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REPUBLIC OF INDONESIA

REPORT ON SURVEY FOR P.T. PELITA BAHALI DOCKYARD REHABILITATION PROJECT (SUMMARY)

JANUARY 1973

OVERSEAS TECHNICAL COOPERATION AGENCY

国際協力事業団
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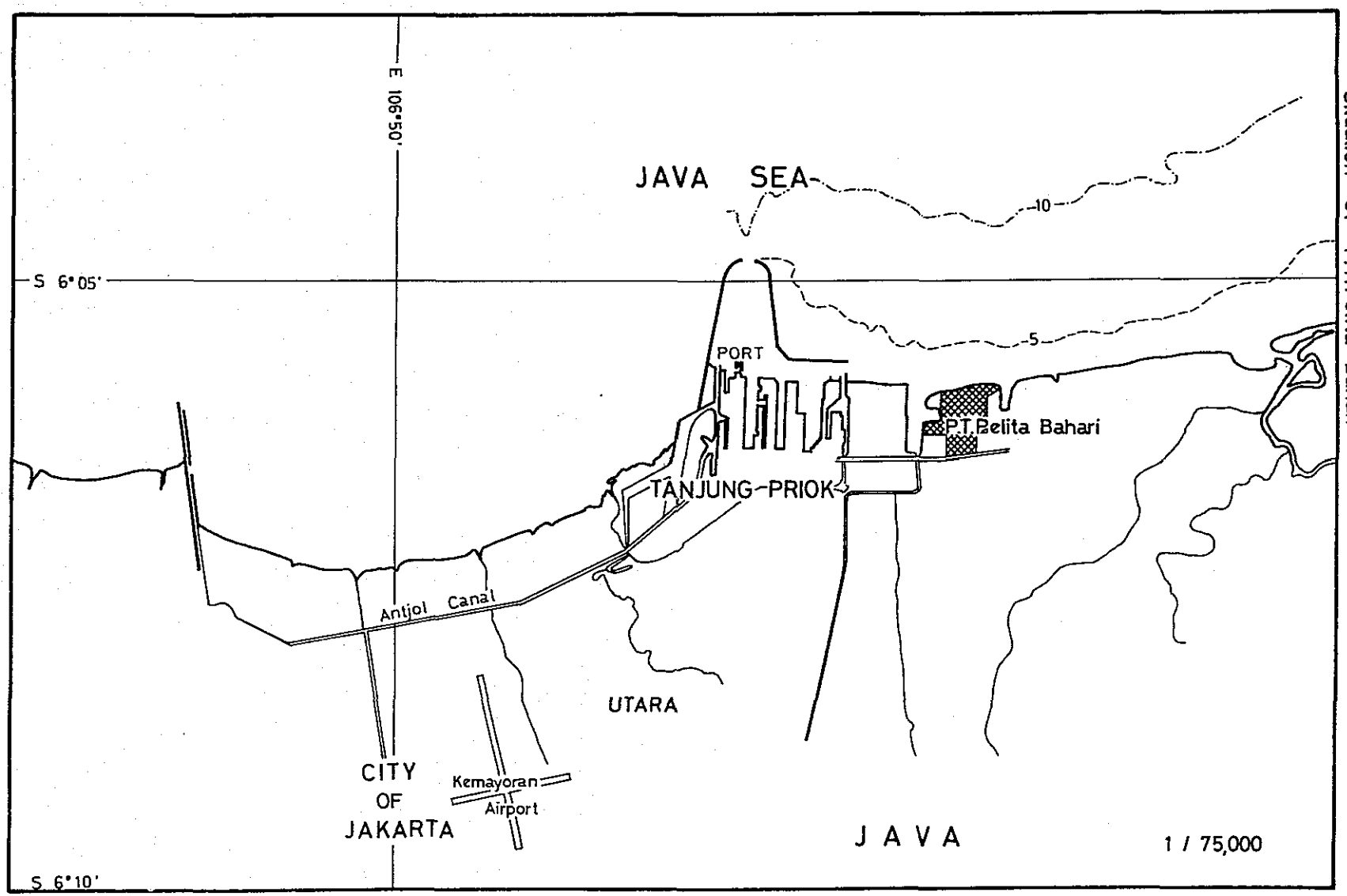


Situation of P.T.Pelita Bahari

CONTENTS

1. INTRODUCTION

1-1 Initiation of Studies

Indonesia's first Five-Year Development Plan 1969-1974 aims at a developing economy and to get the Plan going, Indonesia opens up the opportunity for foreign aid and credits to participate.

One of the important tasks under the Plan is the renovation of coastal shipping, which is progressively implemented by this nation at present, and in early 1972 Indonesian government submitted to Japanese government the rehabilitation project of P. T. Pelita Bahali Dockyard aiming at building of coastal vessels, with their request for Japanese cooperation.

Japanese government accordingly decided to dispatch to Indonesia a team of specialized experts organized by the Overseas Technical Cooperation Agency for feasibility studies and collection of basic information which should serve for their subsequent aid commitments and eventually for the successful implementation of this Project.

1-2 Period of Field Studies and Participating Members

Field investigations and collection of information were conducted by the four-member team comprising the two experts of OTCA, Messrs. Tetsuya Harada and Ryo Kataoka: and the two investigators of Ministry of Transportation Messrs. Yoshio Maki and Yasuo Matsuo, for about two months of from October 6th to December 17th 1972, and with their operation base in P. T. Pelita Bahali, Djakarta.

Meanwhile, Indonesian counterpart team comprising the following members was organized and cooperated in these surveys:

Adviser	Mr. Suwandi	President, Pelita Bahali
"	Mr. Wasdno	PROJASINMAR
Chief	Mr. Hermawan	Director, Pelita Bahali
	Mr. Sumarno	PROJASINMAR
	Mr. P. Pasha	"
	Mr. Mapkaban	Pelita Bahali
	Mr. Ashaf	"
	Mr. Darmadi	Pelita Bahali

The Japanese team had the regular meetings weekly with the Indonesian counterpart team, and mapped out the policies and strategies of the Project by taking into account the Indonesian opinions. Further, these meetings were co-attended by Messrs. Senoguchi and Fujii of the Japanese Shipping Advisory Team, in the capacity of observers.

2. CAPITAL INVESTMENT PLAN

2-1 Basic Policies

With the objective of equipping P. T. Pelita Bahali Dockyard with new facilities for building coastal vessels and small size sea-going vessels, the capital investment plan was formulated as a result of repeated consultations with related people of the Indonesian government and the Dockyard, as are described in the succeeding sub-chapter 2-3, while the basic policies are summarized below:

(a) The dockyard should be modernized to the utmost possible extent and made to function as the pilot dockyard in development of Indonesia's ship-building industry.

(b) The factory should be equipped for building four 3,000 Dw/t class vessels annually, which in turn will become its optimum production capacity.

(c) The Eastern area of the Dockyard's property is a vast land and will be reserved intact for future expansion, while the Western area should be utilized for this Project.

(d) The civil work and installation of machinery should be projected in such a way as to avoid hindrance in the present repair work of ships.

(e) Shifting of the presently operated installations should be avoided as far as practicable.

(f) Whatever appropriate the existing installations should be utilized for the Project to the maximum extent.

(g) Provision shall be made for the long-range expansion of production capacity.

(h) The new installations should be made to function in the repair work of ships as well.

2-2 Soil Surveys

In advance of formulating the capital investment plan, the soil surveys were made about the projected land.

The Dockyard is surrounded by new factories and tank yards which are now under construction, and therefore findings of soil surveys are more or less available, along with the recently constructed slipways of 60,000 DW/t ships. However in order to make more accurate the design of installations and also estimation of construction cost, the two borings of 30 meter deep each were carried out in the Western area, within a period of from October 10th to November 9th 1972, and by a private contractor P. T. Soilens of Bandung.

The boring results are nearly identical with those of the surrounding areas, as is shown in the annexed Drawing, and appear to be composed of moderate strata on the whole; The stratum of from ground surface (+ 2 meter)

to - 3 meters is in sand, followed by clay extending upto approximately - 22 meters which is high in dis-permeability and insecure in supportability. The strata extending below - 22 meters are alternation of hard clay and sand, with adequate bearing power. Accordingly the supporting piles of major installations and sheetpiles of quays should be driven down to the supporting stratum, while the dock floor plates are to be installed upon the sand stratum and quite safe against up-lift.

Further, the neighbouring sea-bottom is composed of similar strata and part of the dredged soil might be re-used for reclamation. A sustantial amount of such dredged soil should preferably be dumped offshore, while the reclamation work ought to be done with better soil hauled from the hill.

2-3 Outline of New Facilities

2-3-1 Basic Principles

(a) At present the Western area of about 7,000 m^2 is being used for the repair work and new shipbuilding, while the Eastern area of about 22,000 m^2 is rented to and used by the metal working factory of a separate management. In order to construct new facilities of this Project without hindrance in the presently operated production and repair, it is preferable that the construction of this Project should be located in the Central area by reserving the presently operated areas for future expansion.

(b) New facilities and machinery to be installed should be of such type as fully proven, trouble-free and simply constructed, from the viewpoint of the present difficulties such as inadequacy of maintenance, spare parts and skilled labour force.

(c) Shipbuilding should be principally by assembly of blocks pre-fabricated in welded construction; Blocks pre-fabricated in the roofed sub-assembly yard are transported to and outfitted in the block stockyard, and thence hauled and built up in the assembly dock.

(d) The layout of factories shall be made to function in the most efficient flow of work. These factories are to be disposed in the "T" shape in relation to the assembly dockyard; Outfitting and associated factories shall be disposed in such way that whatever are labour-consuming will be located in the vicinity of assembly dock and block stockyard.

(e) The production supervision (control) should be chiefly by stage-wise control and the projected production scale does not warrant fragmentation. Further, focusing upon labour productivity and rapid growth of production strength, it is preferable to introduce the Japanese technology into such production control.

(f) The assembly method shall be by dry dockyard. In spite of the construction cost becoming comparatively higher (See the foot-note below), the dry dock method is recommended because of the opposing sea being confined, and also from the viewpoint of capital investment of launching-ways and ..... as well as the expenses of launching, which in the long-run will place the dry dock method in advantaged

position along with less technical risk.

Note: Because of soft terrain, the cost of foundations should not differ materially.

(g) Shipbuilding facilities will not be automated or numerically controlled either. Because one of the long-range objectives of this Project aims at increased employment of labour force, and also acquirement of fundamental shipbuilding technology.

(h) The local subcontract of components being not envisaged under the present situation, it is preferable that all the components will be either imported or manufactured in new facilities. Therefore ancillary equipment and facilities will increase in the New Dockyard to the extent of more than otherwise necessary.

(i) Operating days of machinery and installations are estimated on the average of 25 days per month, with 52 Sundays, 10 public holidays and half-day Saturdays annually.

(j) Whatever practicable the existing machinery such as lathes should be re-used for this Project.

(k) Industrial water is to be supplied by augmenting the existing well and pumping system, while the drink water should continue to be supplied by the water supply boat.

(l) Whatever become useless or duplicate in location as a result of this Project, the existing machinery and installations should be disposed of or dislocated to a new site.

2-3-2 Outline of Dockyard Layout

(a) A sea-coast of about 240 meters long should be reclaimed and developed into a new land, in the north side of near-Central Zone out of the Western area, while quay-walls are to be established in parallel with the south-side boundary, so as to construct a building lot of 180 meters wide and 240 meters long for this Project.

(b) New facilities are to be constructed as follows:

i) Assembly dock

ii) Jib crane and its rail foundations.

iii) Outfitting wharf.

iv) Design office and pattern shop.

v) Block prefabrication factory and material stockyard.

vi) Metal working and piping shop.

vii) Machining shop.

viii) Power and prime mover shop and power distribution piping and wiring.

ix) Transportation roads and etc.

(c) Existing facilities to be converted for new objectives;

i) Electrical engineering shop and iron foundry and blacksmith, by converting the existing machining shop.

ii) Wood processing shop and its warehouse, by converting the existing servicing shop.

(d) Existing facilities to be dislocated:

i) No. 1 floating dock

ii) No. 2 floating dock

(e) The assembly dock should be constructed at a location of about 200 meters from the West end, facing North-to-South, while the outfitting wharf of 150 meters long is to be constructed along the neighbouring sea-coast.

Further, the opposing sea-bottoms are to be dredged upto - 5 meters below the datum water level. The opposing sea-coast being about 190 meters distant, the available length of new wharf ought to be about 150 meters.

(f) Jib crane for the final assembly is to be installed on the East side, in parallel with assembling dock.

(g) Block prefabricating shop is to be disposed in the "T" shape in relation to assembly dock; This shop should comprise two buildings processing and assembling, while material stockyard is to be provided on the east side of the processing sub-shop. The flow of steel material is to be disposed east to west throughout the processing sub-shop, transported to the assembling sub-shop by means of bogies operating in the central area of block fabrication shop, and then to be moved to the west of assembling sub-shop untill reaching the block stockyard.

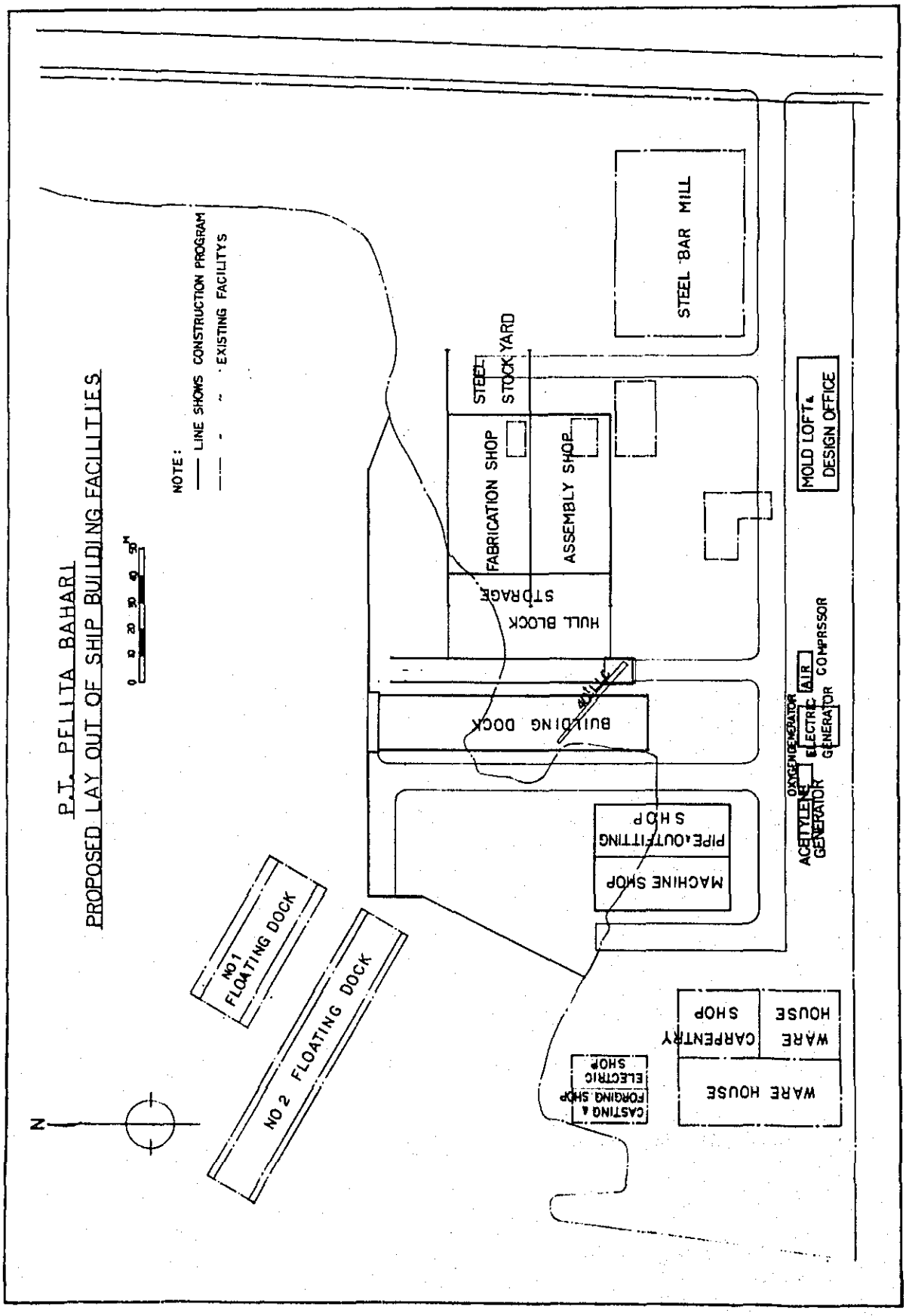
(h) Block stockyard is to be established on the west side of block fabrication shop and in the vicinity of assembly dockyard; Blocks are to be transferred by means of jib crane located in the assembly dock. The neighbouring area of block stockyard being rather spacious, this area is to be reserved for the long-range expansion.

(i) Design office and pattern shop are to be disposed into a common building and located near the south-side boundary and alongside the block fabrication shop, while reserving adequate space for the long-range expansion of block fabrication shop.

(j) Metal working and piping shop is to be disposed into a common building in order to avoid duplication of machinery, and located on the west side of assembling dock so as to function in efficient operation of block outfitting and also in-dock outfitting.

(k) Machining shop is established alongside the metal working and piping shop, for easy transportation of processed material.

Whatever appropriate the existing machinery are to be dislocated and re-installed, while whatever become necessary the new machinery are to be procured.


