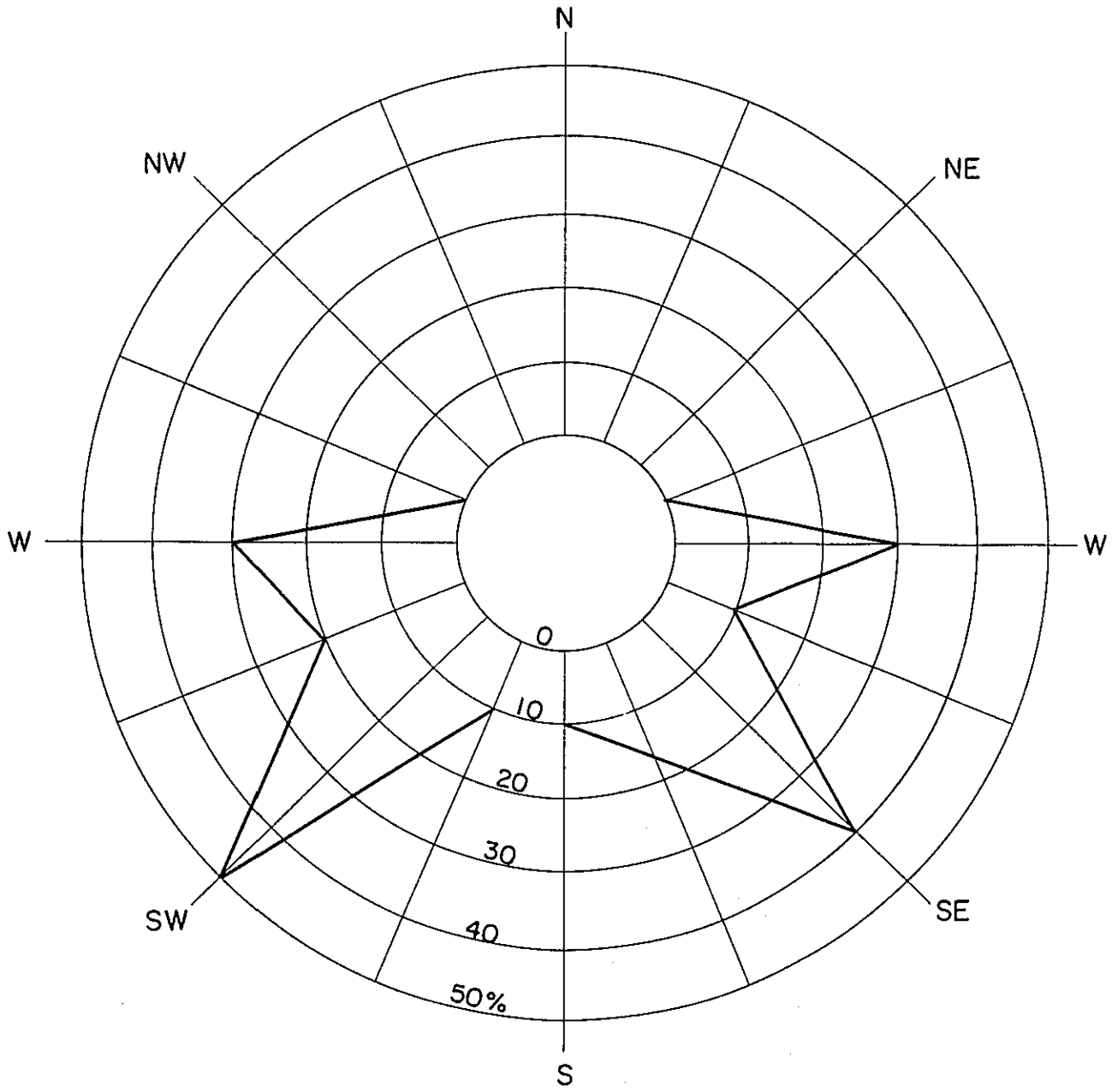


Fig. III-4-1 Direction of Wind

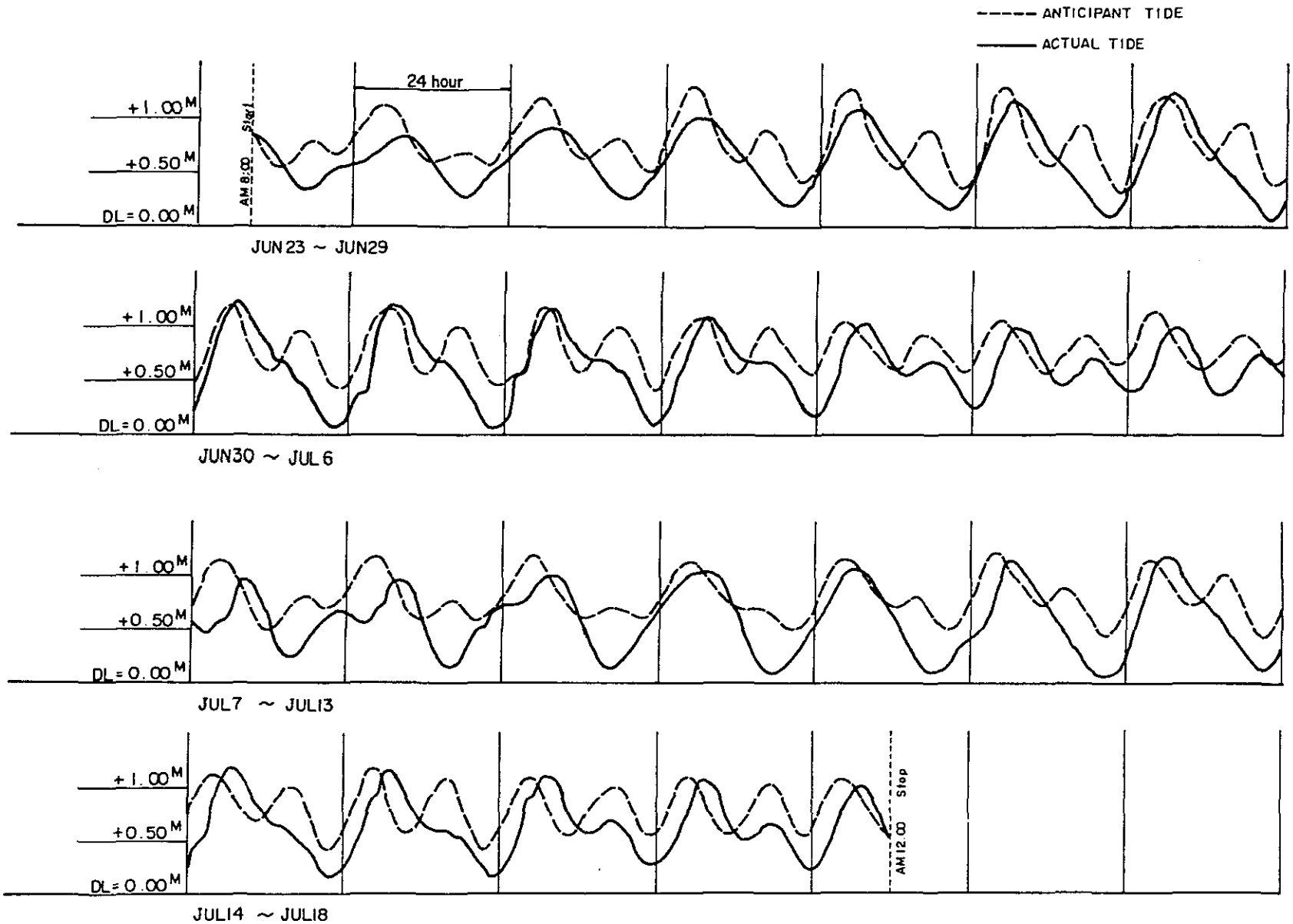


Fig. III-4-2 Tide Curve

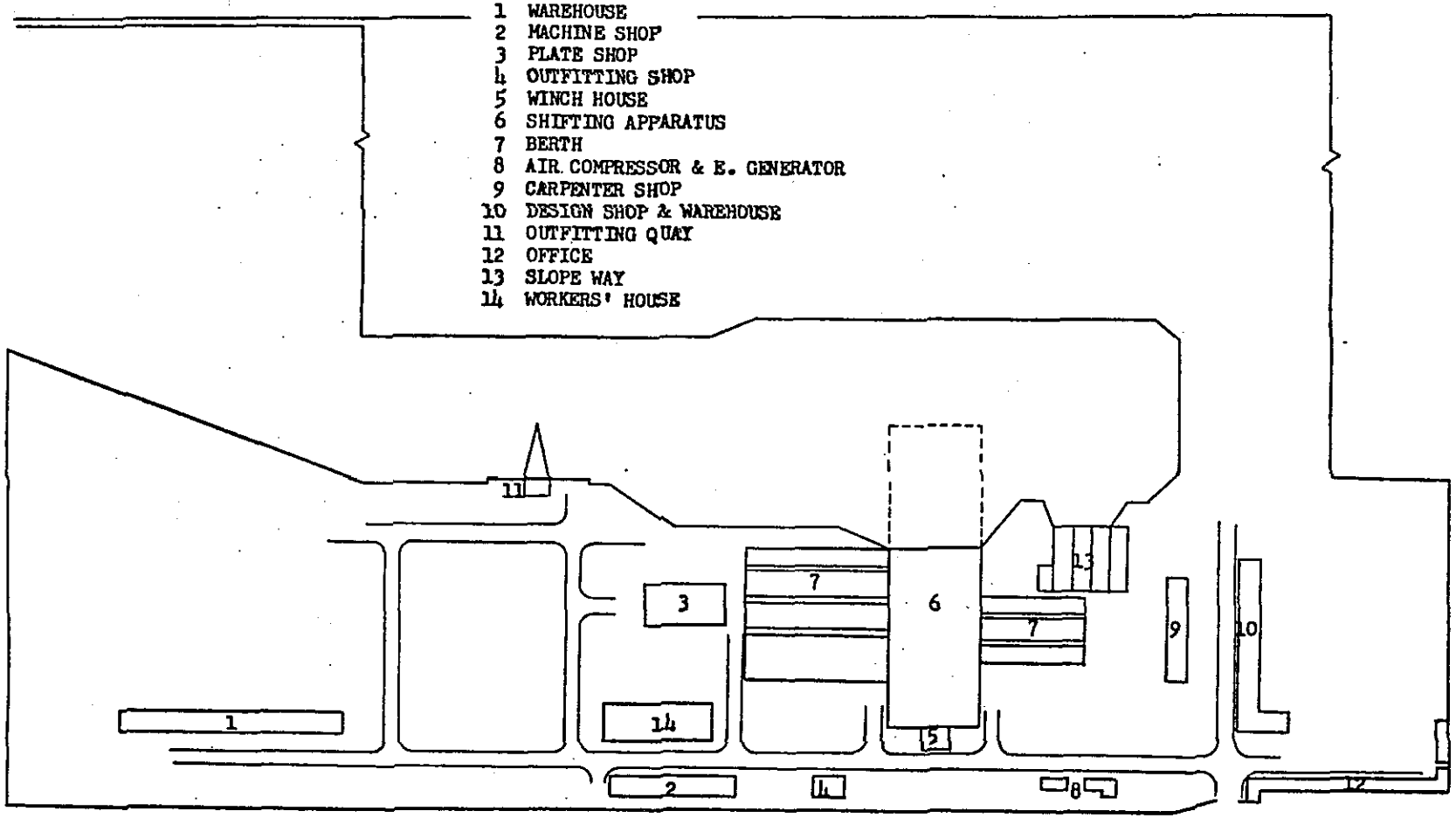


Fig. III-4-3 Existing Layout

Scale 1 : 3000

(7) Chartering

Tug-boats, barges and mobil cranes are easily chartered.

4-1-3 Facilities

(1) Composition of Site

The shipyard consists of a 15-hectare reclaimed land to which the shipyard will be expanded and a 12-hectare shipyard under operation, with a canal running through them. Refer to Fig. III-4-3.

Old piles driven 18 years ago remain on the reclaimed land, and some parts of the sea bank have been crumbled.

(2) Scale of Shipyard

There is a 45-meter, 500-ton berth where it is possible to repair or build about eight vessels, each up to 1,000 DWT, simultaneously. See Fig. III-4-3.

(3) Quay

The outfitting quay is about 40 meters long, which is not well utilized because the construction of cranes has not been completed. Except this quay, the revetment is built with cemented rocks, and has no bits or bollards.

(4) Crane

Besides the uncompleted outfitting crane, they have a 3-ton mobil crane, but it is not working enough due to the lack of spare parts.

(5) Outline of Other Major Shops is as follows:

1) Mold loft

Full-size drafting is made here. The structure is so old that the floor is deformed. However, reinforcement is not necessary, because a 1/10 drafting method may be adopted in the future.

2) Carpenter shop

The facilities have been well furnished. As for the capacity for this project, however, it is not sufficient. There is no painting shop for wooden products.

3) Plate shop

This is now used as a hull fabrication shop. This shop looks fine, but its working rate is low.

4) Outfitting shop

This shop is now working well in spite of the simple structure.

5) Machine shop

Necessary facilities are well prepared, but the crane capacity is not enough.

6) Warehouse

There are two warehouses, one is near the front gate and the other is in the southwestern part of the shipyard. They will be available even after the expansion will have been completed.

(6) Electric Power

They have two power systems of 384V and 220V. Alternative of the power systems is troublesome, and dual investment is needed for their facilities. Nominal capacity of substation is 500kVA, but actually, it is assumed to be one-fifth of nominal one.

The emergency generators have been furnished, but they are now useless since some parts have been taken off.

(7) Gas and Oxygen

They have no lines for gas and oxygen in the shipyard, and when they need gas and oxygen they are supplied through bottles conveyed by human power. Oxygen is not pure enough. More pure oxygen should be obtained in the future.

(8) Compressed Air

Compressors, air reservoir and main lines are prepared. However, they are not actually utilized because they may damage tools due to insufficient draining.

(9) Tug-boat and Barge

The shipyard has not own tug-boats and barges, but these can be chartered easily.

4-1-4 Organization

The Makassar Shipyard is the largest of the four shipyards of P.T. IKI (Industri Kapal Indonesia). Together with P.T. IKI's head office, the shipyard is located in Ujung Pandang City.

The system is well organized. But due to a shortage of personnel, main staffs must do dual tasks. For the purpose of reinforcing the staffs in the future, new employees are being sought.

There are three directors including the president. Most of them are concurrently serving as a general manager and/or a manager. Regular employees at the shipyard number about 200, and subcontractors' workers about 80. The organization and numbers of employees are shown in Fig. III-4-4.

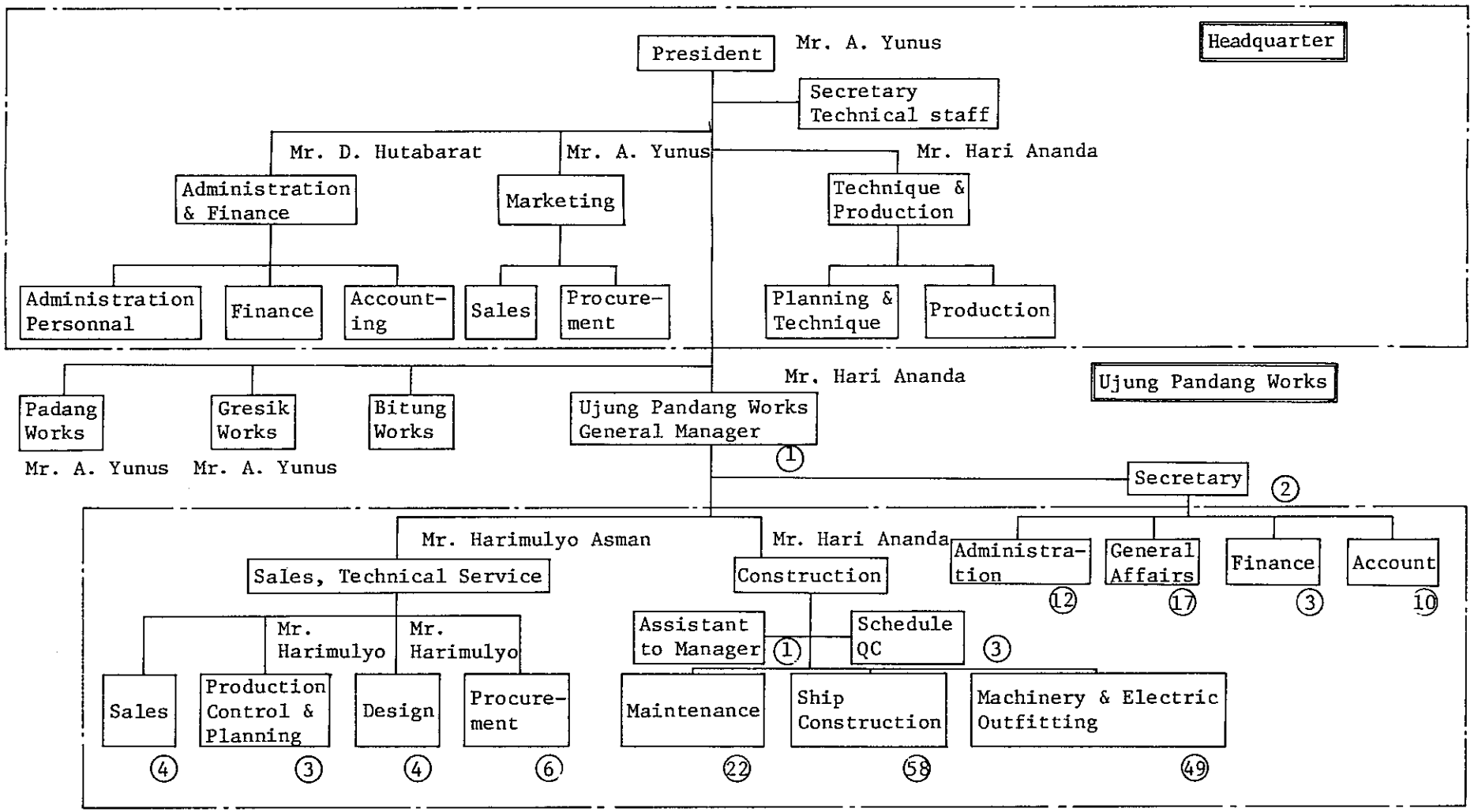
4-1-5 Management

As stated earlier, Makassar Shipyard is not an integrated business unit by itself. It is one of the four business units under the control of P.T. IKI. It is organically managed in linkage with the headquarters in the same way as the other business units. Consequently, the business reports are prepared by P.T. IKI in a form of combining all the four business units including Macassar Shipyard and the head office.

Total sales of P.T. IKI were amounted to about 693 million Rps in 1978 and 760 million Rps in 1979. Of the sales, about 318 million Rps in 1978 and 391 million Rps in 1979 were attained by Makassar Shipyard, which mean about 50% of total sales of P.T. IKI. Most of the sales were gained by ship repairing. For instance, sales for new shipbuilding of Makassar were 2.7 million Rps in 1978 and zero in 1979. As can be seen from the viewpoint of sales, Makassar Shipyard is the greatest unit among the four units.

In this section the management situation of P.T. IKI and Makassar Shipyard, namely, the profitability and the financial stabilities, is discussed through the financial analysis made on the basis of P.T. IKI's Balance Sheet (Table III-4-2) and Profit and Loss Statement (Table III-4-3).

The results of the financial analysis are shown in Table III-4-4. Also attached is the evaluation sheet used for financial rating of the Japanese small-medium manufacturing industry for reference.



Note: Numbers in ④ show the number of employees.

Fig. III-4-4 Organization of P.T. IKI Makassar

(1) Profitability

1) Profit ratio of operating capital
(Operating profit/operating capital)

This ratio shows operating capital efficiency, namely, profitability of operating capital. Operating capital means the whole capital used for business operations. More specifically, it consists of current assets, inventory & fixed assets.

The profit ratio of operating capital is analyzed as follows:

$$\text{Profit ratio of operating capital} = \text{Ratio of operating profit to sales} \times \text{Turnover of operating assets}$$

$$\frac{\text{Operating profit}}{\text{Operating capital}} = \frac{\text{Operating profit}}{\text{Sales}} \times \frac{\text{Sales}}{\text{Operating capital}}$$

The profit ratio of operating capital of P.T. IKI is very low. This is because, in addition to the low ratio of operating profit to sales, the turnover of operating capital is extremely low. In the case of Makassar Shipyard, the ratio of operating profit to sales is better than other three business units. The 8.6% reported in 1979 is seemed to be a reasonable figure. However, the problem is the low turnover of operating capital making profitability of the operating capital very low. This is due to the fact that P.T. IKI's sales are not in proportion to the amount of operating capital used.

It is necessary to make endeavors to aggressively increase sales and thus to use the assets more efficiently. It is also necessary to reduce the cost of operations by cost control so as to increase the ratio of profit.

2) Profit ratio of total capital
(Current profits/total capital)

This is an index of profitability. The difference between this index and the profit ratio of operating capital is that this method takes into consideration the non-operating income and expenses. Total capital consists of total liabilities and net worth. Both P.T. IKI and Makassar Shipyard show the non-operating income exceed non-operating expenses.

Thus, ratio of current profits to sales is highest than that of operating profits to sales. However, as mentioned in above paragraph 1), the turnover of total capital is low making the profit ratio of total capital low.

3) Collection period of accounts receivable
(Average accounts receivable/average monthly sales)

This means the average number of months between issuance and realization of bills for credit sales. P.T. IKI's collection period of accounts receivable is about 4 months, which is approximately the same as a medium-sized shipyard in Japan. This is shorter than the standard terms of payment practiced in Indonesia. Delays in collection of accounts receivable will give an adverse effect on the financing of fund and lead to the burden heavier due to increased amount of loan, and thus, will impose strong pressure on business more and more. It is needless to say that trying to make early collection of accounts receivable is necessary in the improvement of the profitability.

4) Fixed assets turnover ratio
(Sales/average of fixed assets valued at the beginning and at the end of the fiscal term)

Fixed assets have low cashability. It is necessary to make the most efficient use of the fixed assets. The fixed assets turnover shows how efficiently the fixed assets are used. The figures of P.T. IKI shows a considerably low efficiency. This is due to the low sales in relation to the fixed assets, which is also caused by a long construction period. It is, therefore, important to secure more orders and to shorten the construction period through higher work efficiency, and at the same time, to find more efficient use of the land-area.

(2) Financial Liquidity

1) Current ratio (Current assets/current liabilities)

Liquid ratio is the index to show the company's ability to pay and its financial stability. It is also called a banker's ratio. Liquid ratio of 200% or over is thought to be sound. 150% or more is said to be good. P.T. IKI's liquid ratio is about 180%, and, so, is in a good condition.

2) Quick ratio (Quick assets/current liabilities)

This is the ratio of current liabilities to highly liquid assets such as cash deposits, notes receivable, accounts receivable with high cashability. This index shows more immediate ability to pay than the current ratio. If a company's position shows 100% or more of this index, the company's paying ability is maintained in a stable position. The P.T. IKI's short-term solvency is thought to be safe, showing 98% of this index as of the end of 1979.

3) Fixed assets ratio (Fixed assets/equity capital)

This is the ratio of fixed assets to enquity capital. In this ratio is lower than 100%, the company's financial liquidity is stable, and its financial position is therefore sound. In other words, if the fixed assets ratio shows 100% or less, the funds needed to secure the fixed assets could be provided out of its equity capital. P.T. IKI, being fallen under the jurisdiction of government, has a high rate of equity capital. And its fixed assets ratio is lower than 100%. From this point of view, the comapny's financial position is thought to be healthy.

From the above analyses, the management situation of P.T. IKI shall be summarized as follows:

The company's financial position based on the financial liquidity analysis is thought to be healthy. This is related to the fact that P.T. IKI has a high ratio of equity capital on account of a enterprise fallen under the jurisdiction of the government.

On the other hand, the company's profitability is considerably low. This is due to an extremely low turnover of capital. Profitability is the fundamental element of a business management. It is a prerequisite to the financial stability of the company. If this situation would continue to be sustained, the company's financial health should be affected.

It is required, therefore, the endeavors be made not only to enhance the ratio of profit to sales through cost control but also to increase the sales in the proportion of the invested capital. Further, it is necessary for Makassar Shipyard to improve the turnover of capital through shortening the construction period with higher efficiency, etc.

Table III-4-2 Balance Sheet of P.T. IKI

(Unit: 1,000 Rps)

		Dec. 31th, 1979				Dec. 31th, 1978			
		Head Office	Ujung Pandong Unit	Other Three Units	P.T. IKI	Head Office	Ujung Pandong Unit	Other Three Units	P.T. IKI
Assets	Current Assets	29,893	285,545	268,876	584,314	2,275	186,391	176,186	364,852
	Fixed Assets	24,131	616,341	724,869	1,365,341	23,401	623,162	76,694	1,408,257
	Inter-office Account	1,647,103	-	-	-	1,555,086	22,077	3	-
	Total	1,701,127	901,886	993,745	1,949,655	1,580,762	831,630	937,883	1,773,109
Liabilities Equity	Current Liabilities	105,439	126,773	96,239	328,451	6,945	87,830	102,708	197,483
	Fixed Liabilities	36,000	-	-	36,000	-	-	-	-
	Inter-office Account	-	706,393	940,709	-	-	720,103	857,063	-
	Issued Capital	1,500,000	-	-	1,500,000	1,500,000	-	-	1,500,000
	Earned Surplus or Deficit	559,688	68,720	43,203	85,204	73,817	23,697	21,888	75,626
	Total	1,701,127	901,886	993,745	1,949,655	1,580,762	831,630	937,883	1,773,109

Note: Ujung Pandong Unit means Makassar Shipyard in this study.

Table III-4-3 Profit and Loss Statement of P.T. IKI

(Unit: 1,000 Rps)

	1979			1978		
	Ujung Pandong Unit	Other Three Units	P.T. IKI	Ujung Pandong Unit	Other Three Units	P.T. IKI
1. Sales	390,643	369,798	760,441	318,092	374,467	692,559
2. Cost of Sales	217,017	267,781	484,798	221,377	295,184	516,561
3. General and Administrative Expenses	140,012	129,973	269,985	89,075	94,414	183,489
(Unit expenses)	(104,517)	(94,479)	(198,996)	(77,043)	(72,757)	(149,800)
(Units of share in the expenses of head office)	(35,495)	(35,494)	(70,989)	(12,032)	(21,657)	(333,689)
4. Operating Profit	33,614	Δ 20,956	12,658	7,640	Δ15,131	Δ 7,491
5. Non-operating Income	14,221	2,535	16,756	3,937	8,905	12,842
6. Non-operating Expenses	2,811	2,897	5,708	-	-	-
7. Current Profit	45,024	Δ 21,318	23,706	11,577	Δ 6,226	5,351

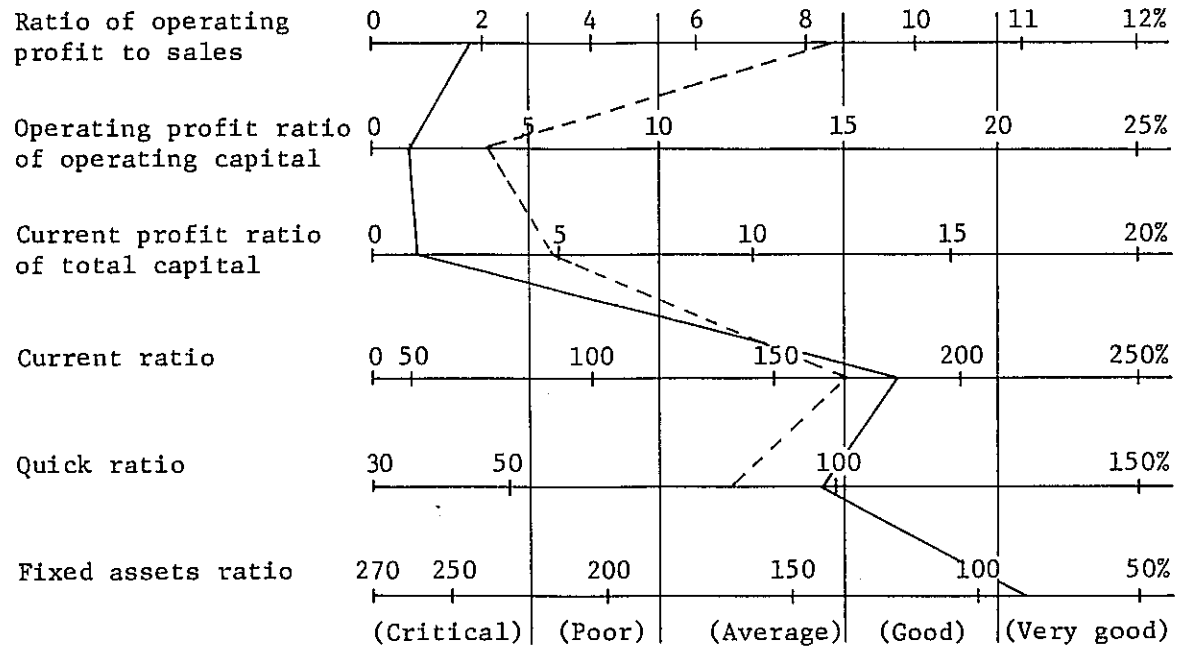
Note: Ujung Pandong Unit means Makassar Shipyard in this study.

Table III-4-4 Results of Financial Analysis of P.T. IKI

		1978	1979
Profitability	Ratio of operating profit to sales	-1.2% (2.4%)	1.7% ((8.6%)
	Turnover of operating capital	0.4% (0.34%)	0.4% (0.43%)
	Operating profit ratio of operating capital	-0.48% (0.82%)	0.67% (3.69%)
	Current profit ratio of total capital	0.30% (1.39%)	1.23% (4.85%)
	Receivable period of accounts	3.6 months	4.0 months (4.1 months)
	Fixed assets turnover ratio	0.49%	0.55% (0.62%)
Liquidity	Current ratio	185% (207%)	178% (167%)
	Quick ratio	131% (136%)	98% (87%)
	Fixed assets ratio	89%	86%

Note: Figures in parentheses show estimated financial ratio of Ujung Pandong Unit (Makassar Shipyard).

