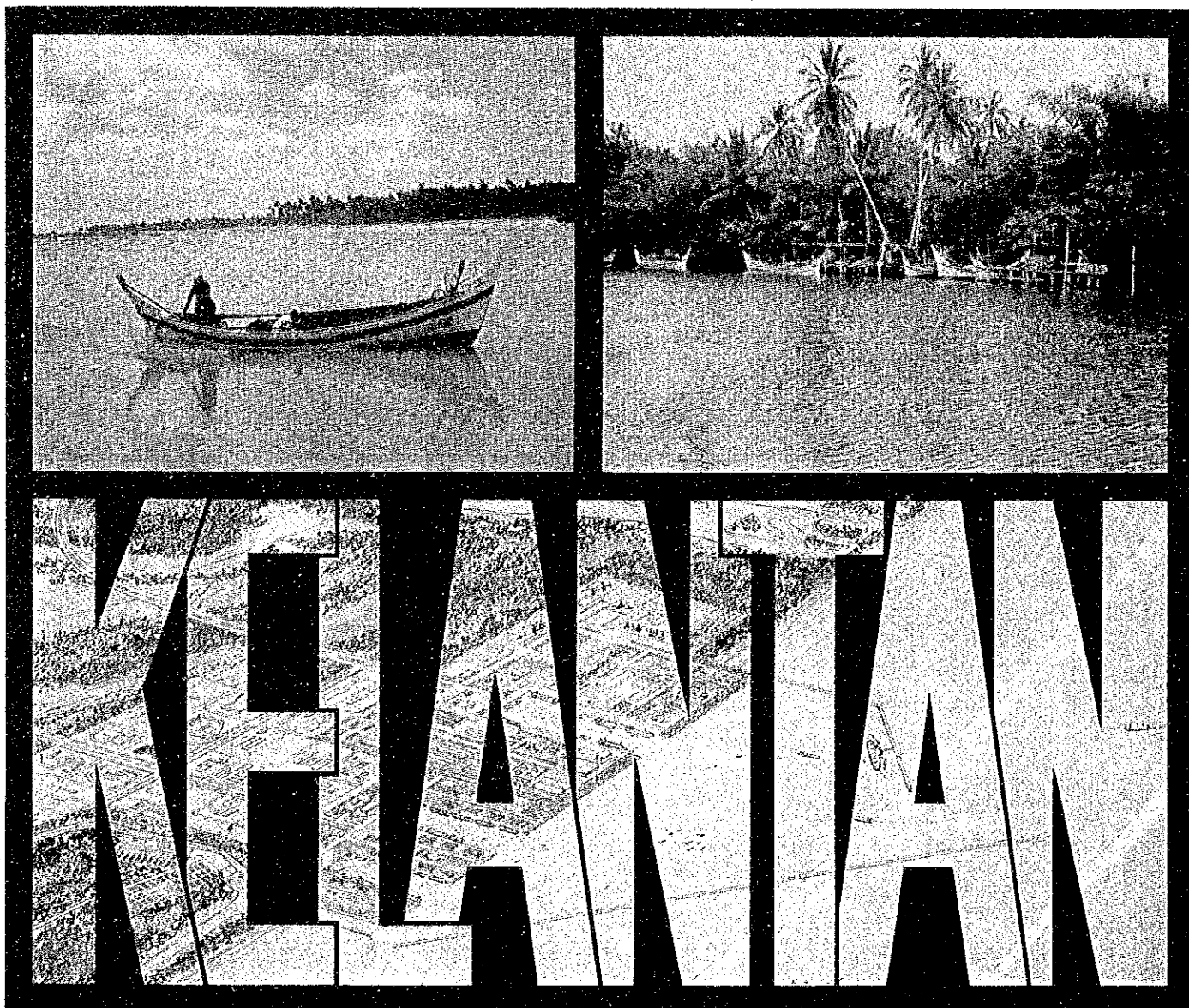


THE FEASIBILITY STUDY REPORT FOR KELANTAN PORT DEVELOPMENT PROJECT IN MALAYSIA

FEBRUARY 1981



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**THE FEASIBILITY
STUDY REPORT
FOR
KELANTAN PORT
DEVELOPMENT PROJECT
IN MALAYSIA**