P.T. PELITA BAHARI
PROPOSED LAY OUT OF SHIP BUILDING FACILITIES
NOTE:
LINE SHOWS CONSTRUCTION PROGRAM
EXISTING FACILITYS
0 10 20 30 40 50M
N
NO 1 FLOATING DOCK
NO 2 FLOATING DOCK
BUILDING DOCK
SLIP
HULL BLOCK STORAGE
FABRICATION SHOP
ASSEMBLY SHOP
STEEL STOCK YARD
STEEL BAR MILL
MOLD LOFT & DESIGN OFFICE
OXYGEN GENERATOR
ELECTRIC GENERATOR
AIR COMPRSSOR
ACETYLENE GENERATOR
PIPE & OUTFITTING SHOP
MACHINE SHOP
CASTING & FORGING SHOP
ELECTRIC SHOP
CARPENTRY SHOP
WARE HOUSE
WARE HOUSE

(l) The existing workshop is to be partly converted into extension of warehouse, and the remaining area into wood working shop.

(m) The existing machining shop is to be converted into electrical engineering and foundry and blacksmith.

(n) The principal road is to be provided 25 meters away and alongside the south-side boundry, in the south-side of which the power house and design office (pattern shop) as well as building of supervisory staff shall be disposed without hindrance in the long-range expansion of production facilities.

(o) Two units of existing floating docks are to be transferred, as it is, to the west side of new outfitting wharf.

2-3-3 Nemerals for Planning of Capital Investment

(a) Shipbuilding Schedule

As are described in the preceeding sub-chapter 2-1 (Basic policies), the new Dockyard aims at building four 3,000 DW/t class cargo ships when it operates in full swing. Meanwhile in order to train and familiarize the labour force, the initial step is to take in hand the building of 1,000 DW/t class vessels and to progressively increase shipbuilding in the succeeding years, as are described in the next-page table.

(b) Dimension, weight etc. of vessel to be built

Although planning has been required for building general cargo freighter of 3,000 D.W. class in this dockyard, this plan has been drafted for building combination vessel of max. 3,500 D.W. class as well, incorporating a capacity margin.

i) Dimension of Vessel

Type	Overall Length (Loa)	Length between perpendiculars (Lpp)	(Bm)	(Dm)
3,000 D.W. Freighter	$76^m \sim 90^m$	$71^m \sim 85^m$	$12.5^m \sim 13.8^m$	$5.8^m \sim 7.1^m$
3,500 D.W. Combination Vessel(*)	85 ~ 96	80 ~ 90	13.5 ~16.0	6.2 ~8.4

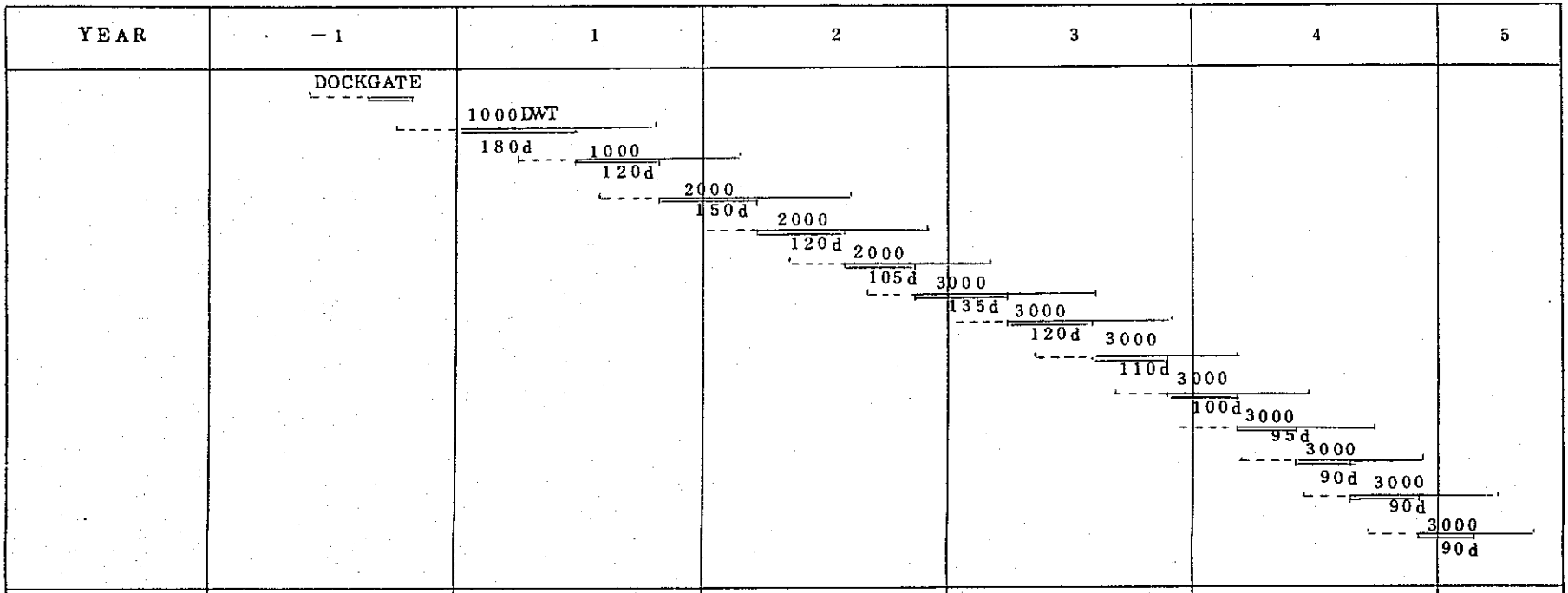
(*) A type of combination vessel is varying depending on the specification, and above figures are calculated on the basis of short-voyage coastal vessel mainly for cargo transportation.

ii) Weight of vessel

Type	Hull block Weight	Engine Portion Weight	Weight of Other portion	Total
	(abt. t)	(abt. t)	(abt. t)	(abt. t)
3,000 D.W.T. Freighter	800	300	200	1,300
3,500 D.W.T. Combination Vessel	1,300	500	500	2,300

SHIP BUILDING SCHEDULE

	HSW
1000DWT	360T
2000 〃	600
3000 〃	810



TONS/MONTH (ERECT)		60	90	120	150	172	180	203	220	243	256	270	270	270
EFFICIENCY MH/T		400	350	320	300		280	265		250	240			
OUT PUT MH/MONTH		24,000	33,000	43000	51,000		53,000	60,000		64,000	65,000			
NO.WORKOR REQ.		160	220	285	340		360	400		425	435			

☆ NO OF PERSONS ARE CALCURATED AS FOLLOWS

WORKING HOURS PER DAY (7H + 1H OVERTIME) × W DAYS PER MOUNTH 24 × DIRECT LABOUR RATIO 0.87 × ATTENDANCE RATIO 0.90 = WORKING HOURS PER MDNTH,MAN 150 H/MONTH

(c) Hull block monthly steel consumption (standard)

Weight of fabricated steel = Hull block weight 800t ÷ Building period (month) 3 ÷ Yield rate 0.86 ≒ 310 t/month

Weight after assembled = Hull block weight 800t ÷ Building period(month) 3 x 0.9 ≒ 240t/month

Weight after outfitted = Hull block weight 800t ÷ Building period(month) 3 ≒ 270t

(d) Area Required for Installation of Equipment for Hull Block

In this item, investigation has been made on macroscopic viewpoint for overall balance, on the basis of empirical figures(Turnover, area are percentage etc.) of the existing ship-building dockyard.

Workshop	Monthly movement volume (ton)	Stocking period (day)	Area/Turnover (M^2/ton/Month)	Workshop area (M^2)	Area percentage (%)
Steel material storage area	Steel plate 270 Shaped Steel 40	60	Steel plate 0.8 Shaped steel 3.0	430 270	7.9
Fabrication Shop	270	10	5.0	1,800	20.3
Assembling Workshop	250	5	6.0	1,750	19.8
Block storage area	250	15	4.5	1,690	19.2
Building dock				2,000	22.6
Others				900	10.2
Total				8,840	100.0

2.3.4 Specification of Equipment

(a) Dredging and reclamation work

i) Dredging Work

Water depth -5m

Dredging soil volume 108,000m^3

ii) Reclamation Work

Reclamation soil volume	Dredging spoil soil	Excavated Soil
121,000m^3	24,000m^3	97,000m^3

(b) Building dock

Dimension	Width×Length×Depth 20m x 100m x 7.2m	5.2m deep from datum water level
Structure	Foundation with reinforced concrete pile	To be built of reinforced concrete.

Foundation for 40 ton jib crane rail

Dimension	Gauge 9m	Length 90m
Structure	Foundation with steel tube pile	To be built of reinforced concrete

(c) Quay Construction work

Water depth x length -5m x 160 m

Structure Quay built of steel sheet pile

Temporary bank revetment work

Water depth x length ±0m x 95m

Structure Self-standing type quay built of light-weight steel sheet pile

(d) Design office and pattern shop

16m x 50m = 800m^2 x 2 stories = 1,600m^2

To be built of steel structure for 2-story and roof covered with slates.

Design office 1st story
Pattern shop 2nd story

(e) Ship-building shop

i) Buildings

Description	Dimension				Structure
	Width	Length	Height	Area	
Steel Material storage area	30m	x 24m	x 8m	720m^2	Built with steel-structures
Fabricating Shop	30m	x 60m	x 8m	1,800m^2	Built with steel-structures and roof covered with slates
Assembling shop	30m	x 60m	x 13m	1,800m^2	〃
Block Storage area	60m	x Girder section 30m	x 8m / 13m	1,800m^2	Built with steel-structure (girder section L=12m)
Concrete floor				5,400m^2	Concrete thickness 15cm
Foundation for machinery		-35			Built with reinforced concrete

ii) Major machinery installation

Description	Unit	Particulars	Remarks
20 ton overhead travelling crane	1	Span 28m, Lift 13m	To be newly installed
5 ton overhead travelling crane	3	Span 28m, Lift 8m	do
5ton inter-shop transfer bogie	1	Gauge 30m, 2m x 6m	do
200 ton C-type hydraulic press	1	2T fitted with hoist	do
50 ton C-Type hydraulic press	1	1T fitted with hoist	do
50 ton frame bender	1	1T fitted with hoist	do

(f) Outfitting and pipe shop

i) Building

Building	Width Length Height Area 20m x 50m x 8m 1,000m^2	To be built with steel structures and roof covered with slates
Concrete floor and foundation for machinery	Floor area 1,000m^2	Floor concrete thickness 15cm To be built with reinforced concrete

ii) Major machinery installation

Description	Unit	Particulars	Remarks
30 ton hydraulic press	1		To be newly installed
4 inch pipe bender	1		do
Screwing machine	1	4 inch	do
High-speed cutter	2	Disc, cutter	do
Boring machine	2		do
Water-pressure pump for testing	2	30Kg/cm^2, 50Kg/cm^2	do
High-pressure compressor for testing	1	50Kg/cm^2	do
Grinder	2		do
1.5 ton overhead travelling crane	2	Span 18m, Lift 8m, Pendant-operated	do
Shearing machine	1		Existing unit to be transferred.

(g) Machinery shop

i) Building

Building	Width Length Height Area 20m x 50m x 8m 1,000m^2	To be built with steel structures and roof covered with slates
Floor concrete and foundation for machinery	Floor area 1,000m^2	Floor concrete thickness 15cm. To be built with reinforced concrete

ii) Major machinery installation

Description	Unit	Particulars	Remarks
Horizontal boring machine	1	Spindle diameter 100mmø	To be newly installed
Planer	1	Table 800mm x 1,500mm	do
8 feet lathe	1	2,400mm	do
Double-wheel grinder	1	Wheel diameter 400mmø	do
Hull boring machine	1		do
40 feet lathe	1	12,000mm	Existing unit to be transferred
6 feet lathe	1	1,800mm	do
5 feet lathe	1	1,500mm	do
2 feet lathe	1	600mm	do
Radial boring machine	1	VR-4	do
Radial boring machine	1	VR-6	do
Multi-purpose milling machine	1		do
Multi-purpose burnishing machine	1		do
Shaper	1		do
Band saw	1		do
5 ton overhead travelling crane	1	Span 18m Lift 8m Pendant-operated	To be newly installed
1.5 ton overhead travelling crane	1	Span 18m, Lift 8m, Pendant-operated	do

(h) Electrical shop

i) Building

Existing machining workshop to be used 12m x 28m = 336 m^2

ii) Major machinery installation

Description	Unit	Particulars	Remarks
Cable winder	1		To be newly installed
Drying furnace	1		do
Table boring machine	1		do
Double wheel grinder	1		do

(i) Casting and forging shop

i) Existing machining shop to be used 12m x 28m = 336 m^2

ii) Major machinery installation

Description	Unit	
Tilting furnace	1	Furnace with 200 kg capacity for copper alloy
Blower	1	
Heating furnace	1	
0.5 ton forging hammer	1	

(j) Wood-working workshop

i) Building
Existing building to be used 25m x 30m = 750m^2

ii) Major machinery installation

Description	Unit	Remarks
Automatic planer machine	1	To be newly installed
Wood-working lathe	1	do
Disc sawing machine	1	do
Band sawing machine	1	do
Slotting machine	1	do

(k) Power plant

i) Building

Generator room	12m x 16m	Area 200m^2	To be built with steel structures and roof covered with slates
Compressor room	5m x 15m	" 75m^2	do
Acetylene room	5m x 10m	" 50m^2	do
Oxygen plant	5m x 2m	" 10m^2	do

ii) Major machinery installation

Description	Unit		Remarks
Generator	2	500 KVA x 2	To be newly installed
Distributor board	1 set	Transformer, condenser	do
Compressor	3	Diesel 150Hp x 3	do
Fuel tank	1	5T	do

(l) Road and drainage work

Road

Pavement with asphalt concrete	Thickness 5cm	Roadbed	Roadbed of crushed stone	Thickness 15cm	Area 7,200m^2

Drainage Work

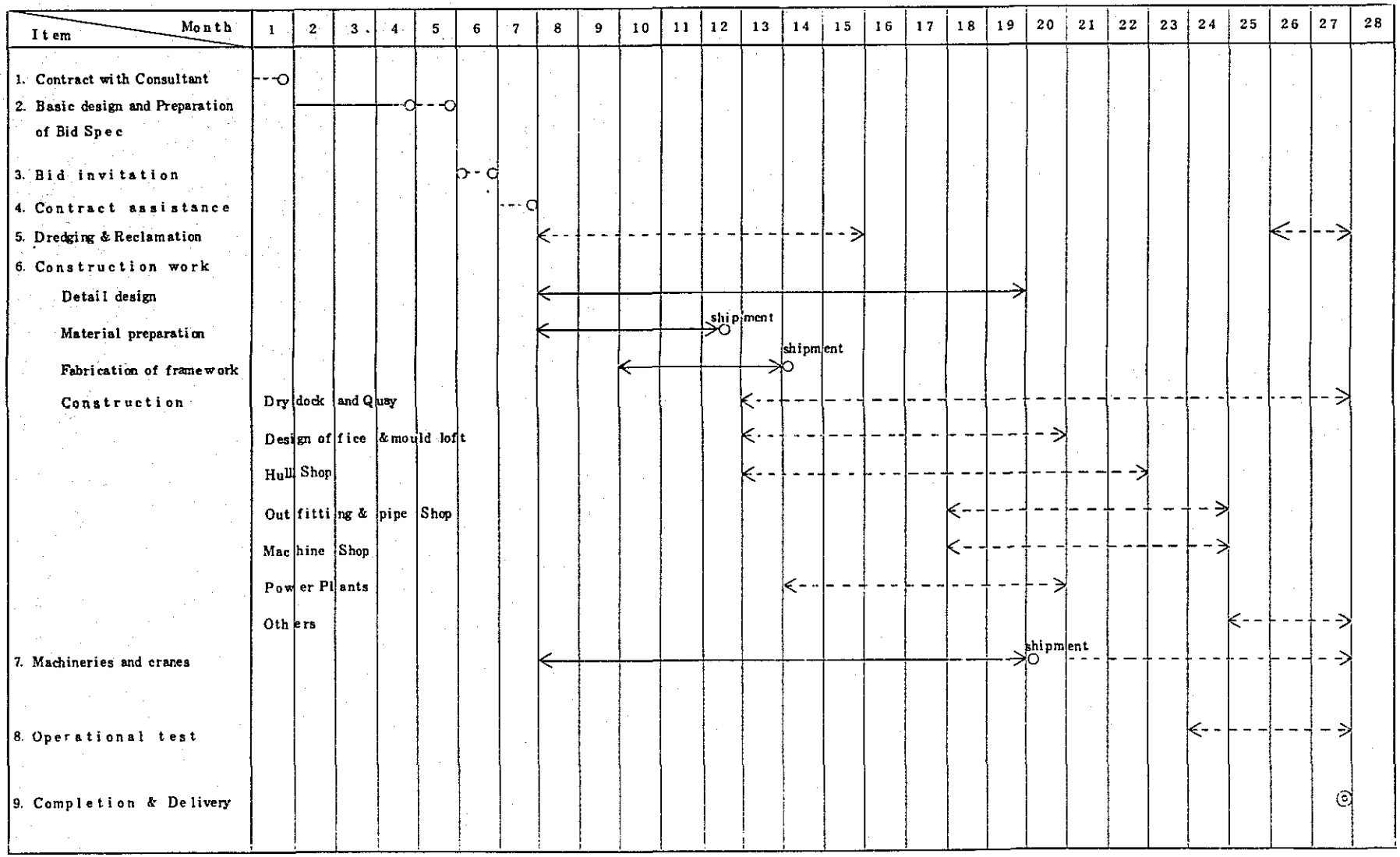
Reinforced concrete pipe 250ϕ ~ 600ϕ ℓ =1,270m

(m) Piping work

Air piping	50^{A}~150^{A}	1,700m
Acetylene piping	25^{A}~ 50^{A}	1,500m
Oxygen piping	20^{A}~ 40^{A}	1,500m
Clean water piping	20^{A}~100^{A}	2,800m
Sea water piping	50^{A}~ 80^{A}	1,150m

2.4 Construction Plan

PROCEDURE SCHEDULE



2. 5 Investment

2. 5. 1 *Manner of assessing investment for construction*

For the constructing facilities stated in each of the foregoing items, expenses will be needed vide supporting cost calculation data and list in the next item.