<Reference> Evaluation Sheet for Financial Ratio
(Used for Japanese small-medium manufacturing industries)



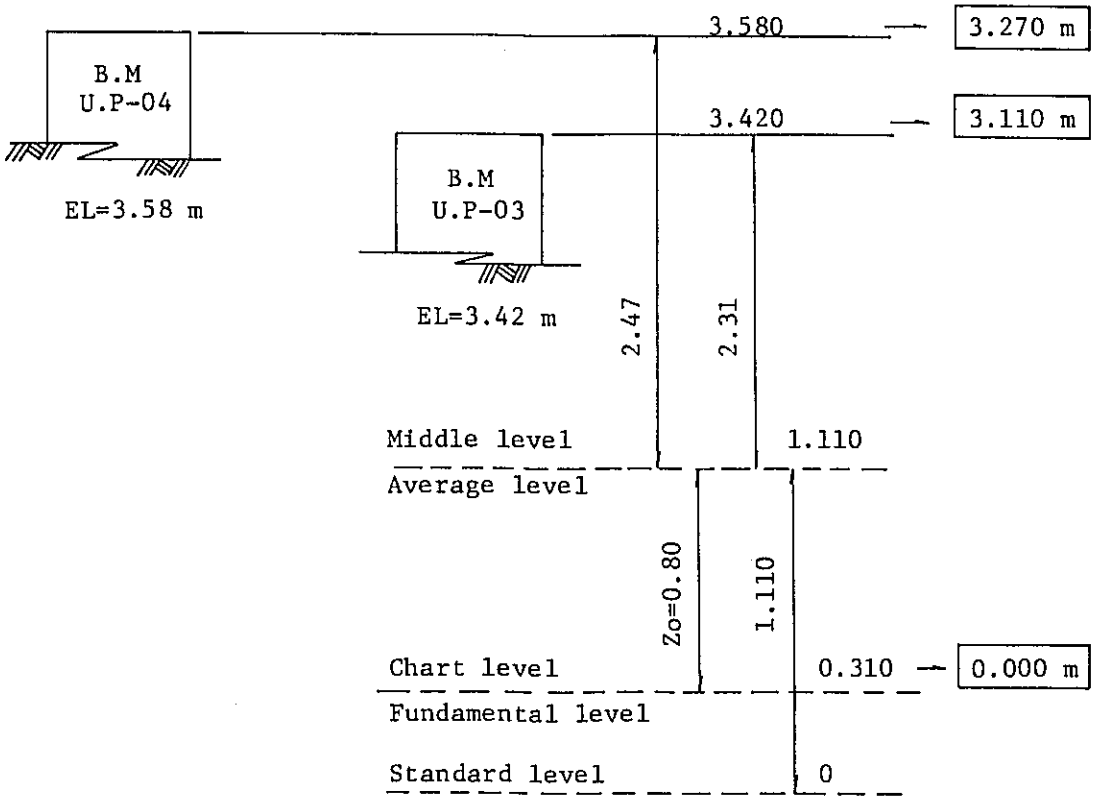
Note: —— : P.T. IKI, ---- : Ujung Pandong Unit (Makassar Shipyard) in 1979

4-1-6 Topography and Soil Foundation

(1) Topography

Fig. III-4-5 shows the topography of the project area which is based on the result of a topographic survey and sounding.

The elevations in Fig. III-4-5 are calculated on the basis of the data of the Ujung Pandang Port Office, on condition that the chart level is ±0.00 m.



□ : Elevation with chart level ±0.00 m

B.M : Bench-mark

The shipyard construction site was reclaimed about 18 years ago. It is mostly flat, 1.0 m ~ 2.5 m above the sea level.

A part of the revetment in the northeastern site is broken down, and as result of the outflow of sand and earth, the northeastern site is a low and swampy zone.

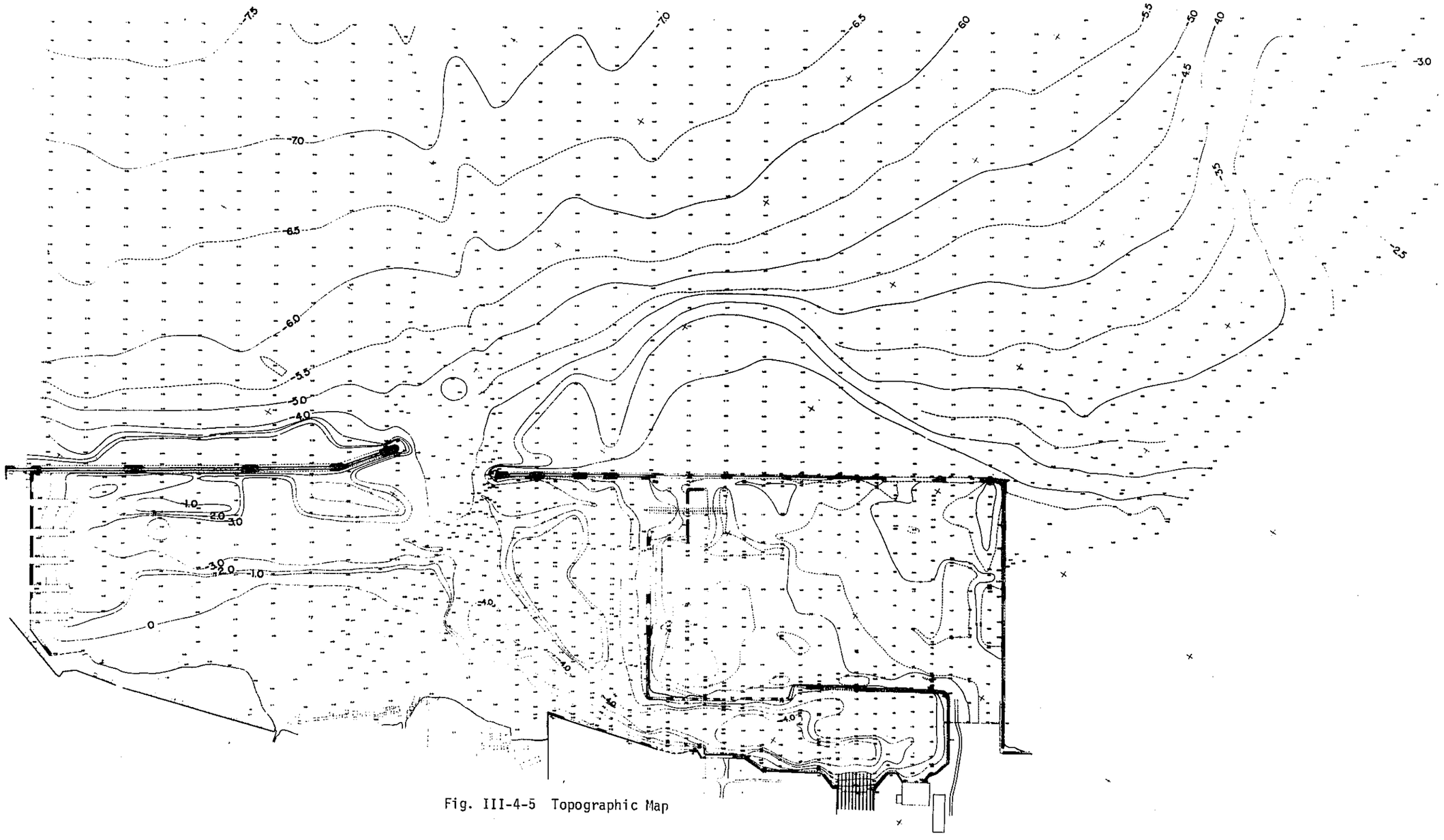


Fig. III-4-5 Topographic Map

Sea area around the shipyard is shallow to a great distance from the shore. Sea route was dredged at a depth of minus 4 meter, thereby facilitating the arrival and departure of vessels. However, further dredging will be required for vessels to be constructed at the shipyard in the future, because of narrow course and insufficient depth of water.

(2) Soil Foundation

1) Soil composition

Fig. III-4-6 shows the location of the lately-conducted boring and Swedish sounding. Assumed soil profiles drawn on the basis of these results are shown in Fig. III-4-7 and Fig. III-4-8. The soil of the site is composed of sandy soil, clayey soil and bed rock. Sandy soil is 4 - 6 meters thick and consists of an original sedimentary layer and a reclaimed layer. Their boundary is not clear because the former layer is identical with the latter layer in soil properties. 7 m to 10 m thick marine clay, which was formed in the alluvial era belonging to the newest geologic epoch, accumulates under the sandy soil, 1 - 2 meters thick weathering layer (partly defective) is sandwiched between the marine clay and mudstoac or sand stone, which composes the soil foundation.

2) Soil test results

Fig. III-4-9 and Fig. III-4-10 reveal the results of soil tests conducted for each layer.

a) Sandy soil

i) Maximum grain size of fine sand, composing this soil, is 2 mm. The sand at a depth of 1 m to 2 m from its upper layer has the relatively even quality, where fine grained silt and clay contain 2% to 10%. The greater the depth, the greater the inclusion of silt and clay, which include 20% to 40% in deeper layer.

ii) The N value, which indicates the relative strength of soil, is 5 - 10 in the upper layer containing a small amount of fine grained silt and clay. The value is 2 - 5 in the lower layer; it is too small value for the sandy soil, so that the bearing value to a shallow foundation is low.

iii) According to the results of a field permeability test, coefficient of permeability of this sandy soil is $1 \times 10^{-2} \sim 4 \times 10^{-3}$ cm/sec, which is small value for the sandy soil. The permeability is relatively small.

b) Clayey soil

i) Relatively uniform clayey soil containing a small amount of sand and shell fragment.

ii) The N value is zero; it is impossible to conduct the standard penetration test.

iii) Natural moisture content ranges from 70 to 100%, and the value is almost constant throughout the entire layer.

iv) Consistency index, which indicates the relative hardness of clayey soil, is 0.3 - 0.5*. This clayey soil is a relatively stable as the marine clay of the alluvial era.

v) The greater the depth, the greater the value of unconfined compressive strength. It is 0.2 - 0.4 kg/m^2 in the upper soil layer, and 0.4 - 0.8 kg/m^2 in the lower soil layer.

Depth distribution of unconfined compressive strength is much greater than that of the theoretical compressive strength which is calculated with effective overburden load and consistency increase rate (cu/p = 0.25 - 0.35). It is somewhat presumed to be in a preconsolidated situation.

vi) Compressive index, which indicates the compressibility of soil, is 0.8 - 1.2. It is a medium value for marine clay of the alluvial era.

c) Soil foundation

i) The layer is composed of soft rock containing mudstoac or sand stone. The upper layer is noticeably weathered and is in a clayey state.

* In the ordinary marine clay of the alluvial era, liquid limit is close to natural moisture content, and consistency index is close to zero of often below zero.

ii) The N value exceeds 50, and is strong enough for a piling foundation.

3) Problems for the soil foundation

As explained above, the proposed site of the shipyard construction has poor foundation consisting of loose sandy layers and soft marine clay. This should be taken into account in planning the shipyard construction.

Particularly for land-slide protection wall, temporary cofferdam and excavation, thorough studies must be made on a heaving phenomenon, stabilization of the land-slide protection wall and collapse of the cutting slope.

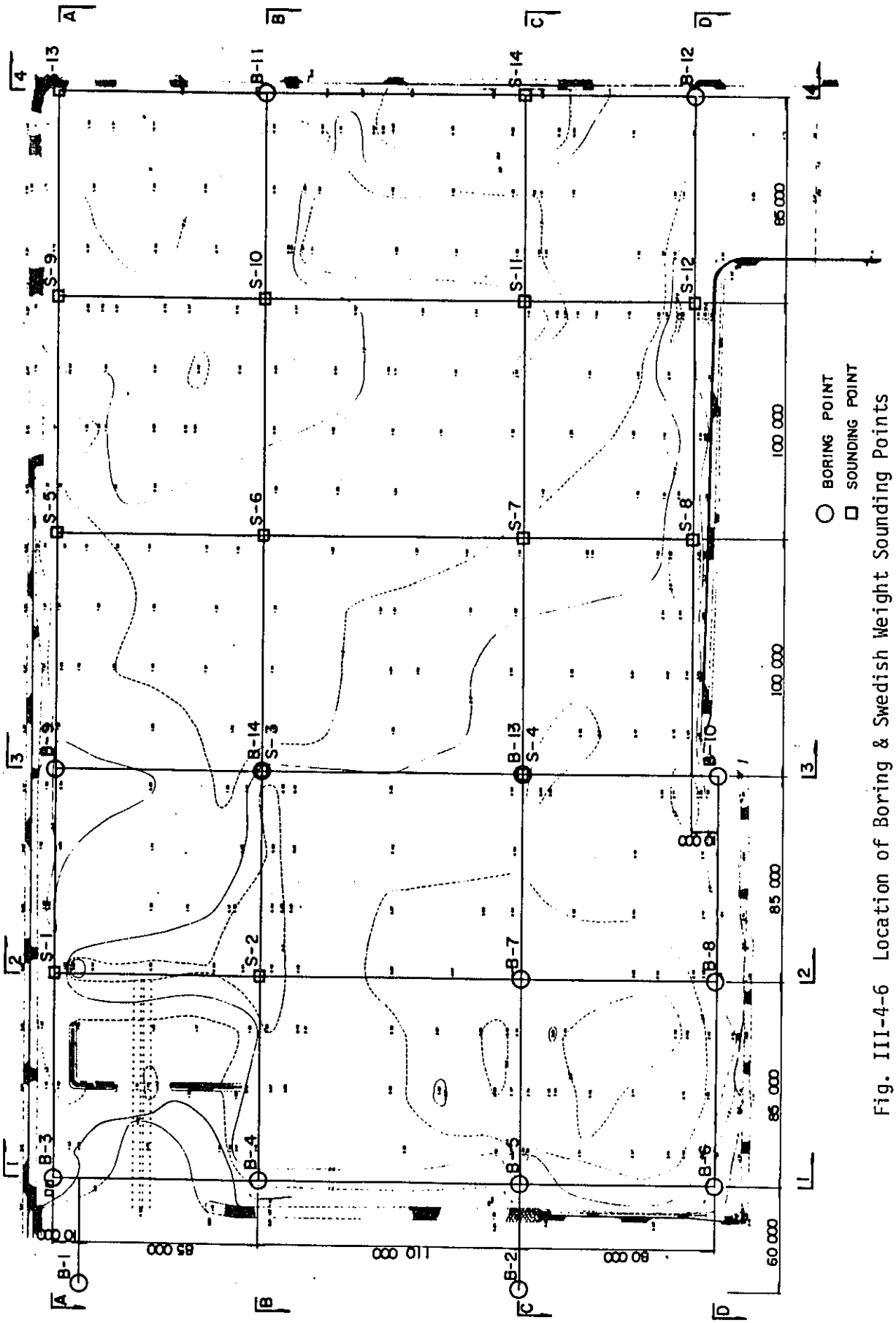
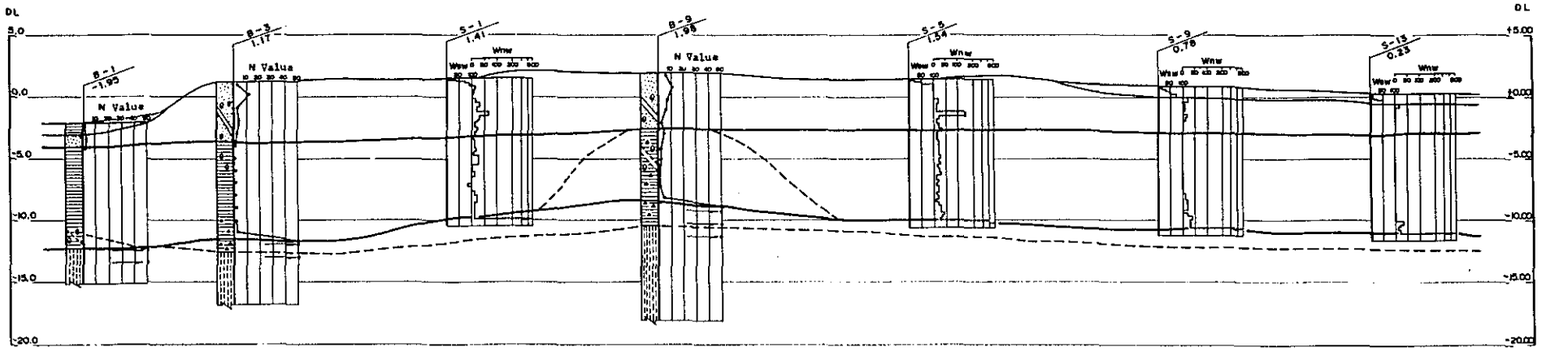
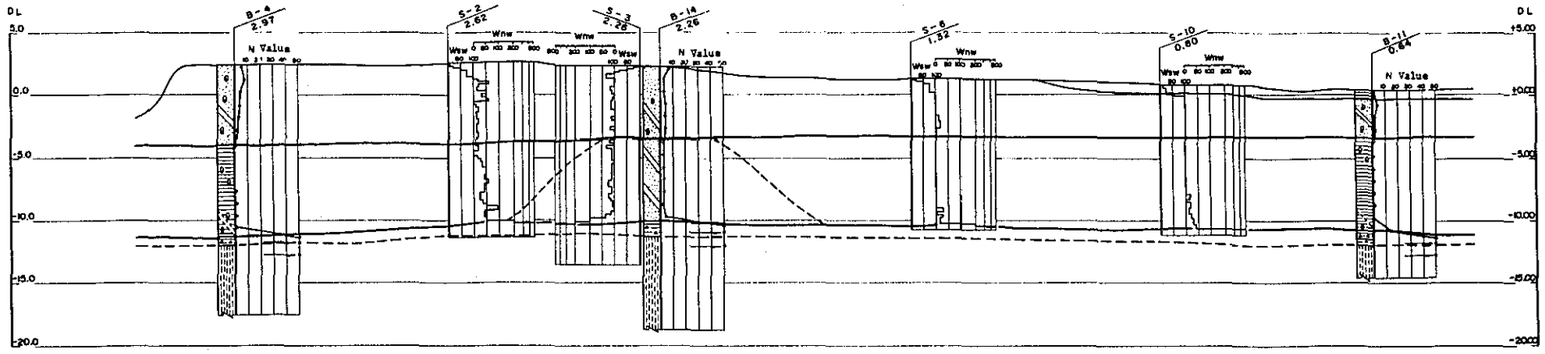


Fig. III-4-6 Location of Boring & Swedish Weight Sounding Points

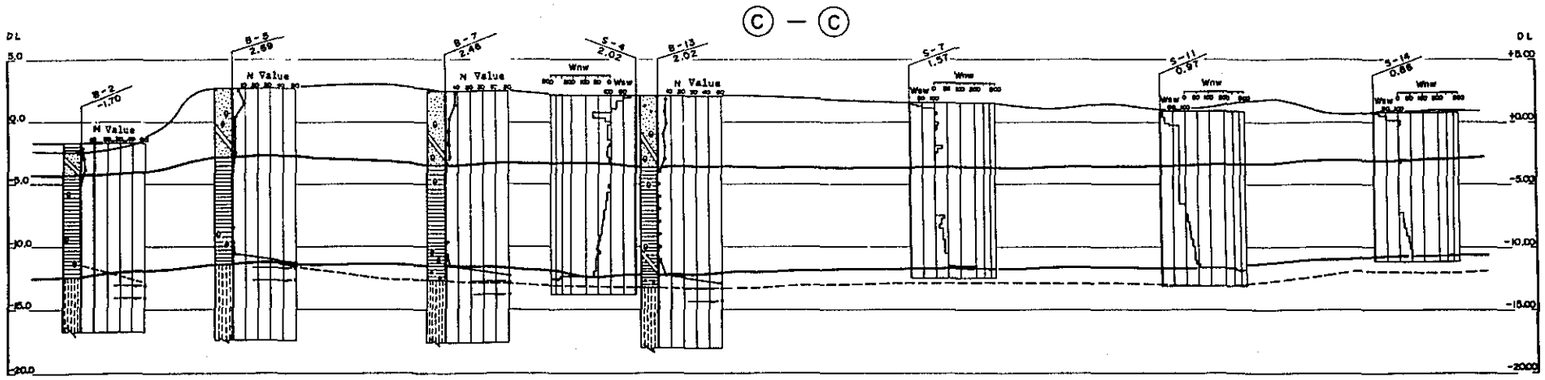
Ⓐ — Ⓐ

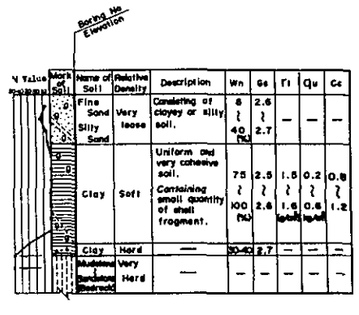


Ⓑ — Ⓑ



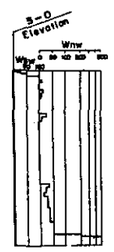
Ⓒ — Ⓒ





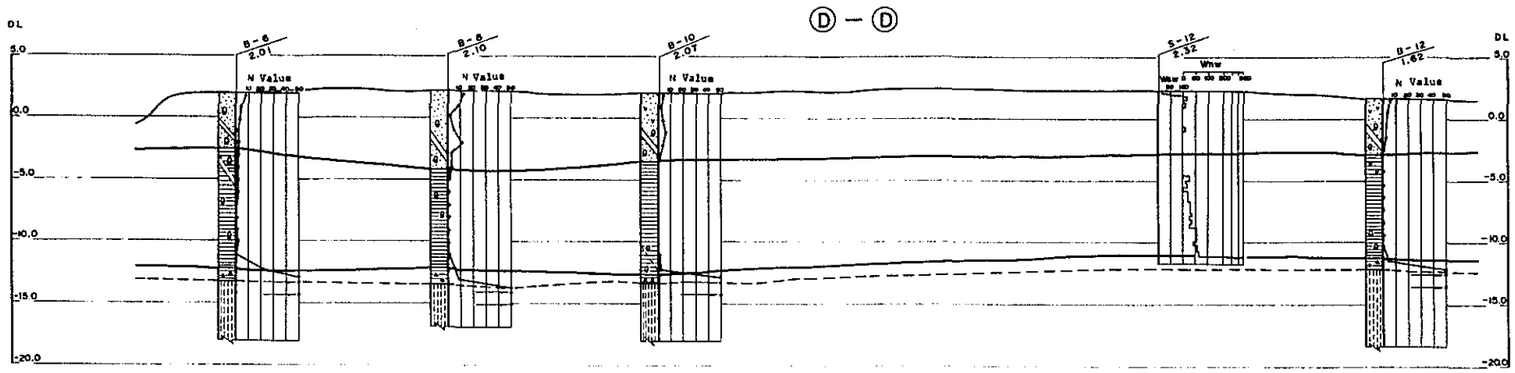
Mark of Soil	Name of Soil	Relative Density	Description	Wn	Gs	Yt	Qu	Cc
	Fine Sand	Very loose	Consisting of clayey or silty soil.	8 ~ 40 (%)	2.6 ~ 2.7	—	—	—
	Silty Sand							
	Clay	Soft	Uniform and very cohesive soil.	75	2.5	1.5 gf/cm³	0.2 kg/cm²	0.8
			Containing small quantity of shell fragment.	~ 100 (%)	~ 2.6	~ 1.6 gf/cm³	~ 0.6 kg/cm²	~ 1.2
	Clay	Hard	—	30~40	2.7	—	—	—
	Mudstone Sandstone Sandstone	Very Hard	—	—	—	—	—	—

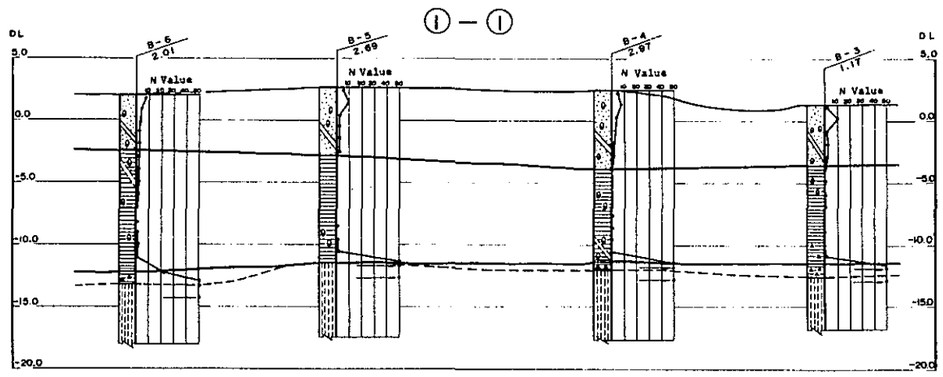
Wn : Natural Moisture Content
Gs : Specific Gravity
Yt : Wet Density
Qu : Unconfined Compressive Strength
Cc : Compression Index

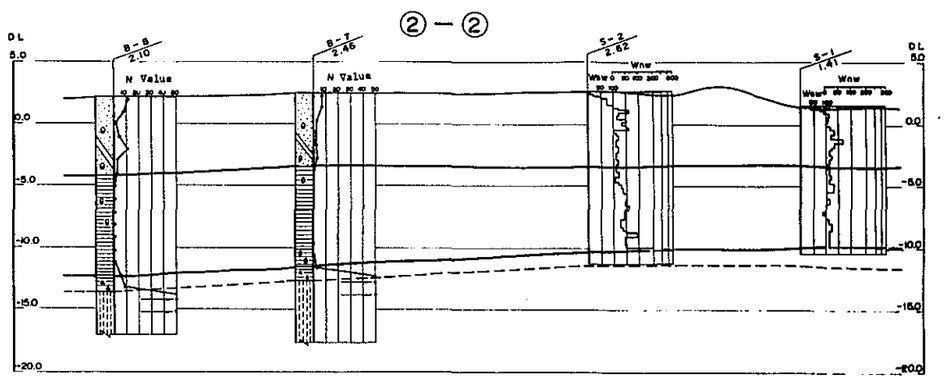


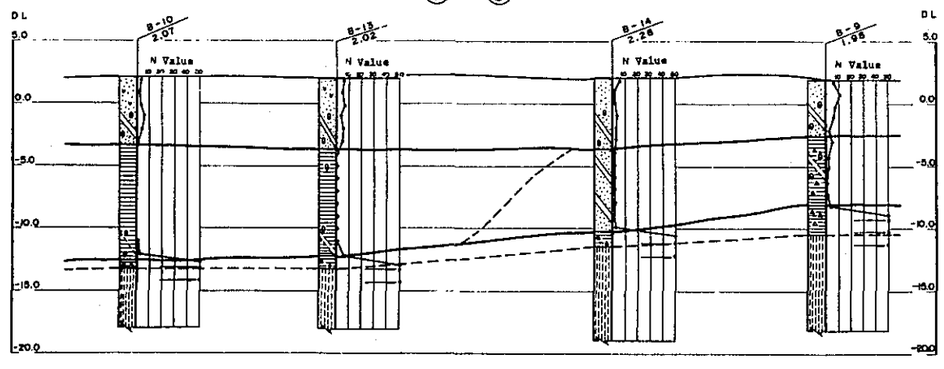
S-0 : Swedish Sounding No
Wsw : Load
Wnw : Number of half revolution per 1M

Fig. III-4-7 Soil Profile 1









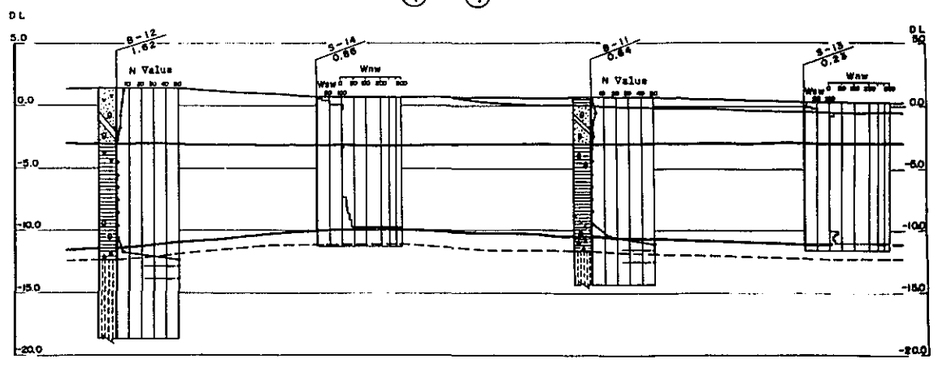
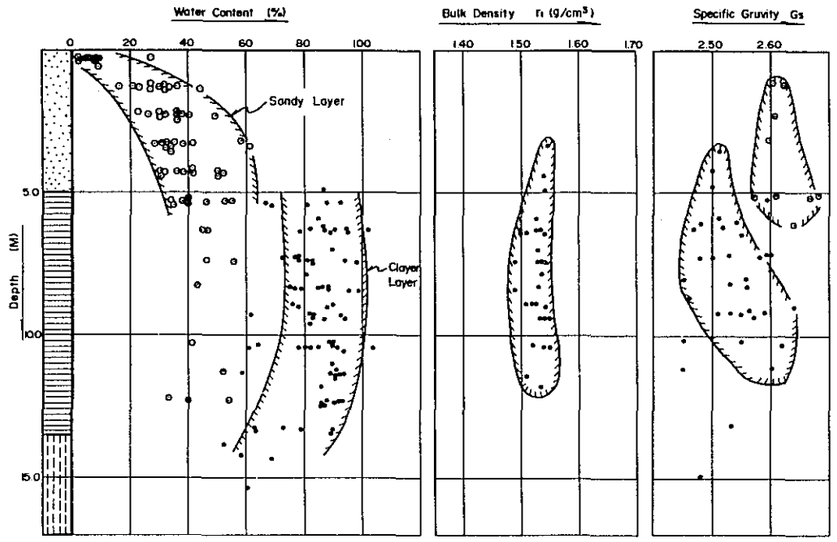
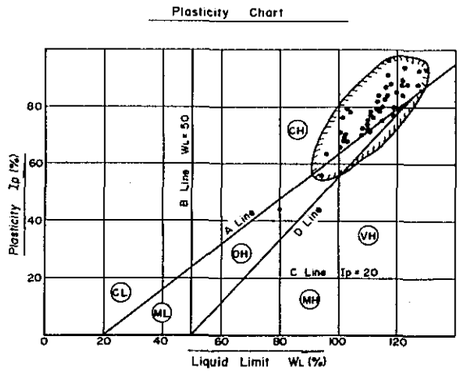
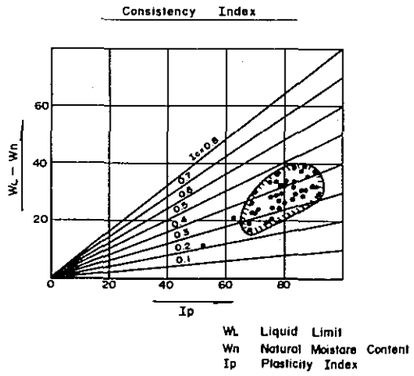