FEBRUARY 1981

国際協力事業団	
受入 月日	84. 5. 16
登録No.	04879
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PREFACE

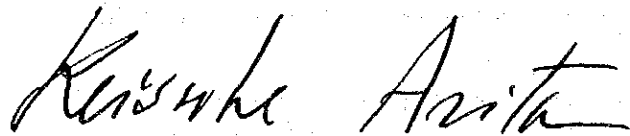
In response to a request of the Government of Malaysia, the Japanese Government decided to conduct a Feasibility Study on the Kelantan Port Development Project and entrusted the survey to the Japan International Cooperation Agency. The J.I.C.A. sent to Malaysia a survey team headed by Mr. Yoshio Takeuchi several times from September 1979 to December 1980.

The team exchanged views with the officials concerned of the Government of Malaysia and conducted a field survey in the project area, 10 km east of the city of Kota Bharu. After the team returned to Japan, further studies were made and the present report has been prepared.

I hope that this report will serve for the development of the Project and contribute to the promotion of friendly relations between our two countries.

I wish to express my deep appreciation to the officials concerned of the Government of Malaysia for their close cooperation extended to the team.

February, 1981



Keisuke Arita
President

Japan International Cooperation Agency

LETTER OF TRANSMITTAL

Mr. Keisuke Arita, President
Japan International Cooperation Agency

Dear Mr. Arita,

It is my great pleasure to submit the report on the Feasibility Study for Kelantan Port Development Project in Malaysia.

The Japanese Study Team carried out field surveys in Malaysia from September 26, 1979 to October 25, 1979, and from May 14, 1980 to June 19, 1980, at the request of the Japan International Cooperation Agency. Following the Interim Report completed in March 1980, this report was formulated. It included surveys and studies in 1979 and 1980.

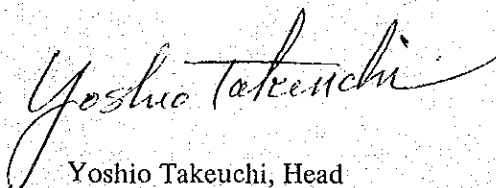
The State Government of Kelantan has expressed its desire that the Feasibility Study of this project be expedited, due to the vital importance of the project for the development of the state economy.

On behalf of the Japanese Study Team, I would like to express my deep appreciation to the Government of Malaysia, the state Government of Kelantan and the participating government organizations for their unlimited cooperation and assistance. The team members are very grateful for the warm hospitality extended to them during their stay in Malaysia.