(a) Steel material, fabricated steel products, non-ferrous metal, machinery, supplies, cement etc. are to be covered by yen-credit financing and were computed on the basis of CIF Tanjung Priok, while soils, teimber, timber products, local work cost (including rentals of construction equipment) etc. were computed on the basis of local procurement by local funds.

(b) Consulting fee
Services of consultant are as outlined below.

i) Relative to contract:
Preparation of bid specification
Explanation Pre-bid orientation
Evaluation of bids submitted
Recommendation for award

ii) Relative to procurement
Order, acceptance and distribution of equipment procured on yen-credit financing
Inventory control for equipment
Presence at final inspection of completed machinery (at manufacturer)

iii) Relative to work implementation
Check of detail design
Check of work methods
Budget control
Daily schedule control
Quality control
Presence at performance test of machinery (after installation)

Breka-up of consulting fee

Design and survey fee	¥15,000,000.-	
Travelling expenses	¥ 4,880,000.-	
Travelling and lodging expenses (domestic)	¥ 1,840,000.-	
Travelling expenses (in Indonesia)	¥ 8,000,000.-	Rp. 10,800,000.-
Local lodging expenses	¥27,400,000.-	Rp. 37,000,000.-
Comunication charge	¥ 590,000.-	
Technical know-how fee	¥54,500,000.-	
Labour charge	¥ 260,000.-	Rp. 350,000.-
Travelling expenses of government officers	¥ 4,110,000.-	
Miscellaneous ¥116,580,000 x 5%	¥ 5,800,000.-	
Total	¥122,380,000.-	
Account Item Yen credit portion	¥86,720,000.-	
¥86,720,000 308 = US$ 282,600.-		
Local funds	¥35,660,000.-	= US$116,000.-
¥35,660,000 0.74 = Rp. 48,150,000.-		

2.5.2 List of Investment

Itemized Table of Investments for Rehabilitation of Ship Building Facilities

Unit: 1,000 US$

No.	Description	Civil Engineering			Machinery			Total
		1 Aid	2 Domestic	3 Total	4 Aid	5 Domestic	6 Total	
1	Dredging and reclamation work	0	412	412	0	0	0	412
2.	Ship-building dock	565	432	997	326	59	385	1,382
3.	Quay construction work	388	195	583	0	0	0	583
4.	Design and mould loft	84	124	208	0	0	0	208
5.	Ship-building shop	266	273	539	307	33	340	879
6.	Out-fitting and pipe	104	115	219	223	19	242	461
7.	Electrical, casting and forging shop	0	0	0	70	14	84	84
8.	Wood working shop	0	0	0	39	7	46	46
9.	Power plant	21	20	41	232	30	262	303
10.	Tools & vehicles	0	0	0	221	0	221	221
11.	Common items	7	118	125	291	88	379	504
	Total	1,435	1,689	3,124	1,709	250	1,959	5,083
	Consulting fee	Aid		7	282			
		Domestic		8	116			

Total Aid	1 + 4 + 7	3,426
Total Domestic	2 + 5 + 8	2,055
Total		5,481

2.5.3 Appropriation of Construction Fund

Construction work being expected to extend over as long as 3 years, it is seen that the fund will be appropriated in several installments. A special attention must therefore be taken to ensure quick availability of the funds, as otherwise in the event of the funds becoming short against the expenditures, this is likely to suspend the construction and to involve additional expenditure.

Listed below are fiscal-year investment (unit:&S$1,000)

	1973	1974	1975	Total
Yen credit by Japanese Government	3,426	-	-	3,426
Fund by Indonesian Government	441	1,351	263	2,055
Total	3,869	1,351	263	5,481

3. OPERATIONAL PLAN

3.1 Forecast of vessel requirements

A plan is drafted that four vessels of 3,000 DW/t class each are built yearly in Pelita Bahali shipbuilding dockyard, on the assumption that the demand be created for this type of vessel.

(a) Requirements of coastal vessels

In June 1971, the Indonesian Government made public a forecast for marine transportation volume in 1980, according to which inport and export cargo volume in 80 major ports is as tabulated below. It is seen that coastal and sea-going cargo volumes will increase by about 2.8 and 1.3 times respectively;

(1,000 ton)

	Coastal cargo volume			Sea-going cargo volume		
	Outgoing	Incoming	Total	Outgoing	Incoming	Total
1969(A)	2,298	2,222	4,520	2,500	3,965	6,465
1980(B)	6,305	6,469	12,774	3,268	5,174	8,432
B/A	2.74	2.91	2.83	1.31	1.31	1.31

1) Petroleum, minerals etc. are excluded.
2) Preliminary Projections of Commodity Flow 1980 (Bureau of Research & Analysis Dept. of Communication)

The Indonesia's economic policy is implemented satisfactorily at the present time, and if such progress continues to remain unchecked, it is seen that the projections of commodity flow in 1980 will be made realistic. Meanwhile regarding the coastal vessels which are a type to be built in the new Dockyard, it is noted that its transportation efficiency (figure obtained by dividing operatable ship tonnage by annual commodity flow) is presently in low order of 8. Supposing that such efficiency is improved to 20 in 1980 as projected, through the expected renovation of diverse facilities, it must be acceded that the Indonesia's present holdings of coastal vessels (280,000 D.W. while the Government estimate actually operatable tonnage of 200,000 D.W.) ought to be maintained. Out of this 200,000 D.W., 100,000 D.W. is to be shared by rehabilitating the existing vessel, while the remaining 100,000 D.W. requires replacement which if executed during 7 years from 1973 to 1979, annual requirements of 14,000 D.W. vessels are expected.

(b) Besides, demand will be expected for replacement and ship tonnage increase of coasting vessel, foreign voyage vessel and exclusive-use vessel of 1,000 ~ 3,000 D.W. class.

(c) In Indonesia, no vessel of more-than 1,000 D.W class has been built so far. However, after start of operation of these ship-building facilities, local building will become possible if it is arranged by policy.

In consideration of the above viewpoints, it is believed that a potential demand will exist in Indonesia of the vessel of less than 3,000 D.W. class.

With regard to demand for repair, it is reported that major portion of vessel repair work (about 30%) has went to foreign countries such as Singapore

despite the fact that such repair, it is believed, can be undertaken locally, due to the dissatisfaction with the owner in respect of repair parts which Indonesia must depend upon import, sub-standard repair technique, and lengthy repair work period. Furthermore, all vessels of more than 100 G. T. class must undergo an annual inspection in Indonesia in accordance with the regulations by BKI (Biro Classification Indonesia). Actually, however, the vessel undergoing such inspection is a few due to financial capability of the owner.

A rapid increase will be expected in the future in demand for repair if technique will be improved thanks to guidance in repairing technique which is presently undertaken by foreign ship-building dockyard, and furthermore, administration guidance will be strongly effected for fulfillment of the inspection regulations.

3.2 Labour Force

3.2.1 Ship building plan and necessary workers

For the purpose of implementing plan of building four vessels of 3,000 D.W. class in fourth year after the dockyard starting operation, it will be necessary to try to shorten a building schedule while trying to build at anitial stage a vessel of 1,000 D.W for gradually enlarging the vessels to be built as is listed under item 4.3.3(a).

For this purpose, 160 and 435 direct workers will become necessary for lst and 4th year respectively as listed below, and this necessity is depending upon the assumption that the workers will become acquainted with the work and gradually acquire a skill. A number of leaders required will be about 10% of total direct workers. Semi-annual necessary workers are as listed below.

Listed below is craftwise distribution of workers at 4th year after commencement of operation.

3.2.2 Sufficiency of Labor Force

A number of workers of new employment will be needed to fulfill the personnel requirements as aforementioned. Big supply potential exists locally for labor force and labor force of comparatively good quality can be secured.

In the present conditions, labors of seasonal employment hold a nearly half portion. It is desirable however, that the workers of the new ship-building dockyard be of direct employment as practicable as possible, with the exception of the workers for some crafts. The ratio of direct and seasonal employment ought to be determined with due consideration taken for local conditions. In this regard, detail survey may not be possible and listed below are total number of employees on semi-annual basis.

1) 80 workers can be transferred from the existing Pelita Bahali shop.

Academic carrier and experience of killed worker and engineer of Pelita Bahali ship-building dockyard are as listed below. If necessary, an employment can be secured at any time from abundant number of graduates of senior schools.

	1st year before commencement of operation		1st year after commencement of operation		2nd year after commencement of operation		3rd year after commencement of operation		4th year after commencement of operation	
	persons	persons	persons	persons	persons	persons	persons	persons	persons	persons
Direct worker	(60)	(110)	160	220	280	340	360	400	425	435
Indirect worker	(5)	(8)	10	12	14	16	18	20	20	20
Leader	(10)	(10)	10	13	16	20	22	25	25	25
Total	(75)	(128)	180	245	310	376	400	445	470	480

Craft	Direct Workers				Leader	Indirect Workers	G. Total
	Leader persons	Skilled persons	Semi-skilled' persons	Total persons	persons	persons	persons
Mold Loft	4	6	6	16	1		17
Fabrication	11	14	15	40	2		42
Assembly	13	24	24	61	3		64
Erection	16	34	30	80	4		84
Outfitting	18	31	30	79	5		84
Painting	6	13	15	34	2		36
Machinery	17	28	31	76	5		81
Electric	5	11	4	20	1		21
Others	6	10	13	29	2		31
Total	98	173	168	435	25	20	480

	2nd year before start of operation		1st year before start of operation		1st year after start of operation		2nd year after start of operation		3rd year after start of operation		4th year after start of operation	
Number of employees	80[1)]	-	50	50	65	65	65	25	45	25	10	-
Accumulated total	80	80	130	180	245	310	375	400	445	470	480	480

Class of worker	Academic Carrier	Experience
Somi Skilled	Graduate of primary school	2 year
Skilled	Graduate of junior high school of technology	2
Leader	Graduate of senior high school of technology	2
Draftman	Graduate of senior high school of technology	2
Engineer	Graduate of Institute of technology	1

3.3 Profitability studies

3.3.1 Turnover, shipbuilding cost and profit

(a) Turnover

The selling price of 1,000 to 3,000 DW/t new ships being estimated on the average of Yens 155,000 per DW/t, the year-to-year building of vessels might be summarized in the Table (see the succeeding sub-chapter 4.3.3 (i), while the year-by-year turnover is shown in the succeeding-page Table. Meanwhile it is assumed that individual turnovers should be realized at the time of delivering ships.

(b) Production cost

Shipbuilding cost is described in the succeeding-page Table and based on the following assumptions;

(i)	Material cost:	All the material is to be imported from Japan. In addition to the FOB Japanese port prices, ocean freight, Indonesian import duty and other taxes, and local land freight are to be included into the cost. Meanwhile the material cost is to be realized at the time of launching.
(ii)	Labour cost:	The annual wage is estimated as Yens 180,000 per capita, while employment of labour is to commence two years ahead of the inauguration and to increase progressively.
(iii)	Direct and indirect expenses:	18% on material and labour cost.
(iv)	Sales tax:	5.2% on the total turnover, by grouping various taxes leviable on the turnover.
(v)	Educational	The labour force are to be technically trained. Such training expenses are estimated as Yens 100,000 per capita, including the cost of textbooks.
(vi)	Profit:	The profit is to be realized in the second year after the inauguration and then to increase upto Yens 567 millions annually in the fourth year onward.
		The shipbuilding cost is to be inflated year by year, while the selling prices of new ships are also to be inflated pro rata, so as to realize the fixed profit in the fourth year onward.

3.3.2 Evaluation

In addition to the profit as are described above, it is expected that the establishment of new Dockyard is likely to provide supplementary returns as are summarized below:

(a) Benefits on the part of P. T. Pelita Bahali

(i) Besides building new ships, machinery and installations of the

Profit and Loss Statement

(Unit: million yen)

Year	1st year	2nd year	3rd year	4th year	5th year	6th year	7th year onward
Proceeds of sales			155	775	1,240	1,860	1,860
(Vessel building tonnage)			(1,000DW)	(5,000DW)	(8,000DW)	(12,000DW)	(12,000DW)
Material cost			168	462	687	916	916
(Launching tonnage)			(2,000DW)	(6,000DW)	(9,000DW)	(12,000DW)	(12,000DW)
Labour cost	18	40	67	83	95	97	97
(No. of employees)	(100)	(220)	(370)	(460)	(530)	(540)	(540)
Direct and overhead cost	7	43	98	141	186	186	
Sales tax			8	39	62	94	94
Training fee	10	10	10	10	10		
Total cost	31	57	296	692	995	1,293	1,293
Profit	31	57	141	83	245	567	567

new Dockyard will be so operated as to improve technology and efficiency of ship repair work, thereby increasing the turnover and profit of ship repair.

(ii) Installations and shipbuilding technology of the new Dockyard will be made avail of for production of steel bridges and structures, steel containers such as tanks and the like, thereby increasing the total turnover and profit of this Enterprise.

(b) Benefits for Indonesia as a whole

(i) The increasing domestic supply of vessels for Indonesia's shipping industry, and the improved technology and capacity of vessel maintenance.

(ii) Saving of foreign exchange by increasing the domestic building of vessels.

(iii) Increasing domestic production of ship components, and development of ship-related industries.

(iv) Increased employment of labour force because of shipbuilding industry being comparatively labour-intensive.

(v) Improvement of domestic shipbuilding technology.

In appraising this plan, the aforementioned secondary investment effect is needed to be taken into account. However, as it is difficult to compute the effect in numerical terms, an appraisal is made on new vessel by benefit-cost ratio method and internal rate of return method, as below.

Calculation by benefit-cost ratio (a) method is as follows:

$$a = \sum_{j=1}^{n} Bj \frac{1}{(1+i)^j} + Sn \frac{1}{(1+i)^n}$$

$$\sum_{j=1}^{m} Cj \frac{1}{(1+i)^j} + \sum_{j=m+1}^{n} Mj \frac{1}{(1+i)^j}$$

Calculation by internal rate of return (r) is as follows:

$$\sum_{j=1}^{n} Bj \frac{1}{(1+r)^j} + Sn \frac{1}{(1+r)^n} = \sum_{j=1}^{m} Cj \frac{1}{(1+r)^j} + \sum_{j=m+1}^{n} Mj \frac{1}{(1+r)^j}$$

B	:	Benefit amount	S	:	Residual book value
C	:	Investment amount	M	:	Equipment maintenance expenses
i	:	Discount rate			
j	:	Year elasped	m	:	Construction period (year)
n	:	Final year when benefit is realized			

a, r are to be calculated by establishing B, S, C, M, e, m, n as below.

B : Benefit amount vide item 5. 3. 2 (c)

S : Residual book value in the case of depreciation of 90% of investment over 10 years for machinery/installation and 30 years for buildings.

C : Determined for ¥1,165,000,000 for 1st year and ¥524,000,000 for 2nd year.

M : Corresponds to 0.1% of installation investment for machinery and steel structures buildings for 1st year, which will increase by 0.1% annually onward.

i : Determined for 0.035 and 0.060 per annum.

m : 2 years.

n : 15 and 20 years after start of construction of shop.

(1) Benefit-cost ratio "a"

Discount rate (i)	Final year when benefit is realized (n)	Benefit-cost ratio (r)
0.035	15	2.721
0.060	15	2.190
0.035	20	3.466
0.060	20	2.685
(0.120	20	1.530)

(2) Internal rate of return "r)

Final year when benefit is realized	Internal rate of return
15	0.1588
20	0.1707

3.4 Technical capability

P. T. Pelita Bahali Dockyard is more or less specialized in ship repair at the present time and little experienced in building of new ships. Acquirement of technology in advance of the inaugulation of the new Dockyard is of paramount importance in order to ensure the eventual smooth operations. The skillfulness of labour force appears to have advanced upto a substantial level through their cumulative experience by means of ship repair, and is likely to advance more prominently by guidance of the presently stationed Technical Advisory Team.

However in order to place the new Dockyard in full readyness for shipbuilding as rapidly as possibly, a systematic training of labour staff is much needed and above all, a group of supervisory staff is to be intensively trained so as to mobilize the new-coming labour strength for the most efficient operations. This is because the skillfulness is likely to advance upto a certain level by means of training, while the modern shipbuilding technology is chiefly based on production technology and failing which, the efficient shipbuilding is never possible. With this objective in view, fundamental training of front-line leaders is earnestly desired.

Further, the present dockyard is obviously lacking in organization of design and production technology, and such personnel in this field are to be recruited and trained.

In addition, the shipbuilding schedule under this Project needs to be formulated nearly two years ahead of the laying-down of the first ship; The ship types to be built should he fixed as early as possible, and design work taken in hand while training the design staff.

With these objectives in view, intensive aids by foreign shipbuilding countries are much needed. Therefore the necessary steps should be formulated as early as possible, so that such technical training will become possible and the shipbuilding schedule performed successfully.

According to this calculation, benefit-cost ratio will be more than 2 and even 1.5 will be secured in the case of i = 0.12 where N = 20. Since internal rate of return will exedes 15%, it is believed that a full investment effect can be obtained in the regular case. However, initial loss is incurred in the administration of ship-building industry. Manner of how to dispose of such initial loss will become a big influential factor and make the subsequent management easy or difficult, in the country in which a loan interest is high. This plan has been drafted for calling-in over about 18 years of the installation investment after start of operation, in the event of absence of any means of decreasing initial loss in the case of loan interest of government investment being 12% (4-years grace period and reimbursement over 16 years), and loan interest of working capital being 20%. A depreciation period will become longer as compared to that of ship-building industry in Japan. It is however, believed that a calling-in period may be shortened since increase in benefit realized by improvement of productivity to be effected by advanced technique, or profit to be realized by repairing or other works, are expected. Furthermore, it is necessary for the enterprise to store up an accumulated capital for the purpose of enlarging ship-building capacity.