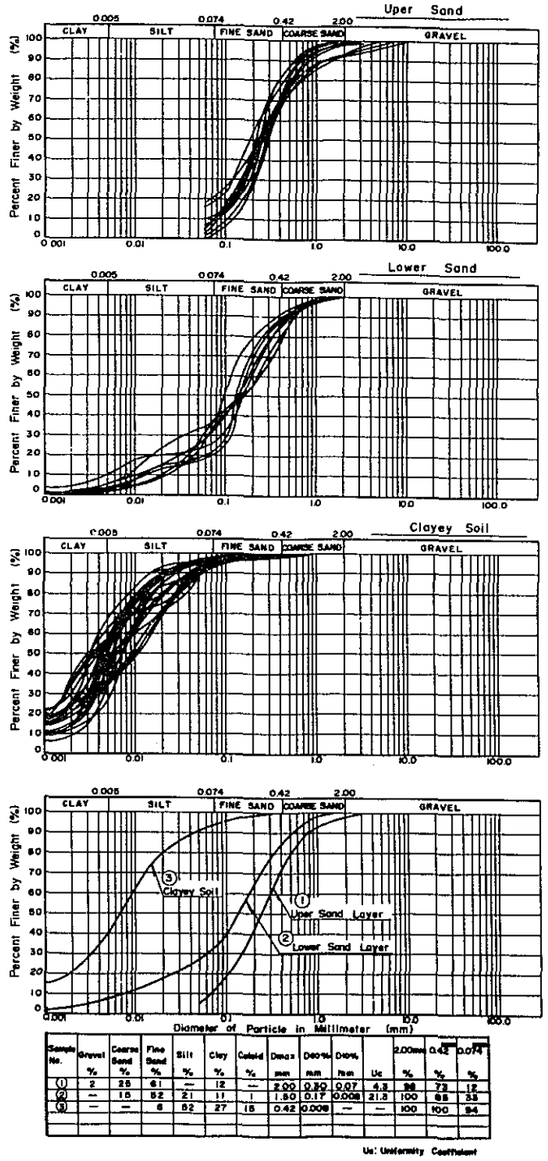
Fig. III-4-8 Soil Profile 2





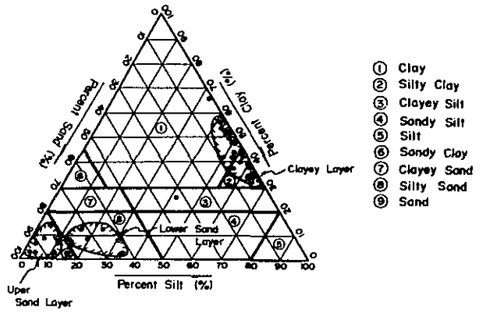


WL Liquid Limit
Wn Natural Moistare Content
Ip Plasticity Index



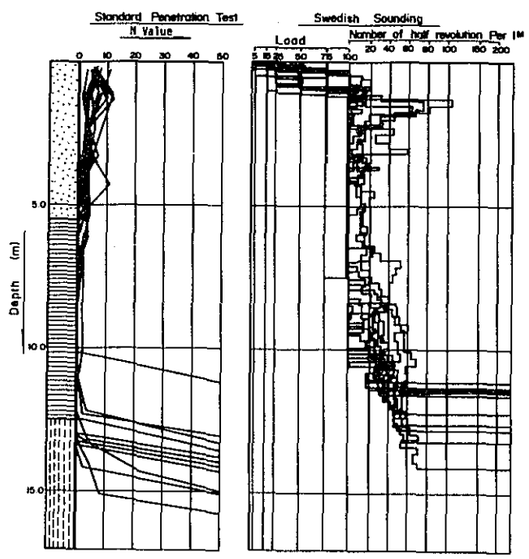
Sample No.	Gravel %	Coarse Sand %	Fine Sand %	Silt %	Clay %	Colloid %	D max mm	D60% mm	D10% mm	Uc	2.00mm %	0.42 %	0.074 %
①	2	26	61	—	12	—	2.00	0.30	0.07	4.3	98	73	12
②	—	15	52	21	11	1	1.80	0.17	0.008	21.5	100	68	33
③	—	—	6	52	27	15	0.42	0.008	—	—	100	100	94

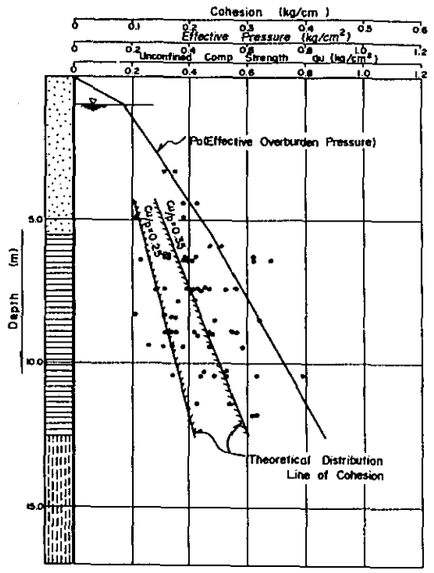
Uc: Uniformity Coefficient



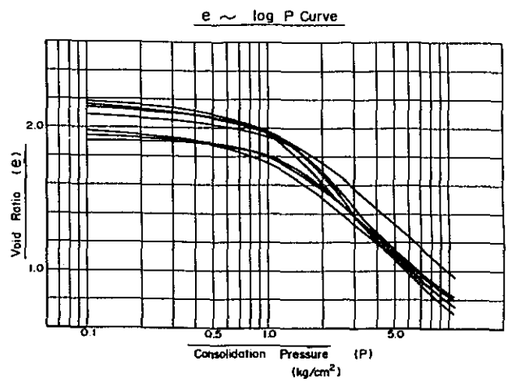
① Clay
② Silty Clay
③ Clayey Silt
④ Sandy Silt
⑤ Silt
⑥ Sandy Clay
⑦ Clayey Sand
⑧ Silty Sand
⑨ Sand

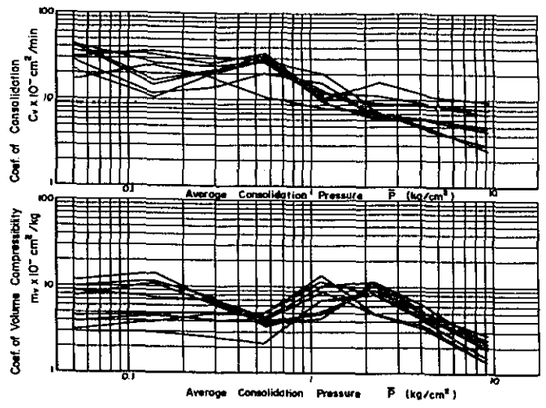
Fig. III-4-9 Result of Soil Test (Fisical Test)





Consolidation





Triaxial Compression

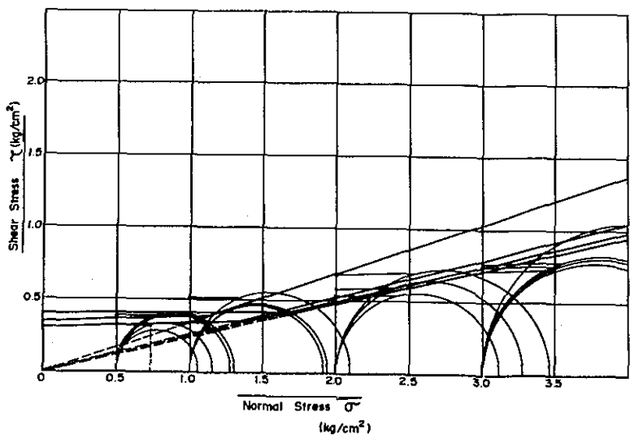


Fig. III-4-10 Result of Soil Test (Dynamic Test)

4-2 Surroundings

4-2-1 Infrastructure

(1) Roads

Roads in Ujung Pandang City are seriously congested. Roads leading from Ujung Pandang Port to the shipyard are badly damaged and narrow. Under these road condition, it is better to carry the materials by sea transport not by land transport, for the time being.

Construction of a by-pass on the route as shown in Fig. III-4-11 is now proceeding. The bridge over the Tallo River is already 80% completed. The by-pass near the shipyard will, when opened, make the land transport of commodities easier.

(2) Sea Routes

The area is suitable for sea transport since the sea is calm and the tide is mild. However, because of the shallow water depth, routes are limited to those leading to berths or outfitting quays. At present, there is no unloading facilities in the shipyard.

(3) Water Supply

Water supply capacity to the city is 500 ℓ/sec. A 50 mmϕ pipe is used for supplying water to the shipyard where water consumption is currently only 10 tons per day.

A plan is underway to raise the water supply capacity. In the near future, a main line located 500 meters away from the shipyard, will be furnished 350 mmϕ pipe. As a result, the water supply capacity will increase to 1,500 ℓ/sec. See Fig. III-4-12.

Therefore, the supply of the water required after shipyard expansion (400 tons per 8-hour day) will be possible.

(4) Electric Power

At present, electric power in the city is generated by means of turbine and diesel generation, and the supply capacity is 52MW. In 1984, another facility with the capacity of 12MW will be installed.

On the other hand, the peak demand is 26MW. So the supply capacity will be more than double the power needed by the city today. However, based on the following factors, an in-house generation system is recommended to be adopted for the expansion.

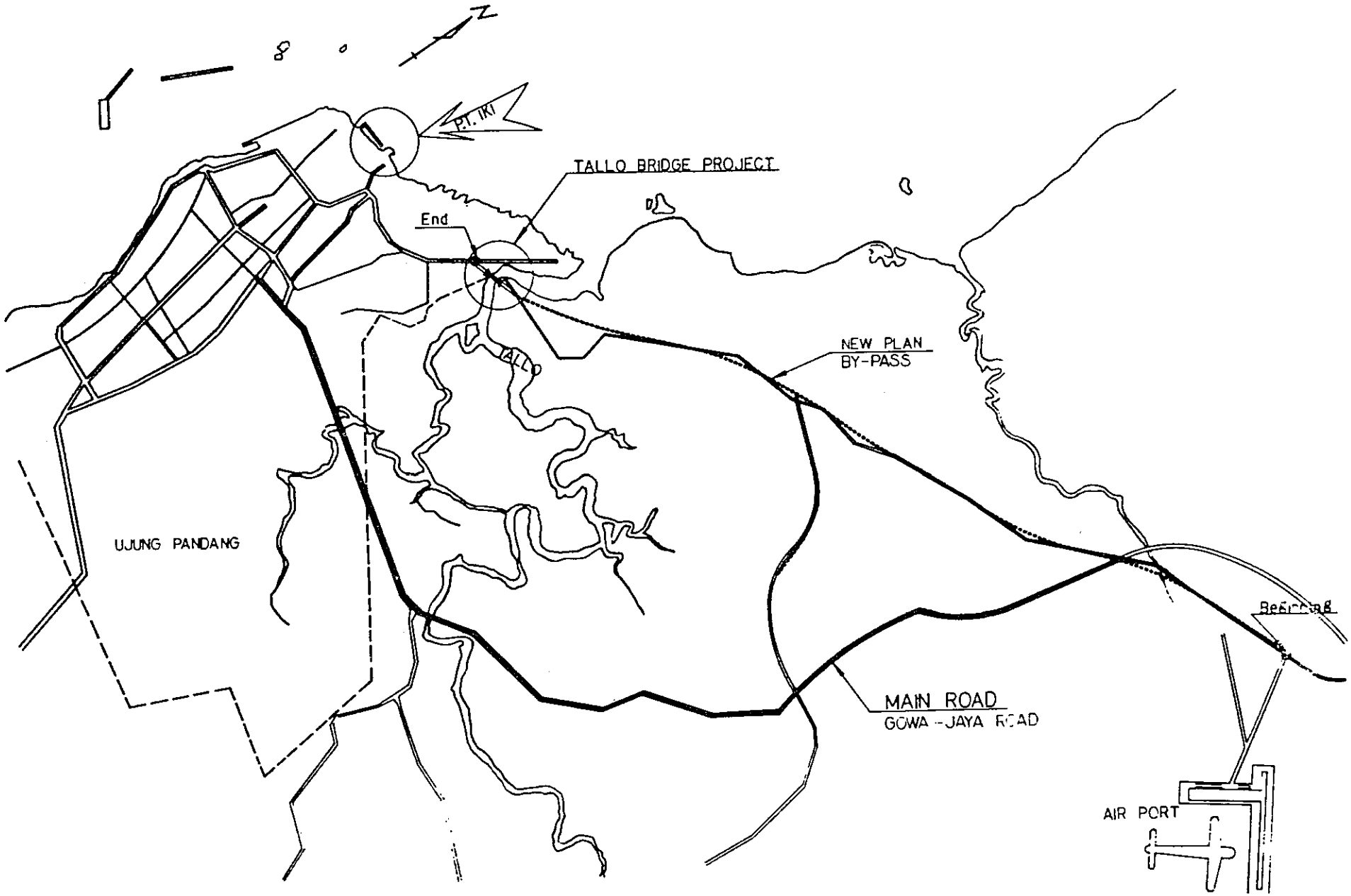


Fig. III-4-11 Road Project in Ujung Pandang

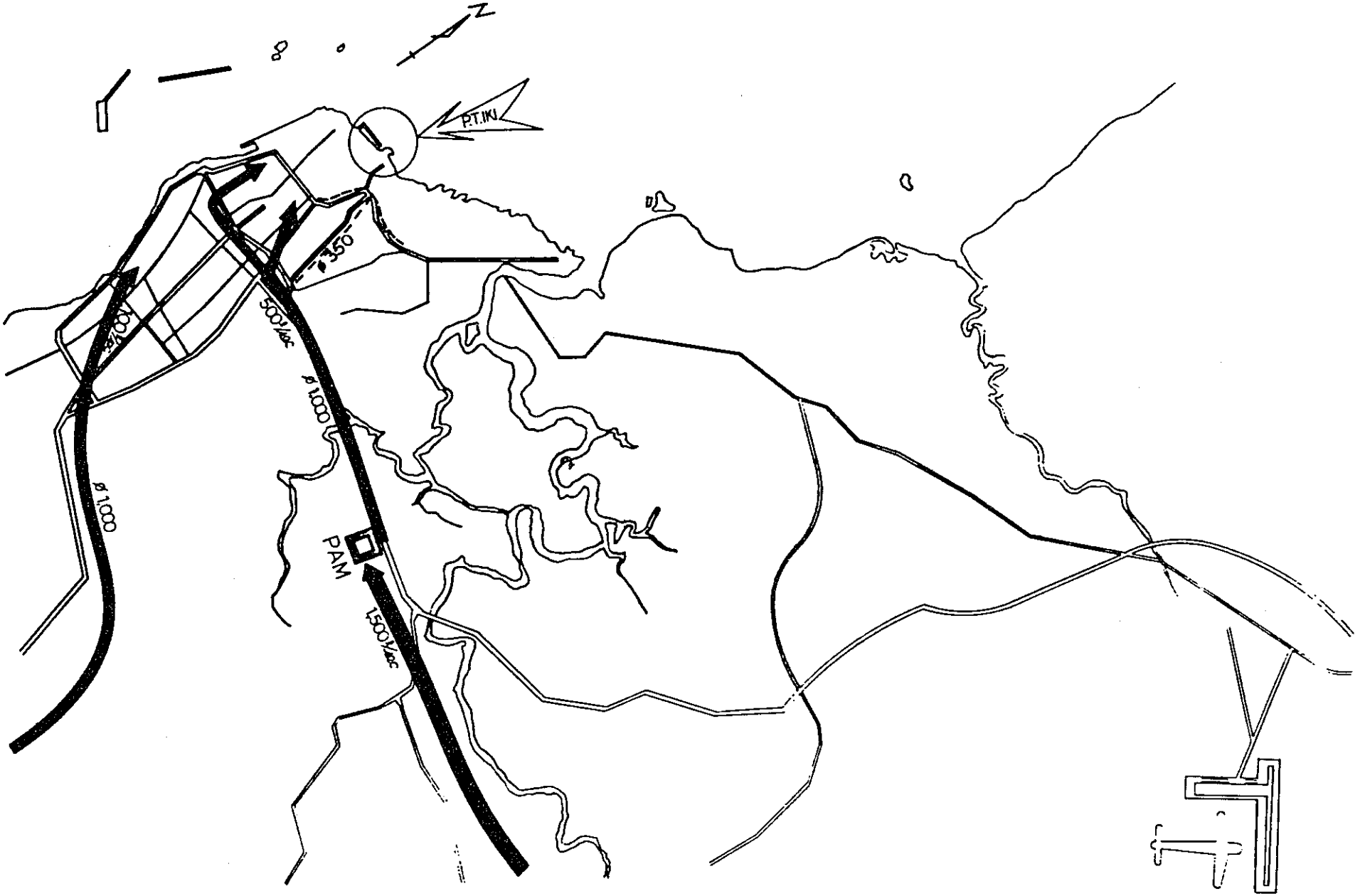


Fig. III-4-12 Water Works in Ujung Pandang

1) The latest change of the power rates brought up a sharp price increase.

2) The capacity of the substation is insufficient and it will need reinforcement.

3) Even if electric power is supplied by the city, emergency generators will be needed.

4) The fuel is cheaper in Indonesia than in Japan.

Nonetheless, the government recommends the use of public electric power instead of in-house sources.

Although it is not required, it will be necessary to obtain government approval before commencement of the expansion.

(5) Acetylene Gas and Oxygen

Acetylene is expensive, and oxygen is not very pure in the city. It is necessary to secure good-quality oxygen by producing it or by inviting plants to the site.

(6) Tug-boat and Barge

A tug-boat can be chartered from the Ujung Pandang Port for Rp 40,000/hour and a 500-ton barge for Rp 50,000/day. Chartering these vessels is more economical than purchasing equipment which will be used infrequently.

(7) Mobile Crane

The First International Plant Hire Company is leasing mobile cranes. In the case of a 10-ton crane, the charge is Rp 40,000/hour, which is relatively expensive.

(8) Vocational Training Center

The city has a well-equipped training center established under a grant from the JICA. The center provides the major courses necessary for shipbuilding, such as drafting, welding, machining, finishing, woodworking electric/electronic engineering and sheet metal processing. The training cost is low, and there is no demand to build other training centers.

4-2-2 Related Industries

For the prosperity of the shipbuilding industry, the development of related industries such as manufacturing of steel, welding rods, paints, gas, oxygen, engines, furniture, electric machineries, pumps and other outfittings is very important.

The local procurement in Indonesia is possible of welding rods, marine paints, lumbers, gas, oxygen, small cast steel, small pipes, small profiles, galvanized iron sheets, etc. In 1983, the production of steel materials for ships is scheduled to be started. No other materials are on schedule for production for the present.

(1) Steel Materials for Ship Use

In the first year of operation of Makassar Shipyard, 1,400 tons of steel materials per year, and on the 7th year of operation, 4,900 tons of steel materials per year will be needed. Right now, there is no production capacity in Indonesia. But in 1983 and thereafter, P.T. Krakatau Steel will start manufacturing steel materials for ship use, and it is expected to supply considerable part of them. The present production of Krakatau Steel is limited to the steel materials for land use. Other mills make only small profiles, pipes, galvanized iron sheets, iron bars for construction. With respect to cast steel, in the first year of operation, 5.5 tons/year will be needed just for full structural members of the ships.

On the 7th year 20 tons/year will be needed of the structural cast steel. It is desirable to procure these castings locally in view of urgency of the need in the construction process. P.T. Barata has experiences in the production of stern tubes and medium-sized anchors, and, therefore, can be expected to be the supplier of cast steel materials in the future.

They can produce the maximum 5 tons of products now and they are now supplying these products to ADIGUNA group. Although they are trying to improve the quality using a J.I.S. specifications as their engineering standard, it needs further efforts to improve the quality of the products.

(2) Welding Rods

In the first year of operation of Makassar Shipyard, 24 tons/year of welding rods will be needed, on the 7th year 84 tons/year of the same will be needed. As long as the quantities are concerned, although local manufacturers have ample production capacities of welding rods for mild steel, there are very few brands which is produced in Indonesia.

In the Makassar Shipyard and other main Indonesian shipyard Shinko RB-26 is one of the most reliable electrode and is very popular. It seems that RB-26 is very popular because it is designed for thin plates and has a good bead appearance, but it is essentially designed only for thin plate, and in case of a thicker plate, although ilmenite type grade-3 electrode which has a good X ray performance is requested, they are not yet produced in Indonesia.

(3) Paints

There is no problem of paints, since a variety of paints are locally produced.

(4) Engine

The ships to be built in Makassar Shipyard will require the engines of over 1,000 H.P. capacities.

Presently, the engines with capacities up to 100 H.P. are only produced in Indonesia. The production of engines more than 1,000 H.P. can not be expected in the near future.

(5) Other Outfittings

There is no local production of these articles except the following.

1) Wooden furniture

There are rich resources of lumbers. Plywood is also locally produced.

Woodworking is still in the stage of cottage industry, workshops are sporadically spread over Ujung Pandang City. Furniture is bulky commodities, so should be procured in the vicinity of the shipyard. It is desirable that some furniture makers shall be trained by the shipyard to learn the knowhow to produce the furniture for ships.

2) Sheet metal articles

There is local production of galvanized iron sheets. Sheet metal articles are bulky and hard to transport like ducts and trunks, so it is desirable either to produce in the shipyard or to produce them in the vicinity of the shipyard. There are small shops run by families. But no large scale factory is seen.

(6) Gas, Oxygen

Acetylene gas is not produced in Ujung Pandang. It is periodically shipped in cylinders from Surabaya. So, the price is very high. Oxygen is available in Ujung Pandang. P.T. Anekagas Industri is the supplier. The purity is low. There is no tank-trailor in the city. It is supplied by bottles, making it expensive. Both gas & oxygen should be either produced inside the shipyard or invite some plants to produce them in the shipyard, so that they would be secured inexpensively and in a better quality.

(7) Non-destructive Testing

There is no X-ray or ultrasonic flaw detector in Ujung Pandang, except BKI. Although it is cost-bearing economically, it is necessary to provide an X-ray and ultrasonic flaw detector in the shipyard.

Ⅳ REINFORCEMENT AND EXPANSION PLAN OF P.T. IKI MAKASSAR SHIPYARD

I. SCALE OF SHIPYARD

Based on the "Demand Estimation" and "Present Condition of P.T. IKI Makassar Shipyard" mentioned before, one berth capable of building vessel up to 5,000 DWT and one dock capable of reparing vessel up to 7,000 DWT are suitable for the reinforcement of Makassar Shipyard. The scale of this shipyard is designed as follows:

1-1 Maximum Size and Deadweight of Vessels

1-1-1 Size of Building Berth

(1) Building Berth

Length 135 m (including working stage 20 m)
Width 20 m

(2) Vessel Size That Can Be Built

About 5,000 DWT
Length overall 110 m (length between perpendiculars about 100 m)
Width 15 m

1-1-2 Size of Repairing Dock

(1) Repairing Dock

Length 140 m
Width 18 m
Depth 7 m

(2) Vessel Size That Can Be Repaired

About 7,000 DWT
Length overall 130 m (length between perpendiculars about 119 m)
Width 17.4 m

(3) Future construction of another 25 000 DWT dock with dimension as follows is also being considered.

Length 183 m
Width 24 m
Depth 8 m

1-2 Estimated Shipyard Output

1-2-1 Number of Vessels to Be Built

The production will increase gradually as shown in Fig. IV-1-1 from one 5,000 DWT vessel in the first year to 3.5 vessels in the seventh year.

Typical building programs are shown on Fig. IV-1-3 and Fig. IV-1-4.

1-2-2 Number of Vessels to Be Repaired

The production will increase gradually as described in Fig. IV-1-2 from 20 vessels (or 100,000 DWT) in the first year to 36 vessels (or 180,000 DWT) in the third year.

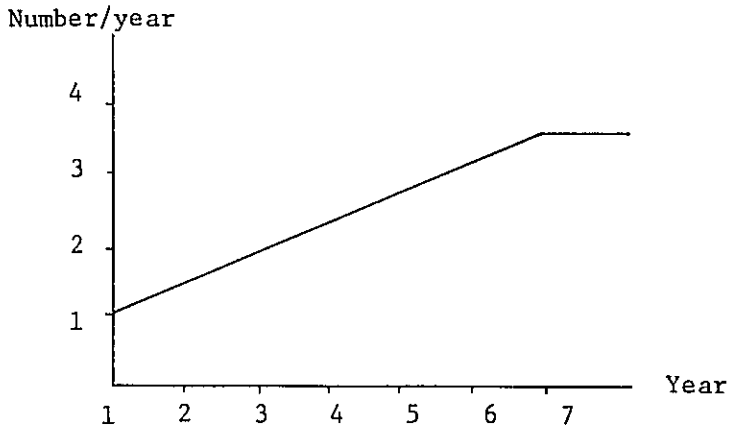


Fig. IV-1-1 Number of New-building Ships

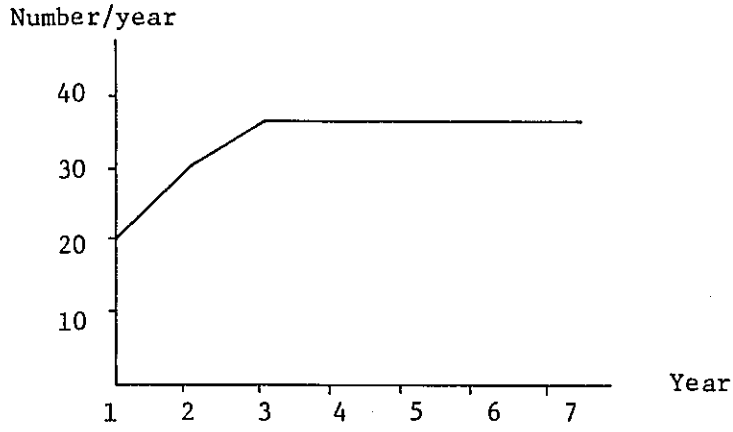


Fig. IV-1-2 Number of Repair Ships

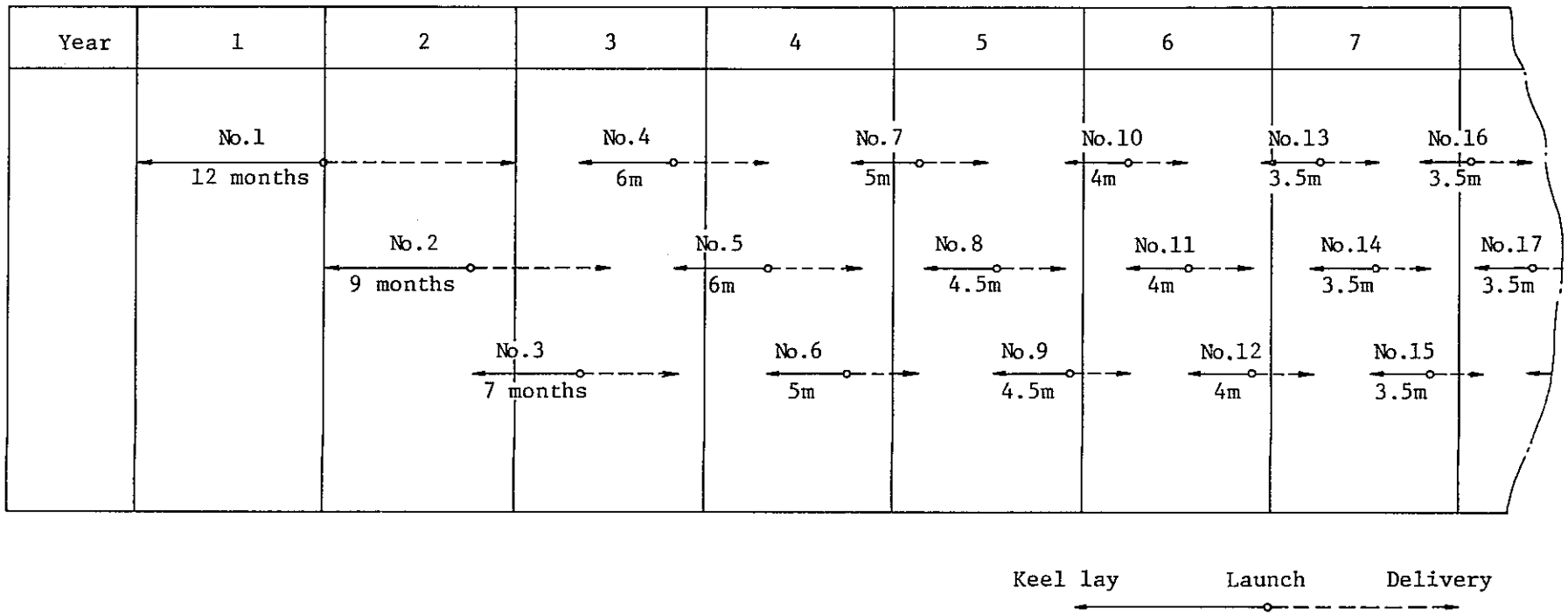


Fig. IV-1-3 Building Program in the Case of 5,000 DWT

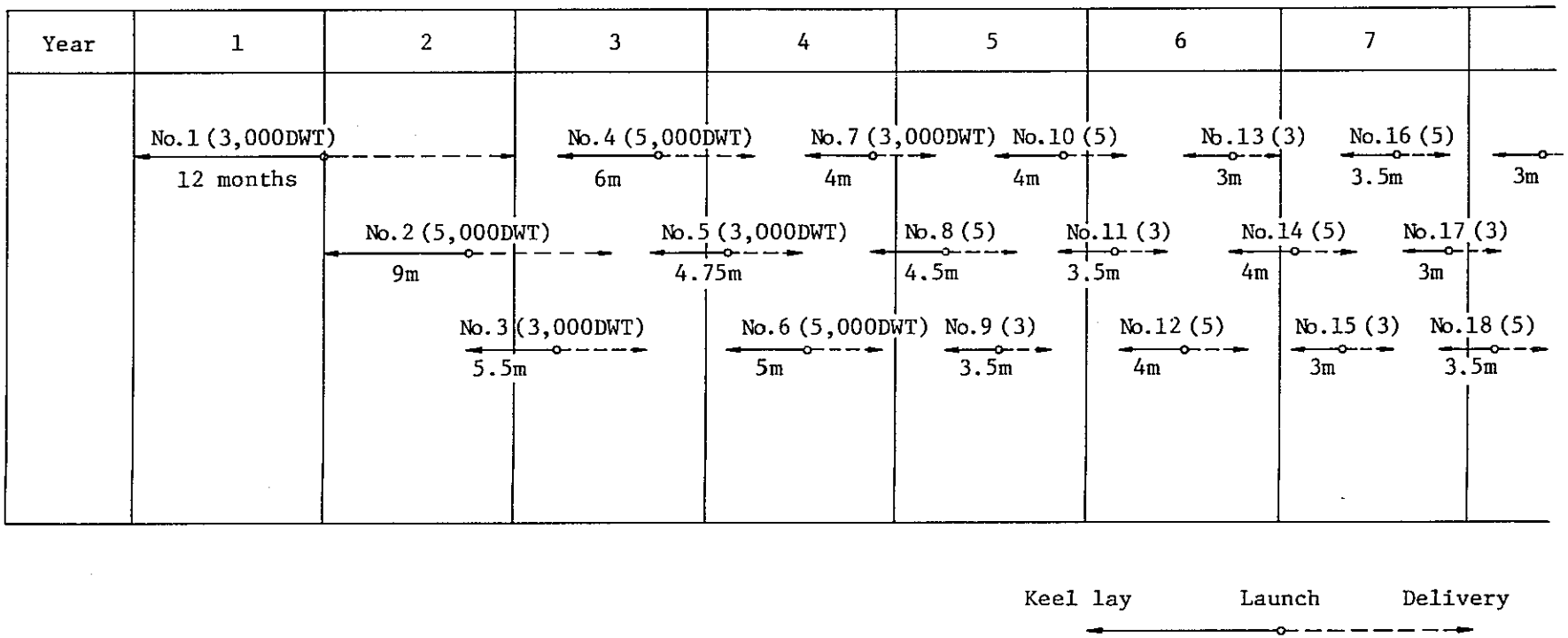


Fig. IV-1-4 Building Program in the Case of 5,000 DWT and 3,000 DWT

2. OPTIMUM LAYOUT

2-1 Basic Concepts

(1) Efforts have been made to attain the maximum effect with the minimum investment.

(2) A straight line system is adopted from the steel stockyard to the berth to minimize the transportation.

(3) Attention has been paid to see that the new facility can produce standard type ships efficiently and that it can also accommodate modifications in the future.

(4) A 1/10 scale drafting system is adopted. According to this system, a template which is made by another company or made together with other companies can be used. This system is convenient for material purchasing.

(5) Hull block construction system is adopted. Hull blocks up to 12 m × 8 m and 30 tons can be assembled. After outfitting, the 40-ton blocks can be erected using 40-ton cranes.

(6) To avoid rain and strong sunlight, shelters have been provided for fabrication, sub-assembly and assembly shops.

(7) The cranes for the fabrication, sub-assembly and assembly are to be goliath cranes which are independent of the shelters.

(8) The crane can move from the steel stockyard to the assembly shop as far as possible to adjust to the amount of work.

(9) The lattice floor plates are also interchangeable in the assembly and sub-assembly shop.

(10) Crane cables are to be the winding-up type.