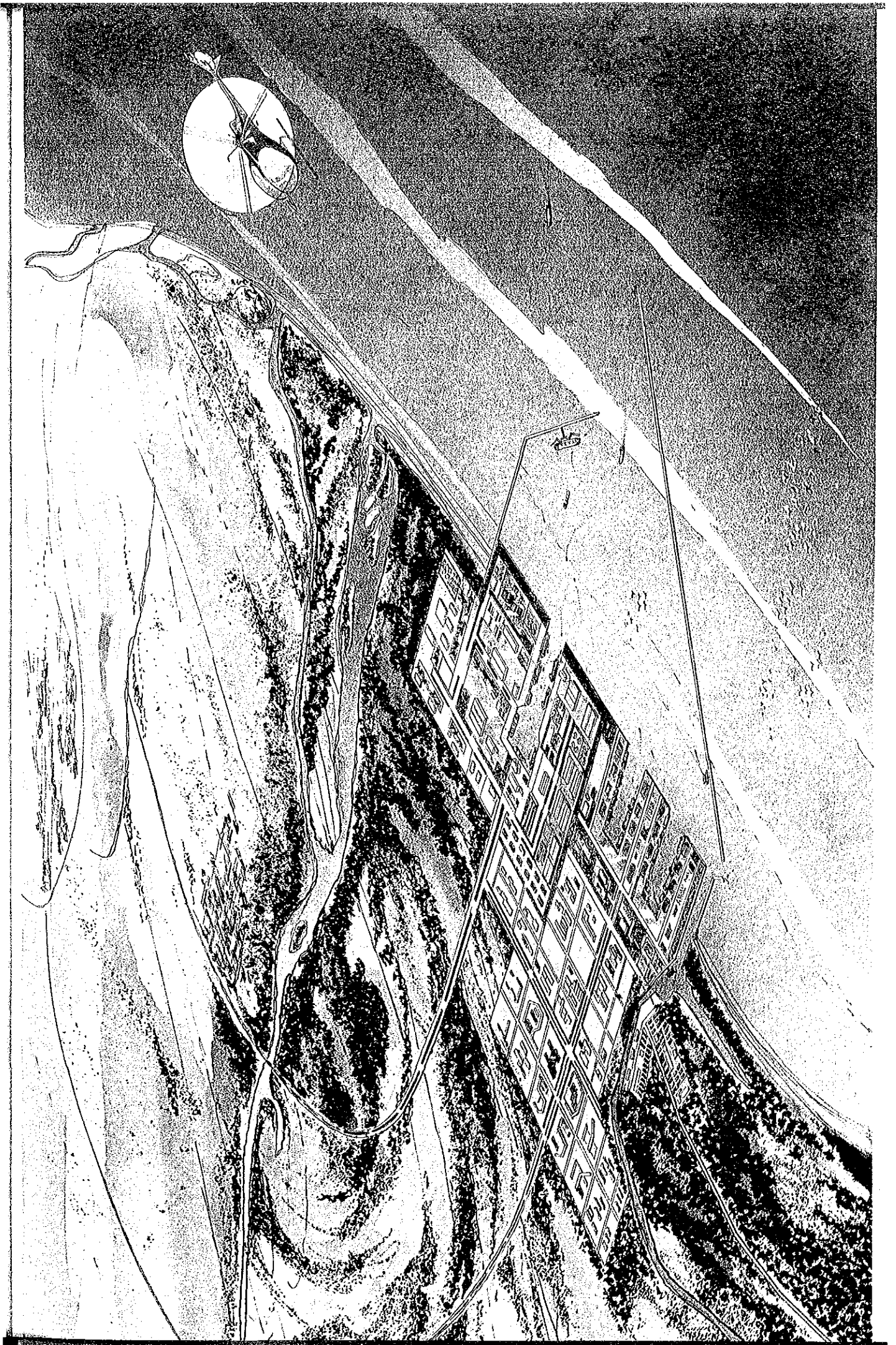
I am also indebted to the Japan International Cooperation Agency, the Ministry of Transport, the Ministry of Foreign Affairs, the Japanese Embassy in Kuala Lumpur, the consultant who surveyed the site conditions, and the many Japanese companies having branches in Kuala Lumpur, for giving us valuable suggestions and assistance in the field study and in the preparation of this report.

February 1981

Sincerely yours,



Yoshio Takeuchi, Head
Japanese Study Team for Kelantan Port
Development Project
(President, the Overseas Coastal Area
Development Institute of Japan)



ACKNOWLEDGEMENT

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The work of the study team was greatly assisted by the cooperation and advice received from officers and staff of following agencies of the Federal Government of Malaysia, the State Government of Kelantan and Port Authorities.

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Drainage & Irrigation Department
Economic Planning Unit, Prime Minister's Department
Federal Land Development Authority
Fisheries Department
Fisheries Development Authority
Forestry Department
Geological Survey Department
Geology Department, University of Malaya
Johore Port Authority
Kelang Port Authority
Kelantan Development Office
Kelantan Economic Development Corporation
Kelantan Economic Planning Unit
Kemubu Agricultural Development Authority
Kuantan Port Authority
Lands and Mines Department
Malayan Railway
Malaysian Industrial Development Authority
Malaysian International Shipping Corporation
Malaysian Rubber Exchange & Licensing Board
Marine Department
Meteorological Services Malaysia
Ministry of Agriculture
Ministry of Commerce and Industry
Ministry of Transport
National Electricity Board
National Padi and Rice Board
Penang Port Commission
Public Works Department
South Kelantan Development Authority
State District Office (Bachok, Kota Bharu, Pasir Puteh)
Survey and National Mapping Department
Town and Country Department

And thanks are given to following officials who contributed especially to the study.