It is therefore considered desirable that a measure be taken to shorten a calling-in period as possible, by such means as the decreasing an initial loss, etc.

Supposing that the new Dockyard is to be financed with the Development loan of 4-year grace and 16-year repayment at interest of 12% p. a. as well as the working capital interest of 20% p. a. and without any means of decreasing initial-period loss, it appears that the recovery of capital investment will take approximately 18 years after the inauguration of the Dockyard, which is compratively longer than that of the Japanese counterpart.

Meanwhile recognizing the expected improvement of technical capability followed by additional profit due to improved productivity and also by supplementary profit arising from repair and diverse fields of work, it is seen that the recovery of capital investment ought to be shortened. However in order to realize the internal capital accumulation for long-range expansion of ship-building capacity, it is recommended that the recovery of investment should be shortened as much as practicable by public strategy such as decreasing initial-period loss.

4. RECOMMENDATIONS

The rehabilitation project of P. T. Pelita Bahali Dockyard is so formulated as to function as the pilot dockyard equipped with modern facilities and organizations, by taking into account various suggestions put up by the Indonesian government. This project is expected to provide fruitful returns to the Indonesian government who aim at progressive industrialization through economic development.

Meanwhile careful attention must be paid to the construction of new dockyard, but also its subsequent operations and management, because the operation of dockyard appears more problematical than its construction. Indonesia's shipbuilding industry is experienced in building of the maximum 800 DW/t new ships at the present time.

Further, the raw material and components are to be imported in great number, and local financing charges are more expensive than in Japan, while Indonesia's shipping industry who will continue to be the customer of new ships are still placed in weak position and standing. With these problems in view and in spite of abundant and inexpensive labour force available, the operations of new Dockyard is feared to encounter many difficulties in the coming years.

In the event when the Japanese government extend their cooperation and the Indonesian government play their major role in the construction of new Dockyard, primary attention should be paid to the implementation of following policies and strategies, so as to achieve the full targets of thie Project.

4-1 Vessel requirements

The modern dockyard is to be operated by improved technology, which in turn takes a lengthy time in technical training of labour force, and accordingly the fixed strength of technicians and mechanics should be employed at all times.

This is to be supported by stable and constant vessel requirements, without extraordinary fluctuations.

As are stated earlier, the Indonesia's shipping industry is placed in weak standing, and in spite of potential requirements of vessels, the procurement by Indonesia's shipping industry is not much expected at the present time. In such transition period until the Indonesian shipping industry is fortified and strengthened, it appears that the Indonesian government should create such vessel requirements, through intensification of their scrap and build program presently implemented and also through formulating the long-range shipbuilding system.

Meanwhile the Japanese government is requested to extend their maximum possible cooperation in creating such vessel requirements toward sound development of this Project.

Since Indonesia import almost all the material and components, standardization of ship types and supplies is likely to reduce the design and material cost, thereby reducing the overall shipbuilding cost. Commercial efforts in this field on the part of the Dockyard is much needed, while the long-range plan to be formulated by the Indonesian government appears quite useful.

4.2 Fiscal appropriations

The construction of new dockyard under this project is to be financed by the Japanese government's credits and by the Indonesian government's fiscal appropriations, failing either of which is likely to produce detrimental effects to this Project.

Since the local financing charges are comparatively expensive, it is of paramount importance that the construction period of this Project should be shortened as much as practicable so as to start up the inauguration of dockyard with the least possible delay.

With this objective in view, both of the Indonesian and Japanese governments are to make available the required funds at all times so as to make quick disbursement for this Project.

4.3 Public financing

The operations of this dockyard is likely to encounter a substantial amount of difficulties, if left as it is now, and accordingly the diverse and effective aids by the Indonesian government is earnestly desired. Above all, the operation of dockyard is characterized by a vast amount of initial capital investment. During the start-up period when the sales turnover is of inadequate scale, it is seen that the repayment of loan financing as well as payment of accrued interests is likely to produce heavy burden upon the management of dockyard, in view of the local interest rate being quite high. Fiscal strategies appears effective such as the fiscal appropriations in initial period, public financing at reduced interest rate, as well as lengthening of grace period and repayment period in the case of public financing.

In spite of the estimation that the shipbuilding is to be operated with the scheduled vessel requirements and at the selling price of Yens 155,000 per DW/t, it is seen that the management of new Dockyard is likely to encounter difficulties, if the Indonesia's present Development loan (two-year grace and eight-year repayment at interest of 12% p.a.) is not relaxed in any way. Because supposing that the public financing is relaxed to the four-year grace and 16-year repayment, it appears that the overall account of new Dockyard is likely to realize profits in the second year after the inauguration, while repayment of loan financing is due to commence from the eighteenth month after the inauguration, even if the coorporate tax is excluded.

4.4 Technical assistance

Acquirement of technical capability is never an easy task; While recognizing the importance of design and shipbuilding technology, it is seen that much stronger management is essential on the part of Indonesia's shipbuilding industry than that of the Japanese counterpart, in view of lack of skilled labour, dependance of necessary supplies on import, extraordinary high interest of loan and etc.

In the field of management, intensive efforts on the part of senior members and front-line technicians are earnestly desired, particularly on the following lines.

i) Improvement of productivity
ii) Standardization of ship types
iii) Cost analysis through introduction of production control
iv) Review of importing method of supplies.

While this project is based on the assumption of such efforts being intensified by the Dockyard people, it is seen that acquirement and development of such technology will contribute to the successful implementation of this Project.

With this objective in view, it is recommended that in addition to efforts by the Dockyard people, the Indonesian government should extend intensive aids, while the Japanese government are to intensify their guidance and encouragement through technical cooperation and the like.

The immediate assistance program may be summarized below:

i) The present Technical Advisory Team should continue to play their major role and should be strengthened by experts specialized in particular field as and when appropriate, so as to realize the long-range field guidance.

ii) The present labour force appear to have advanced to a certain technical level and will be developed further through field training, while the front-line leaders such as foreman should be selected and invited to Japan for training of supervisory technology.

Annexe

A. Work Cost Details (Yen, U.S. Dollars)

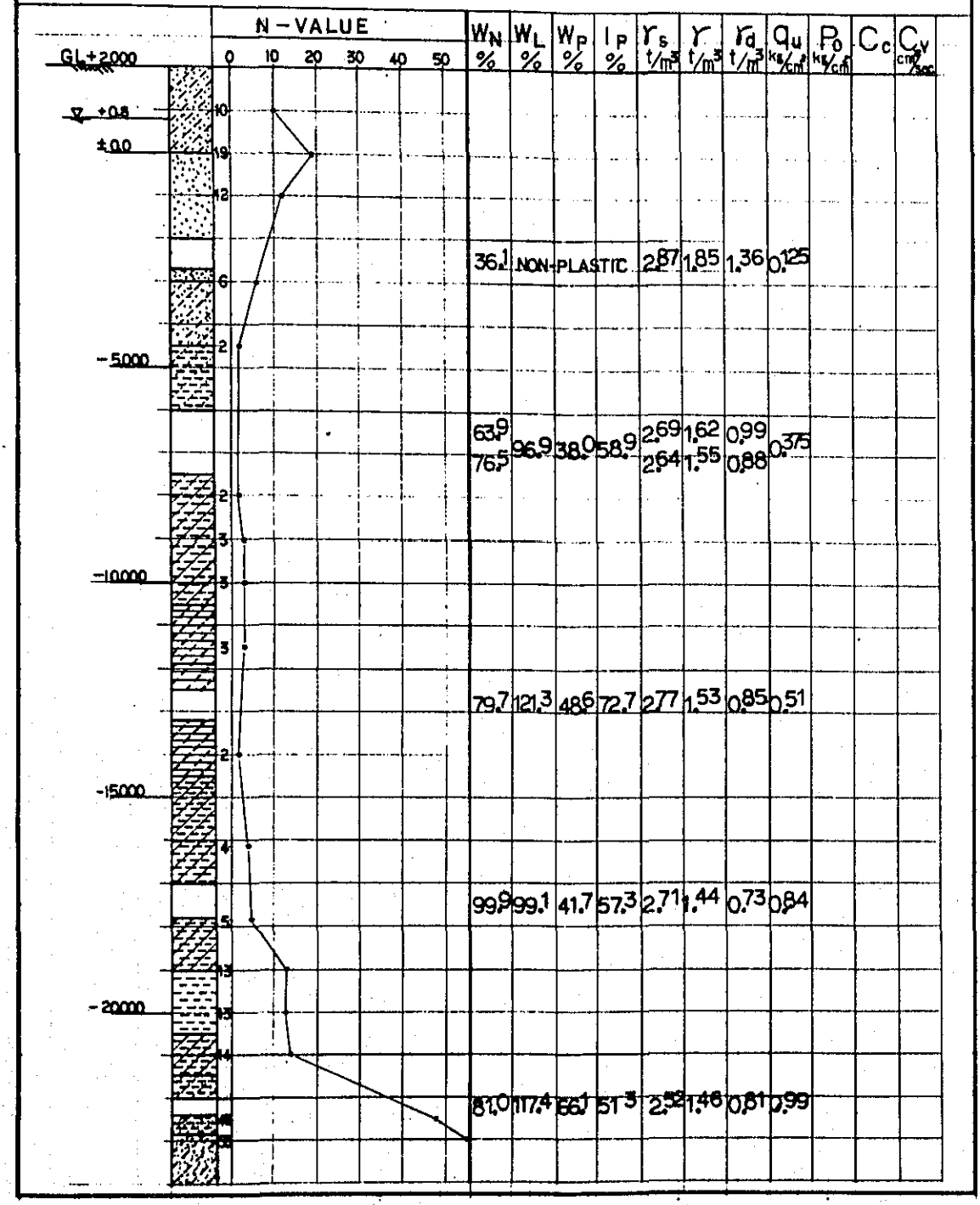
Description	(Unit:¥1,000) Aid	Domestic	Total	(Unit:$1,000) Aid	Domestic	Total	Remarks
1. Dredging and reclamation work	0	126,790	126,790	0	412	412	Dredging soil volume 108,000m^3 Reclamation soil volume 121,000m^3
2. Ship-building dock							
Civil engineering work	153,170	108,160	261,330	498	351	849	Width Length Depth 20m x 100m x 7.2m
Foundation for jib crane	17,020	12,880	29,900	55	42	97	Length 90m
Dock gate	3,500	2,900	6,400	12	10	22	Steel material weight 50T
Thwacking board		9,000	9,000	0	29	29	
Total for civil engineering work	173,690	132,940	306,630	565	432	997	
40 ton jib crane (1 unit)	90,000	17,000	107,000	292	55	347	40T/22.5m~20T/35m 1 unit
Pump (4 units)	5,350	670	6,020	18	2	20	Stripper pump (1 unit) Draining pump (2 unit) Flooding pump (1 unit)
5 ton winch (2 units)	4,800	600	5,400	16	2	18	
Total for machinery	100,150	18,270	118,420	326	59	385	
ToTal	273,840	151,210	425,050	891	491	1,382	
3. Quay construction work							
-5m quay	115,920	59,000	174,920	376	192	568	ℓ=160m
Temperary bank revetment work	3,570	920	4,470	12	3	15	ℓ=95m
Total	119,490	59,920	179,410	388	195	583	
4. Design and pattern office							
Building construction work	25,170	36,630	61,800	82	119	201	
Floor concrete	650	1,330	1,980	2	5	7	
Total	25,820	37,960	63,780	84	124	208	
5. Ship-building shop							
Building construction work	70,150	70,300	140,450	228	228	456	Including steel material storage area and block storage area 60m x 60m = 3600m^2
Floor concrete	7,030	7,130	14,160	23	24	47	
Foundation for machinery and surface plate	4,710	6,450	11,160	15	21	36	
Total for civil-engineering work	81,890	83,880	165,770	266	273	539	
Press (3 units)	36,000	5,000	41,000	117	16	133	200T(1 unit) 50Tx2 200T hoist x 2
20 ton overhead travelling crane (1 unit)	24,000	2,000	26,000	78	7	85	Span 28m
5 ton overhead travelling crane (3 units)	32,000	3,000	35,000	104	10	114	Fitted with cab
Horizontal travelling bogie	2,400	0	2,400	8	0	8	
Total for machinery	94,400	10,000	104,400	307	33	340	
Total	176,290	93,880	270,170	573	306	879	
6. Out-fitting and pipe shop, machining shop							
Building construction work	27,280	30,720	58,000	89	100	189	40m x 50m = 2,000m^2
Floor concrete	2,560	2,640	5,200	8	9	17	
Foundation for machinery and surface plate	2,340	1,800	4,140	7	6	13	
Total for civil-engineering work	32,180	35,160	67,340	104	115	219	
4 inch pipe bender (1 unit)	6,000	1,000	7,000	20	3	23	
30 ton hydraulic press (1 unit)	3,600	0	3,600	12	0	12	
Water pressure pump (1 unit)	600	0	600	2	0	2	30K ~ 50K
High-speed shearing machine	600	0	600	2	0	2	
Grinder (2 units)	290	0	290	1	0	1	
Boring machine (2 units)	1,800	0	1,800	6	0	6	
Hull boring machine (1 unit)	1,800	0	1,800	6	0	6	Diameter 200mm

Description	(Unit:¥1,000) Aid	Domestic	Total	(Unit:$1,000) Aid	Domestic	Total	Remarks
Screwing machine (1 unit)	600	0	600	2	0	2	
Total for out-fitting shop machinery	/15,290	1,000	16,290	51	3	54	
Horizontal boring machine	14,400	1,000	15,400	47	3	50	806
Planer (1 unit)	9,600	1,000	10,600	31	3	34	
Lathe (1 unit)	3,600	500	4,100	12	2	14	2.4m
Finishing surface-plate (single surface)	3,600	500	4,100	12	2	14	
Pump for testing	720	0	720	3	0	3	
High-pressure compressor	3,600	0	3,600	12	0	12	100 kg/cm^2
Total for machining shop machinery	/35,520	3,000	38,520	117	10	127	
5 ton overhead travelling crane	6,000	1,000	7,000	20	3	23	
1.5 ton overhead travelling crane	10,800	1,000	11,800	35	3	38	
Total for crane	/16,800	2,000	18,800	55	6	61	
Total	99,790	41,160	140,950	327	134	461	
7. Electrical shop							
Installation (1 set)	7,200	0	7,200	23	0	23	
Casting shop							
Tilting furnace (1 set)	9,600	2,000	11,600	31	7	38	
Forging shop							
Heating furnace, forging hammer etc.	4,800	2,000	6,800	16	7	23	
Total for machinery	*21,600*	*4,000*	*25,600*	*70*	*14*	*84*	
8. Wood-working shop							
Machinery	12,000	2,000	14,000	39	7	46	
Total	12,000	2,000	14,000	39	7	46	
9. Power plant							
Generator room construction work	3,120	3,085	6,205	10	10	20	
Floor concrete for generator room	140	280	420	1	1	2	
Foundation for generator room	250	250	500	1	1	2	
compressor room construction work	1,330	1,240	2,570	5	4	9	
Acetylene room construction work	950	940	1,890	3	3	6	
Oxygen room construction work	300	300	600	1	1	2	
Total for civil-engineering work	/6,090	6,095	12,185	21	20	41	
Electric generator (2 units)	48,000	8,000	56,000	156	26	182	
Power distributor board(1 set)	4,800	0	4,800	16	0	16	
Fuel tank	400	300	700	1	1	2	
Compressor (3 sets)	14,400	1,000	15,400	47	3	50	
Total for machinery	/71,200	9,300	80,500	232	30	262	
Total	*77,290*	*15,395*	*92,685*	*253*	*50*	303	

Description	(Unit:¥1,000)			(Unit:$1,000)			Remarks
	Aid	Domestic	Total	Aid	Domestic	Total	
10. Tools and transportation equipment							
Tools, tackles	27,000	0	27,000	88	0	88	
A.C. arc welder	9,000	0	9,000	29	0	29	
	2,160	0	2,160	7	0	7	
10 ton truck crane (1 unit)	18,000	0	18,000	59	0	59	
3 ton fork lift (2 units)	4,800	0	4,800	16	0	16	
5 ton payload truck(2 units)	4,800	0	4,800	16	0	16	
3 ton payload bogie(1 unit)	1,800	0	1,800	6	0	6	
Total for machinery	67,560	0	67,560	221	0	221	
11. Common items							
Road and drainage work		27,750	27,750	0	90	90	
Clean-water equipment, well (2 sets)	1,340	8,280	9,620	4	27	31	
Clean-water pump (3 units)	780	100	880	3	1	4	
Total for civil-engineering work	2,120	36,130	38,250	7	118	125	
Electrical work							
Temporary power-source installation work	1,200	1,000	2,200	4	3	7	
Power-source installation work for quay, dock	12,000	2,000	14,000	39	7	46	
Power-source installation work for ship-building shop	24,000	5,000	29,000	78	16	94	
Power-source installation work for pipe and out-fitting shop	9,600	2,000	11,600	31	7	38	
Power-source installation work for casting, forging, electrical, wood-working shop	3,000	1,000	4,000	10	3	13	
Power-source installation work for pattern, design office	12,000	3,000	15,000	39	10	49	
Power-source installation work for trunk cable	17,600	4,000	21,600	57	13	70	
Sub-total	79,400	18,000	97,400	258	59	317	
Piping work							
Air	3,600	2,500	6,100	12	8	20	
Acetylene	1,200	1,000	2,200	4	3	7	
Oxygen	960	800	1,760	3	3	6	
Clean water	3,600	4,000	7,600	12	13	25	
Sea water	600	500	1,100	2	2	4	
Sub-total	9,960	8,800	18,760	33	29	62	
Total for machinery	89,360	26,800	116,160	291	88	379	
Grand total	91,480	62,930	154,410	298	206	504	