(11) Unnecessary works are to be eliminated as much as possible. Reinforcement of revetment is limited to crumbling sections.

(12) Available existing facilities are to be fully utilized. A new carpenter shop is not going to be built. Instead the present shop is to be remodeled, and a new warehouse is to be added. When the amount of work exceeds the capacity of carpenter shop, it should be subcontracted.

The existing machine shop is also to be utilized, and only small shop is to be constructed to accommodate the newly furnished large machinery.

(13) The dock is designed as a graving dock. The construction cost of a graving dock is expensive than that of a floaitng dock. However, the dock is designed as a graving dock because it will have a longer lifetime, the maintenance fee is far small and the harbour is too narrow to moor the floating dock in the harbour.

(14) Because public facilities can be utilized at little expenses, a new training center is not going to be built. If it becomes necessary in the future to improve skill development, a welding laboratory will be established at the existing facilities.

(15) A barge, which is not used often, is to be chartered. Purchasing it is considered too costly. One tug-boat is purchased considering the special conditions of Indonesia.

(16) Electric power is to be mainly supplied by the in-house generator and only from outside sources at night. Outside power is expensive, besides it employs transmission cables, power substation and an emergency generator.

(17) Ample space is prepared for acetylene gas and oxygen. To obtain low-cost and good-quality acetylene gas and oxygen, a new plant should be furnished either by the shipyard's own investment or by inviting an other company to the site.

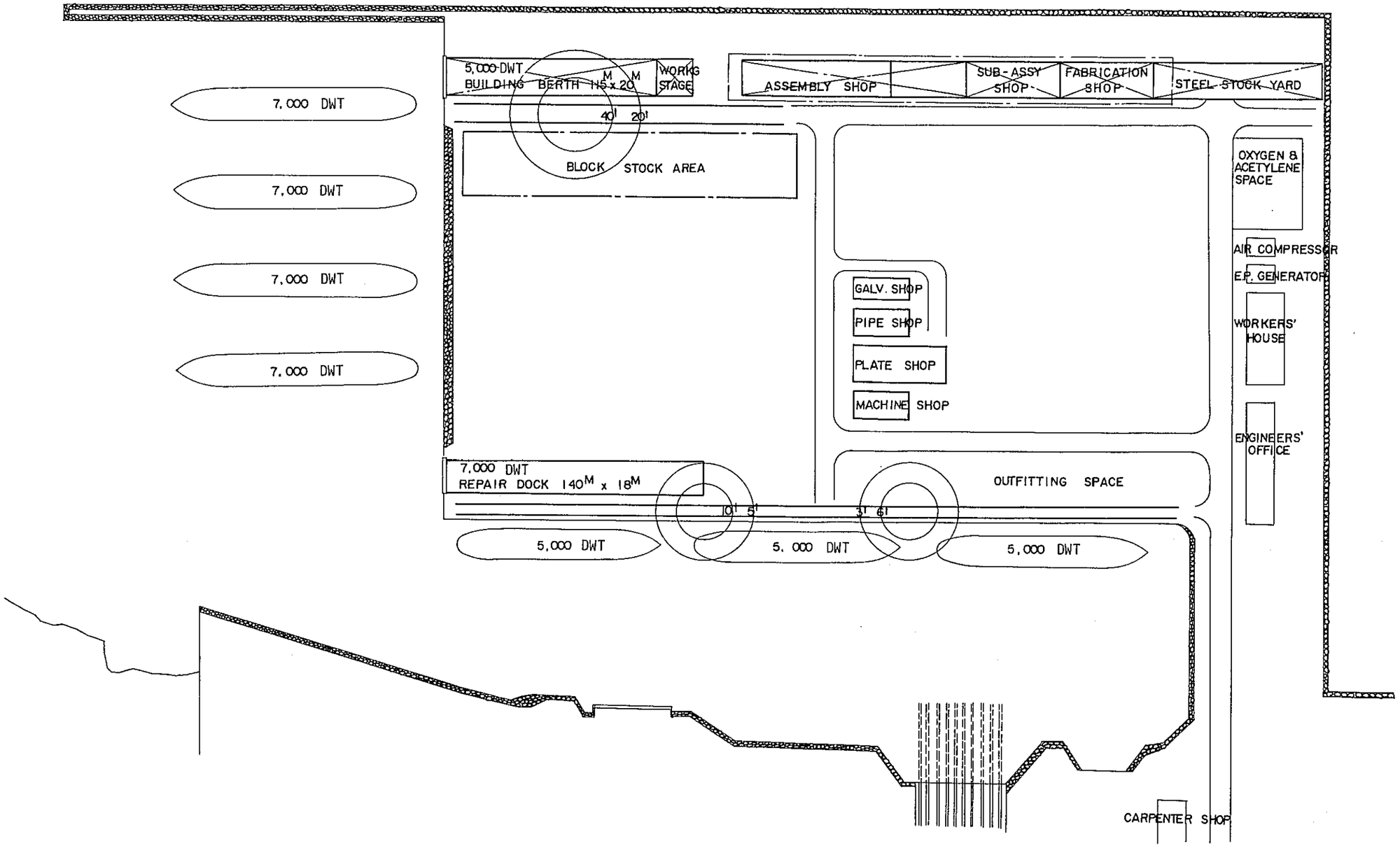
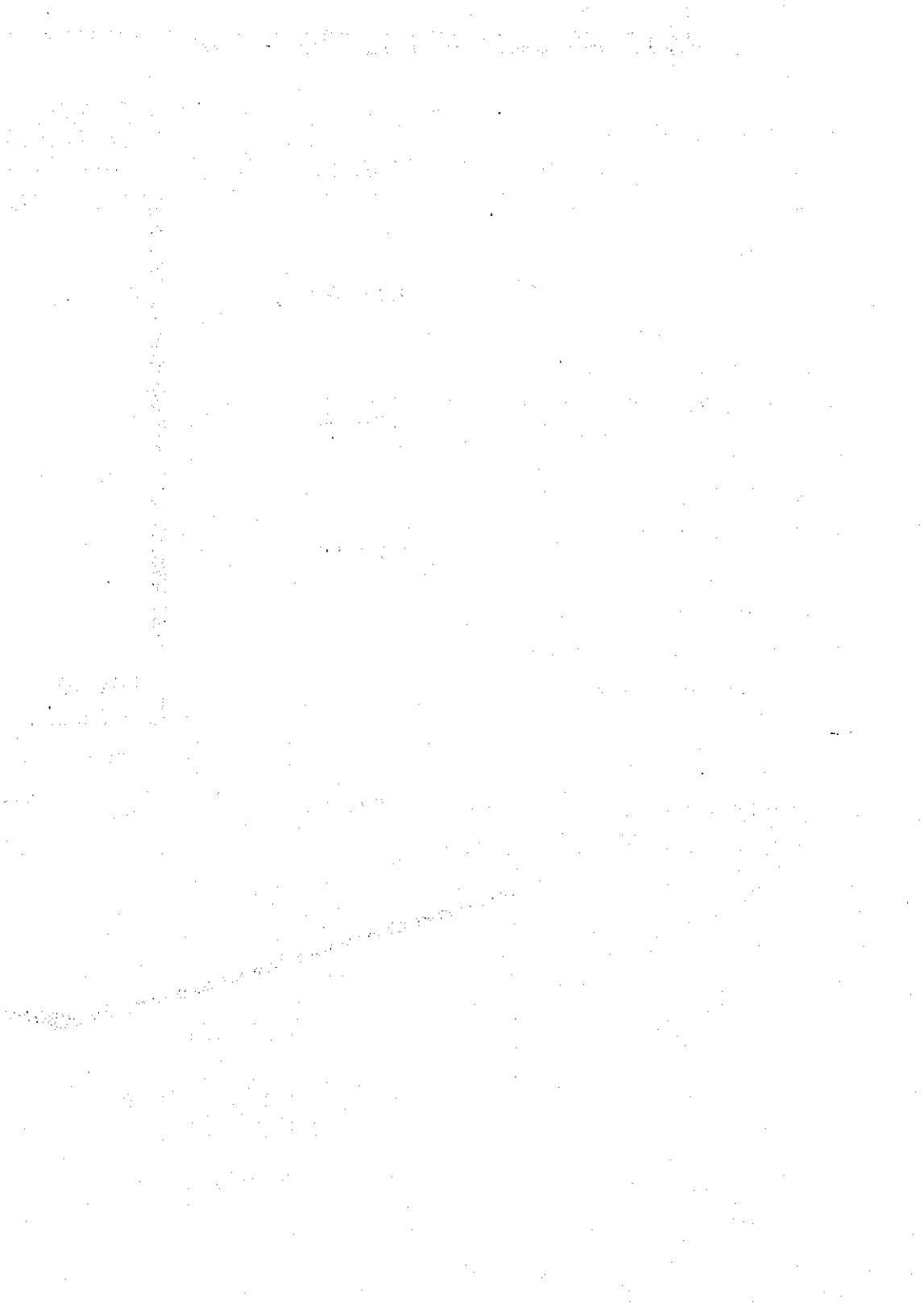


Fig. IV-2-1 Expansion Plan of Makassar Shipyard



2-2 Optimum Layout

(1) The layout is shown in Fig. IV-2-1.

(2) Concerning hull construction every shop including steel stockyard and construction berths is arranged on a straight line except for block storage; this layout is suitable for a block construction system.

(3) An outfitting quay is to be located along the canal. Because the canal is too narrow for vessels to pass, the quay is to be cut back 28 meters.

The quay will have two cranes (10-ton and 6-ton) and outfitting space is located within the crane's reach.

(4) Outfitting shop such as pipe shop, plate shop, machine shop and galvanizing shop are arranged in a place so that it is convenient to go either to the building berth, outfitting quay or repair dock.

(5) In the future, when a 25,000 DWT repair dock is necessary, it is recommended to be built along the 7,000 DWT dock.

2-3 Outline of Facilities

The planning of facilities are made by the procedure shown on Fig. IV-2-2. Details of facilities are shown on Table IV-2-1. However, the outline of them is as follows.

2-3-1 Steel Stockyard

(1) Ample area is to be provided for the stockyard. Steel plates are to be stored according to plate thickness for easy identification.

(2) A shot blast machine is furnished in the steel stockyard.

(3) The stockyard crane is to be a 3-ton goliath crane with 6.5 m lifting height. This crane will not be available for the unloading of materials from a barge directly. Instead, the crane for outfitting or for the construction berth is to be used for unloading.

(4) The layout of steel stockyard is shown on Fig. IV-2-3.

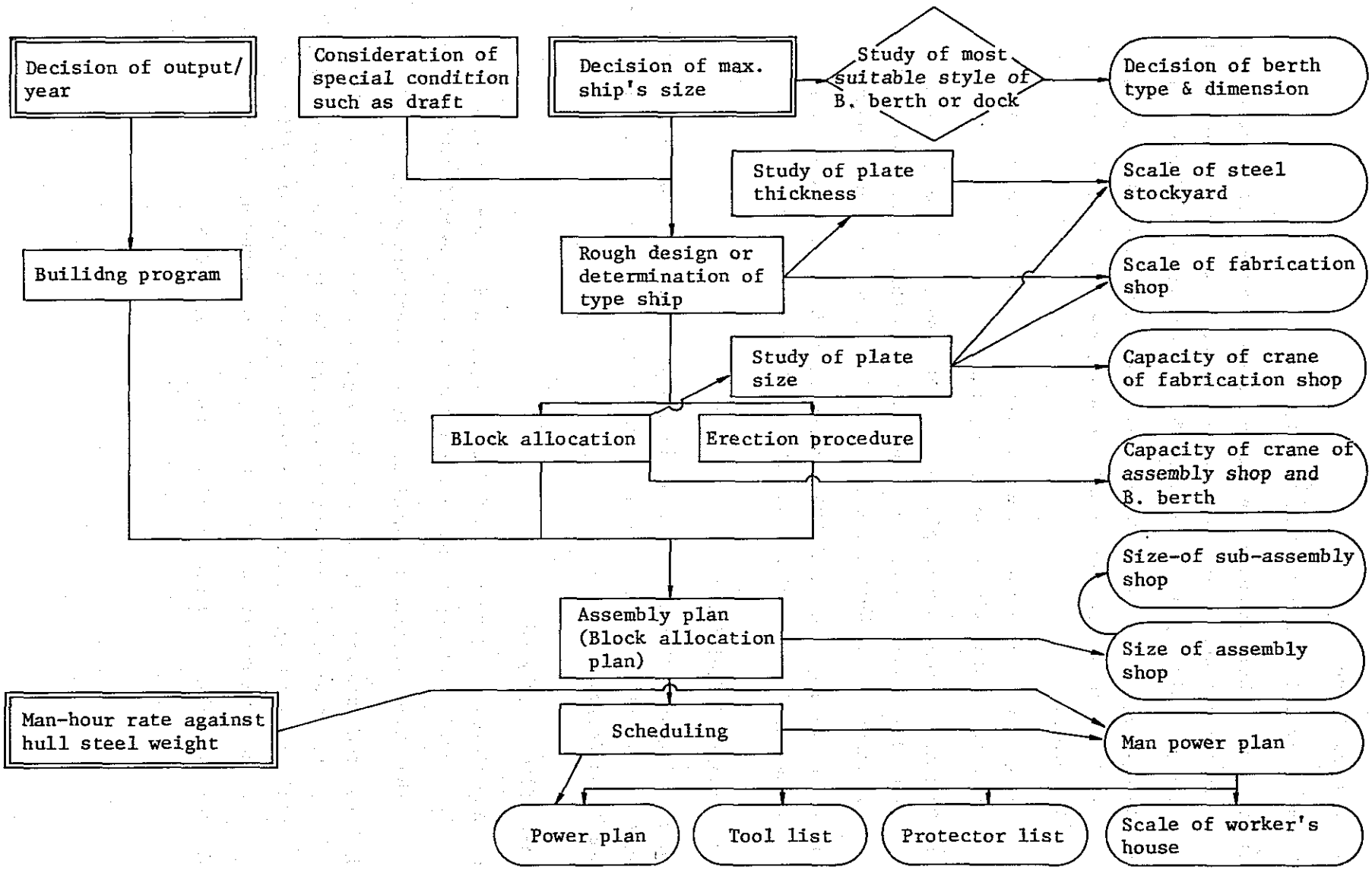


Fig. IV-2-2 Procedure for Planning Shipbuilding Facilities

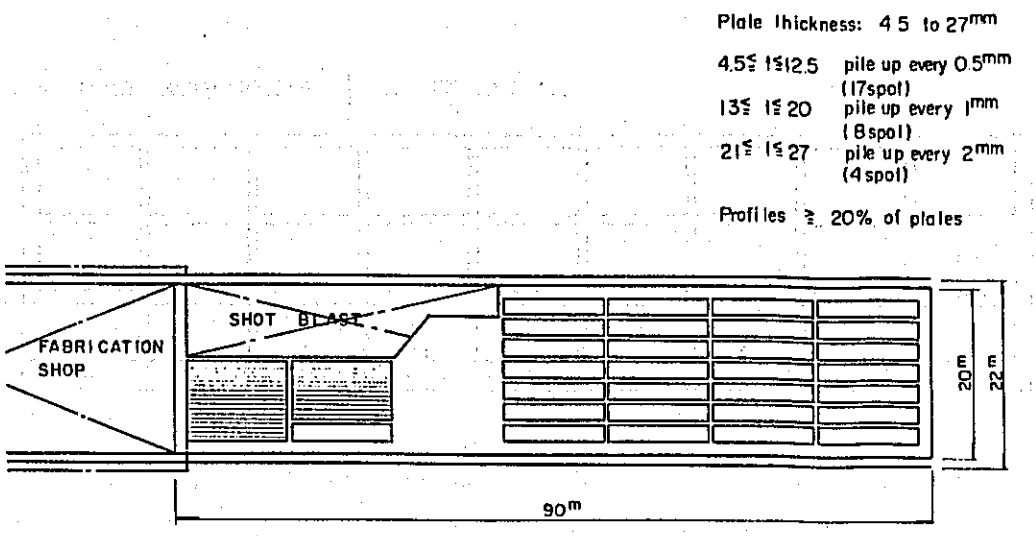


Fig. IV-2-3 Steel Stock Yard

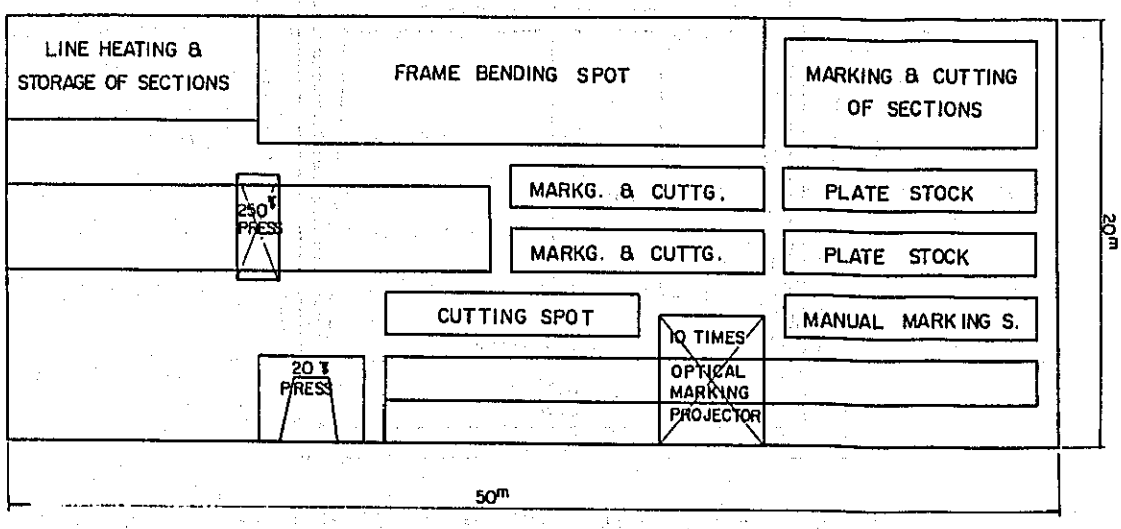


Fig. IV-2-4 Layout of Fabrication Shop

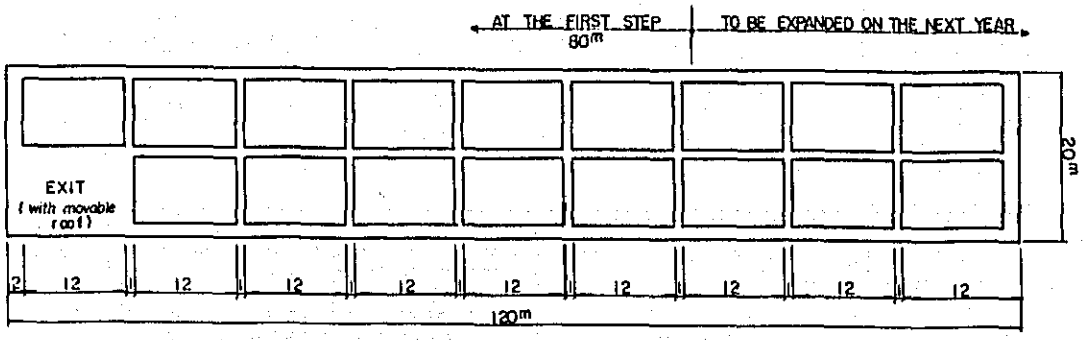


Fig. IV-2-5 Arrangement of Assembly Shop

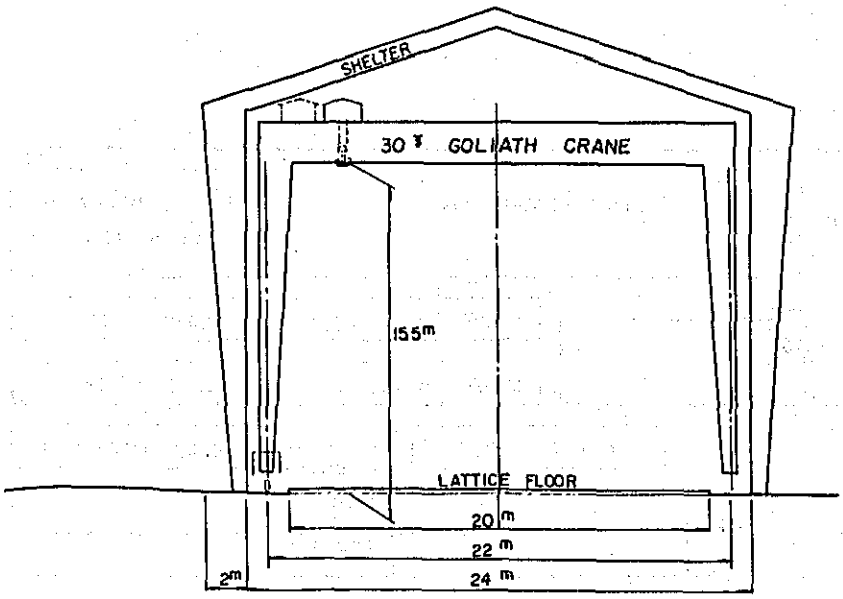


Fig. IV-2-6 Section of Assembly Shop

2-3-2 Fabrication Shop

(1) Simplified roof design is adopted to avoid direct sunlight and rain during the rainy season. The inside width is 24 m, and the crane can travel freely under the roof.

(2) The crane is to be a 3-ton goliath crane with 22 m span and 6.5 m lifting height.

(3) Two marking methods are to be used. One is an optical marking system by which even complicated lines can be easily projected on the plate. Procurement of a 1/10-scale template makes the marking very easy. The other is the conventional manual marking system using drawings or tables.

(4) A bending roller is not adopted because the daily bending work is small. Only a press for universal use is adopted.

(5) The floor is to be concrete. However, horizontal press site (frame bending spot) is to have a honeycomb floor plates.

(6) The layout of fabrication shop is shown on Fig. IV-2-4.

2-3-3 Sub-assembly Shop

(1) Simplified roof design is adopted. The inside width is 24 m.

(2) The crane is to be a 5-ton goliath crane with 22 mm span and 7.5 m lifting height.

Accordingly, sub-assembly weights up to 5-tons are desirable, however, weight up to 8-tons is also possible considering the handling made by two cranes.

(3) The floor is made of lattice plates buried in the concrete.

2-3-4 Assembly Shop

(1) Simplified roof design is adopted. The inside width is 24 m.

(2) The detail of assembly site is shown on Fig. IV-2-5.

(3) The crane is to be a 30-ton goliath crane with 22 m span and 15.5 m lifting height. Therefore, a 30-ton block can be produced.

(4) The floor is made of lattice plates buried in the concrete.

(5) A section of assembly shop is shown on Fig. IV-2-6.

2-3-5 Building Berth

(1) The building berth is 115 m long with a separate working stage, 20 m long. A gate will be built in the aft end to make the berth a semi-dock style. The water depth in the aft end of the berth is 2 m from the mean water level. Refer to Fig. IV-2-7 and Fiv. IV-2-8.

(2) The above length of the building berth can be shortened to lower the construction cost. Since there is no slipway in the water, the work is easier and also the ship's cost will be reduced.

(3) The crane is 40-ton LLC with a 10 m rail gauge under which a truck can pass. With a 40-ton load, the outreach is 20 m and the lifting height, 37.5 m. With 20-ton load, the outreach and lifting height are 35 m and 27.5 m respectively. Refer to Fig. IV-2-9.

(4) The empty portion in the range of the 40-ton crane is the block stock and outfitting yard. A block of 40-tons after outfitting can be handled here.

2-3-6 Machine Shop

(1) This shop is to hold only new machines to supplement the existing ones.

(2) The kinds of machines furnished are a large-size lathe, a vertical lathe, a slotter and a shaper.

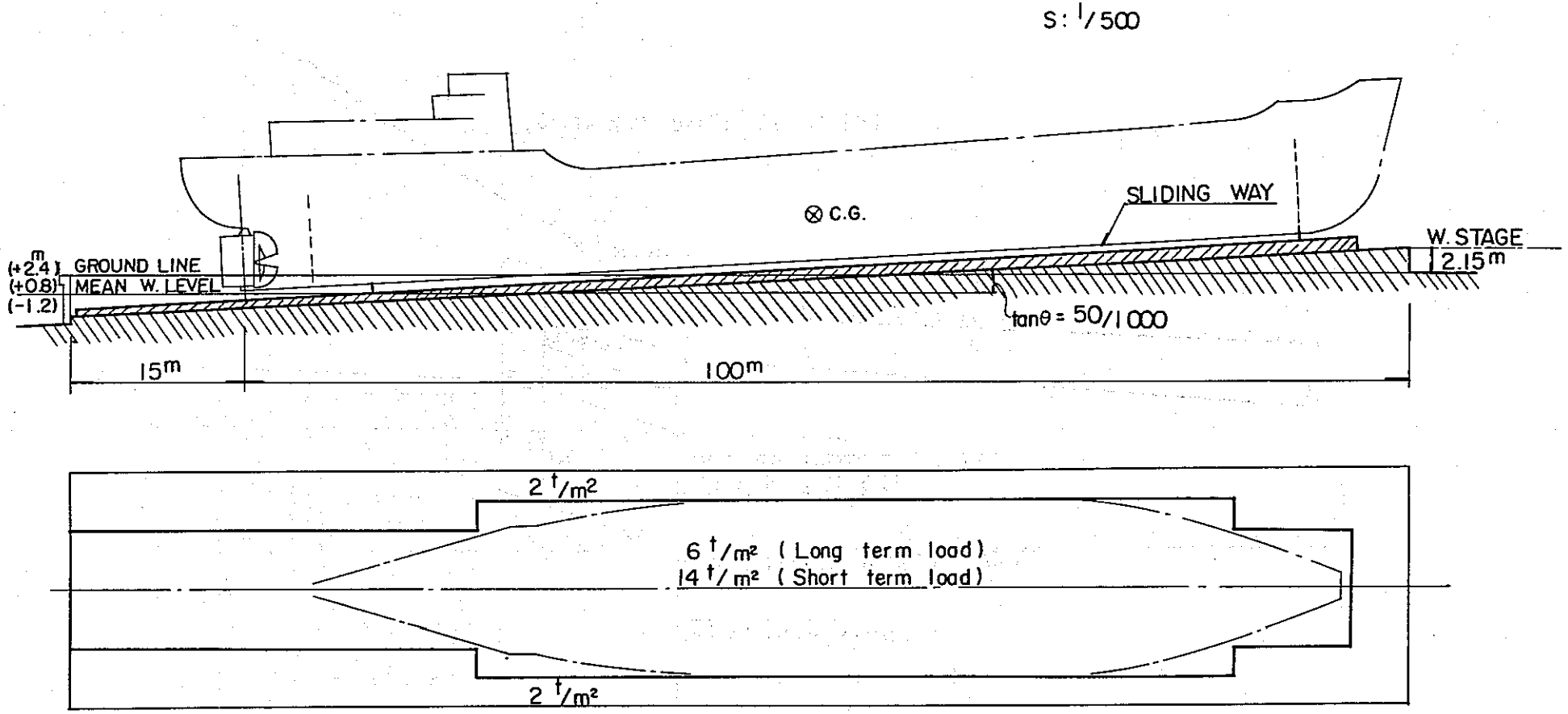
2-3-7 Plate Shop

(1) The shop is comparatively large size (20×50 m) in order to be able to supply bulky goods such as trunks.

(2) The crane to be installed is a 2-ton overhead crane (OHC).

(3) The floor is made of lattice plates.

(4) The machinery includes brake press, spot welder, gap shear, bending roller and drilling machine. The plant is able to produce all kinds of iron goods in combination with the pipe shop.



Value in ( ) shows the height from the LOW WATER SPRING in the TIDE TABLE, which has some discrepancy with O point of chart.

BEARING LOAD

$6^{t}/m^{2}$ long term permi. load.

$14^{t}/m^{2}$ short term permi. load.