Mr. Basha bin Nordin (Director of EPU)

Mr. G. Parameswaren (Assistant Director of EPU)

Capt. Abudul Karim Stuart Russel (Harbour Master)

Mr. Abdul Kahalid Aziz (Director of SEPU)

Mr. Zuinudeen bin Yussof (Assistant Director of SEPU)

Tengku Shah Buddin Maasum (Assistant Director of SEPU)

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CONCLUSIONS AND RECOMMENDATIONS

CONCLUSIONS AND RECOMMENDATIONS

I. The First Phase Development Plan

1. Conclusions

(1) Fig. C-1 and Table C-1 show the First Phase Development Plan with a target year of 1987 and its construction schedule respectively.

The total investment is estimated at M\$88.25 million, of which M\$43.683 million is foreign currency, and the remaining M\$44.567 million is local currency.

(2) The First Phase Development Plan is concluded to be feasible both technically and economically. The economic internal rates of return are obtained as 9.4 percent with modified labour cost (Case I), 9.1 percent with unmodified labour cost (Case II), and 12.3 percent (Reference Case).

Besides the measurable economic effects, social and economic impacts by the port development, which are difficult to calculate, would be tremendous.

It would be possible to finance ordinary operation costs, and to depreciate the facilities and equipment at the proposed port charges. Therefore, the port authority would be financially self-supporting within the limits of the operating revenue/expenditure.

2. Recommendations

(1) The First Development Plan for Kelantan Port should be implemented as early as possible.

(2) A model study should be made to clarify the uncertain factors of coastal erosion and accretion of littoral drifts. In this case, the model study of the training walls to be constructed in the Kemasin Semerak Integrated Rural Project should be taken into consideration.

II. Master Plan

1. Conclusions

(1) The Master Plan with a target year of 2000 would give a future concept of the coastal area development in Kelantan.

(2) Fig. C-2 and Table C-2 show the Plan, and the construction schedule respectively. The investment is roughly estimated at M\$503.5 million.

2. Recommendations

(1) Commercial and fishing port facilities of the Master Plan should be developed to cope with the actual port needs after the completion of the First Phase Development Plan.

(2) The industrial port zone should be developed in accordance with the progress of Kelantan's economy and potentials as a whole, considering that this development would play a leading role of industrialization.

(3) Environmental assessment of the industrial development should be carried out in advance.

Fig. C-1 THE FIRST PHASE DEVELOPMENT PLAN OF KELANTAN PORT (PLAN C)