BORING PROFILES

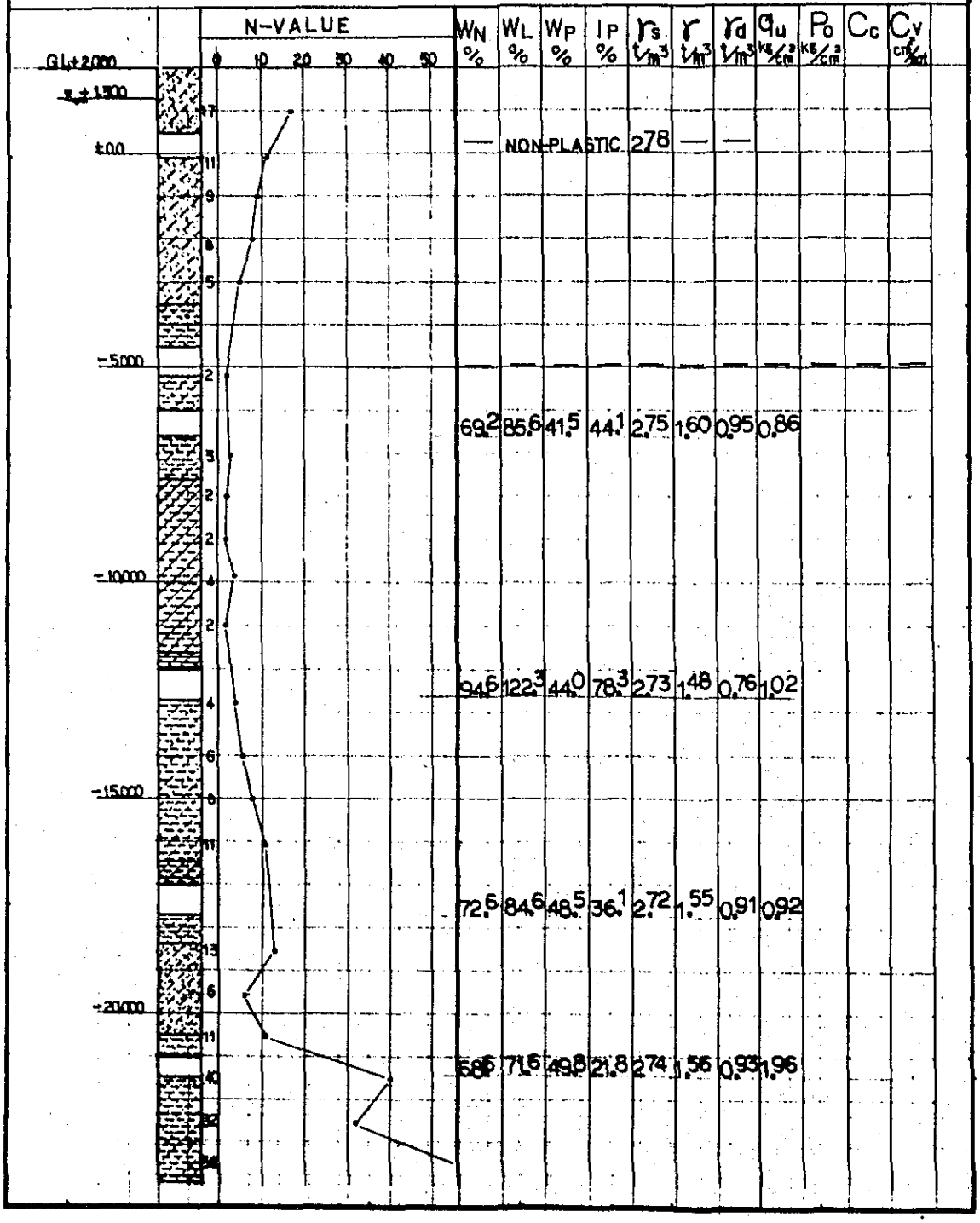
NO 1

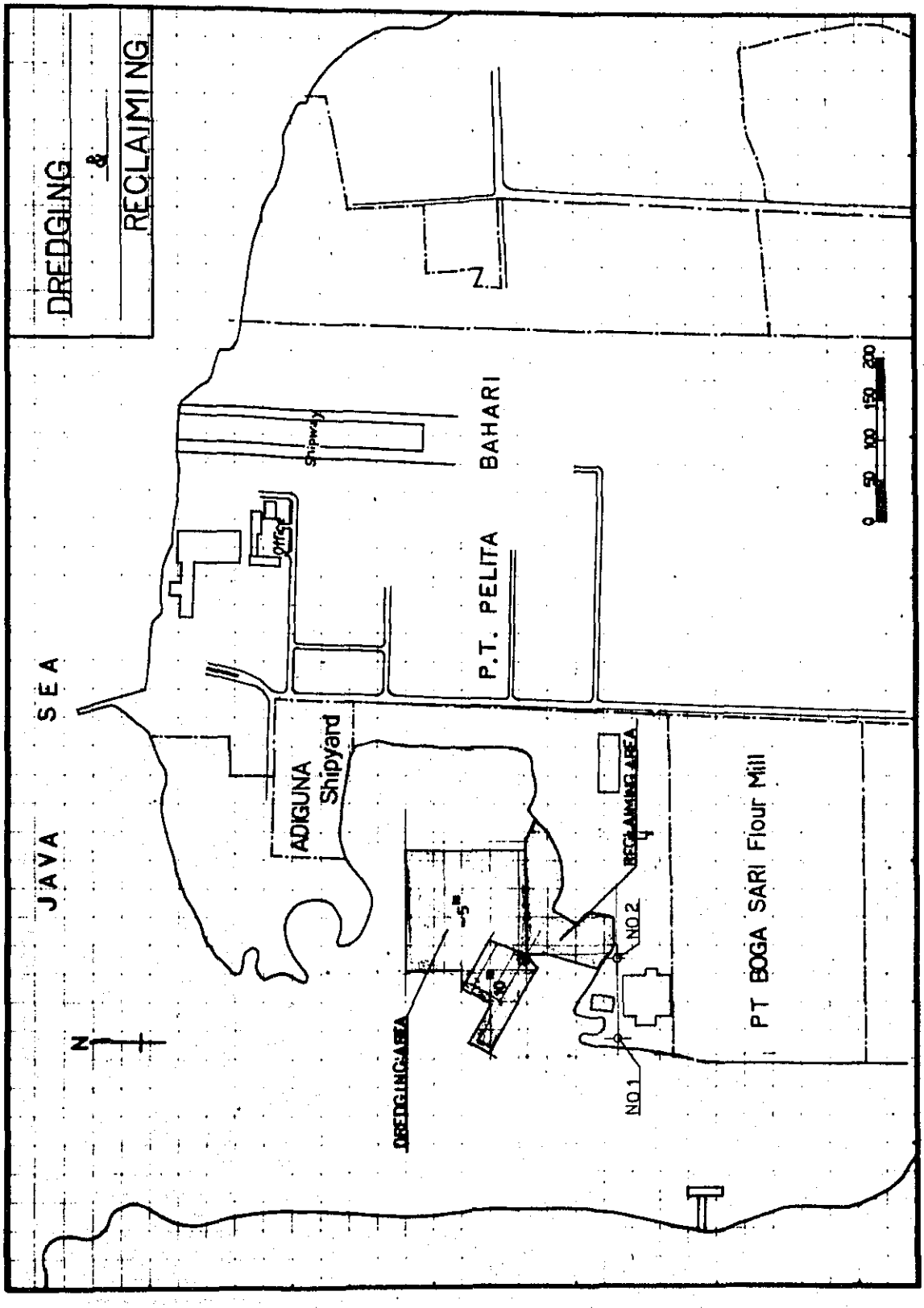


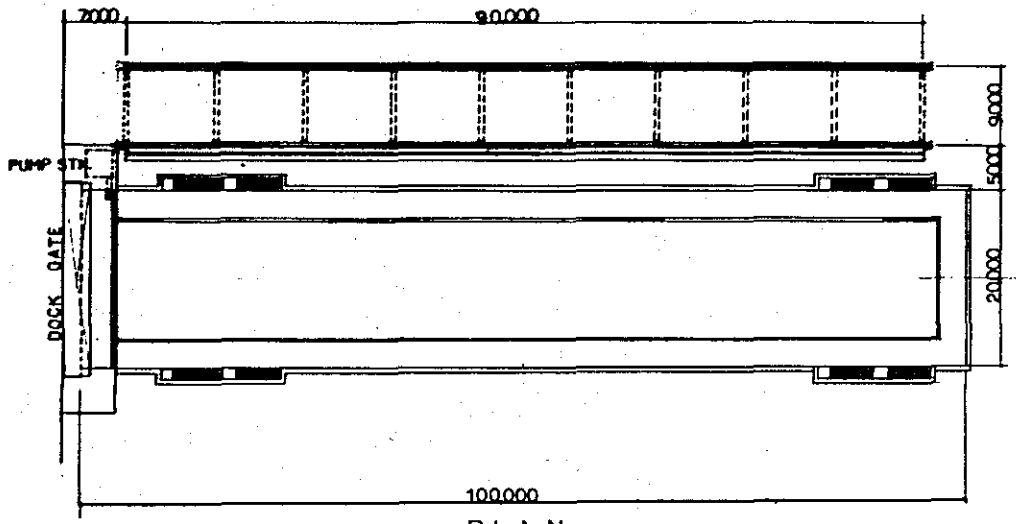
W_N %	W_L %	W_P %	I_P %	γ_s t/m³	γ t/m³	γ_d t/m³	q_u kg/cm²	P_0 kg/cm²	C_c	C_v cm²/sec
36.1	NON-PLASTIC			2.87	1.85	1.36	0.125			
63.9	96.9	38.0	58.9	2.69	1.62	0.99	0.375			
76.5				2.64	1.55	0.88				
79.7	121.3	48.6	72.7	2.77	1.53	0.85	0.51			
99.9	99.1	41.7	57.3	2.71	1.44	0.73	0.84			
81.0	117.4	66.1	51.3	2.52	1.46	0.81	0.99			

BORING PROFILES

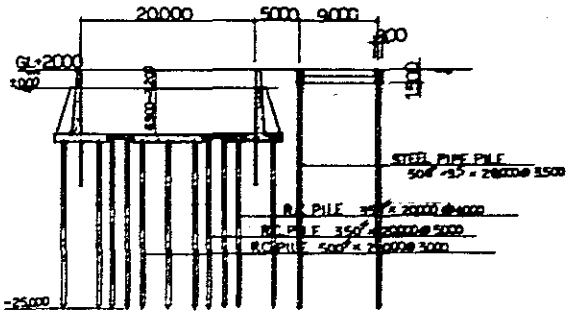
NO 2



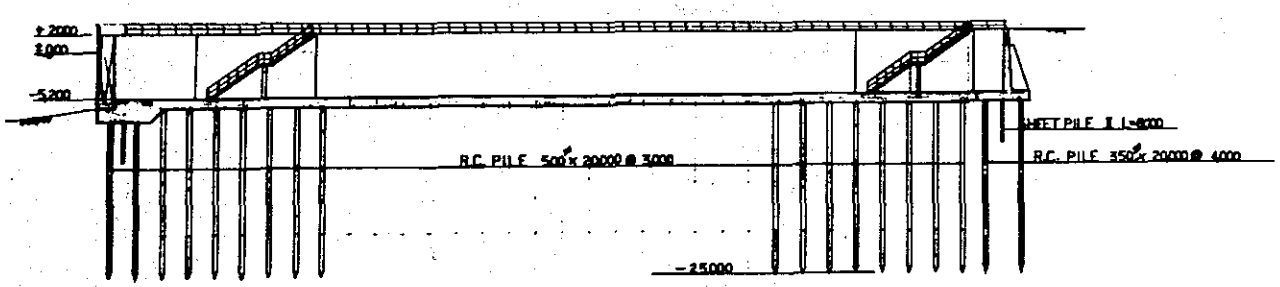

DREDGING
&
RECLAIMING
JAVA SEA
N
ADIGUNA Shipyard
P.T. PELITA BAHARI
PT BOGA SARI Flour Mill
DREDGING AREA
RECLAIMING AREA
NO.1
NO.2
-5m
0
50
100
150
200



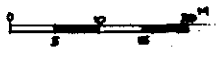
PLAN



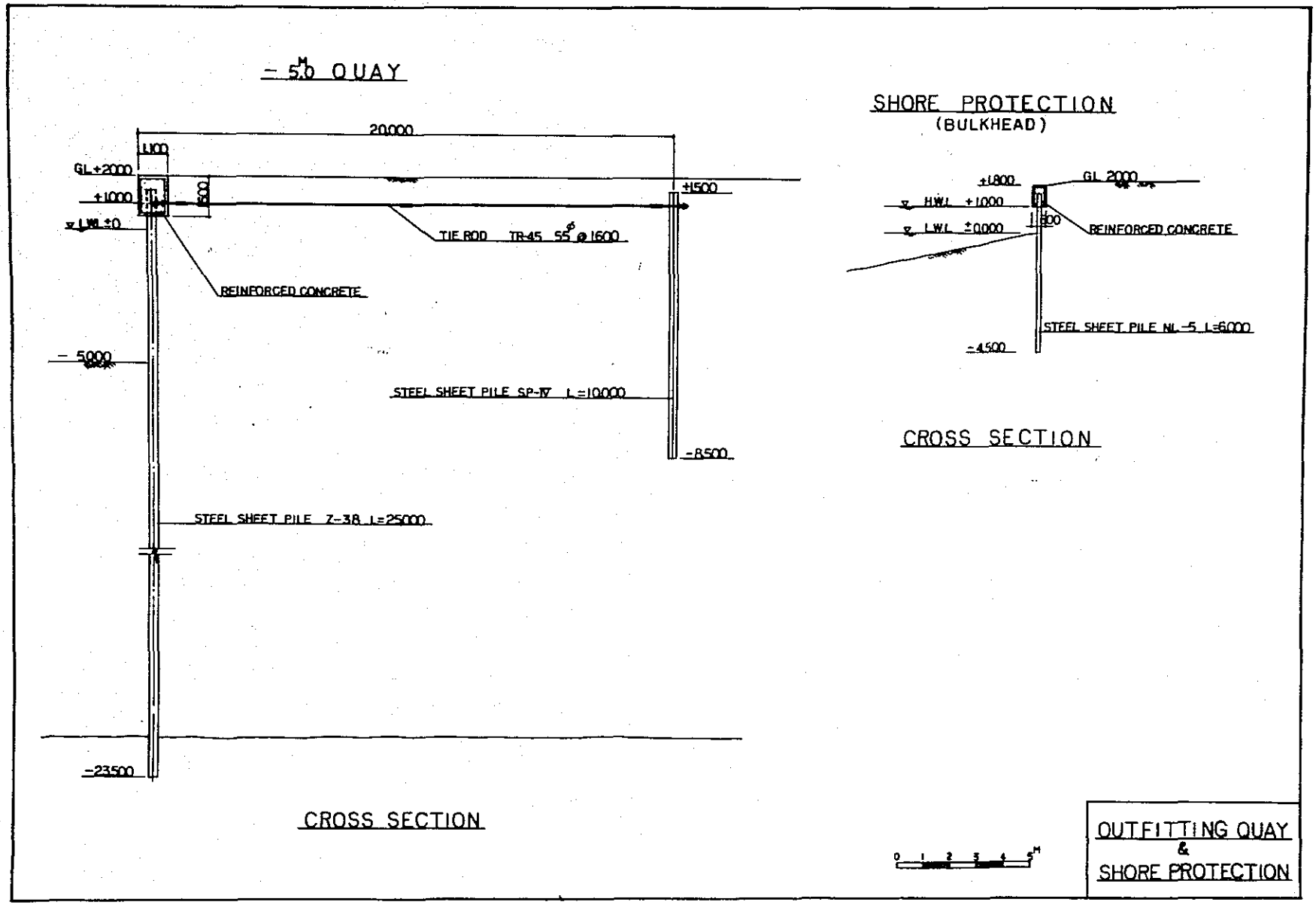
CROSS SECTION

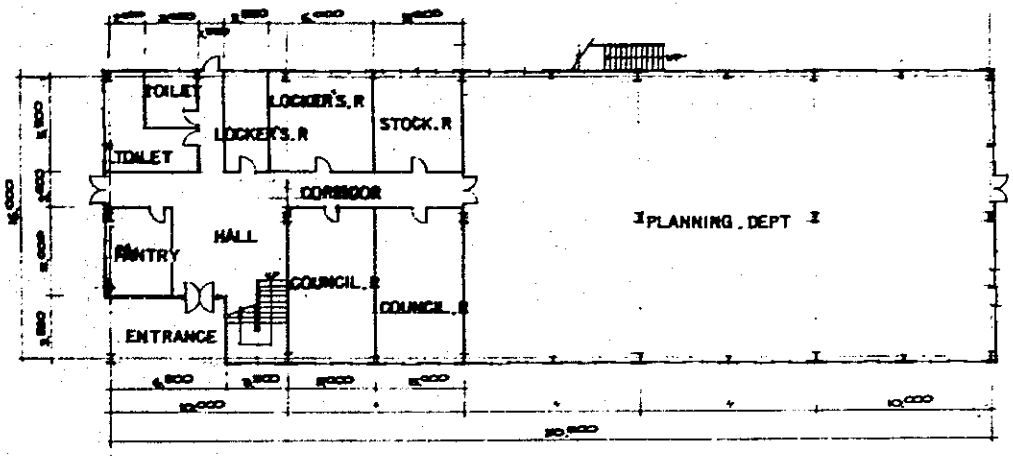


LONGL SECTION

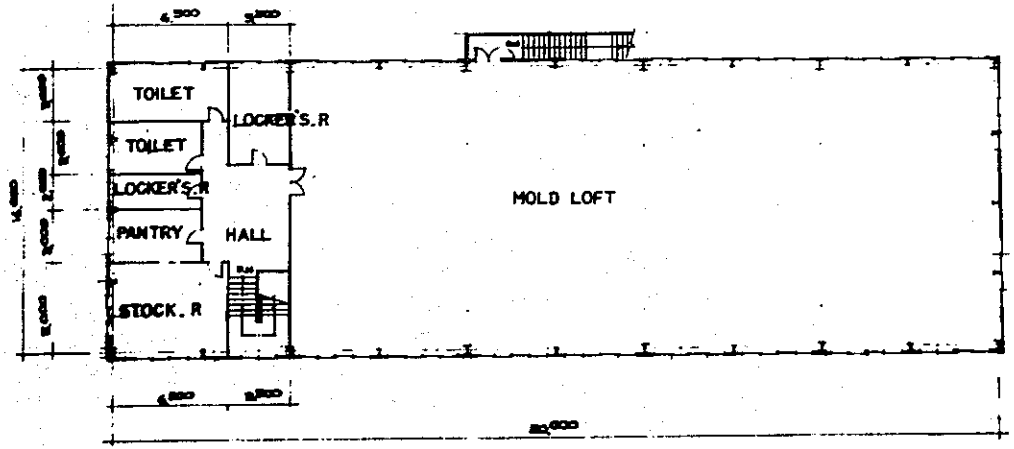


BUILDING DOCK
&
40t CRANE FOUNDATION


- 5.0M QUAY
20000
1100
GL+2000
+1000
W.L ±0
800
+1500
TIE ROD TR-45 55φ @1600
REINFORCED CONCRETE
- 5000
STEEL SHEET PILE SP-IV L=10000
-8500
STEEL SHEET PILE Z-38 L=25000
-23500
CROSS SECTION
SHORE PROTECTION
(BULKHEAD)
+1800
GL 2000
H.W.L +1000
L.W.L ±0000
800
REINFORCED CONCRETE
STEEL SHEET PILE NL-5 L=6000
-4500
CROSS SECTION
0 1 2 3 4 5M
OUTFITTING QUAY
&
SHORE PROTECTION