Fig. IV-2-7 Position of 5,000 DWT Ship

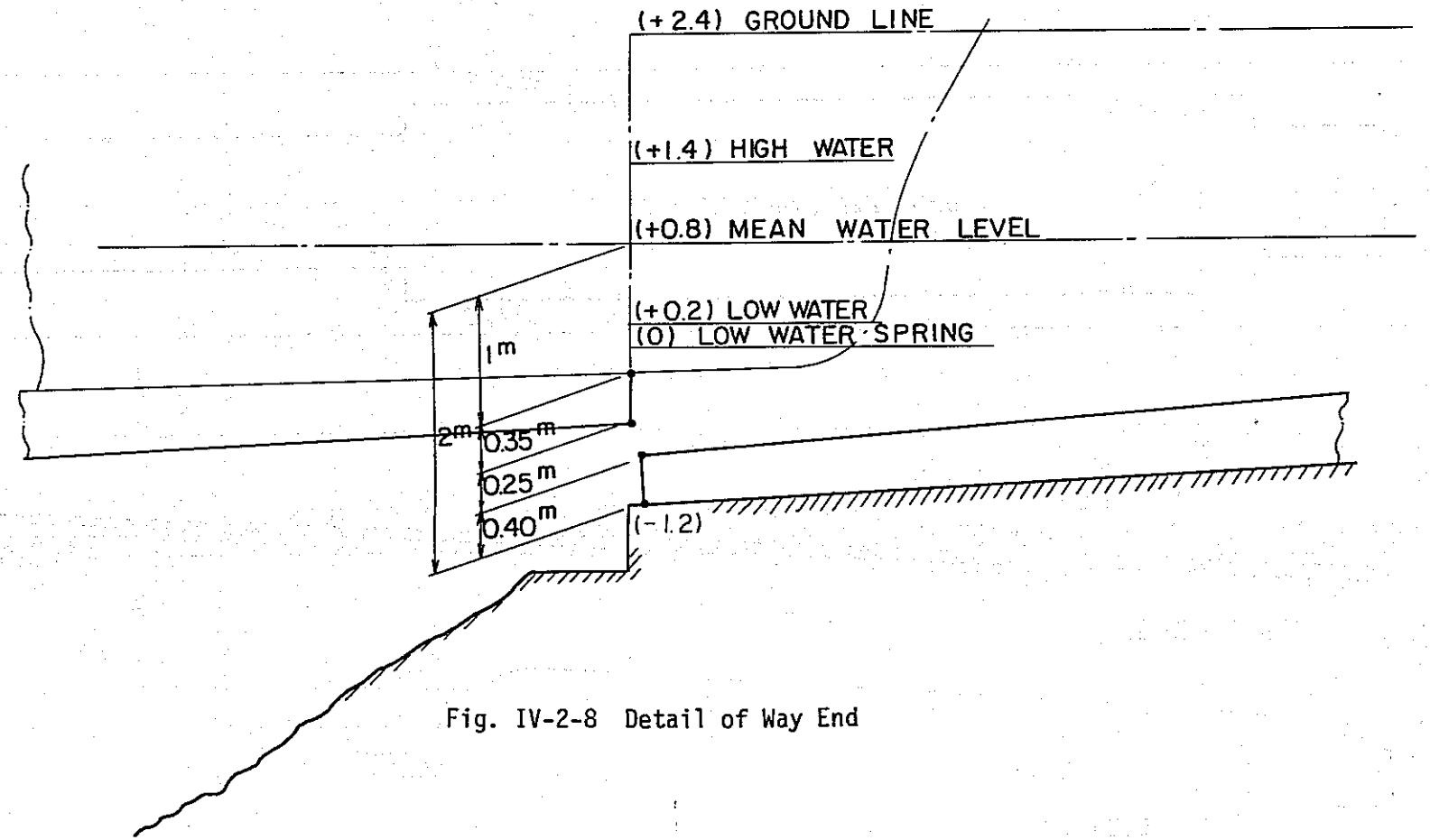


Fig. IV-2-8 Detail of Way End

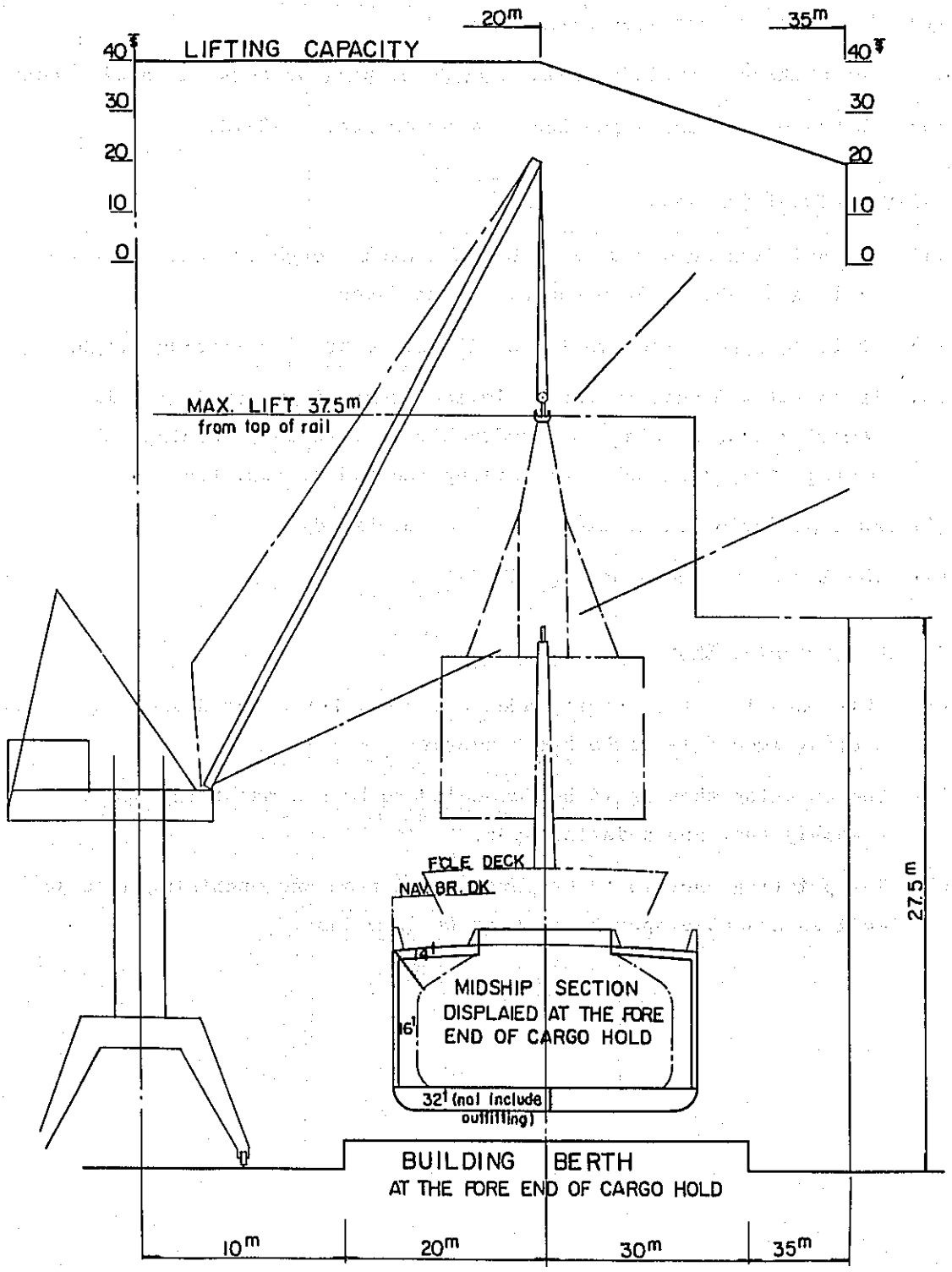


Fig. IV-2-9 40 t Crane

2-3-8 Pipe Shop

(1) The building measures 15 × 30 m.

(2) The shop is installed with 1-ton OHC.

(3) The machinery includes 6-in. and 2-in. pipe benders and a pipe cutter.

(4) The layout of the pipe shop is shown on Fig. IV-2-10.

2-3-9 Galvanizing Shop

(1) The building measures 12 × 30 m and high enough so that a crane lifting height of 12 m can be accommodated.

(2) It is equipped with two 1-ton OHC with over 12 m lifting height.

(3) It contains 8 tubs in the following order of processing: oil-removing tub, washing tub, hydrochloric acid tub, washing tub, storage tub, flux tub, galvanizing tub and cooling tub.

(4) Anti-pollution facilities are also furnished.

(5) The layout is shown on Fig. IV-2-11.

2-3-10 Carpenter Shop

(1) This shop is not to be expanded but a warehouse for drying and storing lumber is to be built nearby.

(2) The existing shop is to be remodeled to have a machining spot, assembly spot and painting spot.

(3) The painting spot is to be partitioned from the machining spot as well as assembly spot to protect it from dust.

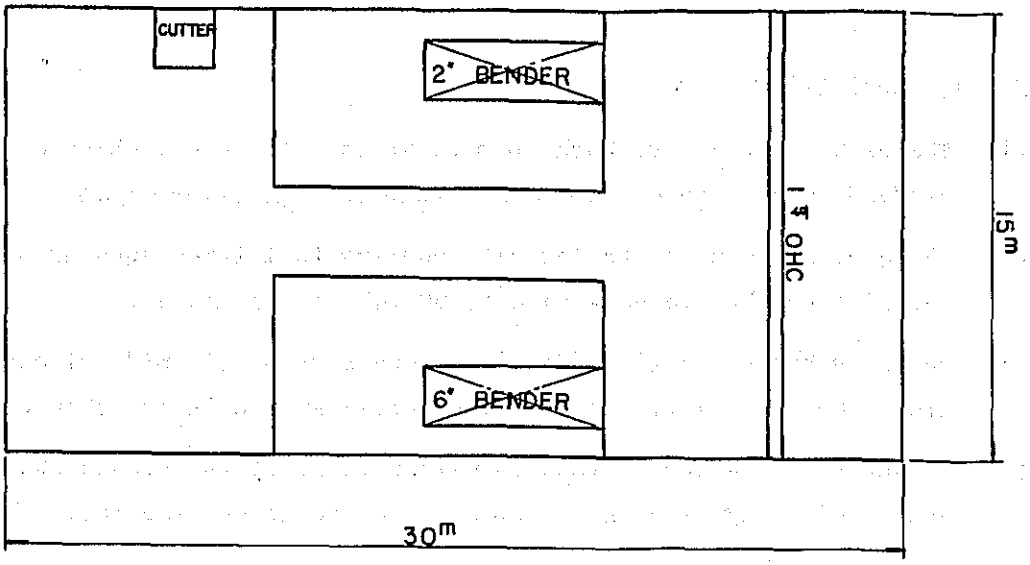


Fig. IV-2-10 Layout of Pipe Shop

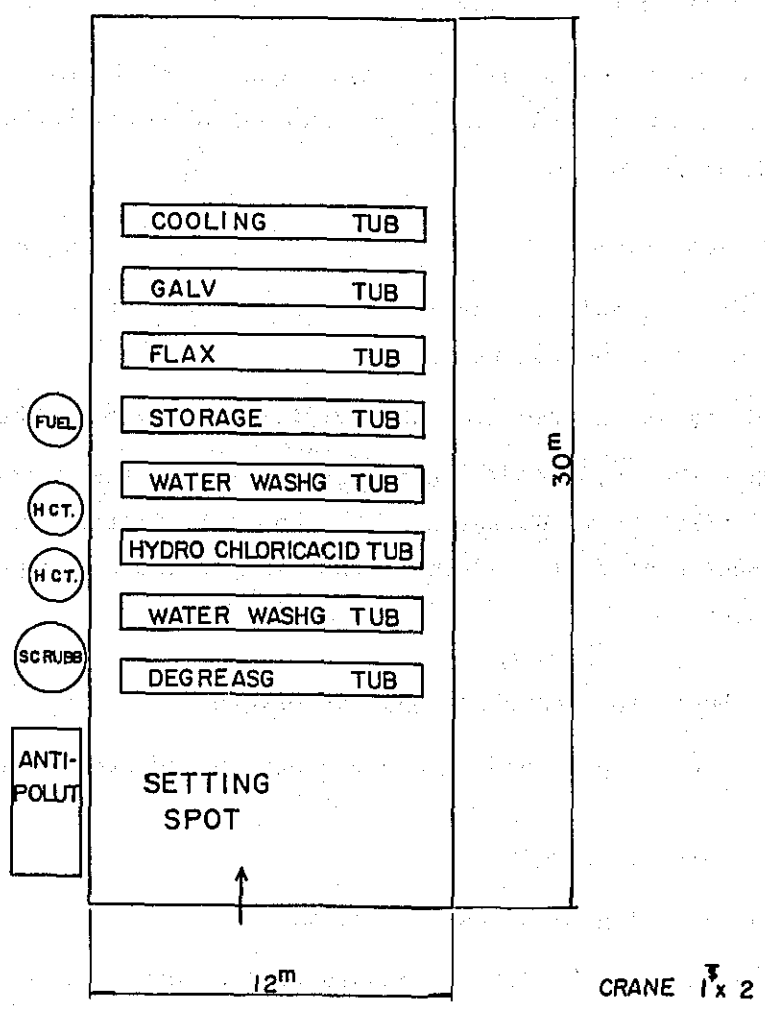


Fig. IV-2- Galvanizing Shop

2-3-11 Outfitting Quay

(1) The bank is to be cut back 28 m to broaden the canal which will be dredged to a depth of 3.5 m to create the outfitting quay.

(2) The quay is to be installed with mooring facilities such as winch and bitt so that vessels upto 5,000 DWT can be moored.

(3) One 5/10-ton crane (15 m/26 m) and one 3/6-ton (15 m/26 m) crane are to be installed. Both of them will have rails for a 10-ton crane.

(4) An outfitting space is located within range of the cranes where the unit outfitting, finishing and storage are to be executed.

(5) Mooring facilities are also to be installed on the harbor side quay dredged to the water depth of 4.5 m so that vessels upto 7,000 DWT can be moored. Refer to Fig. IV-2-12.

(6) In order to construct a large repair dock in the future for vessels up to 25,000 DWT, the place must be additionally dredged to a water depth of 5.5 m.

2-3-12 Repairing Dock

(1) A dock capable of receiving vessels upto 7,000 DWT (L140m × W18m × D7m) is to be constructed.

(2) The existing crane for the outfitting quay is to be used.

(3) When the 25,000 DWT docking facilities (L183m × W24m × D8m) will be constructed in parallel to the above facilities in future, it is considered that a 40-ton crane will be installed between the two docks.

2-3-13 Space for Acetylene Gas and Oxygen

Enough space is provided to produce oxygen and acetylene.

2-3-14 Compressor Room

(1) The building measures 10 × 15 m.

(2) Two existing 90 HP compressors will be moved in and another 150 HP one will be installed.

(3) The existing air accumulator will be moved inside.

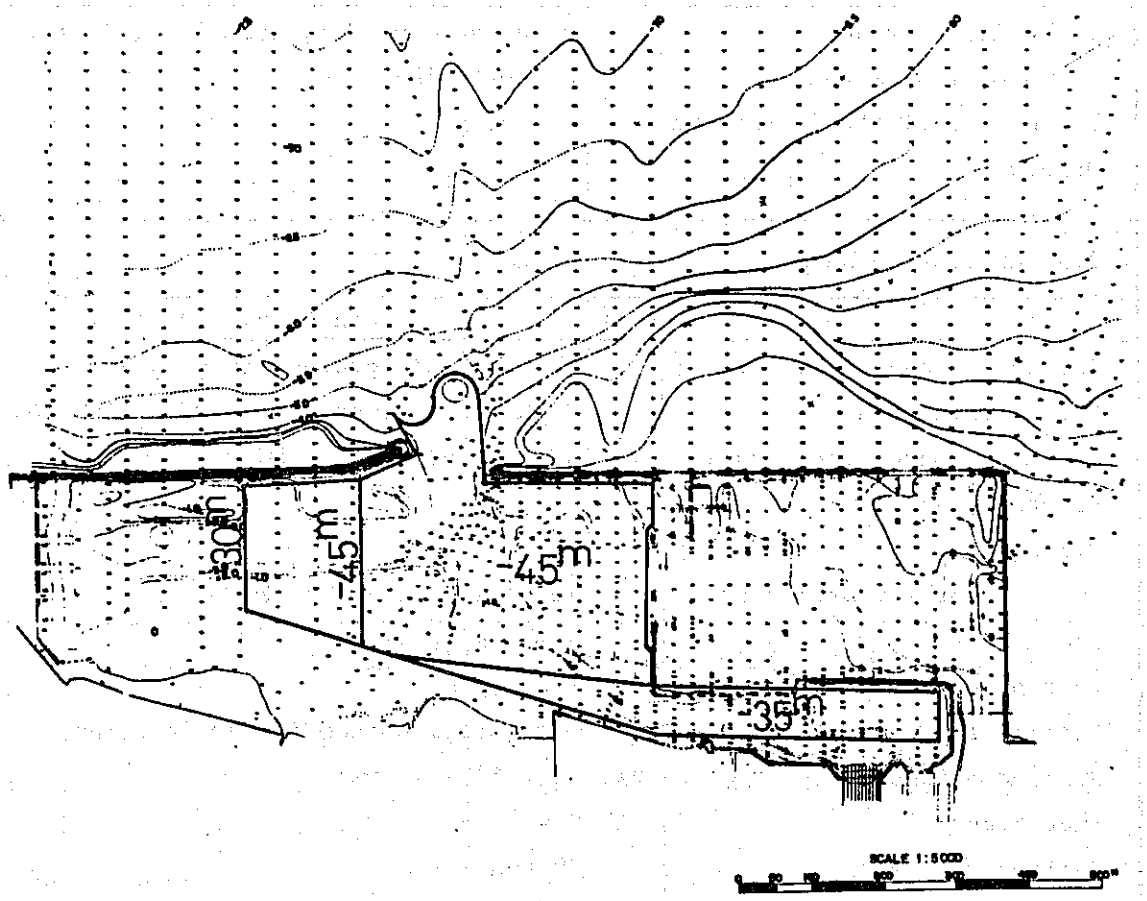


Fig. IV-2-12 Plan of Dredge

2-3-15 Generator Room

(1) The building measures 10 × 15 m.

(2) Three 700kW generators will be installed including one spare.

Table IV-2-1 Detail of Facilities

1. Steel stock yard

Item	Unit	Main Particulars
3 t goliath crane	1	With cable winder, span 22 m, lift 6.5 m
3 t G.C. foundation		Without pile
3 t G.C. rail (incl. fitting)		L = 90 m
Others		

2. Fabrication shop

Item	Unit	Main Particulars
Shelter & concrete floor		Shade & rain protection only 24 × 50 m
3 t goliath crane	1	With cable winder, span 22 m, lift 6.5 m
3 t G.C. foundation & rail		Without pile L = 50 m
Electric cable		
Piping		
Optical marking projector	1	10 times 2.5 m × 12 m
250 t press	1	B = 4 m
20 t press	1	d = 1.3 m
Lattice floor	6	With steel bottom for gus cutting
Honeycomb floor	91	3' × 6' × 75 mmt
Shot blast	1	B = 2.5 m
Horizontal press	1	30 ton
Others		

3. Sub-assembly shop

Item	Unit	Main Particulars
Shelter		Shade & rain protection only 24 × 50 m
5 t G. crane	1	With cable winder, span 22 m, lift 7.5 m
5 t G.C. foundation & rail		Without pile L = 50 m
Lattice floor		Combined with concrete floor & 250 × 90 angle 20 m × 50 m
Electric cable		
Piping		
Others		

4. Assembly shop

Item	Unit	Main Particulars
Shelter		Shade & rain protection only 24 × 120 m
30 t goliath crane	1	With cable winder, span 22 m, lift 15.5 m
30 t G.C. foundation & rail		L = 130 m
Lattice floor		Combined with concrete floor & angle 20 m × 120 m
Electric cable		
Piping		
Others		

5. Building berth

Item	Unit	Main Particulars
Berth		$L_{115} \times B_{20}$ m
Dock gate		B: 20 m D: 3.6 m
40 t LLC	1	With cable winder, 40 t × 20 m (O. reach) (20 t × 35 m (O. reach))
40 t LLC foundation & rail		
Working stage	1	L_{20} m × B_{20} m, steel structure
Electric cable		
Piping		
Wooden block		500 pcs
Launching way		L: 380 m B: 500/700 d: 250 mm
Pump (Main)	1	720 ton/hr incl. piping
(Aux.)	1	incl. piping
(Portable)	5	
Stair way & gang way		
Others		

6. Quay

Item	Unit	Main Particulars
Outfitting quay		L 400 m
10 t LLC	1	With cable winder, 10 t × 15 m, 5 t × 26 m
6 t LLC	1	Ditto 6 t × 15 m, 3 t × 26 m
10 t, 6 t LLC foundation		
10 t, 6 t LLC rail		L: 400 m
Electric cable		
Piping		
Winch	4	10 ton × 20 m
Bollard	14	
Bank (repair)		
Gang way		
Others		

7. Dredging

Item	Unit	Main Particulars
Dredging		370,000 m^3

8. Repair dock

Item	Unit	Main Particulars
7,000 DWT dock		L_{140} m × B_{18} m × D_{7} m
Dock gate		Floating gate 20 m × 7 m
Electric cable		
Piping		
Wooden block		400 pcs
Pump (Main)	1	3,000 ton/hr
Pump (Aux.) 15 HP	2	
Stair way & gang way		
Winch	4	10 ton × 20 m
Bitt	22	
Guide rail		L: 130 m
Others		

9. Machine shop

Item	Unit	Main Particulars
House		15 × 30 m, with OHC rail, concrete floor
20 t OHC	1	Span 15 m
Electric cable		
Piping		
Trolley work		L = 30 m
Large lathe	1	1,200ϕ × 12 m
Vertical lathe	1	1,600ϕ (turn table)
Slotter	1	200 (stroke)
Shaper	1	800 (stroke)
Boring equipment	1	For 5,000 DWT ship
Others		

10. Pipe shop

Item	Unit	Main Particulars
House		15 × 30 m, with OHC rail, concrete floor
1 t OHC	1	Span 15 m
Electric cable		
Piping		
Trolley work		L = 30 m
6" pipe bender	1	max. 6"
2" pipe bender	1	max. 2"
Pipe cutter	1	max. 110ϕ
Others		

11. Galvanizing shop

Item	Unit	Main Particulars
House		12 × 30 m, with OHC rail, concrete floor
1 t OHC	2	Span 12 m
Electric cable		
Piping		
Trolley work		L = 30 m
Tub	8	$L_{8\ m} \times B_{1.2\ m} \times D_{1.5\ m}$, galv. tub 50 mmt
Fume collector	1	Others 12 mmt with lining
Boiler	1	
Fuel tank	1	
Burner	1	
Hydro-chloric acid tank	2	
Anti-pollution apparatus	1	
Scrubber & others		

12. Plate shop

Item	Unit	Main Particulars
House		20 × 50 m, with OHC rail
Lattice floor		20 × 50 m
2 t OHC	1	Span 20 m
Trolley work		L = 50 m
Electric cable		
Piping		
Brake press	1	300 t
Spot welder	1	L 1.2 m
Portable spot welder	1	L 1.2 m
Gap shear	1	B 2.5 m 10 ton
Bending roller	1	B 2.6 m 16 ton
Radial boring machine	1	65ϕ
Others		

13. Carpenter shop

Item	Unit	Main Particulars
Drying space		10 × 30 m, H 6 m (inside dimension)
Circular saw	2	Cross cut saw × 1, elevation saw × 1
Rip saw	1	
Planning machine	1	
Hollow chisel mortiser	1	
Press	1	4' × 8'
Painting room (remodel)		
Others		

14. Gas space

Item	Unit	Main Particulars
Roof & concrete floor		7 × 15 m No wall
Bottle rest	1	
Electric cable		
Piping		
Others		

15. Air compressor

Item	Unit	Main Particulars
House & concrete floor		10 × 15 m
Electric cable		
Piping		
Compressor 150 HP	1	
Compressor 90 HP (transfer)	2	
Cooling apparatus		
Chain block, lifting beam		
Others		

16. Electric generator

Item	Unit	Main Particulars
House & concrete floor		10 × 15 m
Electric cable		
Piping		
Diesel generator	3	700kW
Transformer		
C.block, lifting beam		
Cooling apparatus	1	
Others		

17. Workers' house

Item	Unit	Main Particulars
House		20 × 50 m
Electric cable		
Table, bench, locker, etc.		Table 3' ×6' 200 pcs, bench 400 pcs, locker for 3 persons 400 pcs
Others		

18. Engineers' office

Item	Unit	Main Particulars
House		15 × 65 m
Electric cable		
Desk, chair, locker, etc.		Desk 40, chair 40, F. cabinet 51, locker for 1 person 11, locker for 3 persons 10
Air conditioner		
Others		

19. Pavement & parking space

Item	Unit	Main Particulars
Road		
Parking area for car		
for motor cycle		
for bicycle		

20. Tuck & forklift

Item	Unit	Main Particulars
4 t truck	1	
2 t truck	1	
5 t mobile crane	1	
1 t forklift	1	

21. Communication facility

Item	Unit	Main Particulars
Communication facility	1	

22. Others

Item	Unit	Main Particulars
AC welder	150	500A
	350	300A
DC welder	20	
Submerged arc welder	5	
Drying oven for electrode	1	
Stocker for electrode	1	
Cabtire 38□		
Ditto 60□		
Holder		
Hand shield		
Glove		
Helmet		
Gas cutter	200	
Semi-automatic gas cutter	60	
Oxygen hose		
Acetylene hose		
Air hose 12φ		
Ditto 56φ		
Coupler		

Item	Unit	Main Particulars
Grinder	100	
Drill		
Jack	100	10 t
Ditto	20	50 t
Hammer	130	
Wedge	130	
X-ray apparatus	2	160 kVP
UT flaw detector	1	
Film development equipment		
Film inspection equipment		
Magnetic particle test	1	
Micro meter, other inspection equipment		
Sand blast	2	
Disk sander	30	
Airless spray	5	
Baby grinder	30	
Other painting equipment		
Lifting equipment		beam block, etc.
Wire rope		
Scaffold frame		
Ditto stage		4 m × 300 × 60
Winch	5	1 t
Tug-boat	1	500 HP
Others		

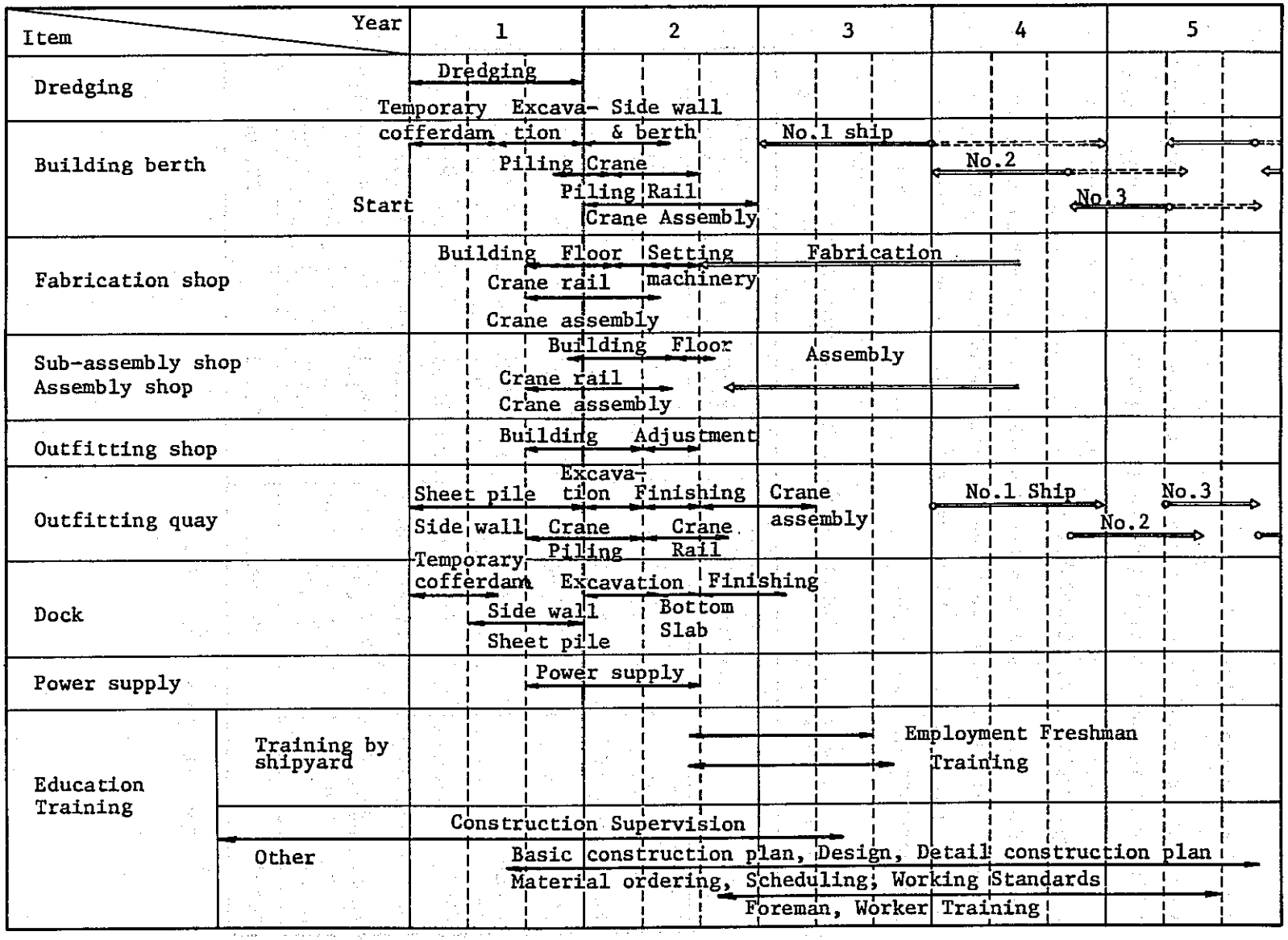


Fig. IV-3-1 Implementing Plan

3. IMPLEMENTING PLAN

3-1 Comprehensive Schedule

A comprehensive schedule concerning to the construction, education and training, ship construction and others is shown on Fig. IV-3-1.

3-2 Construction Investment Program

The breakdown of investment of this project is provided in the Table IV-3-1 (excluding consultant fees). This amount of investment is based on the costs of 1980 and 10% annual rate of inflation is taken into consideration.

Table IV-3-1 Amount of Construction Investment

As of 1984

	Foreign Currency Portion (million Rp)	Local Currency Portion (million Rp)	Total (million Rp)
Fabrication & assembly, etc.	3,474	852	4,326
Building berth	2,811	753	3,564
Outfitting quay	2,889	867	3,756
Dredging	903	603	1,506
Dock	6,087	2,571	8,658
Outfitting shop	1,881	1,128	3,009
Power source	603	183	786
Others	1,560	2,235	3,795
Total	20,208	9,192	29,400

Exchange rate 3 Rp = 1 yen

3-3 Management Plan of P.T. IKI Makassar Shipyard

3-3-1 Organization

P.T. IKI Makassar Shipyard is the largest of four P.T. IKI offices and seems to be equipped relatively well in it's organization. The revised organization and its sound management shall be basically required in order to improve maintenance and after-care of plant facilities as well as to answer to demand increase of new ship building and ship repairing services to be handled at new yard in parallel with repairing works on small-size boats to be done at the existing facilities.

In order to achieve the above picture, the following organization shown in Fig. IV-3-2 will be recommendable. This organization plan is produced in consideration of the following elements.

(1) This organization shall cover the present facility and the new one in the scheme of P.T. IKI Makassar Shipyard.

(2) The administration Department shall have a minimum number of members.

(3) The Sales Department shall be recommended to be set up in the Head-quater, the business section shall have the role to keep contact with ship owners during construction or repairing.

(4) The Public Service Section is newly provided for maintenance of facilities and machinery instead of the present maintenance section. It is definitely recommended to establish a strait instruction system which a general manager takes the command, avoiding to ask plural duties to single manager that have been found in the present organization, so that the management can be able to run business without unnecessary confusion.

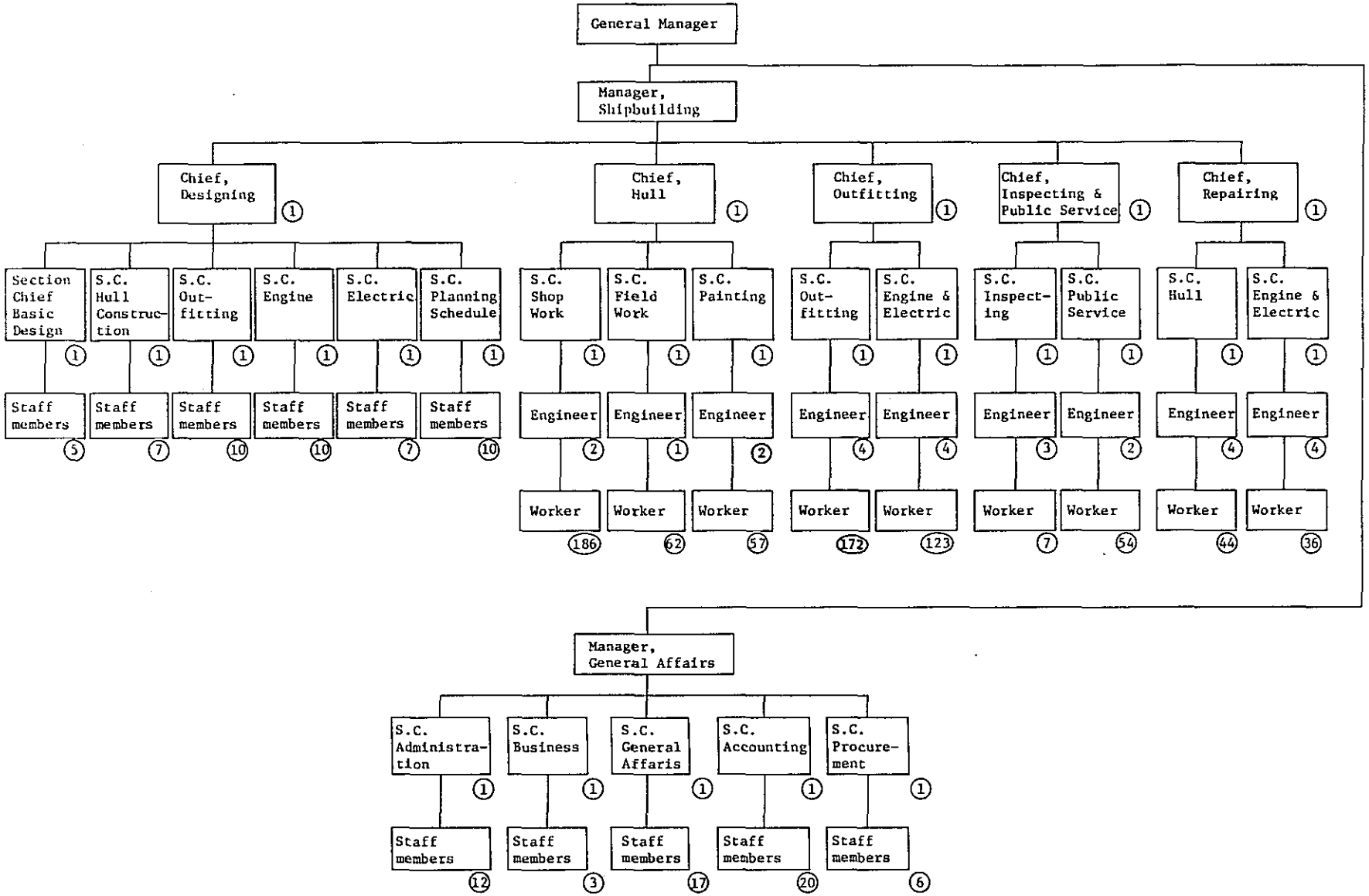


Fig. IV-3-2 Organization of P.T. IKI Makassar

Note: Numbers attached show the number of staff.