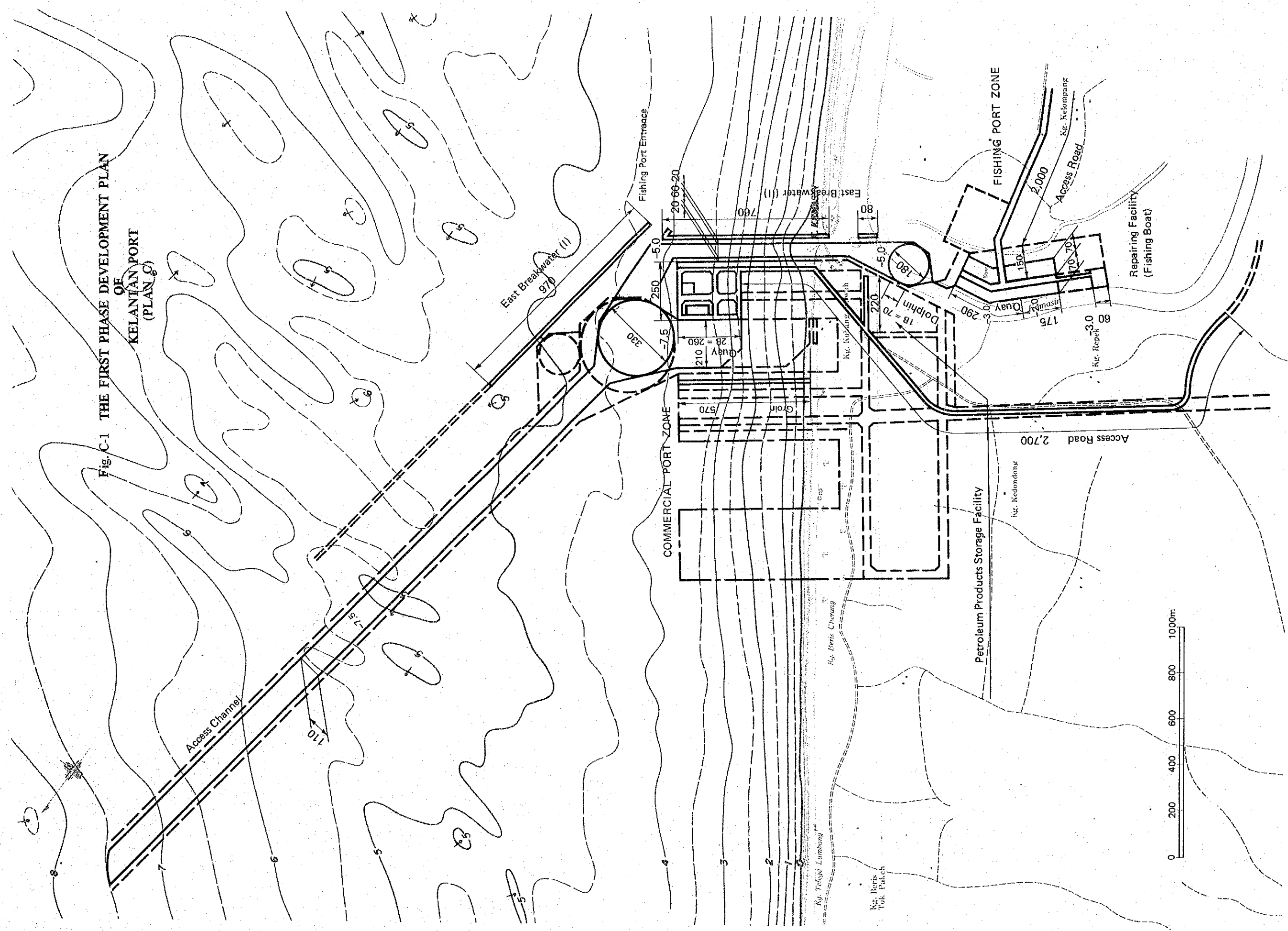


Table C-1 Construction Schedule for the First Phase Development Plan (Plan C)

Item				1981			1982			1983			1984			1985			1986			1987		
No.	Description	Unit	Quantity	3	6	9	12	3	6	9	12	3	6	9	12	3	6	9	12	3	6	9	12	
A-1	Seawall	m	880																					
A-2	Breakwater	m	1,810																					
A-3	Groin	m	570																					
A-4	Dredging/Reclamation	m ³	2,300,000																					
A-5	-7.5 m Quay	m	260																					
A-6	Transit Shed	m ²	4,800																					
A-7	Building	m ²	2,400																					
A-8	Oil Tank (Palm Oil)	sum	1																					
A-9	Port Road	m ²	39,000																					
A-10	Access Road	m ²	23,000																					
A-11	Asphalt Pavement	m ²	9,000																					
A-12	Green Area	m ²	4,000																					
A-13	Drainage	sum	1																					
A-14	Water Supply	sum	1																					
A-15	Electric Power Supply	sum	1																					
A-16	Navigation Aids	sum	1																					
A-17	Port Service Vessels	sum	1																					
A-18	Cargo Handling Equipment/Vehicles	sum	1																					
A-19	Mobilization/Demobilization	sum	1																					
A-20	Land Acquisition	m ²	341,000																					
B-1	-2.0 m Quay	m	175																					
B-2	-3.0 m Quay	m	290																					
B-3	Slip Way	sum	1																					
B-4	Wholesale Market/Office	m ²	4,000																					
B-5	Cold-storage/Freezing Facilities	sum	1																					
B-6	Ice Factory/Ice Storage Facilities	sum	1																					
B-7	Oil Tank (Movable)	sum	1																					
B-8	Port Road	m ²	16,000																					
B-9	Access Road	m ²	40,000																					
B-10	Asphalt Pavement	m ²	15,000																					
B-11	Drainage	sum	1																					
B-12	Water Supply	sum	1																					
B-13	Electric Power Supply	sum	1																					
B-14	Mobilization/Demobilization	sum	1																					
B-15	Land Acquisition	m ²	172,000																					
C-1	-5.0 m Oil Dolphin Berth	berth	1																					
C-2	Oil Supply	sum	1																					
C-3	Mobilization/Demobilization	sum	1																					
C-4	Land Acquisition	m ²	195,000																					
D-1	Natural Conditions Survey	sum	1																					
D-2	Engineering Study	sum	1																					
D-3	Supervision	sum	1																					