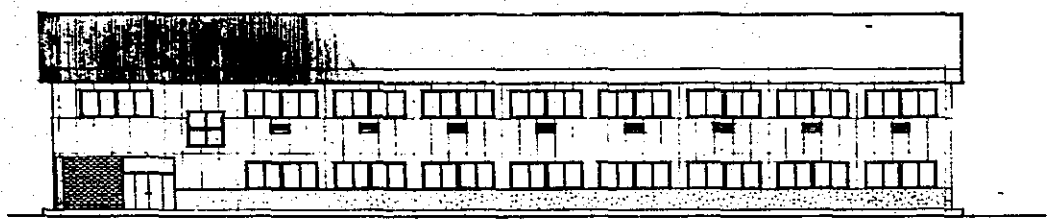
1st FLOOR



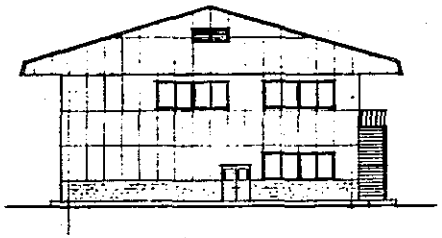
2nd FLOOR

MOLD LOFT

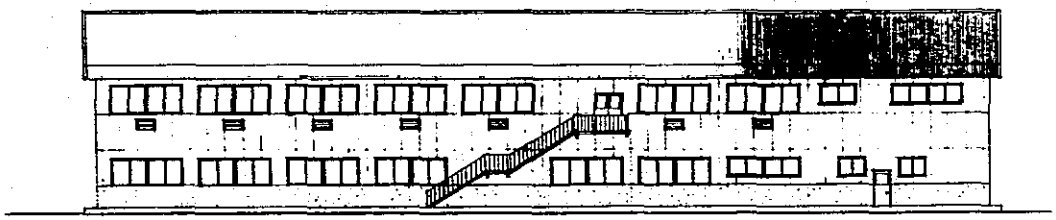
DESIGN OEECE



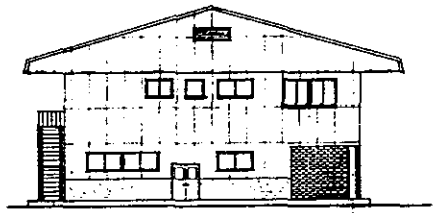
NORTH ELEVATION



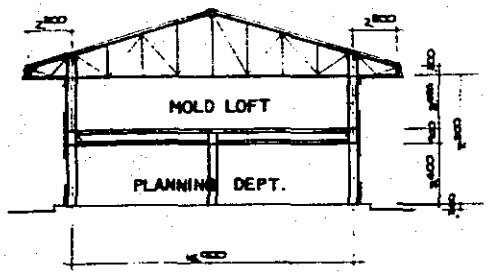
WEST ELEVATION



SOUTH ELEVATION

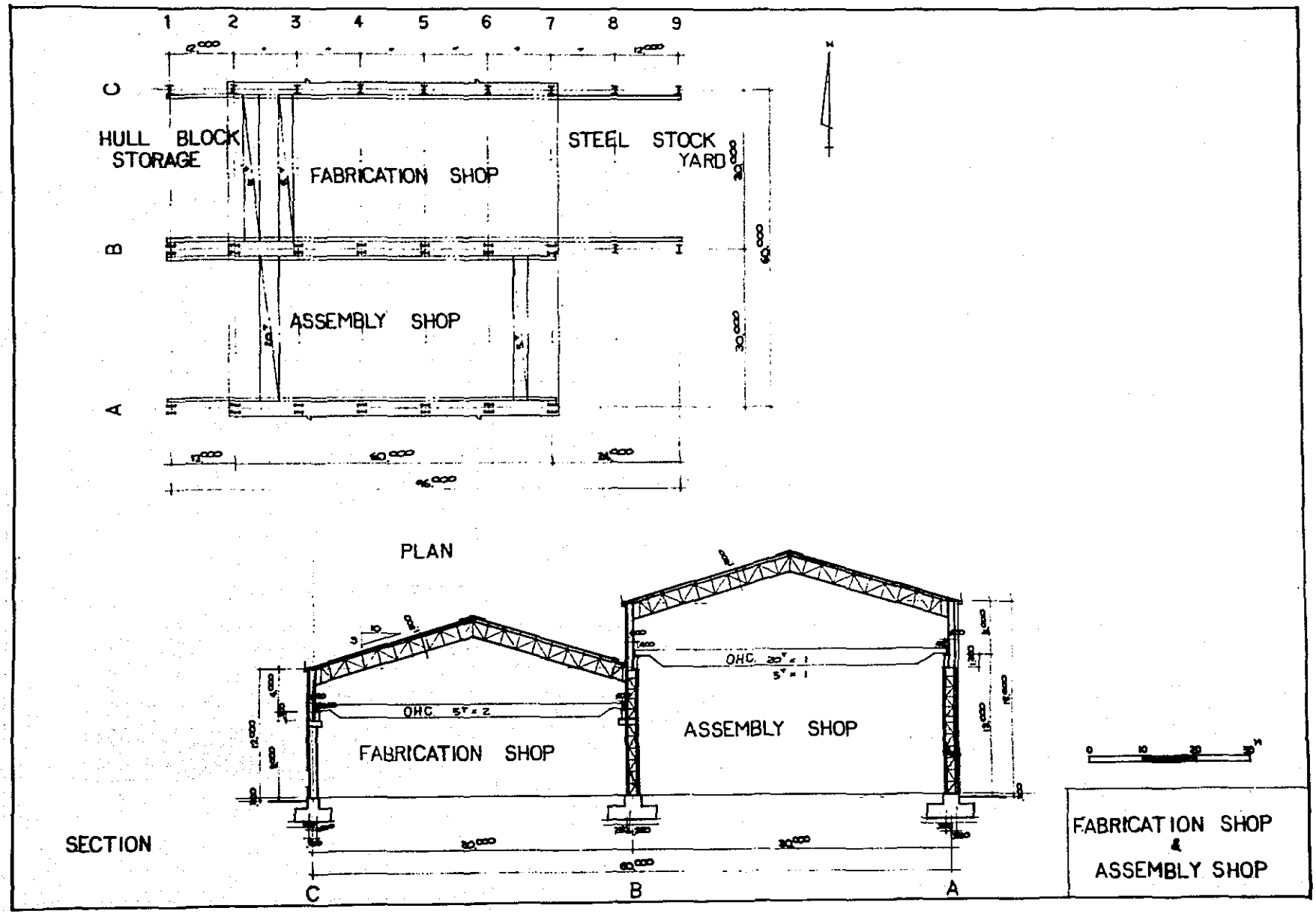


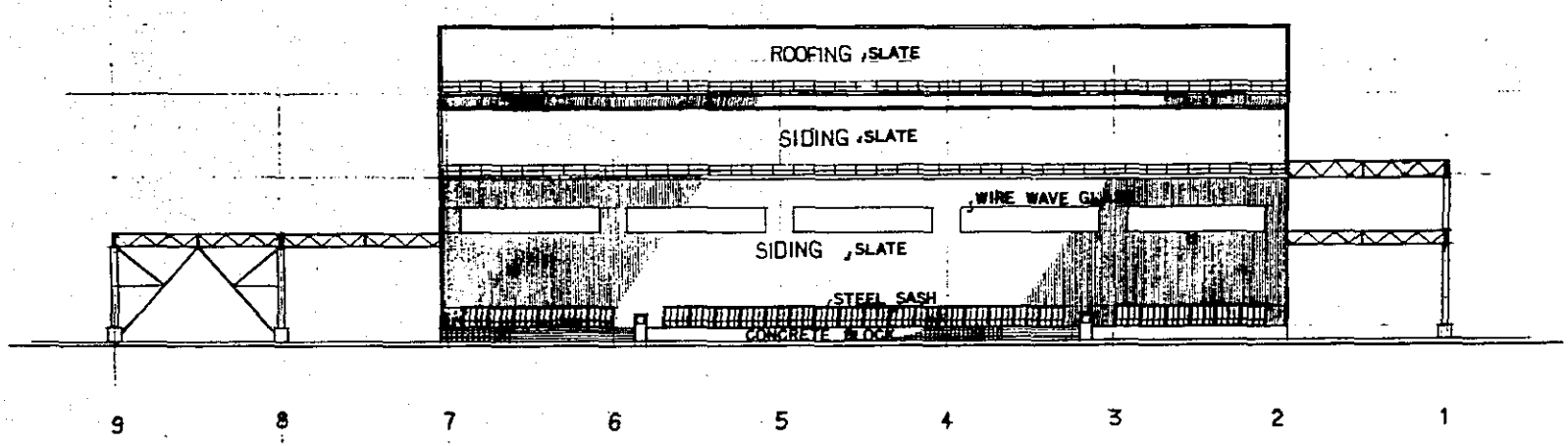
EAST ELEVATION



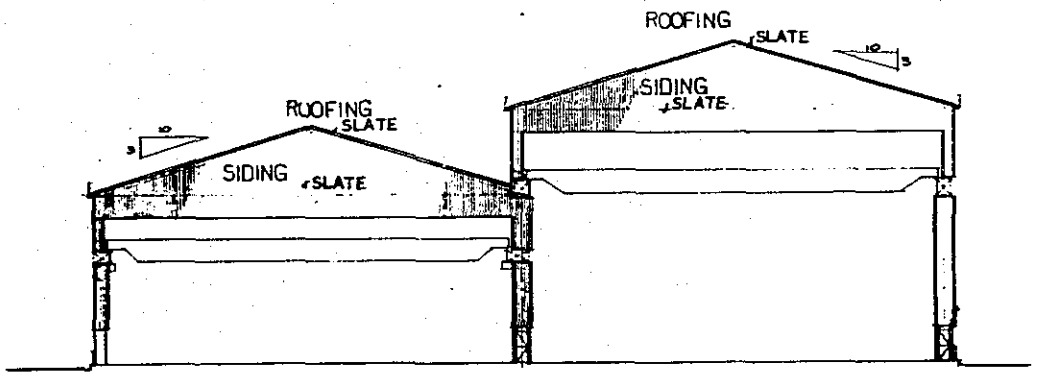
SECTION

MOLD LOFT &
DESIGN OFFICE

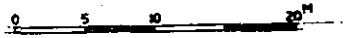

1 2 3 4 5 6 7 8 9
C
B
A
HULL BLOCK STORAGE
FABRICATION SHOP
STEEL STOCK YARD
ASSEMBLY SHOP
PLAN
OHC
FABRICATION SHOP
ASSEMBLY SHOP
SECTION
C
B
A
FABRICATION SHOP & ASSEMBLY SHOP