3-3-2 Personnel Plan

(1) Personnel Employment and Plan

This plan was established based on the following conditions.

Monthly working hour @ head	165.5 hours/person
Yearly working hour @ head	165.5 hours/person × 12 months = 1987 hours/person
Daily working hour	8 hours/person
Monthly working days	23 days/person
Rate of attendance	90%

According to this plan, 701 persons will be required for the first year of the operation. Working staff-members will be increased year by year corresponding to the expansion of production, and 902 persons will be required in the seventh year.

Fig. IV-3-3 is showing a variation of the working hours with respect to the annual construction of ship numbers and the net consumable steel material weight.

Table IV-3-2 is indicating the number of persons to be required annually. The number shown in this Table includes the present 200 staff-members. These workers who have been engaged in repairing of ships shall simultaneously work for the present repair services of small ships being performed.

Meanwhile, as for the increase of employment, it will be expected to be possible to rely on labour resources in South Sulawesi according to the number of students of Junior and Senior High Schools in South Sulawesi in 1978.

Junior High School	89,868 pupils
Junior Technical High School	11,481 "
Senior High School	32,803 "
Senior Technical High School	6,407 "

(Data) Statistik Indonesia

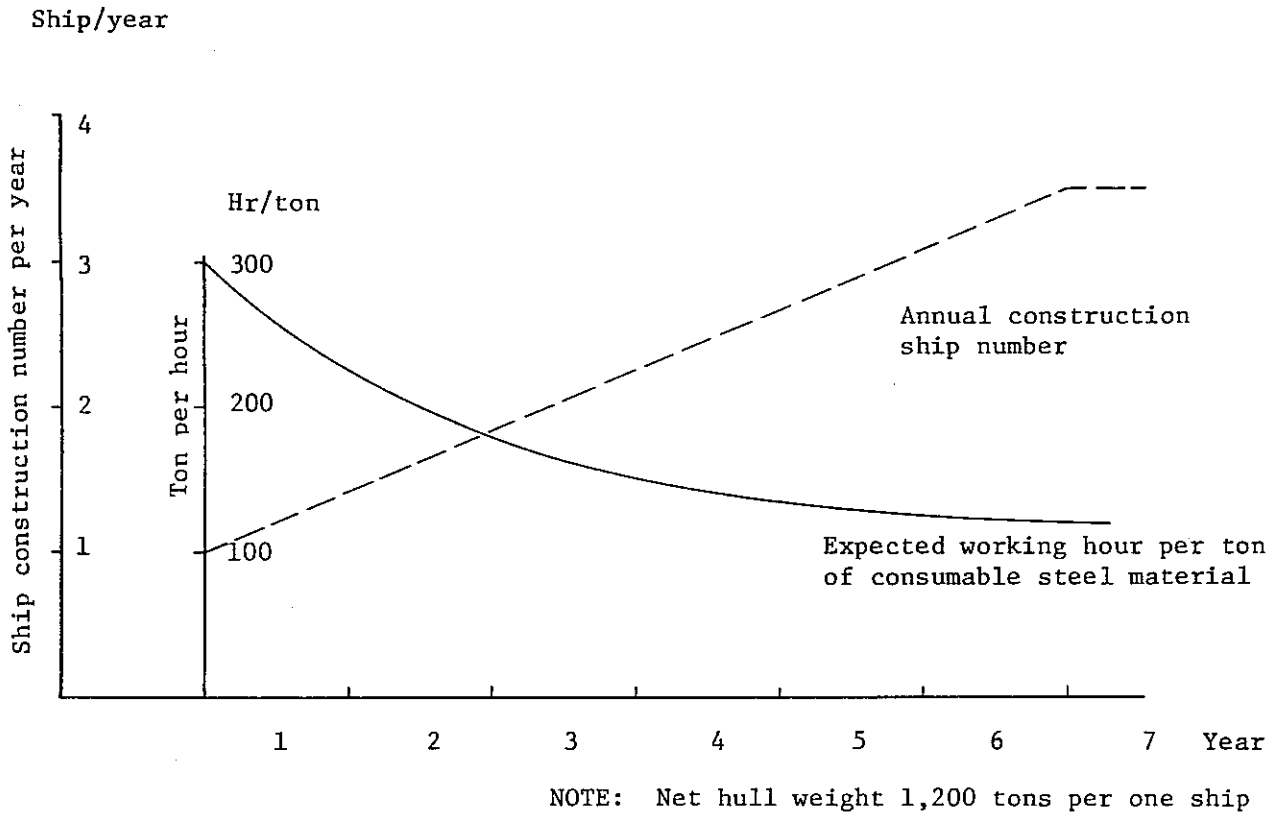


Fig. IV-3-3 Working Hour with Respect to the Annual Construction of Ship Number and the Net Consumable Steel Material Weight

Table IV-3-2 Annual Necessary Employees

Year	Administrative Members	Clerks & Engineers	In-direct Worker	Direct-worker	Total
-1	5	55	28	112	200
1	8	118	55	520	701
2	8	132	56	554	750
3	8	140	58	575	781
4	8	145	58	581	792
5	8	148	60	607	823
6	8	150	60	640	858
7	8	153	61	680	902

Remarks: Indirect-workers: Workers for public service & tug-boat crew

(2) Training Plan

In order to elevate the productivity of hull construction division from 300 Hr/consumable steel material weight ton, (working hours per ton of net steel material) being expected to the construction of the first ship to 120 Hr/consumable steel material weight ton, as have been shown in the aforestated personnel employment plan, such training as consisting of 22 members of technicians and/or skillful workers to be dispatched by some developed country of the shipbuilding industry during a certain long term, being continued to launching of the third ship shall be ideal, in which planning & schedule, design, mold laft, hull, outfitting, and electric training shall be extended to engineers, and the other hand, marking, gas, iron works, welding, automatic welding, assembling, launching, piping, galvanizing, plate works, fitting works, machinery, assembling of machinery, shaft alignment and electric shall be given to workers.

The situation on the shipbuilding schedule and the training to be extended by technical experts is being shown in the Fig. IV-3-4.

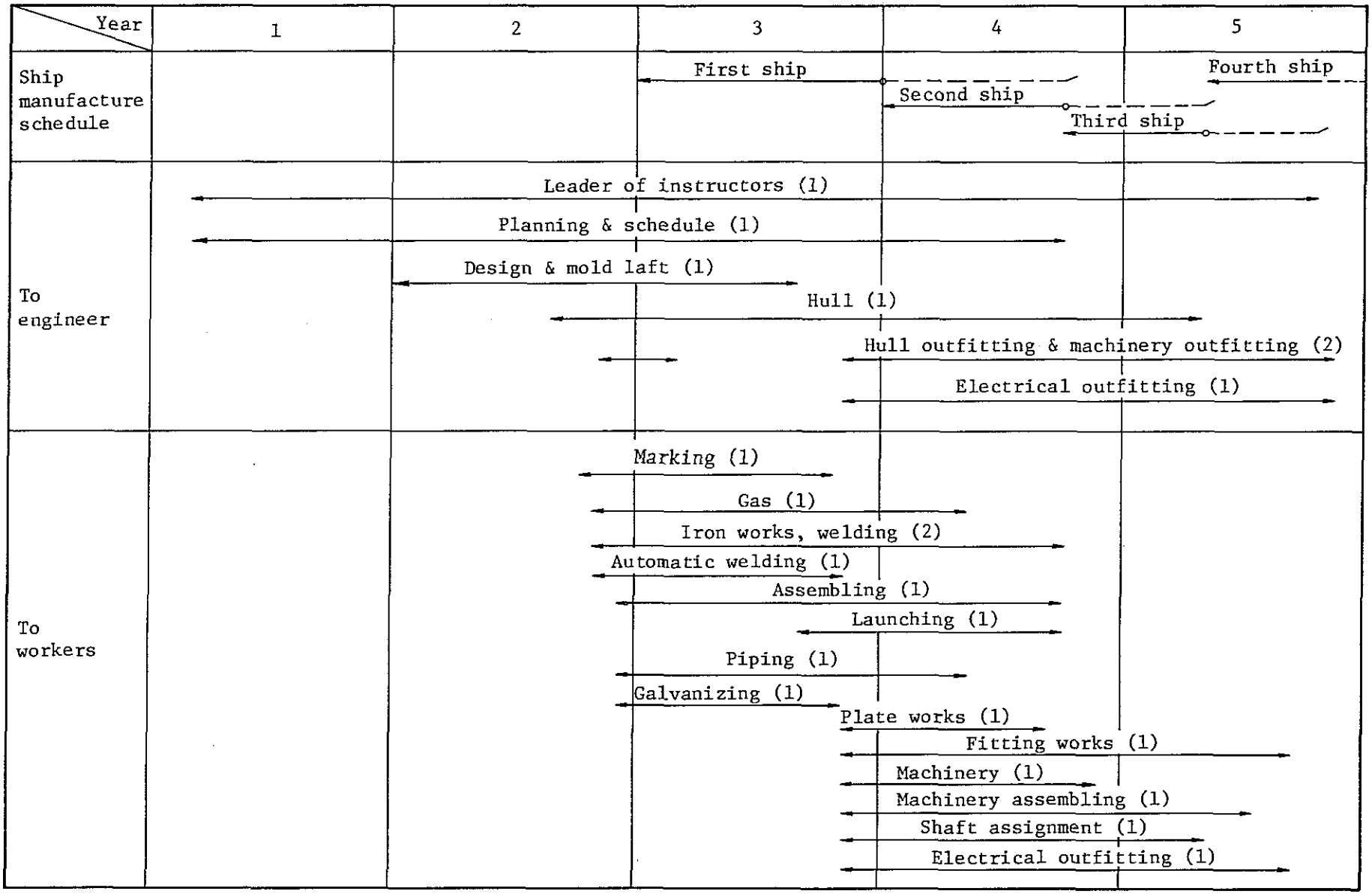


Fig. IV-3-4 Training Schedule

It is considered that the training on-the-job shall be the best system in this project.

This training program is made for such persons as have technology to a certain extent, therefore, it requires to new employees to receive the first-step-training for the first one or two months. In that case, the Vocational Training School to be established by the grand aid from Japanese Government will be suitable for this plan in view of the above training items.

The cost necessary for technical training to be supplied by the skillful experts in some advanced country of shipbuilding industry shall be estimated approximately 5,250,000,000 Rp on the basis for 1978.

3-4 Materials Purchase Program

3-4-1 Purchasing of Materials

(1) *Steel Plates and Profiles*

Until such time that P.T. Krakatau Steel will start producing the steel materials for ship use, same shall be imported from abroad. As soon as the production is started by P.T. Krakatau Steel, the A-grade steel materials shall be purchased from Krakatau Steel and the rest shall be imported.

(2) Cast Steel

P.T. Barata is capable of producing cast steel products. Local products shall be used as far as possible.

(3) Paint

All paints to be used shall be from the local sources.

(4) Wood

All wooden materials shall be obtained locally.

(5) Galvanized Iron Sheets

All shall be locally procured.

(6) Other Materials

For new vessels, it will be necessary to import the other materials from abroad for the time being and package deal seems to be the best system for the import. It will be necessary to maintain an appropriate level of inventory of the standard parts for repairing ships.

3-4-2 Procurement Schedule

All ordering and purchasing date of materials shall be programmed as is shown on Fig. IV-3-5.

3-5 Total Investment

The total investment for this project is as follows (based on the assumption that the construction shall be started in 1983).

The basic figures of costs are for the year 1980, and 10% annual rate of inflation is assumed:

Investment for facilities	Rp 29,400 million
Engineering fee	Rp 2,451 million
Educational & training fee	Rp 5,250 million
Contingencies	Rp 900 million
Total investment	Rp 38,001 million

Exchange rate 3 Rp = 1 yen

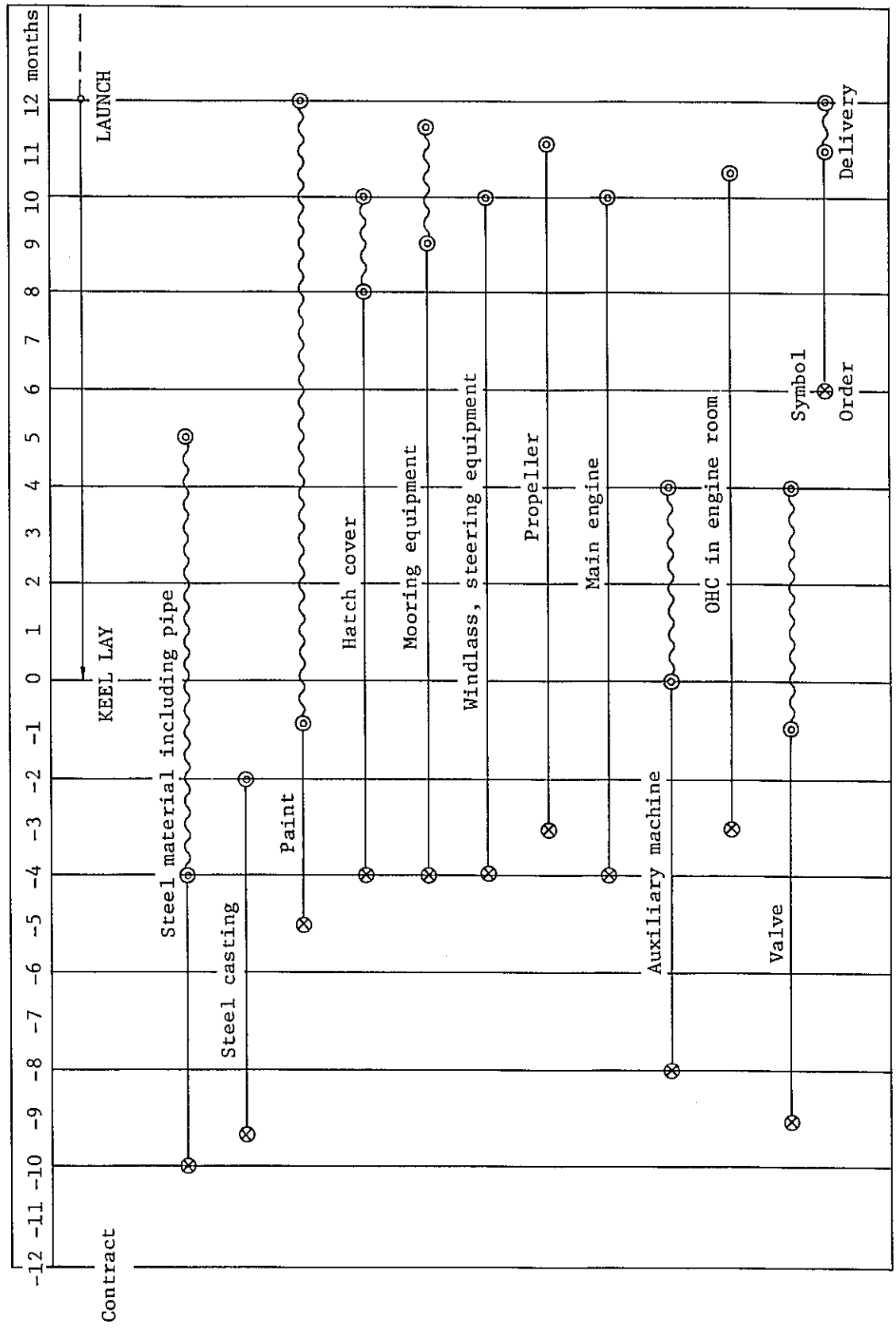


Fig. IV-3-5 Procurement Schedule

4. FINANCIAL ANALYSIS

4.1 Cost Estimation

The cost is estimated as shown in Table IV-4-1 on the assumptions stated below, based on the afore-mentioned production schedule and operational schedule. The following costs are estimated on the basis of 1984 price.

(1) Material Cost

The material costs per vessel are as follows:

New shipbuilding:	2,655 million Rps based on the average of 5,000 DWT.
	2,140 million Rps based on the average of 3,000 DWT.
Repairing:	14.4 million Rps based on the average of 5,000 DWT.

Materials for new shipbuilding take a long time for the procurement, depending the kind of material and the receiver of an order. The terms of payment shall vary from contract to contract. It is assumed in this calculation that the materials cost shall be paid base on term of contract for new shipbuilding mentioned after, that is, 25% of the material cost at the time of contract (about 1 year before starting the construction), 25% at the time of keeling, 25% at the time of launching and 25% at the time of delivery.

The materials cost for ship repairing is assumed to accure in accordance with the repair schedule. It is assumed that 50% of the materials needed will require 9 months to prepare and these materials enough for 20 ships are considered to be kept as constant inventory.

(2) Labor Cost

Average labor cost per head is assumed as follows, based on the present wage level in Indonesia.

Direct labor	88,500 Rps/month
Indirect labor	88,500 Rps/month
Clerk and engineer	138,000 Rps/month

For the new employees, considering probational period of 6 month and period for acquisition of skills, the labor cost is 50% of the above-stated figure for the first year and 80% for the second year. And the incidental expenses of 20% of the labor cost is considered.

The total labor cost is calculated on the basis of personnel plan afore-mentioned under the said assumption. In estimating the labor cost during one-year period preceding the start of construction of the first ship, 65% of the clerks and engineers and 35% of the direct and indirect labors out of the necessary employee in the personnel plan are counted based on the implementing schedule.

(3) Direct Costs

1) Manufacturing department cost

Based on man-hours per vessel

New shipbuilding:	84 million Rps for 5,000 DWT
	72 million Rps for 3,000 DWT
Repairing:	3.6 million Rps for 5,000 DWT on the average

2) Subcontract cost

This is the subcontract cost for ship repairing, which is assumed to be 720 Rps/DWT on the average.

3) Other expenses

Other expenses, shipbuilding insurance and inspection fees, is assumed at 1% of the total cost excluding depreciation cost.

(4) Design and Royalty Fees

Purchasing cost for a set of design is assumed to be 900 million Rps. Considering the standardization of ship to be built, the design is assumed to be purchased for every 4 ships from the first to the 28th ships (the keeling and delivery will be done on the 11th year). And thereafter, the design are purchased for every 10 ships.

1% royalities of the total cost excluding depreciation cost shall be paid for the standard ship. The cost of design for the first ship only shall be treated as organizational expenses, and will not be part of the operating cost. The said design cost is taken up as a depreciation item.

(5) Repair & Maintenance Expenses

Repair and maintenance expenses (F) shall be expressed in the following terms, applying the coefficient of operation of facilities (A), which increases in proportion to the amount of usage and the coefficient of wearing (B), which increases in proportion to the physical aging of facilities.

$$Fn = An \times Bn \times F_1$$

The multiplier means the number of years. The repair and maintenance expenses (F_1) for the first year of operation is assumed at 0.2% of the construction investment. The coefficient of operation, based on the production program, and the coefficient of wearing based on normal S curve are estimated as shown below:

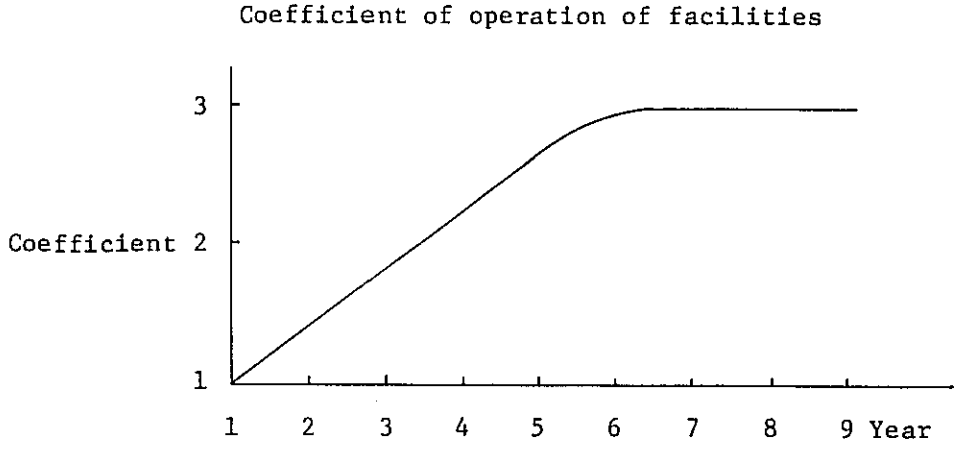


Fig. IV-4-1 Coefficient of Operation of Facilities

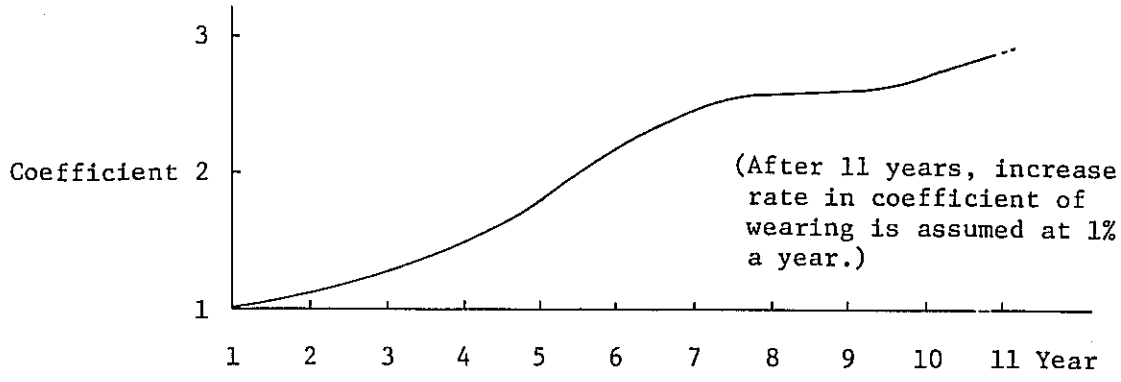


Fig. IV-4-2 Coefficient of Wearing

Out of the repair & maintenance expenses as calculated in the afore-said expression, 20% on the 4th - 5th year and 30% on the 6th year and thereafter are considered as the additional investment with a view to maintaining the facilities, and, therefore, deducted from the repair & maintenance cost.

(6) Production Overhead

3% of the total cost excluding the depreciation is budgeted as production overhead. However, for the one-year period preceding the start of construction of the first vessel, only 1% is considered for production overhead.

(7) General and Administrative Expenses

8% of the total cost excluding depreciation is budgeted as general and administration expenses. However, for the one-year period preceding the time of starting the construction of the first vessel, the said expenses is assumed at 4%.

(8) Depreciation

Depreciation is made on a fixed amount basis according to the life of each asset. However, on the investment for construction and facilities, the residual value is 10% (Table IV-4-2).

The composition ratio of the afore-mentioned expenses per ship vary from year to year depending on the production volume and other factors. Table IV-4-3 shows the total cost of a vessel on the average in 8th to 10th year of operations, which is in a normal operation.

Table IV-4-1 Cost Estimation (at constant 1984 Prices)

(Unit: Million Rps)

	-2	-1	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Material cost	663	783	2,280	4,413	5,829	6,489	7,821	9,144	9,621	9,621	9,621	9,621	9,621	9,621	9,621	9,621
2. Labor cost (direct & indirect labor)		51	273	474	609	672	693	720	759	786	786	786	786	786	786	786
3. (clerk & engineer)		60	144	186	222	234	243	246	249	252	255	255	255	255	255	255
4. (incidental expenses)		21	84	132	168	183	189	195	201	207	207	207	207	207	207	207
5. Direct cost (manufac. dept. cost)		24	114	225	297	315	330	381	417	417	417	417	417	417	417	417
6. (sub contract, etc.)			117	171	219	225	234	258	273	273	273	273	273	273	273	273
7. Design and royalty fee				63	288	534	525	771	879	879	879	879	717	438	438	438
8. Repair and maintenance cost			63	105	153	171	219	285	309	315	321	321	327	327	333	333
9. Production overhead		9	105	195	264	297	345	405	429	429	429	429	426	417	417	417
10. General and administrative expenses	27	39	276	519	699	795	921	1,080	1,143	1,146	1,146	1,146	1,134	1,107	1,107	1,107
Total	690	987	3,456	6,483	8,748	9,915	11,520	13,845	14,280	14,325	14,334	14,334	14,163	13,848	13,854	13,854

	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1. Material cost	9,621	9,621	9,621	9,621	9,621	9,621	9,621	9,621	9,621	9,621	9,621	9,621	9,621	9,621	9,621	9,621
2. Labor cost (direct & indirect labor)	786	786	786	786	786	786	786	786	786	786	786	786	786	786	786	786
3. (clerk & engineer)	255	255	255	255	255	255	255	255	255	255	255	255	255	255	255	255
4. (incidental expenses)	207	207	207	207	207	207	207	207	207	207	207	207	207	207	207	207
5. Direct cost (manufac. dept. cost)	417	417	417	417	417	417	417	417	417	417	417	417	417	417	417	417
6. (sub contract, etc.)	273	273	273	273	273	273	273	273	273	273	273	273	273	273	273	273
7. Design and royalty fee	438	438	438	438	438	438	438	438	438	438	438	438	438	438	438	438
8. Repair and maintenance cost	339	339	345	348	351	354	360	360	366	369	372	372	378	381	387	390
9. Production overhead	417	417	417	417	417	417	417	417	417	417	417	420	420	420	420	420
10. General and administrative expenses	1,110	1,110	1,110	1,110	1,110	1,110	1,110	1,110	1,110	1,113	1,113	1,113	1,113	1,113	1,113	1,113
Total	13,863	13,863	13,869	13,872	13,875	13,878	13,884	13,884	13,890	13,896	13,899	13,902	13,908	13,911	13,917	13,920

Note: In case only 5,000 DWT is built.

Table IV-4-2 Schedule of Depreciation

(Unit: Million Rps)

	Investment	Term of Depreciation	1	2	3	4	5	6	7	8	9	10	11	12
1. Slipway, quay and dock	11,853	30	355.5	355.5	355.5	355.5	355.5	355.5	355.5	355.5	355.5	355.5	355.5	355.5
2. Buildings (office, etc.)	2,040	25	73.5	73.5	73.5	73.5	73.5	73.5	73.5	73.5	73.5	73.5	73.5	73.5
3. Equipment (crane, etc.)	13,821	15	829.2	829.2	829.2	829.2	829.2	829.2	829.2	829.2	829.2	829.2	829.2	829.2
4. Other equipment & furnishings	2,421	10	217.8	217.8	217.8	217.8	217.8	217.8	217.8	217.8	217.8	217.8		
5. Trucks & forklifts	96	5	17.4	17.4	17.4	17.4	17.4							
6. Dredging	1,632	10	163.2	163.2	163.2	163.2	163.2	163.2	163.2	163.2	163.2	163.2		
7. Educational & training	5,250	5	705.0	705.0	705.0	705.0	705.0							
8. Organizational expenses	900	3	300.0	300.0	300.0									
Sub total			2,661.6	2,661.6	2,661.6	2,361.6	2,361.6	1,639.2	1,639.2	1,639.2	1,639.2	1,639.2	1,258.2	1,258.2
9. Additional investment (Note)	3,801					8.4	19.8	44.1	70.2	98.1	110.0	133.2	136.8	140.1
Total			2,661.6	2,661.6	2,661.6	2,370.0	2,381.4	1,683.3	1,709.4	1,737.7	1,750.2	1,772.4	1,395.0	1,398.3

	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1. Slipway, quay and dock	355.5	355.5	355.5	355.5	355.5	355.5	355.5	355.5	355.5	355.5	355.5	355.5	355.5	355.5	355.5	355.5	355.5	355.5
2. Buildings (office, etc.)	73.5	73.5	73.5	73.5	73.5	73.5	73.5	73.5	73.5	73.5	73.5	73.5	73.5					
3. Equipment (crane, etc.)	829.2	829.2	829.2															
4. Other equipment & furnishings																		
5. Trucks & forklifts																		
6. Dredging																		
7. Educational & training																		
8. Organizational expenses																		
Sub total	1,258.2	1,258.2	1,258.2	429.0	429.0	429.0	429.0	429.0	429.0	429.0	429.0	429.0	429.0	355.5	355.5	355.5	355.5	355.5
9. Additional investment (Note)	140.1	140.1	143.4	143.4	143.4	146.7	146.7	150.0	150.0	153.3	153.3	156.6	156.6	159.9	159.9	163.2	163.2	166.8
Total	1,398.3	1,398.3	1,401.6	572.4	572.4	575.7	575.7	579.0	579.0	582.3	582.3	585.6	585.6	515.4	515.4	518.7	518.7	522.3

Note: Additional investment will be carried out for every year from 4th year to 30th year to maintain the facilities of the shipyard.

Table IV-4-3 Total Cost of Building a Vessel

Unit: 1 million Rps,
in terms of 1984 price

	New Vessel		Repaired Vessel
	5,000 DWT	3,000 DWT	Average 5,000 DWT
Cost	3,819	3,165	34.8
Depreciation	333	285	17.1
Total cost	4,152	3,450	51.9

Note 1: The above total cost is the average cost after 8 to 10 years of operations.

2: Depreciation is distributed between new shipbuilding and ship repairing in the ratio of 65:35 in accordance with the investment program.

4-2 Sales Estimation

4-2-1 Sale Price of New Shipbuilding and Repairing

The market price of a new shipbuilding varies to a large extent depending on the demands for vessels which fluctuate according to the world economy and also on the supply capacities of shipyards. It is also influenced by the shipping and shipbuilding policies for each country, the technological innovations, wars, etc. It is therefore impossible to forecast the market price of a vessel for long term.

On the other hand, it goes without saying that it is essential for Indonesia to reinforce the shipping industry and to develop the domestic shipbuilding industry having inseparable relationship with the shipping, for the intention of the economic development of the country in the future. And during a period for bringing up the domestic shipbuilding industry, putting it into the international competitions on the market prices would not be favorable to its healthy development.

For the time being, therefore, it is necessary to set up the political ship price in Indonesia, by which the shipbuilder should earn the reasonable profit.

In view of the above, as the prices in Indonesia market, ratio of operating profit to sales of 10% for the new shipbuilding and that of 15% for repairing are considered in this study, based on the total cost of the vessel as shown in Table IV-4-3. Thus, the sales per vessel at 1984 prices are estimated as follows:

New vessel : 5,000 DWT: 4,620 million Rps
3,000 DWT: 3,840 million Rps
Repaired vessel: 5,000 DWT on the average: 61.2 million Rps

4-2-2 Terms of Payment

There is no particular rule in Indonesia as to the terms of payment in contracting a vessel. The terms of payment which is used in the Japanese shipbuilding program will be applied in this study.