Fig. C-2 MASTER PLAN OF KELANTAN PORT (PLAN C)

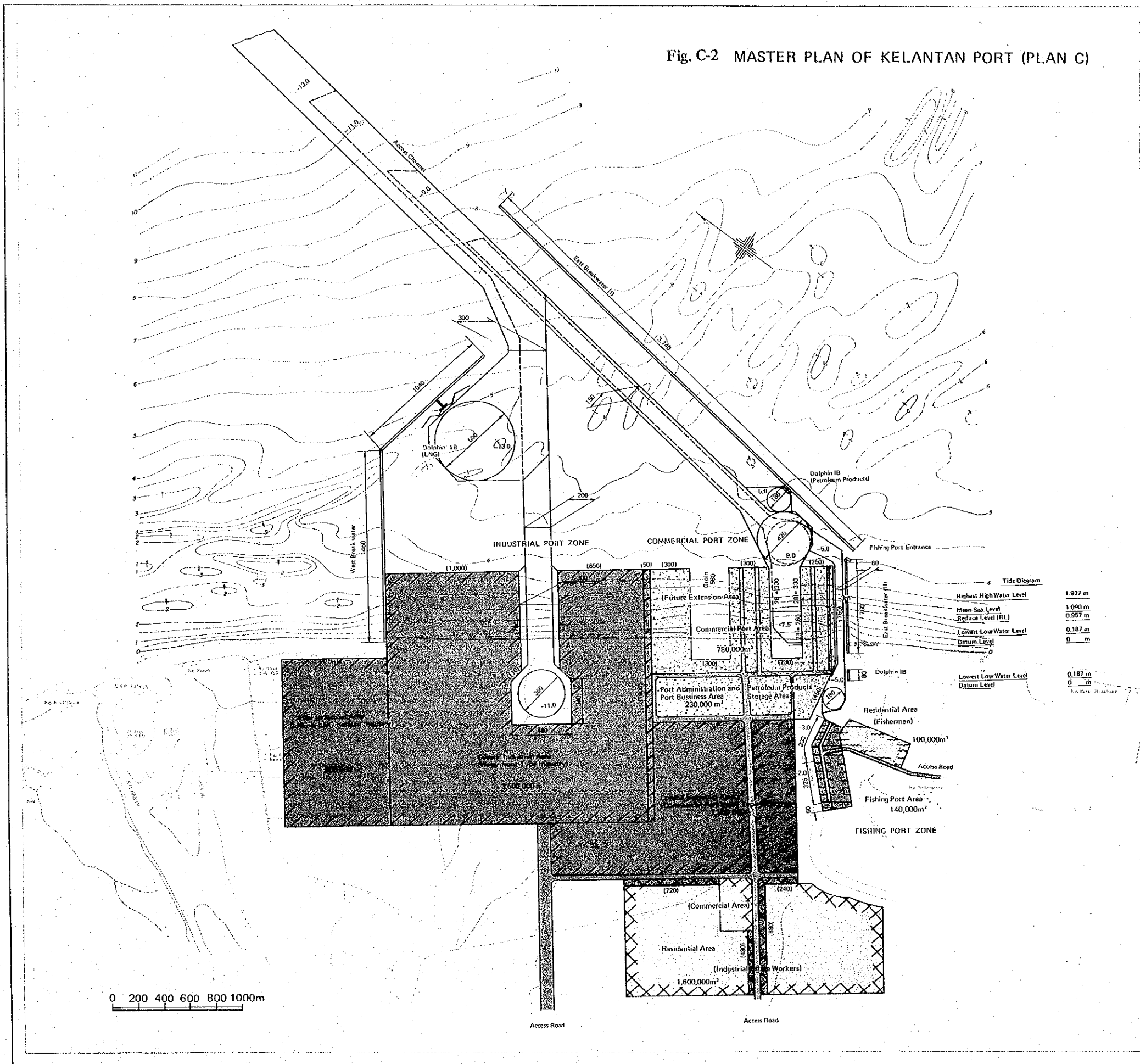


Table C-2 Construction Schedule for Master Plan (Plan C)

Item		1980										1990					2000						
No.	Description	Unit	Quantity	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00
Commercial Port Zone Facilities																							
A	Seawall	m	4,180																				
A-1	Breakwater	m	4,380																				
A-2	Groin	m	670																				
A-3	Dredging/Reclamation	m ³	4,700,000																				
A-4	-7.5 m Quay	m	260																				
A-5	-9.0 m Quay	m	660																				
A-6	Others	Sum	1																				
A-7~21																							
Fishing Port Zone Facilities																							
B	-2.0 m Quay	m	325																				
B-1	-3.0 m Quay	m	330																				
B-2	Others	Sum	1																				
B-3~15																							
Private Port Facilities																							
C	-5.0 m Oil Dolphin Berth	berth	2																				
C-1	Oil Supply	Sum	1																				
C-2	Others	Sum	1																				
C-3~4																							
Industrial Port Zone Facilities																							
D	Seawall	m	3,560																				
D-1	Breakwater	m	1,970																				
D-2	Dredging/Reclamation	m ³	16,900,000																				
D-3	-11.0 m Quay	m	1,470																				
D-4	-13.0 m LNG Dolphin Berth	berth	1																				
D-5	Others	Sum	1																				
D-6~7																							
Engineering																							
E	Natural Conditions Survey	Sum	1																				
E-1	Engineering Study	Sum	1																				
E-2	Supervision	Sum	1																				
E-3																							

SUMMARY

SUMMARY

— SUMMARY OF THE PLANS —

Background

The west coast area of Peninsular Malaysia, where international shipping bases have been located, has long prospered due to their economic and natural advantages. Industries have developed, and commodity distribution has been concentrated in and around two major ports, Kelang Port and Penang Port.