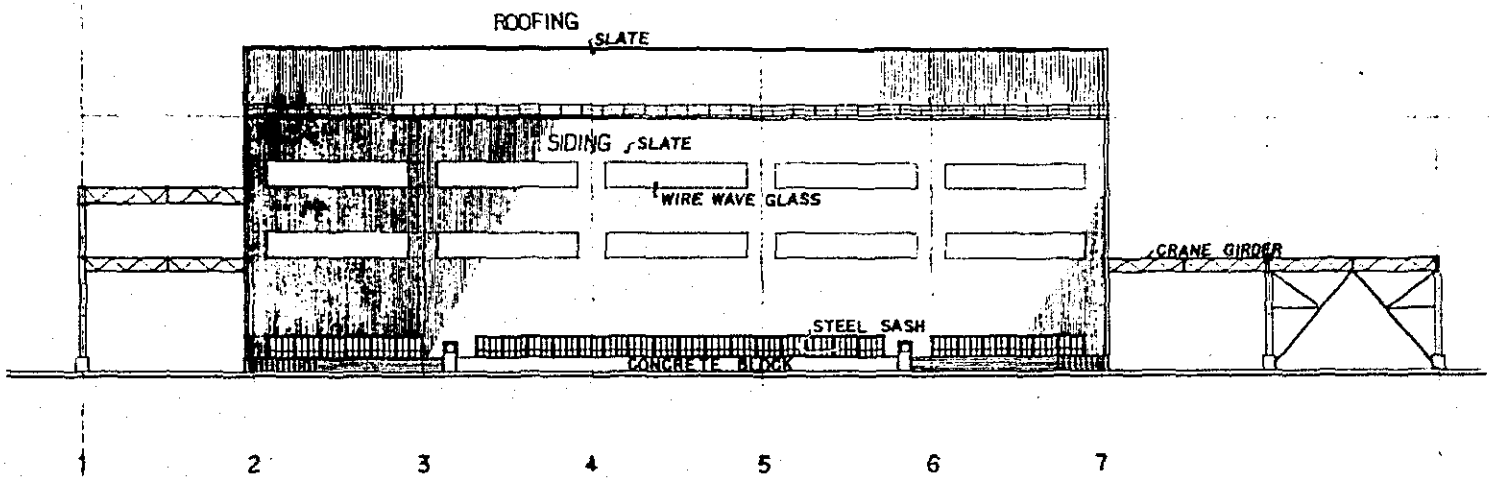
NORTH ELEVATION



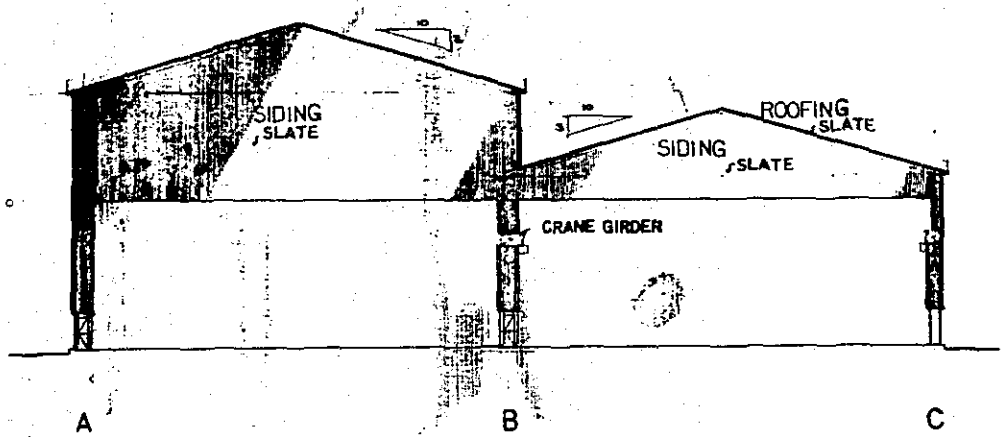
WEST ELEVATION



FABRICATION SHOP
&
ASSEMBLY SHOP

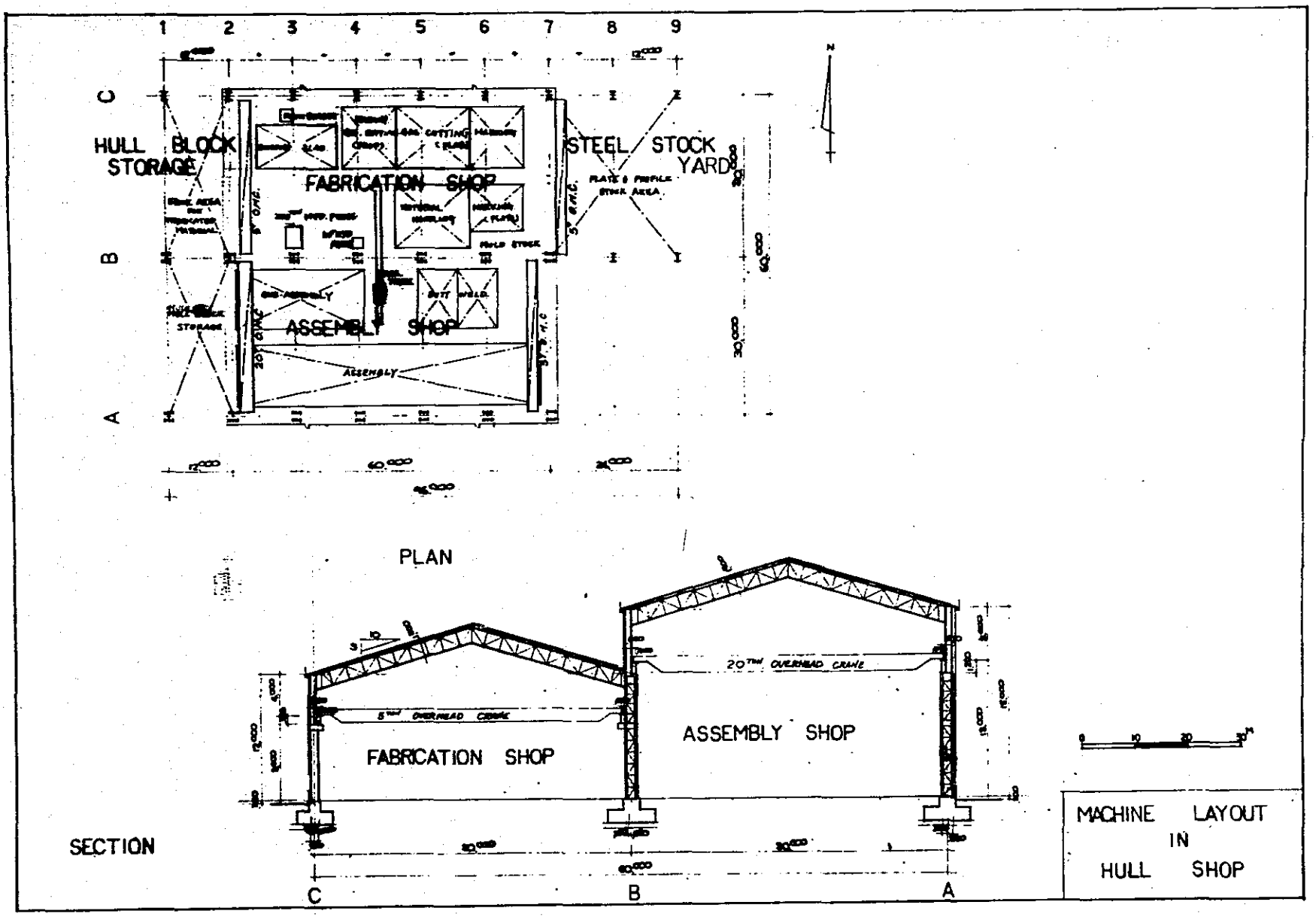


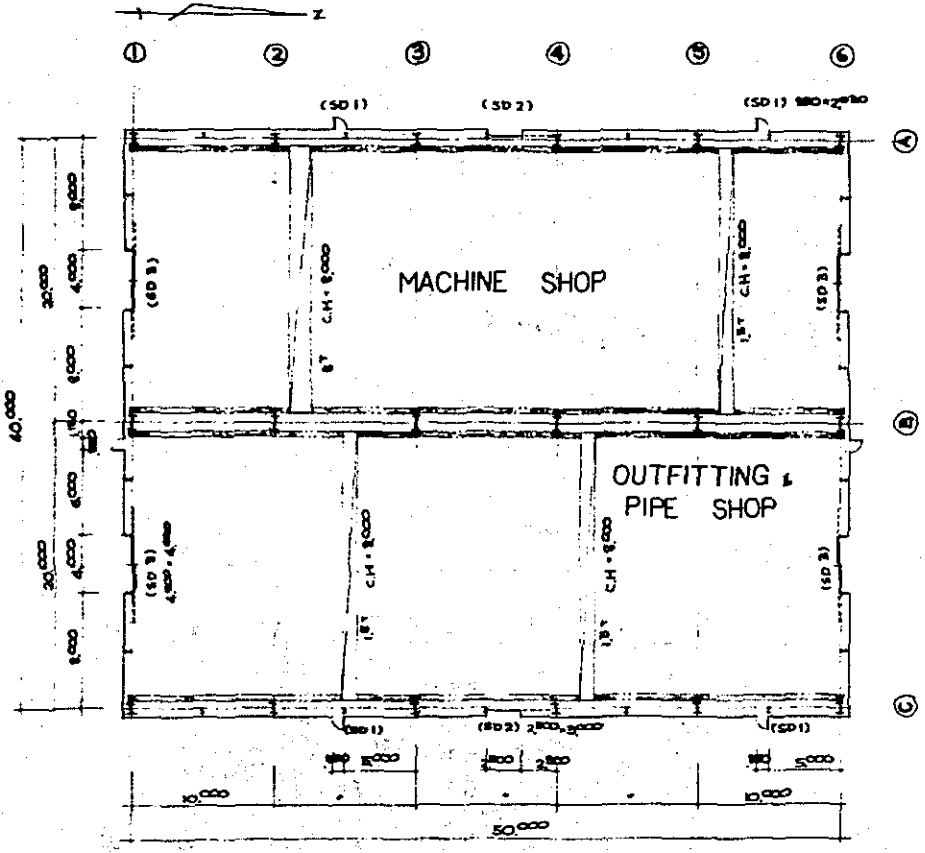
SOUTH ELEVATION



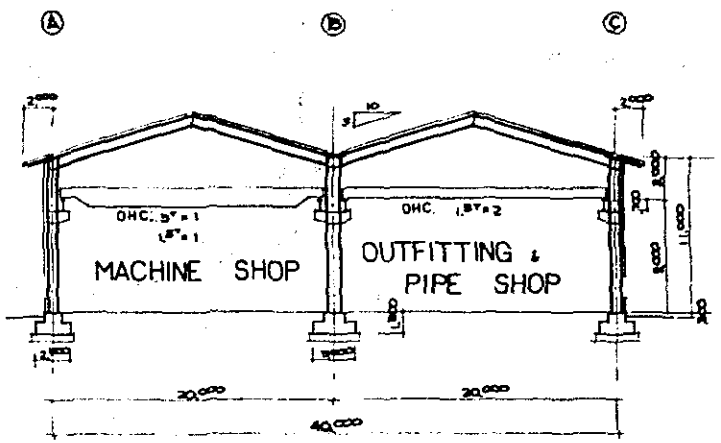
EAST ELEVATION

FABRICATION SHOP
&
ASSEMBLY SHOP


1 2 3 4 5 6 7 8 9
C
B
A
HULL BLOCK STORAGE
FABRICATION SHOP
STEEL STOCK YARD
ASSEMBLY SHOP
PLAN
20TON OVERHEAD CRANE
5TON OVERHEAD CRANE
FABRICATION SHOP
ASSEMBLY SHOP
SECTION
C
B
A
MACHINE LAYOUT IN HULL SHOP



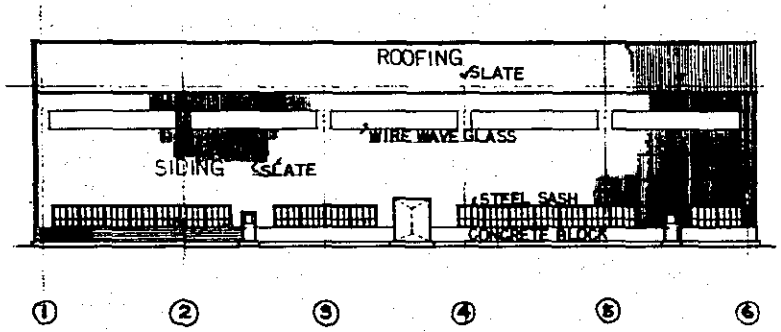
PLAN



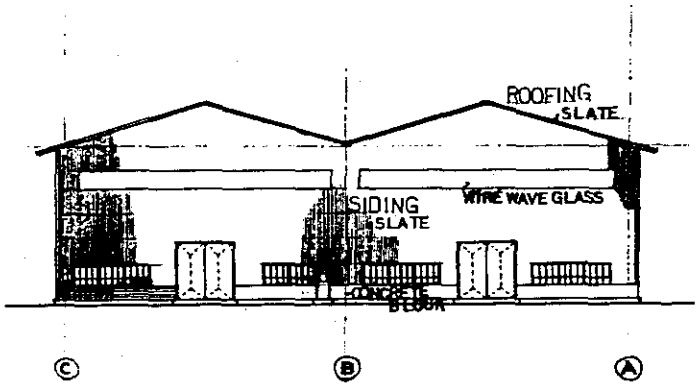
SECTION

0 5 10M

MACHINE SHOP,
OUTFITTING&PIPE SHOP



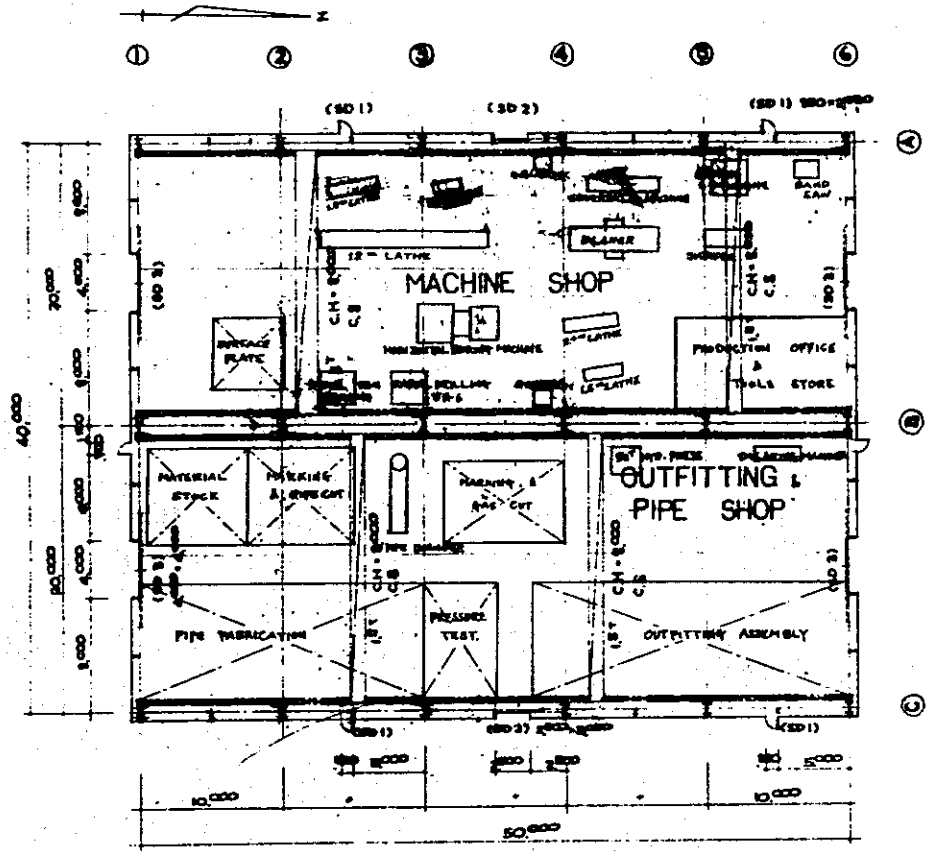
EAST ELEVATION



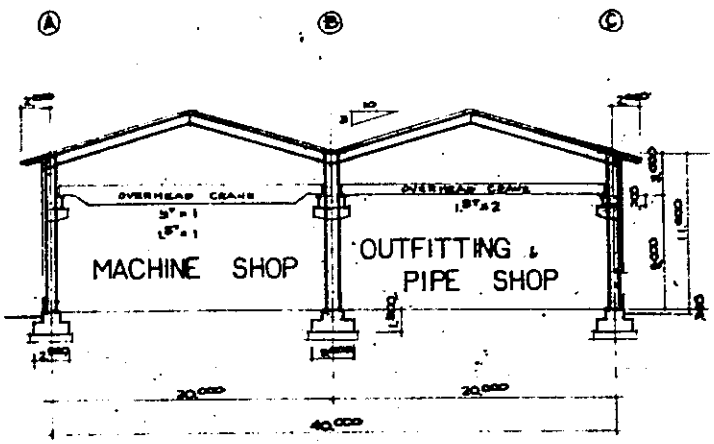
NORTH ELEVATION

MACHINE SHOP

OUTFITTING&PIPE SHOP



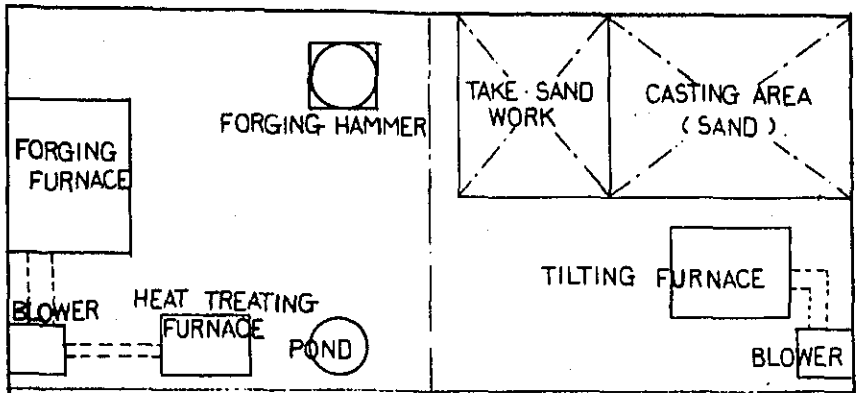
PLAN



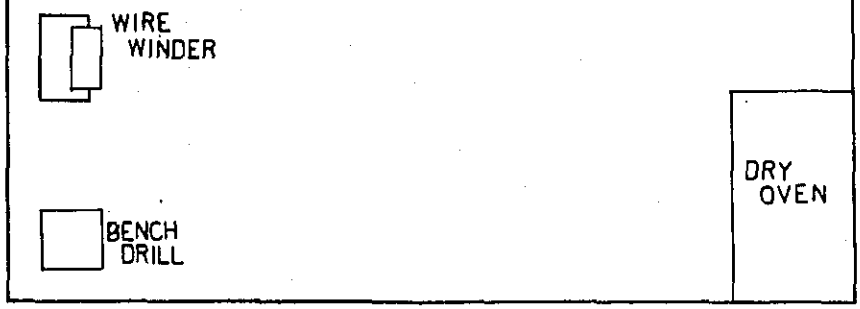
SECTION

MACHINE LALYOUT IN OUTFITTING, PIPE . & . MACHINE SHOP.

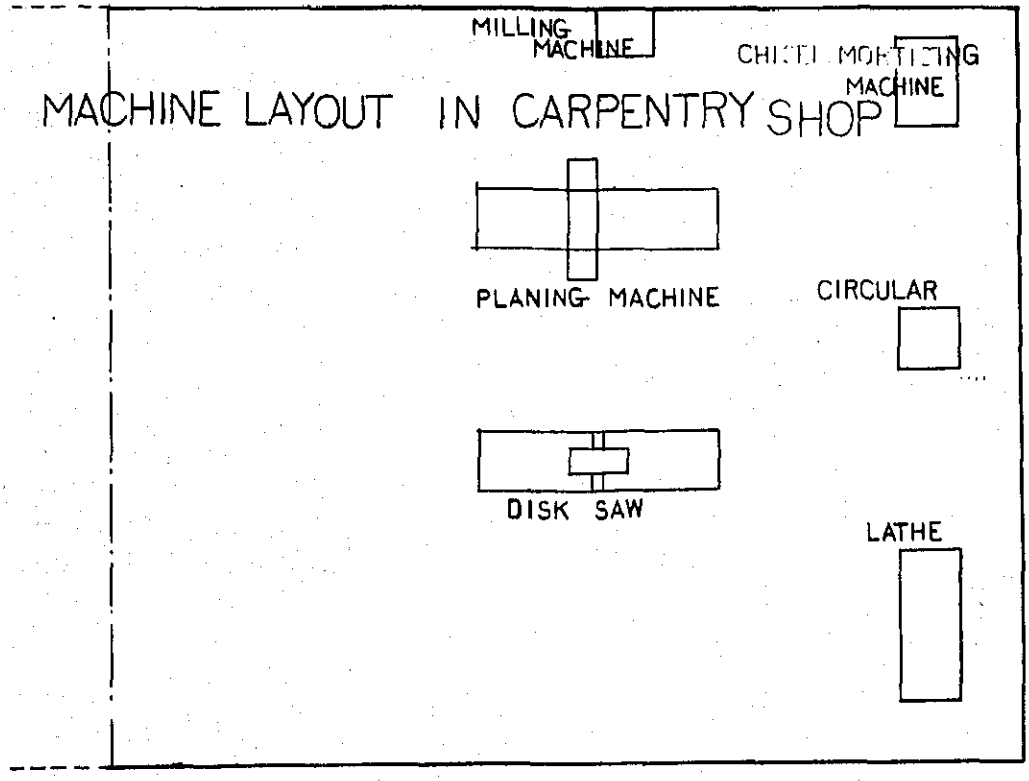
MACHINE LAYOUT IN FORGING & CASTING SHOP