Contract for new shipbuilding:

25% at the time of signing the contract
25% at the time of keeling
25% at the time of launching
25% at the time of delivery

Contract for repairing:

50% at the time of starting the work
50% at the time of delivery

The time of signing the contract is one year ahead of the time of starting the construction, considering the leadtime necessary for procurement of materials, etc.

4.2.3 Sales Estimation

Based on the aforesaid schedule of production, the estimation of sales shall be as in Table IV-4-4.

Table IV-4-4 Sales Projection

Unit: 1 million Rps, in terms of 1984 price

		-2	-1	1	2	3	4	5	6	7th Year & After
New vessel	Case 1	1,155	1,155	3,465	6,970	9,240	10,395	12,705	15,015	15,840
	Case 2	879	1,155	2,634	6,099	10,164	11,319	12,195	14,229	14,973
Repaired vessel				1,224	1,836	2,202	2,202	2,202	2,202	2,202

Note: Case 1: Only 5,000 DWT will be built.
Case 2: 3,000 DWT and 5,000 DWT will be built.

4-3 Financial Analysis

4-3-1 Cash Flow Estimation

In this section operating profits and cashflows are estimated based on the aforesaid cost estimation and sales estimation. As regards new shipbuilding, the following discussion is limited to a case of 5,000 DWT only, because it will make very little difference in the final profitability whether two types of vessels, namely, 3,000 DWT and 5,000 DWT, are constructed simultaneously, or only 5,000 DWT vessels are constructed, since the sales are determined by political price in Indonesian market, and also it is expected to be larger demands for 5,000 DWT vessels.

The cashflow of an enterprise fluctuates by depending on the business activities, and as the business activities is influenced by the external factors, it is natural that the cashflow is affected by the economic, political and social factors. As the factors directly influencing the cash-flow of this project, inflation is considered as an external factor in this study.

Inflation rate is assumed at 10% per year considering the recent trends of economic situation of both Japan and Indonesia, it is by reason that the rate of price increases in Japan is seemed to be substantially reflected on the prices of those equipment and materials to be used in this project.

In the financial analysis for a long-range, the influence of inflation can not be ignored. It is, therefore, considered necessary in making a more realistic financial evaluation if a reasonable rate of inflation would be used.

The estimation of operating profit/loss and cashflow are presented in two cases, one assuming that these will be no increase at all in the material cost, labor cost, etc. and the other assuming these will be 10% annual increase in the cost, as seen in Table IV-4-5 and IV-4-6 respectively.

Table IV-4-5 Operating Profit/Loss and Cash Flow (at 1984 prices)

(Unit: Million Rps)

	-2	-1	1	2	3	4	5	6	7	8	9	10	11	12	13	14
A. Operating profit and loss																
(1) Sales	1,155	1,155	4,689	8,766	11,442	12,597	14,907	17,217	18,042	18,042	18,042	18,042	18,042	18,042	18,042	18,042
(2) Cost	690	987	3,456	6,483	8,478	9,915	11,520	13,845	14,280	14,325	14,334	14,334	14,163	13,848	13,854	13,854
(3) Depreciation			2,661	2,661	2,661	2,370	2,382	1,683	1,710	1,737	1,749	1,773	1,395	1,398	1,398	1,398
(4) Operating profit	465	168	-1,428	-378	33	312	1,005	2,049	2,052	1,980	1,959	1,935	2,484	2,796	2,790	2,790
(Ratio of operating profit to sales)			(-30.5)	(-4.3)	(0.2)	(2.4)	(6.7)	(11.9)	(11.4)	(11.0)	(10.9)	(10.7)	(13.8)	(15.5)	(15.5)	(15.5)
B. Cash inflow																
(3) + (4)	465	168	1,233	2,283	2,694	2,682	3,387	3,732	3,762	3,717	3,708	3,708	3,879	4,194	4,188	4,188
C. Cash outflow																
Initial investment	16,233	16,533	1,500	1,950	900											
Additional investment						42	54	123	132	138	138	138	141	141	141	144
Organizational expenses	450	450														
D. Cash flow																
B - C	-16,218	-16,815	-267	333	1,794	2,640	3,330	3,609	3,630	3,579	3,570	3,570	3,738	4,053	4,047	4,044

	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
A. Operating profit and loss																
(1) Sales	18,042	18,042	18,042	18,042	18,042	18,042	18,042	18,042	18,042	18,042	18,042	18,042	18,042	18,042	18,042	18,042
(2) Cost	13,863	13,863	13,869	13,872	13,875	13,878	13,884	13,884	13,890	13,896	13,899	13,902	13,908	13,911	13,917	13,920
(3) Depreciation	1,401	573	573	576	576	579	579	582	582	585	585	516	516	519	519	522
(4) Operating profit	2,778	3,606	3,600	3,594	3,591	3,585	3,579	3,576	3,570	3,561	3,558	3,624	3,618	3,612	3,606	3,600
(Ratio of operating profit to sales)	(15.4)	(20.0)	(20.0)	(19.9)	(19.9)	(19.9)	(19.8)	(19.8)	(19.8)	(19.7)	(19.7)	(20.1)	(20.1)	(20.0)	(20.0)	(20.0)
B. Cash inflow																
(3) + (4)	4,179	4,179	4,173	4,170	4,167	4,164	4,158	4,158	4,152	4,146	4,143	4,140	4,134	4,131	4,125	4,122
C. Cash outflow																
Initial investment																
Additional investment	144	147	150	150	150	153	153	156	156	159	159	162	162	165	168	168
Organizational expenses																
D. Cash flow																
B - C	4,035	4,032	4,023	4,020	4,017	4,011	4,005	4,002	3,996	3,987	3,984	3,978	3,972	3,966	3,957	3,954

Table IV-4-6 Operating Profit/Loss and Cash Flow (with 10%/year inflation considered)

(Unit: Million Rps)

Year	-2	-1	1	2	3	4	5	6	7	8	9	10	11	12	13	14
A. Operating profit and loss																
(1) Sales	1,155	1,155	4,935	10,074	14,334	17,304	22,446	2,9061	33,399	36,552	40,041	43,797	48,720	53,355	58,566	64,275
(2) Cost	690	987	3,801	7,845	11,643	14,517	18,552	23,889	27,826	30,708	33,798	37,179	40,410	43,461	47,829	52,611
(3) Depreciation			2,661	2,661	2,661	2,373	2,391	1,713	1,764	1,824	1,878	1,932	1,587	1,623	1,659	1,701
(4) Operating profit	465	168	-1,509	-432	30	414	1,503	3,459	3,807	4,020	4,365	4,686	6,723	8,271	9,078	9,963
(Ratio of operating profit to sales %)			(-91.5)	(-12.9)	(0.6)	(7.2)	(20.1)	(35.7)	(34.2)	(33.0)	(32.7)	(32.1)	(41.4)	(46.5)	(46.5)	(46.5)
B. Cash inflow																
(3) + (4)	465	168	1,152	2,229	2,691	2,787	3,894	5,172	5,571	5,844	6,243	6,618	8,310	9,894	10,737	11,664
C. Cash outflow																
Initial investment	16,227	16,527	1,500	1,500	900											
Additional investment						63	87	219	258	297	327	357	402	444	486	546
Organizational expenses	450	450														
D. Cash flow																
B - C	-16,212	-16,809	-348	729	1,791	2,724	3,807	4,953	5,313	5,547	5,916	6,261	7,908	9,450	10,251	11,118

Year	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
A. Operating profit and loss																
(1) Sales	70,518	80,844	88,929	97,677	107,424	118,149	129,816	142,752	157,050	172,578	189,837	209,790	230,838	253,647	279,117	307,080
(2) Cost	57,909	63,699	70,101	77,127	84,858	93,363	102,747	113,019	124,377	136,872	150,594	165,687	182,334	200,613	220,767	242,898
(3) Depreciation	1,749	975	1,041	1,113	1,188	1,275	1,365	1,467	1,578	1,707	1,845	1,935	2,106	2,304	2,526	2,766
(4) Operating profit	10,860	16,170	17,787	19,437	21,378	23,511	25,704	28,266	31,095	33,999	37,398	42,168	46,398	50,730	55,824	61,416
(Ratio of operating profit to sales %)	(46.2)	(60.0)	(60.0)	(59.7)	(59.7)	(59.7)	(59.4)	(59.4)	(59.4)	(59.1)	(59.1)	(60.3)	(60.3)	(60.0)	(60.0)	(60.0)
B. Cash inflow																
(3) + (4)	12,609	17,145	18,828	20,550	22,566	24,786	27,069	29,733	32,673	35,706	39,243	44,103	48,504	54,034	58,350	64,182
C. Cash outflow																
Initial investment																
Additional investment	603	675	759	834	918	1,029	1,131	1,269	1,398	1,566	1,722	1,932	2,124	2,379	2,664	2,931
Organizational expenses																
D. Cash flow																
B - C	12,006	16,470	18,069	19,716	21,648	23,757	25,938	28,464	31,275	34,140	37,521	42,171	46,380	50,655	55,686	61,251

In a case with inflation, the sales are estimated in the following manner:

$$\text{n year sales} = \frac{(1 + \alpha/100)^n \, Cn + Dn}{(1 - \beta n/100)}$$

Where, Cn = Total cost excluding depreciation (at 1984 price)

Dn = Annual depreciation of n year

α = Rate of inflation (%/year)

βn = Ratio of operating profit without considering the inflation (%)

As earlier stated, this estimation is based on the assumption that the prices of new shipbuilding and repairing in domestic market are politically determined on the basis of the cost plus a reasonable profit. As a result, the price increase will be 9.85% on the average over the period of 20 years, while the annual rate of inflation will be 10%.

4-3-2 Internal Financial Rate of Return (IFRR)

Internal financial rate of return (IFRR) is principally the same as internal rate of return so called "IRR" which is the discounted rate to reduce to zero the net present value of the project, namely, the difference between the discounted cash inflow of the project and the discounted cash outflow. It is shown in the following expression:

$$\sum_{t=1}^{n} \frac{CI_t - CO_t}{(1 + i)^t} = 0$$

Here, CI_t = Cash inflow on the t year

CO_t = Cash outflow on the t year

i = IFRR

IFRR is one of the typically criteria used by evaluating of the profitability on investment of a project. IFRR also indicates the highest interest rate to be paid when the all investment cost depends on the borrowing capital. In this case, cash flow can be appropriated for redemption of the loan and interest payment.

Here, two cases are studied, one without considering the inflation, and the other with the inflation considered. The reason why two cases are studied is that the character of the project itself can be made clear by assuming no inflation and no cost increase at all, and on the other hand, by considering the inflation, a more realistic evaluation on the project can be made.

Further, considering the nature of the project, as a period of evaluation two cases (20 years and 30 years) are taken up in this study.

(1) IFRR Without Inflation

The following IFRR are obtained on the basis of the cashflow estimated in Table IV-4-5.

Evaluation period, 20 year: 5.95%

Evaluation period, 30 year: 7.82%

In case the ratio of operating profit for new shipbuilding is at 8, 10, 12% and that of ship repairing at 10, 15, 20%, IFRR in each combination is also calculated. The results are shown in Table IV-4-7.

Table IV-4-7 Internal Financial Rate of Return (IFRR)
(Without Considering Any Cost Increase)

Operating Profit Ratio		IFRR	
New Vessel	Repaired Vessel	Evaluation Period 20 years	Evaluation Period 30 years
8%	10%	4.54%	6.63%
	15%	4.96%	6.98%
	20%	5.38%	7.33%
10%	10%	5.56%	7.48%
	15%	5.95%	7.82%
	20%	6.35%	8.15%
15%	10%	6.51%	8.29%
	15%	6.89%	8.62%
	20%	7.27%	8.39%

(2) IFRR With Inflation

Based on the cashflow estimation in Table IV-4-6 with the rate of inflation of 10% per year, the IFRR is calculated and shown hereinafter.

Evaluation period, 20 years: 13.39%

Evaluation period, 30 years: 16.14%

The sensitivity analysis for variation of inflation rate is made. Fig. IV-4-3 shows the results.

4-3-3 Income Statement and Fund Statement

The income statement and fund statement are made based on the following assumptions.

(1) The ratio of the borrowed capital versus equity capital is 70:30.

(2) As interest rate for the long-term loan, two rates, 8% P.A. and 12% P.A., are studied respectively. The repayment period is 15 years (including its grace period of 6 years) in accordance with the terms of BAPINDO.

(3) The interest rate for the short-term loan is 13.5% P.A. according to the normal rate of interest prevailing in Indonesia.

(4) Surplus funds will be deposited in the bank, and earn the interest of 9% P.A. (the current rate of interest for a fixed deposit of one year).

(5) The corporate tax rate is 45% of the current profit, according to the taxation system in Indonesia. However, taking into consideration that this project will have a high priority of the Indonesian Government, contributing to the savings of foreign exchange and an investment outside the Java, etc., tax exemption of 6 years is applied according to the Tax Holiday system. And, further, the accumulated losses during the period of tax holiday will be carried over to the 4-year period following the end of the tax holiday on accordance with Loss Compensation system.

(6) After breaking the accumulated losses, maximum dividend of 30% of the profit after tax shall be paid. However, this will be limited to maximum of 70% of the profit after tax.

The income statement and fund statement in case of interest rate of 8% P.A. for borrowed capital are shown in Table IV-4-8 and Table IV-4-9 respectively, and these statement in case of 12% P.A. in Table IV-4-10 and Table IV-4-11.

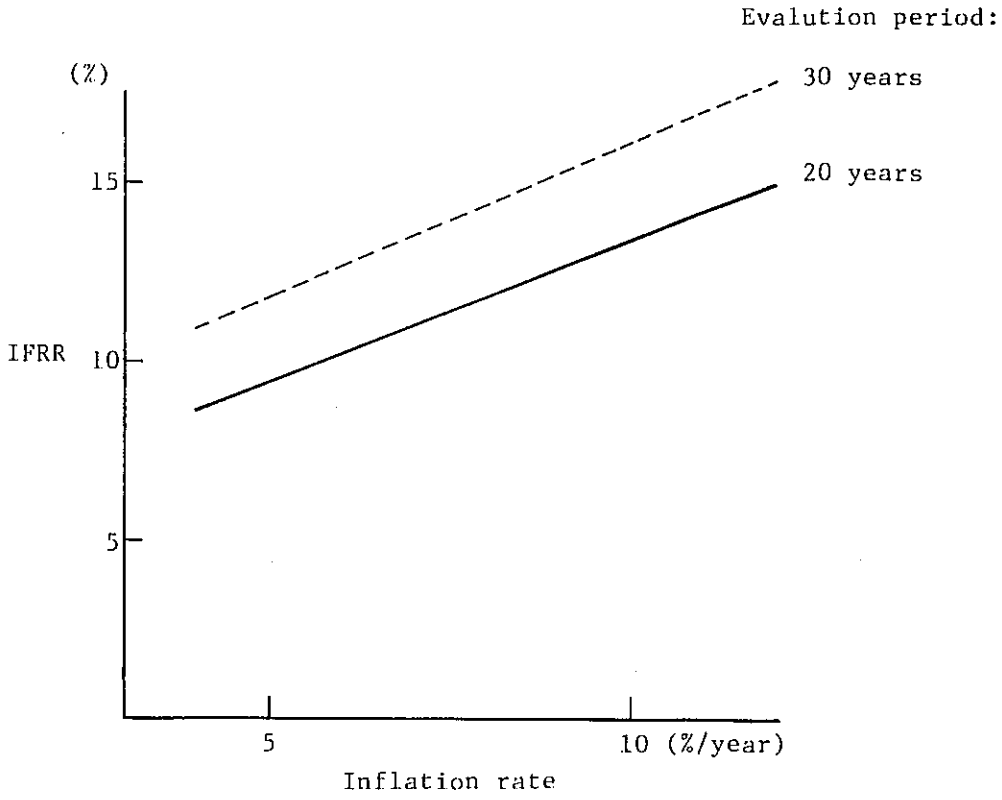


Fig. IV-4-3 IFRR vs. Inflation Rate

Table IV-4-8 Income Statement and Recovery for Initial Investment(1/2)
(Interest rate for the borrowed capital: 8%/year)

Year	-2	-1	1	2	3	4	5	6	7	8	9
Operating income and expenses											
Sales	1,155	1,155	4,953	10,074	14,334	17,304	22,446	29,061	33,399	36,552	40,041
Cost	690	987	3,801	7,845	11,643	14,517	18,552	23,889	27,828	30,708	33,798
Depreciation			2,661	2,661	2,661	2,373	2,391	1,713	1,764	1,824	1,878
Operationg income or loss	465	168	-1,509	-432	30	414	1,503	3,459	3,807	4,020	4,365
Non-operating income											
Interest received on deposit											
Non-operating expenses											
Interest paid for long-term loans	852	1,731	1,851	2,007	2,079	2,079	2,079	1,983	1,791	1,584	1,362
Interest paid for shore-term loans	0	150	405	555	600	597	591	597	603	555	471
Income or loss before taxes	-387	-1,713	-3,765	-2,994	-2,649	-2,262	-1,167	879	1,413	1,881	2,532
Taxes											
Net income or net loss	-387	-1,713	-3,765	-2,994	-2,649	-2,264	-1,167	879	1,413	1,881	2,532
Dividends											
Earned surplus or deficit	-387	-1,713	-3,765	-2,994	-2,649	-2,264	-1,167	879	1,413	1,881	2,532
(Retained earning or deficit brought forward to the next period)	(-387)	(-2,100)	(-5,865)	(-8,859)	(-11,508)	(-13,770)	(-14,937)	(-14,058)	(-12,645)	(-10,764)	(-8,232)
Recovery for initial investment											
Cumulative depreciation			2,661	5,322	7,983	10,356	12,747	14,460	16,224	18,048	19,926
Cumulative retained earning			-5,865	-8,859	-11,508	-13,770	-14,937	-14,058	-12,645	-10,764	-8,232
Cumulative re-investment											
Cumulative recovered funds			-3,204	-3,537	-3,525	-3,477	-2,340	33	2,952	6,360	10,443
Initial investment	16,277	32,751	34,251	36,201	37,101	37,101	37,101	37,101	37,101	37,101	37,101
Payback period											

Notes: 1. Capital structure: Borrowed capital/Equity capital = 70/30

2. Inflation rate: 10%/year

Table IV-4-8 Income Statement and Recovery for Initial Investment(2/2)
(Interest rate for the borrowed capital: 8%/year)

Year	10	11	12	13	14	15	16	17	18	19	20
Operating income and expenses											
Sales	43,797	48,720	53,355	58,566	64,275	70.518	80,844	88,929	97,677	107,424	118,149
Cost	37,179	40,410	43,461	47,829	52,611	57,909	63,699	70,101	77,127	84,858	93,363
Depreciation	1,932	1,587	1,623	1,659	1,701	1,749	975	1,041	1,113	1,188	1,275
Operating income or loss	4,686	6,723	8,271	9,078	9,963	10,860	16,170	17,787	19,437	21,378	23,511
Non-operating income											
Interest received on deposit			102	111	90	225	531	1,053	1,701	2,472	3,378
Non-operating expenses											
Interest paid for long-term loans	1,131	900	669	438	207	72	33	9			
Interest paid for shore-term loans	309	48									
Income or loss before taxes	3,246	5,775	7,704	8,751	9,846	11,013	16,668	18,831	21,138	23,850	26,889
Taxes		2,598	3,468	3,939	4,431	4,956	7,500	8,475	9,513	10,734	12,099
Net income or net loss	3,246	3,177	4,236	4,812	5,415	6,057	9,168	10,356	11,625	13,116	14,790
Dividends			2,427	3,339	3,339	3,339	3,339	3,339	3,339	3,339	3,339
Earned surplus or deficit	3,246	3,177	1,809	1,473	2,076	2,718	5,829	7,017	8,286	9,777	11,451
(Retained earning or deficit brought forward to the next period)	(-4,986)	(-1,809)	(0)	(1,473)	(3,549)	(6,267)	(12,096)	(19,113)	(27,399)	(37,176)	(48,627)
Recovery for initial investment											
Cumulative depreciation	21,858	23,445	25,068	26,727	28,428	30,177	31,152				
Cumulative retained earning	-4,986	-1,809	0	1,473	3,549	6,267	12,096				
Cumulative re-investment	1,608	2,010	2,454	2,940	3,486	4,089	4,764				
Cumulative recovered funds	15,264	19,626	22,614	25,260	28,491	32,355	38,484				
Initial investment	37,101	37,101	37,101	37,101	37,101	37,101	37,101				
Payback period							16.77				

Notes: 1. Capital structure: Borrowed capital/Equity capital = 70/30

2. Inflation rate: 10%/year

Table IV-4-9 Fund Statement(1/2)
(Interest rate for the borrowed capital: 8%/year)

Year	-2	-1	1	2	3	4	5	6	7	8	9
Ordinary income and expenses											
Operating income	1,155	1,155	4,953	10,074	14,334	17,304	22,446	29,061	33,399	36,552	40,041
Operating expenses	690	987	3,801	7,845	11,643	14,517	18,552	23,889	27,828	30,708	33,798
Non-operating income											
Non-operating expenses											
Interest for long-term loans	852	1,731	1,851	2,007	2,079	2,079	2,079	1,983	1,791	1,584	1,362
Interest for short-term loans	0	150	405	555	600	597	591	597	603	555	471
Income or deficit	-387	-1,713	-1,104	-333	12	111	1,224	2,592	3,177	3,705	4,410
Financial income											
Owned capital	5,565	5,565									
Long-term loan	10,662	10,959	1,500	1,950	900						
Short-term loan	837	2,163	1,104	333			48	30			
Total	17,064	18,687	2,604	2,283	900		48	30			
Financial disbursement											
Initial investment	16,227	16,524	1,500	1,950	900						
Re-investment						63	87	219	256	297	327
Initial expenses	450	450									
Repayment of long-term loan							1,185	2,403	2,571	2,787	2,886
Repayment of short-term loan					12	48			348	621	1,197
Corporate taxes paid											
Dividents											
Total	16,677	16,974	1,500	1,950	912	111	1,272	2,622	3,177	3,705	4,410
Cash balance at the end of the year (Cumulative cash balance)											
Loan balance											
Balance of long-term loans (1)	10,662	21,621	23,121	25,071	25,971	25,971	25,971	24,786	22,383	19,812	17,025
Balance of long-term loans (2)	10,662	21,621	23,121	25,071	25,971	25,971	24,786	22,383	19,812	17,025	14,139
Balance of short-term loans (1)	0	1,119	3,000	4,104	4,437	4,425	4,377	4,425	4,455	4,107	3,486
Balance of short-term loans (2)	837	3,000	4,104	4,437	4,425	4,377	4,425	4,455	4,107	3,486	2,289

Notes: 1. (1): Beginning of the period, (2): End of the period

2. Capital structure: Borrowed capital/Equity capital = 70/30

3. Inflation rate: 10%/year

Table IV-4-9 Fund Statement(2/2)
(Interest rate for the borrowed capital: 8%/year)

Year	10	11	12	13	14	15	16	17	18	19	20
Ordinary income and expenses											
Operating income	43,797	48,720	53,355	58,566	64,275	90,518	80,844	88,929	97,677	107,424	118,149
Operating expenses	37,179	40,410	43,461	47,829	52,611	57,909	63,699	70,101	77,127	84,858	93,363
Non-operating income			102	111	90	225	531	1,053	1,701	2,472	3,378
Non-operating expenses											
Interest for long-term loans	1,131	900	669	438	207	72	33	9			
Interest for short-term loans	309	48									
Income or deficit	5,178	7,362	9,327	10,410	11,547	12,762	17,643	19,872	22,251	25,038	28,164
Financial income											
Owned capital											
Long-term loan											
Short-term loan											
Total											
Financial disbursement											
Initial investment											
Re-investment	357	402	444	486	546	603	675	759	834	916	1,029
Initial expenses											
Repayment of long-term loan	2,886	2,886	2,886	2,886	1,701	480	315	99			
Repayment of short-term loan	1,935	354									
Corporate taxes paid		2,598	3,468	3,939	4,431	4,956	7,500	8,475	9,513	10,734	12,099
Dividents			2,427	3,339	3,339	3,339	3,339	3,339	3,339	3,339	3,339
Total	5,178	6,240	9,225	10,650	10,017	9,378	11,829	12,672	13,686	14,991	16,467
Cash balance at the end of the year		1,122	102	-240	1,530	3,384	5,814	7,200	8,565	10,047	11,697
(Cumulative cash balance)		(1,122)	(1,224)	(984)	(2,514)	(5,898)	(11,712)	(18,912)	(27,477)	(37,524)	(49,221)
Loan balance											
Balance of long-term loans (1)	14,139	11,253	8,367	5,481	2,595	894	414	99			
Balance of long-term loans (2)	11,253	8,367	5,481	2,595	894	414	99	0			
Balance of short-term loans (1)	2,289	354									
Balance of short-term loans (2)	354	0									

Notes: 1. (1): Beginning of the period, (2): End of the period

2. Capital structure: Borrowed capital/Equity capital = 70/30

3. Inflation rate: 10%/year

Table IV-4-10 Income Statement and Recovery for Initial Investment(1/2)
(Interest rate for the borrowed capital: 12%/year)

Year	-2	-1	1	2	3	4	5	6	7	8	9
Operating income and expenses											
Sales	1,155	1,155	4,953	10,074	14,334	17,304	22,446	29,061	33,399	36,552	40,041
Cost	690	987	3,801	7,845	11,643	14,517	18,552	23,889	27,828	30,708	33,798
Depreciation			2,661	2,661	2,661	2,373	2,391	1,713	1,764	1,824	1,878
Operating income or loss	465	168	1,509	-432	30	414	1,503	3,459	3,807	4,020	4,365
Non-operating income											
Interest received on deposit											
Non-operating expenses											
Interest paid for long-term loans	1,281	2,595	2,775	3,009	3,117	3,117	3,117	2,973	2,685	2,379	2,043
Interest paid for short-term loans	0	210	588	885	1,110	1,317	1,548	1,824	2,127	2,409	2,682
Income or loss before taxes	-816	-2,637	-4,872	-4,326	-4,197	-4,020	-3,162	-1,338	1,005	-768	-360
Taxes											
Net income or net loss	-816	-2,637	-4,872	-4,326	-4,197	-4,020	-3,162	-1,338	-1,005	-768	-360
Dividends											
Earned surplus or deficit	-816	-2,637	-4,872	-4,326	-4,197	-4,020	-3,162	-1,338	-1,005	-768	-360
(Retained earning or deficit brought forward to the next period)	(-816)	(-3,453)	(-8,325)	(-12,651)	(-16,848)	(-20,868)	(-24,030)	(-25,368)	(-26,373)	(-27,141)	(-27,501)
Recovery for initial investment											
Cumulative depreciation			2,661	5,322	7,983	10,356	12,747	14,460	16,224	18,048	19,926
Cumulative retained earning			-8,326	-12,651	-16,848	-20,868	-24,030	-25,368	-26,373	-27,141	-27,501
Cumulative re-investment						63	150	369	627	924	1,251
Cumulative recovered funds			-5,664	-7,329	-8,865	-10,575	-11,433	-11,277	-10,776	-10,017	-8,826
Initial investment	16,227	32,751	34,251	36,201	37,101	37,101	37,101	37,101	37,101	37,101	37,101
Payback period											

Notes: 1. Capital Structure: Borrowed capital/Equity capital = 70/30

2. Inflation rate: 10%/year

Table IV-4-10 Income Statement and Recovery for Initial Investment(2/2)
(Interest rate for the borrowed capital: 12%/year)

Year	10	11	12	13	14	15	16	17	18	19	20
Operating income and expenses											
Sales	43,797	48,720	53,355	58,566	64,275	70,518	80,844	88,929	97,677	107,424	118,149
Cost	37,179	40,410	43,461	47,829	52,611	57,909	63,699	70,101	77,127	84,858	93,363
Depreciation	1,932	1,587	1,623	1,659	1,701	1,749	975	1,041	1,113	1,188	1,275
Operating income or loss	4,686	6,723	8,271	9,078	9,963	10,860	16,170	17,787	19,437	21,378	23,511
Non-operating income											
Interest received on deposit									96	789	1,611
Non-operating expenses											
Interest paid for long-term loans	1,698	1,350	1,005	657	312	108	51	12			
Interest paid for short-term loans	2,910	3,078	3,135	3,060	2,892	2,466	1,761	464			
Income or loss before taxes	78	2,295	4,131	5,361	6,759	8,286	14,358	17,079	19,533	22,167	25,122
Taxes		1,032	1,860	2,412	3,042	3,729	6,462	7,686	8,790	9,975	11,304
Net income or net loss	78	1,263	2,271	2,949	3,717	4,557	7,896	9,393	10,743	12,192	13,818
Dividends								3,339	3,339	3,339	3,339
Earned surplus or deficit	78	1,263	2,271	2,949	3,717	4,557	7,896	6,054	7,404	8,853	10,479
(Retained earning or deficit brought forward to the next period)	(-27,423)	(-26,160)	(-23,889)	(-20,940)	(-17,223)	(-12,666)	(-4,770)	(1,284)	(8,688)	(17,541)	(28,020)
Recovery for initial investment											
Cumulative depreciation	21,858	23,445	25,068	26,727	28,428	30,177	31,152	32,193	33,306	34,494	
Cumulative retained earning	-27,423	-26,160	-23,889	-20,940	-17,223	-8,666	-4,770	1,284	8,688	17,541	
Cumulative re-investment	1,608	2,010	2,454	2,940	3,486	4,089	4,764	5,523	6,357	7,275	
Cumulative recovered funds	-7,173	-4,725	-1,275	2,847	7,719	17,896	21,618	27,954	35,637	44,760	
Initial investment	37,101	37,101	37,101	37,101	37,101	37,101	37,101	37,101	37,101	37,101	
Payback period										19.16	

Notes: 1. Capital structure: Borowed capital/Equity capital = 70/30

2. Inflation rate: 10%/year

Table IV-4-11 Fund Statement(1/2)
(Interest rate for the borrowed capital: 12%/year)

Year	-2	-1	1	2	3	4	5	6	7	8	9
Ordinary income and expenses											
Operating income	1,155	1,155	4,953	10,074	14,334	17,304	22,446	29,061	33,399	36,552	40,041
Operating expenses	690	987	3,801	7,845	11,643	14,517	18,552	23,889	27,828	30,708	33,798
Non-operating income											
Non-operating expenses											
Interest for long-term loans	1,281	2,595	2,775	3,009	3,117	3,117	3,117	2,973	2,685	2,379	2,043
Interest for short-term loans	0	210	588	885	1,110	1,317	1,548	1,824	2,127	2,409	2,682
Income or deficit											
Financial income	-816	-2,637	-2,211	-1,665	-1,536	-1,647	-771	375	759	1,056	1,518
Owned capital	5,565	5,565									
Long-term loan	10,662	10,959	1,500	1,950	900						
Short-term loan	1,266	3,087	2,211	1,665	1,536	1,710	2,043	2,247	2,070	2,028	1,695
Total	17,493	19,611	3,711	3,615	2,436	1,710	2,043	2,247	2,070	2,028	1,695
Financial disbursement											
Initial investment	16,227	16,524	1,500	1,950	900						
Re-investment						63	87	219	258	297	327
Initial expenses	450	450									
Repayment of long-term loan							1,185	2,403	2,571	2,787	2,886
Repayment of short-term loan											
Corporate taxes paid											
Dividents											
Total	16,677	16,974	1,500	1,950	900	63	1,272	2,622	2,829	3,084	3,213
Cash balance at the end of the year (Cumulative cash balance)											
Loan balance											
Balance of long-term loans (1)	10,662	21,621	23,121	25,071	25,971	25,971	25,971	24,786	22,383	19,812	17,025
Balance of long-term loans (2)	10,662	21,621	23,121	25,071	25,971	25,971	24,786	22,383	19,812	17,025	14,139
Balance of short-term loans (1)	0	1,548	4,353	6,564	8,229	9,765	11,475	13,518	15,765	17,835	19,863
Balance of short-term loans (2)	1,266	4,353	6,564	8,229	9,765	11,475	13,518	15,765	17,835	19,863	21,558

Notes: 1. Beginning of the period, (2) End of the period

2. Capital structure: Borrowed capital/Equity capital = 70/30

3. Inflation rate: 10%/year

Table IV-4-11 Fund Statement(2/2)
(Interest rate for the borrowed capital: 12%/year)

Year	10	11	12	13	14	15	16	17	18	19	20
Ordinary income and expenses											
Operating income	43,797	48,720	53,355	58,566	64,275	70,518	80,844	88,929	97,677	107,424	118,149
Operating expenses	37,179	40,410	43,461	47,829	52,611	57,909	63,699	70,101	77,127	84,858	93,363
Non-operating income									96	789	1,611
Non-operating expenses											
Interest for long-term loans	1,698	1,350	1,005	657	312	108	51	12			
Interest for short-term loans	2,910	3,078	3,135	3,060	2,892	2,466	1,761	696			
Income or deficit	2,010	3,882	5,754	7,020	8,460	10,035	15,333	18,120	20,646	23,355	26,397
Financial income											
Owned capital											
Long-term loan											
Short-term loan	1,233	438									
Total											
Financial disbursement											
Initial investment											
Re-investment	357	402	444	486	546	603	675	759	834	916	1,029
Initial expenses											
Repayment of long-term loan	2,886	2,886	2,886	2,886	1,701	480	315	99			
Repayment of short-term loan			564	1,236	3,171	5,223	7,881	5,154			
Corporate taxes paid		1,032	1,860	2,412	3,042	3,729	6,462	7,686	8,790	9,975	11,304
Dividents								3,339	3,339	3,339	3,339
Total	3,243	4,320	5,754	7,020	8,460	10,035	15,333	17,037	12,963	14,232	15,672
Cash balance at the end of the year								1,083	7,683	9,123	10,725
(Cumulative cash balance)								(1,083)	(8,766)	(17,889)	(28,614)
Loan balance											
Balance of long-term loans (1)	14,139	11,253	8,367	5,481	2,595	894	414	99			
Balance of long-term loans (2)	11,253	8,367	5,481	2,595	894	414	99	0			
Balance of short-term loans (1)	21,558	22,791	23,229	22,665	21,429	18,258	13,035	5,154			
Balance of short-term loans (2)	22,791	23,229	22,665	21,429	18,258	13,035	5,154	0			

Notes: 1. Beginning of the period, (2) End of the period

2. Capital structure: Borrowed capital/Equity capital = 70/30

3. Inflation rate: 10%/year

Based on the income statement and on the fund statement the curves showing the balance of long-term loans and short-term loans and the recovery of initial investment can be drawn as shown in Fig. IV-4-4 in case of interest rate of 8% P.A. for the borrowed capital and in Table IV-4-5 in case of 12% P.A.