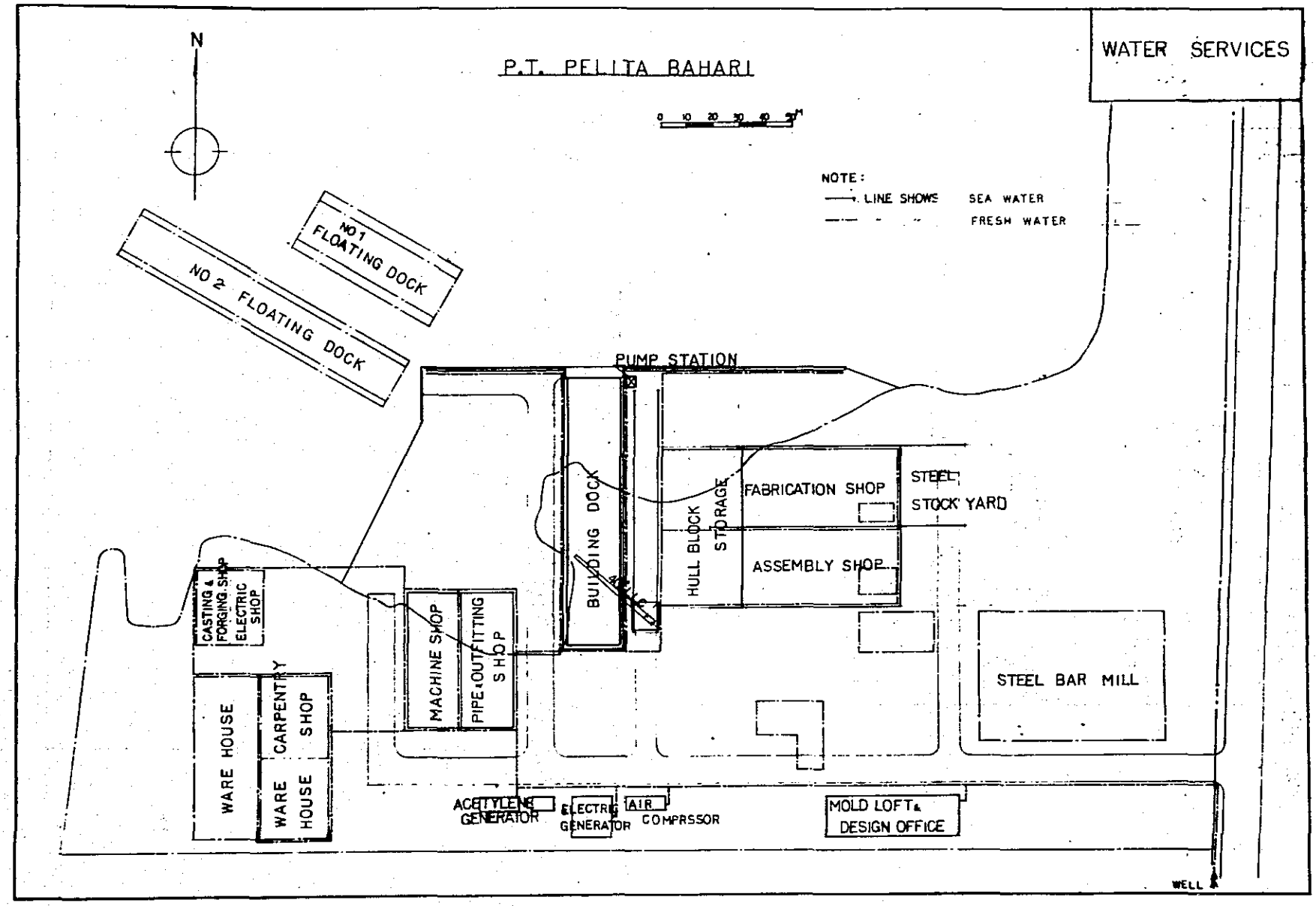


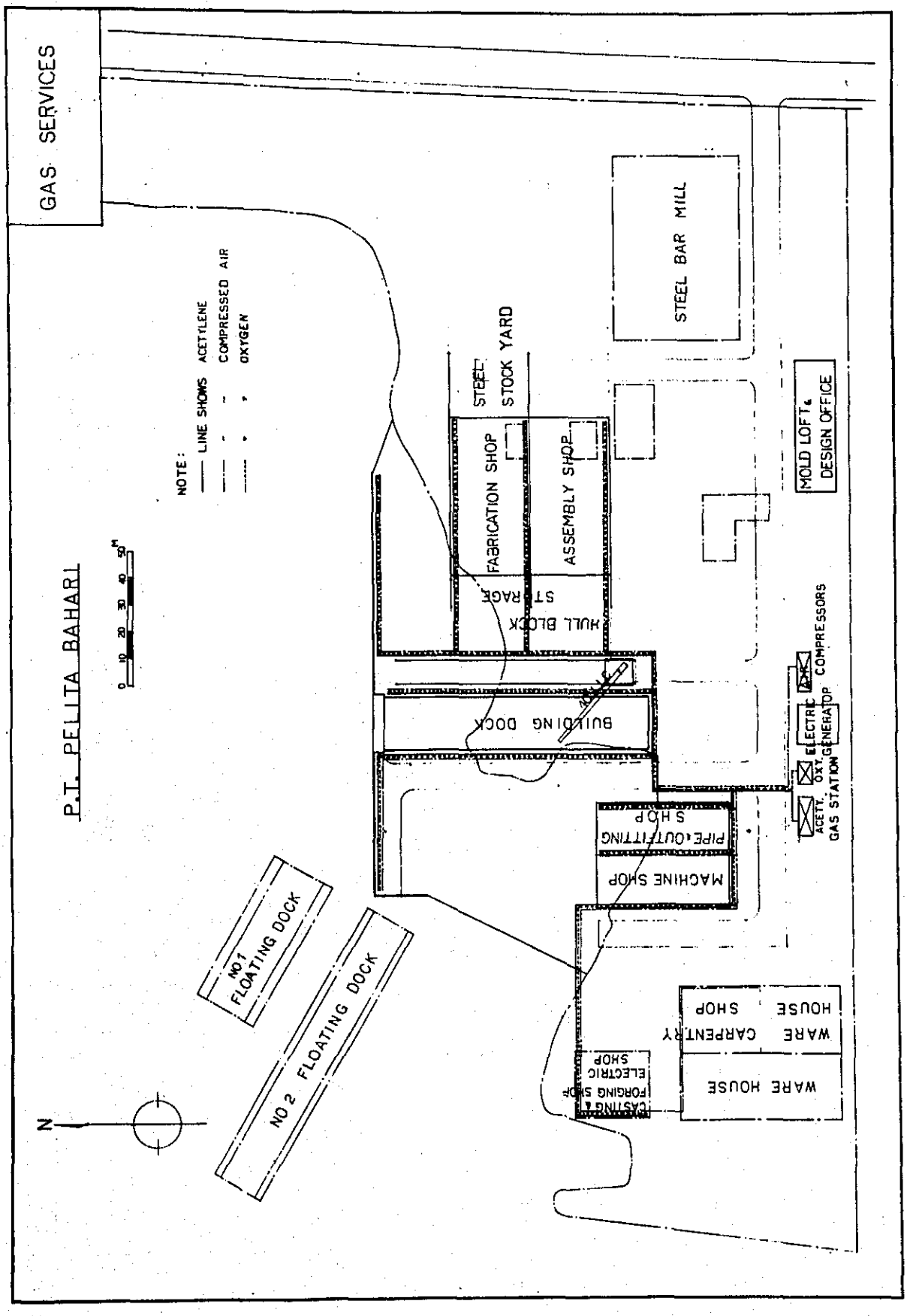
MACHINE LAYOUT IN ELECTRIC SHOP

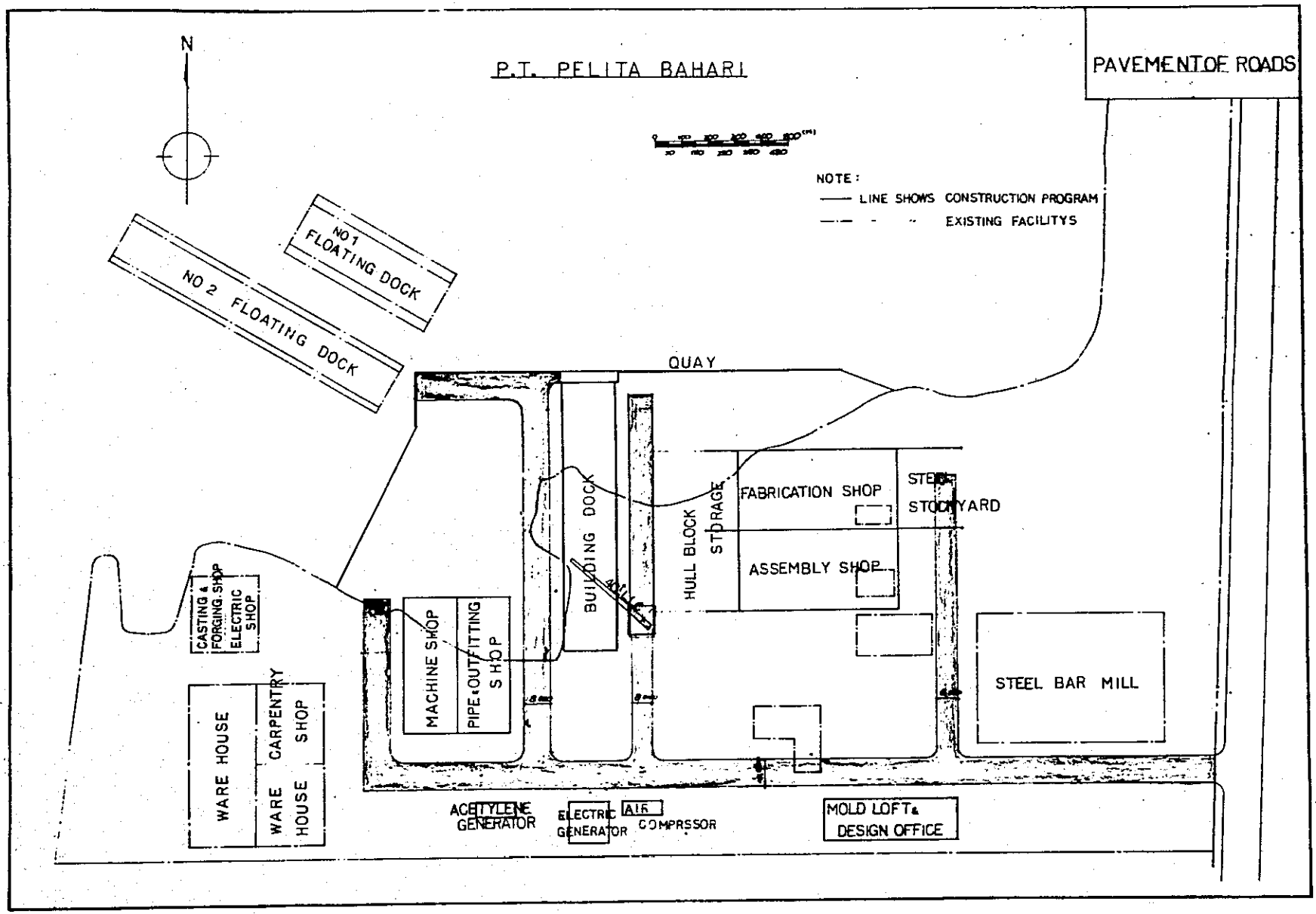


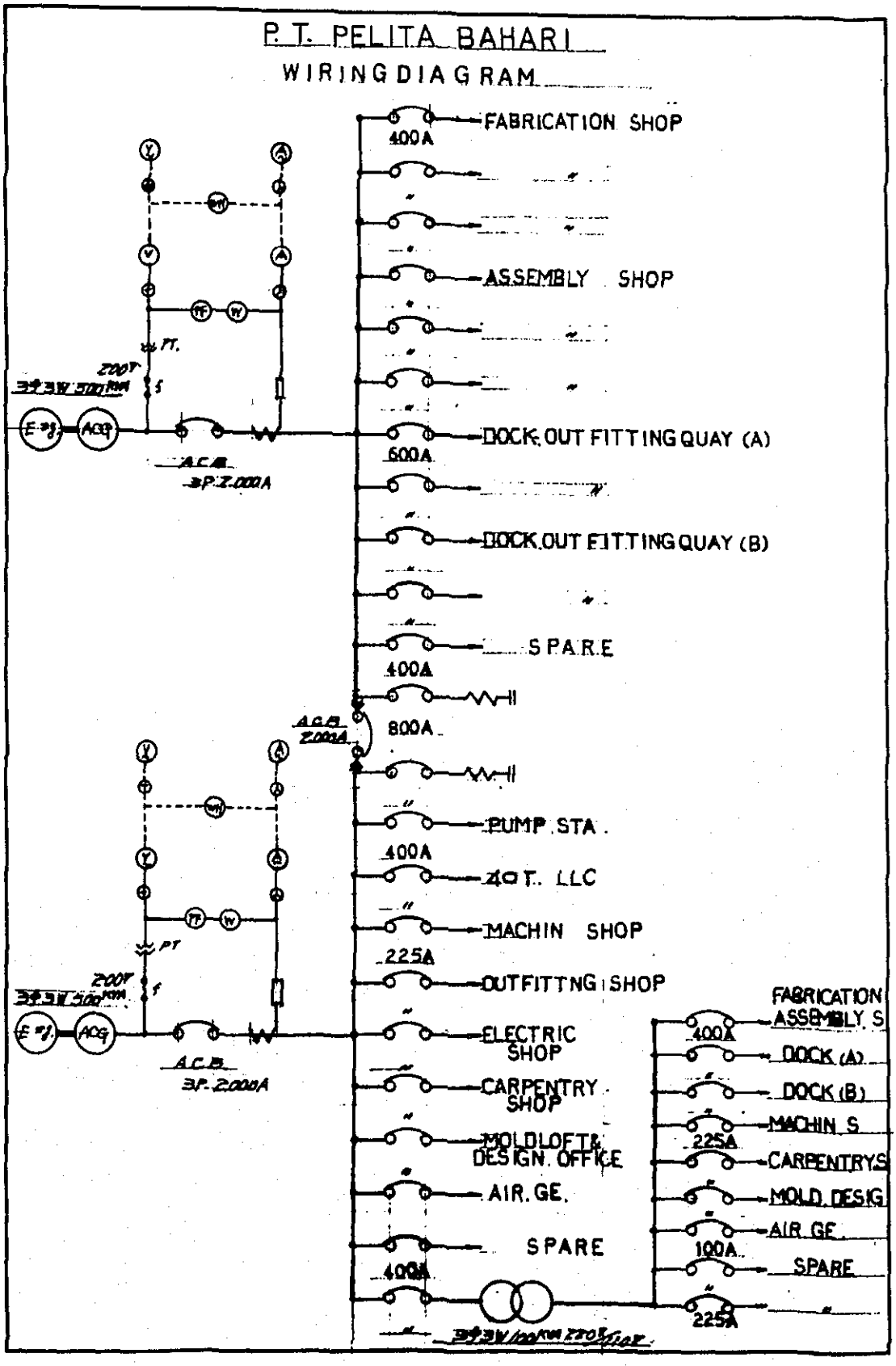
MACHINE LAYOUT IN CARPENTRY SHOP




P.T. PELITA BAHARI
N
WATER SERVICES
NOTE :
LINE SHOWS SEA WATER
FRESH WATER
NO 1 FLOATING DOCK
NO 2 FLOATING DOCK
PUMP STATION
BUILDING DOCK
HULL BLOCK STORAGE
FABRICATION SHOP
STEEL STOCK YARD
ASSEMBLY SHOP
CASTING & FORGING SHOP
ELECTRIC SHOP
MACHINE SHOP
PIPE & OUTFITTING SHOP
WARE HOUSE
CARPENTRY SHOP
WARE HOUSE
STEEL BAR MILL
ACETYLENE GENERATOR
ELECTRIC GENERATOR
AIR COMPRSSOR
MOLD LOFT & DESIGN OFFICE
WELL


GAS SERVICES
P.T. PELITA BAHARI
NOTE:
LINE SHOWS ACETYLENE
COMPRESSED AIR
OXYGEN
0 10 20 30 40 50M
STEEL BAR MILL
STEEL STOCK YARD
FABRICATION SHOP
ASSEMBLY SHOP
HULL BLOCK STORAGE
BUILDING DOCK
MOLD LOFT & DESIGN OFFICE
ELECTRIC COMPRESSORS
OXY. GENERATOR
ACETY. GAS STATION
PIPE & OUTFITTING SHOP
MACHINE SHOP
WARE HOUSE
CARPENTRY SHOP
WARE HOUSE
CASTING & FORGING SHOP
ELECTRIC SHOP
NO 1 FLOATING DOCK
NO 2 FLOATING DOCK
N


P.T. PELITA BAHARI
N
PAVEMENT OF ROADS
NOTE :
LINE SHOWS CONSTRUCTION PROGRAM
EXISTING FACILITYS
NO 1 FLOATING DOCK
NO 2 FLOATING DOCK
QUAY
BUILDING DOCK
SLIP WAY
HULL BLOCK STORAGE
FABRICATION SHOP
STEEL STOCKYARD
ASSEMBLY SHOP
MACHINE SHOP
PIPE & OUTFITTING SHOP
CASTING & FORGING SHOP
ELECTRIC SHOP
WARE HOUSE
WARE HOUSE
CARPENTRY SHOP
STEEL BAR MILL
ACETYLENE GENERATOR
ELECTRIC GENERATOR
AIR COMPRSSOR
MOLD LOFT & DESIGN OFFICE


P. T. PELITA BAHARI
WIRING DIAGRAM
FABRICATION SHOP
400A
ASSEMBLY SHOP
DOCK OUT FITTING QUAY (A)
600A
DOCK OUT FITTING QUAY (B)
SPARE
400A
800A
PUMP STA.
400A
40 T. LLC
MACHIN SHOP
225A
OUTFITTNG SHOP
ELECTRIC SHOP
CARPENTRY SHOP
MOLDLOFT & DESIGN. OFFICE
AIR. GE.
SPARE
400A
FABRICATION ASSEMBLY S
400A
DOCK (A)
DOCK (B)
MACHIN S
225A
CARPENTRY S
MOLD. DESIG
AIR GE.
100A
SPARE
225A