In addition to the above study, the income statement and fund statement are estimated in case of interest rate of 6%, P.A. and 13.5% P.A. for the borrowed capital.

The results of the analysis are summarized in Table IV-4-12.

Table IV-4-12 Results of Financial Analysis

		Evaluation Period	
		20 years	30 years
Internal financial rate of return (IFRR)	Without inflation	5.95%	7.82%
	With inflation of 10% year	13.39%	16.14%

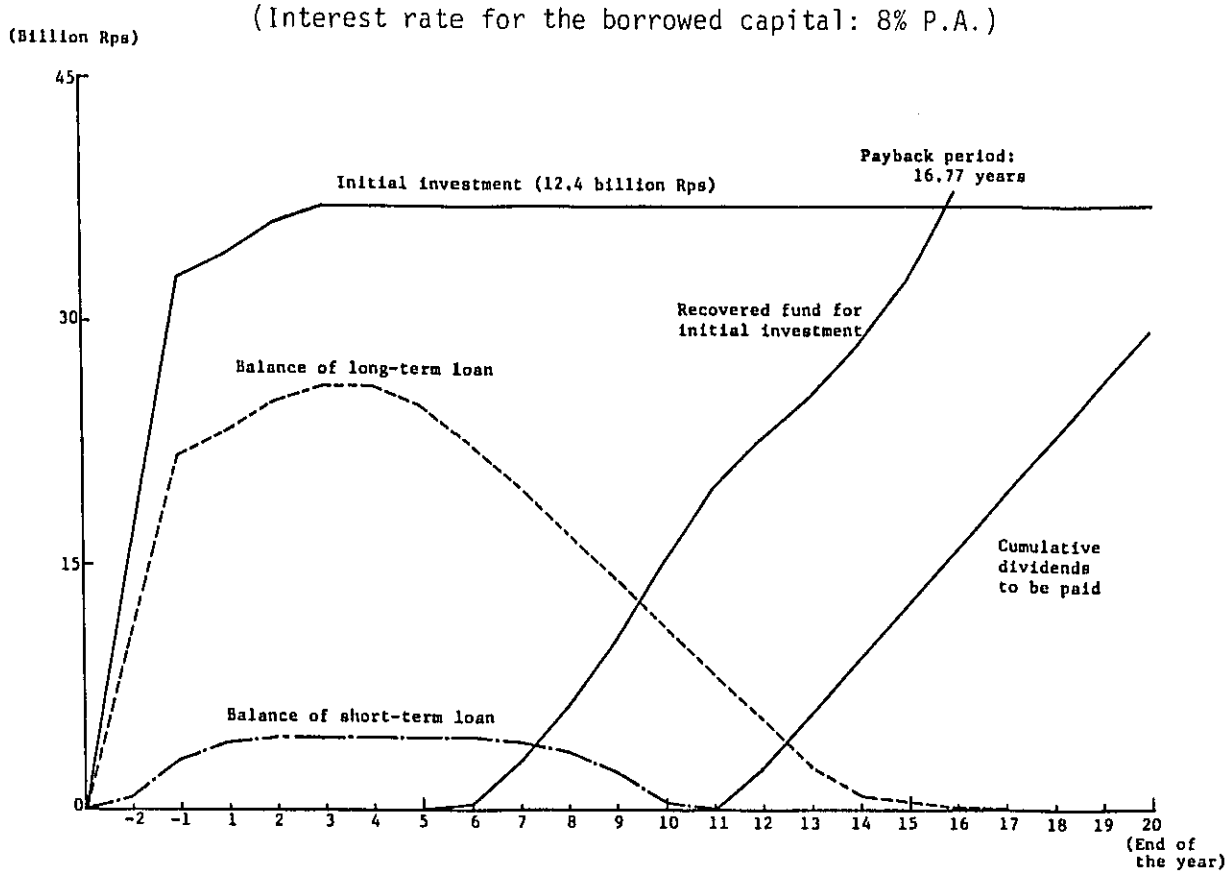
	Interest Rate of the Borrowed Capital			
	6% P.A.	8% P.A.	12% P.A.	13.5% P.A.
Payback period of initial investment	16.2 years	16.8 years	19.2 years	20.2 years
Peak of short-term loan	1,701 million Rps Ⓐ	2,163 million Rps Ⓐ	3,087 million Rps Ⓐ	3,429 million Rps Ⓐ
Peak of balance of short-term loan	2,874 million Rps in 1st year	4,455 million Rps in 5th year	23,229 million Rps in 11th year	32,814 million Rps in 12th year
Peak of cumulative losses	10,368 million Rps in 5th year	14,937 million Rps in 5th year	27,501 million Rps in 9th year	35,850 million Rps in 10th year
Point to break the cumulative losses (Time to start the payment of dividends)	9th year	12th year	17th year	18th year

Note 1: Rate of inflation: 10% per year

2: Capital structure ratio: Borrowed capital: 70%
Equity capital : 30%

Ⓐ In a year previous to commencement of operation

(Interest rate for the borrowed capital: 8% P.A.)



(Interest rate for the borrowed capital: 12% P.A.)

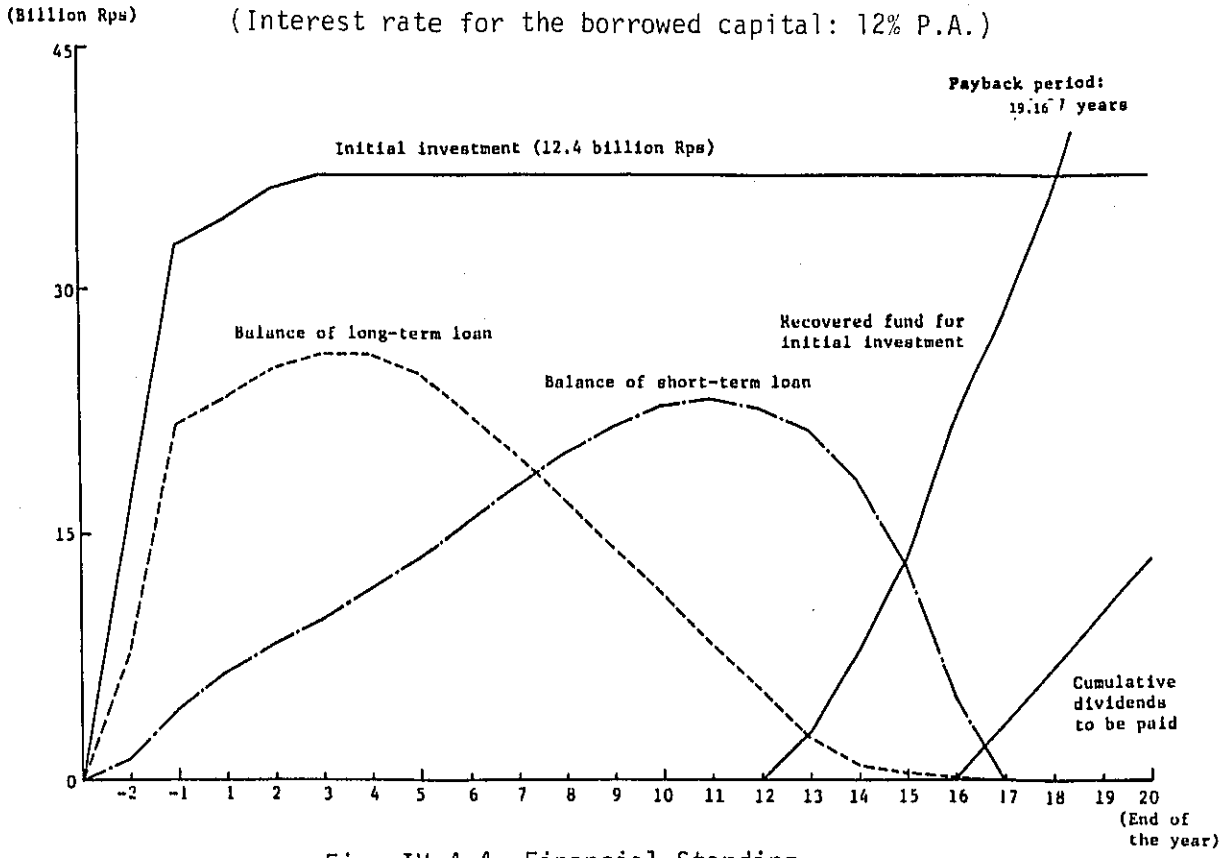


Fig. IV-4-4 Financial Standing

4-4 Financial Evaluation

The examination and evaluation on various indexes obtained through the financial analysis of this project are made hereinafter.

(1) Internal Financial Rate of Return (IFRR)

IFRR of this project are 5.95% in a term of 20 years and 7.82% in a term of 30 years in case of no cost increase being considered, and are 13.39% in a term of 20 years and 16.14% in a term of 30 years in case that the cost inflation of 10% per year are considered.

From these results, it can be said that this project is considered feasible.

The development of the shipbuilding industry as well as the shipping industry should be essential for the Indonesia being islands nation. Further, considering the effects that the project will have on the national economy of Indonesia, the profitability should not be of a decisive factor in evaluating the project.

(2) Recovery of Initial Investment (Payback Period)

Payback period of initial investment takes 16.2 years if the interest rate for the borrowed capital is 6% P.A., 16.8 years if 8% P.A., 19.2 years if 12% P.A. and 20.2 years if 13.5% P.A. This period is not necessarily short compared with the standard industrial project. However, considering the specific features of the shipbuilding industry, namely, a large investment needed and a relatively longer life of facilities. The payback period within 20 years is considered admissible.

(3) Peak of Cumulative Losses

The cumulative losses will reach 10,368 million Rps in 5th year of operation if the interest rate is 6% P.A., 14,937 million Rps in the 5th year if 8% P.A., 27,501 million Rps in the 9th year if 12% P.A. and 35,850 million Rps in the 10th year if 13.5% P.A.

From the viewpoint of the finacial stability, it is desired that the peak of the accumulative losses is within the limit of the equity capital which is 11,136 million Rps.

Then, the interest rate for the borrowed capital should be less than 6% P.A. to meet this condition.

(4) Point to Break the Cumulative Losses
(Time to Start the Dividends Payment)

The break point of the cumulative losses is on 9th year of operation if the interest rate is 6% P.A., on the 12 years if 8% P.A., on the 17th year if 12% P.A. and on the 18th year if 13.5% P.A.

If considering this time as the time to start the payment of dividends, from the viewpoint of industry (generally considered as normal is within 10 years), the rate of interest for the borrowed money should be less than 8% P.A.

From a viewpoint of commercial base, the rate of return on the investment of this project is by no means sufficient. However, if long term loan with low interest rate less than 8% P.A. would be utilized. The financial soundness would be kept and it is possible to reimburse debt and to repay tax and dividends.

5. ECONOMIC ANALYSIS

It is expected that the implementation of this project will bring about various effects to the Indonesian economy and will play an important role in the enhancement of the national life of the Indonesian people.

5-1 Increase in National Income (Multiplier Effect)

It is expected that the expenditures of the shipyard as the result of its production activities will create the increase in national income several times as much as the initial expenditures by repercussion effect. In other words, the sales of the shipyard will primarily create the increment of income of the workers who are engaged in the shipyard and the related industries.

The recipients of such increased income will use part of their income for purchasing goods and services. Consequently, such disbursements will create the secondary increment of income in the sectors of goods and services. In the same way, the third increment will be brought about. Thus, such process of the increment of income, except the part of income saved and the portion spent for the payment of the imported goods, will be repeated, and will cause to increase the national income.

This effect is expressed as follows:

· Primary effect (E_1n)

$$E_1n = Sn\ (1 - \alpha_1n)(1 - \beta n)$$

S = Sales of the shipyard

α = Propensity to save

β = Rate of imported goods

n = Year

· Secondary effect (E_2n)

$$E_2n = Sn\ (1 - \alpha_1n)(1 - \beta_1n)(1 - \alpha_2n)(1 - \beta_2n)$$

· m th effect (Emn)

$$Emn = Sn\ (1 - \alpha_1n)(1 - \beta_1n)(1 - \alpha_2n)(1 - \beta_2n)$$
$$\ldots(1 - \alpha mn)(1 - \beta mn)$$
$$\vdots$$

The annual sales of this project under the normal operations will be about 18,000 million Rps (in terms of 1984 price). How much the sales of this project will contribute to the increment of the national income of Indonesia are studied hereunder.

Based on the amount of money of importation, the ratios of imported materials for the shipyard are determined as:

	Ratio of imported materials
1st ∿ 5th year	90%
6th ∿ 10th year	80%
11th ∿ 20th year	70%
21st ∿ 30th year	60%

It is also assumed that 3% of the total cost will flow out of the country in addition to the payment for design fees and royalties.

After the 2nd stage, the ratio of imports to the increased income is assumed to be a flat rate of 20% and the propensity to save is assumed at 5%.

As the primary effect (E_1n), therefore, the increment of income is obtained as follows:

$$E_1n = (\text{Sales} - \text{Payment for imports} - \text{Payroll of old employee}) \times (1 - 0.05)$$

The increment of income after the 2nd stage (En) is expressed as follows:

$$En = E_1n\,(1 - 0.2)(1 - 0.05) + E_1n\,(1 - 0.2)^2(1 - 0.05)^2 + \cdots\cdots$$

$$= \frac{(1 - 0.2)(1 - 0.05)}{1 - (1 - 0.2)(1 - 0.05)}\,E_1n$$

Based on the above-stated expressions, the increment of national income deriving from this project is calculated and seen in the Table IV-5-1.

Table IV-5-1 Increment of National Income

Unit: Million Rps (1984 price)

Years after Operations	Primary Increment	Increment of 2nd Stage and Thereafter	Total
11th ∿ 20th year	9,666	30,615	40,281
21st ∿ 30th year	10,581	33,510	44,091

5-2 Development of Related Industries (Linkage Effect)

The shipbuilding industry has extensive related industries. It is believed that this project, once realized, will give an extensive influence onto the related domestic industries of Indonesia.

Applying the ratio of imported materials earlier discussed, the increase in sales of shipbuilding-related industries is estimated at about 2,900 million Rps annually during the 11th to 20th year period after the operations will be started, and the same will be 3,850 million Rps annually during the 21st to 30th year of operations (in terms of 1984 price).

Such increase in demands for the products of ship-related industries will, further, induce investments needed for expansion of production facilities, which will have a multiplier effect to the national economy.

This effect of inducement to invest will apply to the general consumption goods sector and the service sector.

5-3 Saving of Foreign Currency

Assuming that the Indonesian prices of new-shipbuilding and repairing are the same as the prices in the world market, the sales minus the cost of imported materials is the amount of the foreign currency saved, which will derive from this project.

In realizing this project, the savings of the foreign currency can be expected at about 10,440 million Rps per year during 11th to 20th year of operations and at about 11,420 million Rps per year during 21st to 30th year of operations and will reach the cumulative amount saved of about 290,000 million Rps over the period of 30 years of operations.

This does not mean increased receipts of foreign currency by exports. However, it is expected that this project will contribute to a great extent to the improvement of the international balance of payments of Indonesia in the sense that the project will help reduce the amount of foreign currency which would flow out of the country if this project would not be undertaken.

5-4 Expansion of Employment

Number of employees in this shipyard will be about 900. At present, 200 workers are already employed by the shipyard. This project will, therefore, create the job opportunities for 700 people. As earlier stated, if the multiplier effect of this project is considered, this project is expected to eventually create 4 times the above-stated number of jobs including those in the related industries and other sectors.

5-5 Effects of the Project on the Ujung Pandang Region

(1) Personal Phase

Assuming that the employee in the shipyard has an average family of 5 persons (wife and four children) to support, the total number of new employee and their family will be 4,200. If the number of employee and their family for the related industries and those in indirectly related establishments including service sectors would be counted, about 8,400 people will be thought to earn their livelihood by realizing this project. This estimation was made on the assumption that about a half of increase in national income brought about by this project would contribute to local economy in this region. If the current workers in the shipyard would be counted, the total number of people whose livelihood will be supported by this project will be about 11,000. This number occupies about 2% of the present population of the city, 650,000.

(2) Effect on the Regional Development

The development of the related industries in parallel with this project was earlier mentioned. It is also expected that this development will induce the investment of the government for infrastructure such as the construction of roads, waterways, and electric power. The improvement of the infrastructure will induce the decision by new industries to set up their operations in this region, and will contribute to the further industrial development of the region. This is in complete line with the policy of the Indonesian Government of decentralizing the population and industries.

(3) Increased Benefits to the Local People

The educational level of the employees for the shipyard will be higher than the average in the region. This will have a substantially favorable effect on the exucation and the aspect of standards of living to the community.

Greater benefits are, also, expected to be brought about to the local people through the improvement of the infrastructure and construction of more schools, hospitals and other public facilities.

5-6 Internal Economic Rate of Return (IERR)

From the standpoint of the national economy of the project, the evaluation was made by calculating IERR of the project. IERR is the discounted rate which equates the sum of present value of benefits to that of cost, from national economic point of view.

It is expressed as follows:

$$\sum_{t=1}^{n} \frac{B_t - C_t}{(1 + IERR)^t} = 0$$

B = Benefit

C = Cost

The savings of foreign currency, that is, the outflow of foreign currency which would occur in case this project would not be carried out, was considered as the benefits of the project viewed from the standpoint of the national economy. The secondary benefits, namely the development of related industries, technological advancement and regional development, were not considered. The initial investment and additional investment were considered as the cost of the project.

As regards the saving of foreign currency by this project, the value mentioned before was used as base case. In addition to this case, the effect on IERR by changing the ratio of imported materials was analysed. The analysis was done over a period of 30 years.

The results of calculation are as seen in Table IV-5-2.

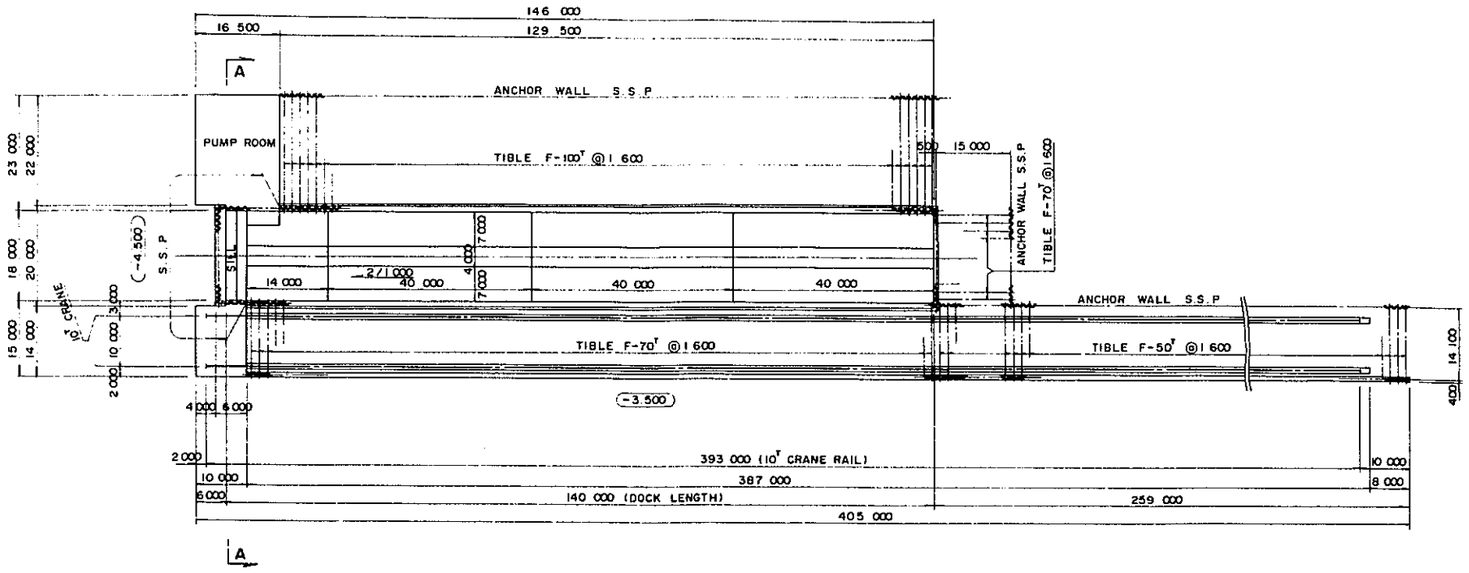
Table IV-5-2 Internal Economic Rate of Return

Ratio of Imported Materials	IERR
Basic case	17.58%
+5% (increase as compared with base case)	16.86%
-5% (decrease as compared with baee case)	18.29%

Note: Refer to Section 5-1 as regards base case.

IERR of this project is 17 to 18%. This IERR is better than the rate of the opportunity cost of capital set by the World Bank being 8 to 15%. (The rate depends on country and kind of project.) From this point of view, also, this project is considered admissible.

PLAN



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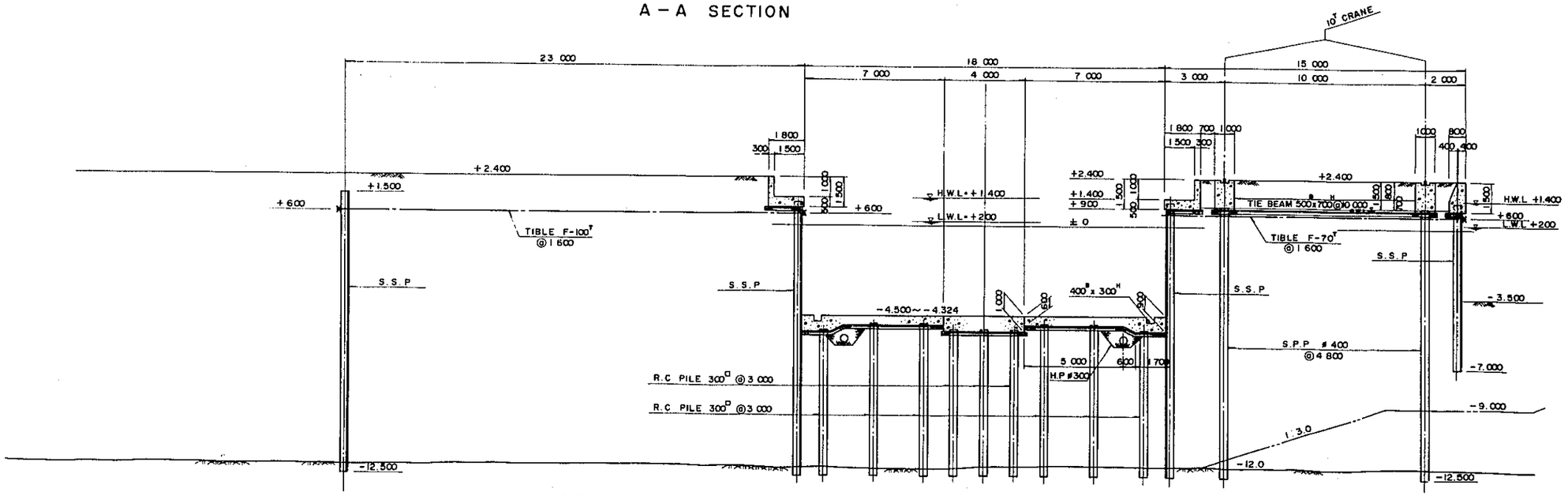
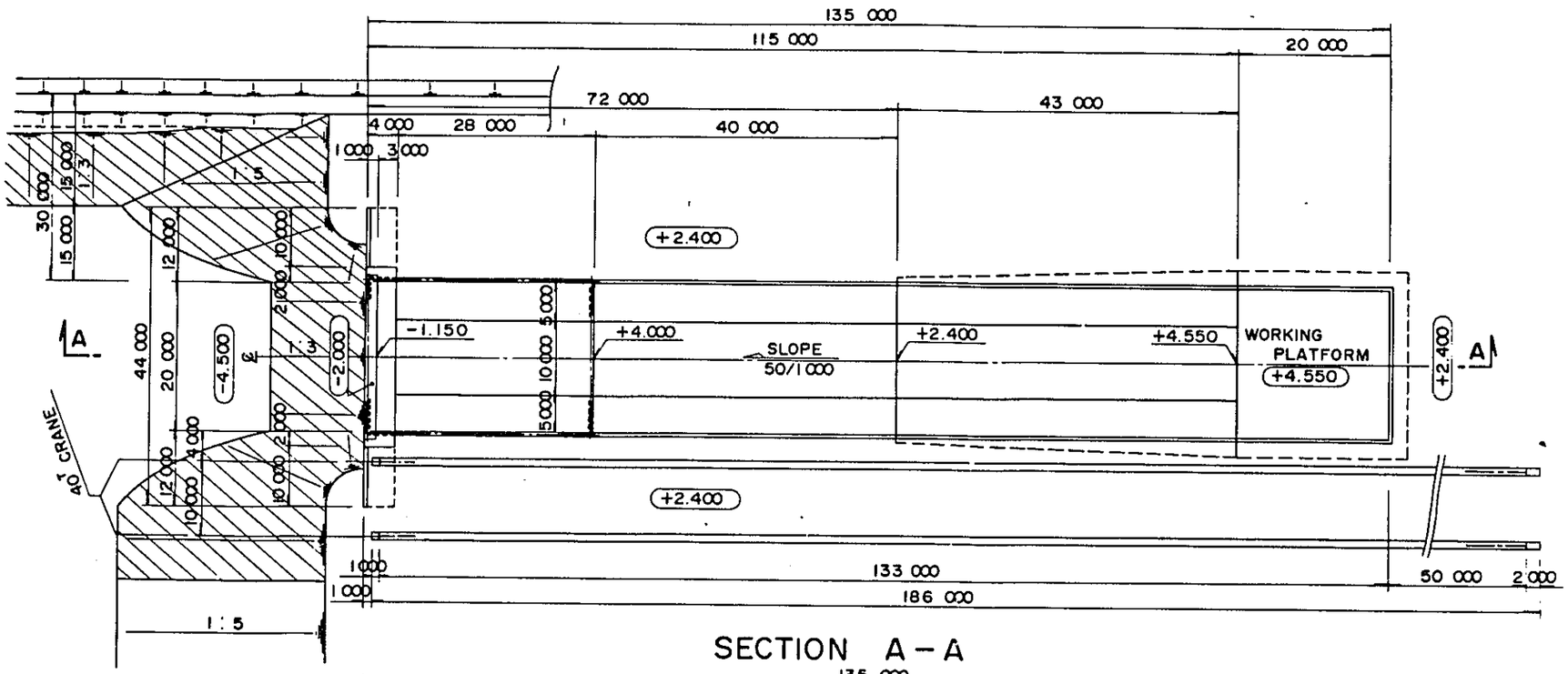
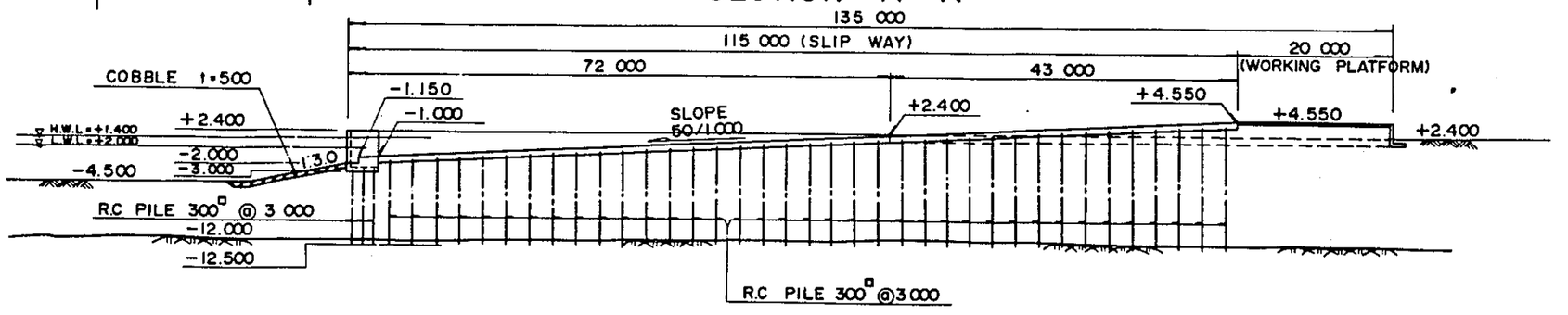


General Dimension of 7 000^{DWT} Repair Dock

PLAN OF SLIP WAY



SECTION A – A



Slip Way