On the contrary, the east coast area lags far behind the west coast area in terms of economic output. In particular, Kelantan is economically the least developed state mainly because of lack of infrastructures, low productivity of Kelantan's principal industries such as agriculture, forestry, fishery, damage by flooding, etc.

The Federal and State Governments have been foregoing industrialization, and making efforts to support the first industrial sector activities in the state under the Third Malaysia Plan.

It is indispensable to develop transport infrastructures such as highways, a port, irrigation facilities, in order to realize and accelerate the government policies mentioned above. Highway projects and irrigation schemes have been carried out and will continue over a long period. But no port project has been executed.

Once Tumpat Port functioned as a port of call for coastal and ocean shipping, but presently, it is useless because deposition of soil and sand discharged from the Kelantan River, and littoral drifts have almost blocked the estuary and shallowed the basin. Since the sand bars of the river mouth are developing westerly, it is economically difficult to maintain in order to use the port. Therefore no port is available in Kelantan at present, and the necessity of a new port, where ships can call throughout the year, is increasingly important as a physical distribution center.

Besides a commercial port, a fishing port which will enable fishermen to operate fishing boats if the weather permits, is needed, since estuaries of rivers are almost blocked by littoral drifts, and the fishing boats have difficulties in passing through the river mouth.

Moreover, it is required to accelerate the industrialization of the economy of Kelantan in order to reduce the economic gap with other developed states in Malaysia. Otherwise the gap will be widened and the per capita income will become less than half of the Malaysian average. Accordingly, there will also be a need of an industrial port as a core of industrial development in Kelantan. But the need for an industrial port would not be as urgent as that of a commercial port or a fishing port.

Site Selection

The Sebak-Kemasin area is selected as the Kelantan Port development site from the results of the site observation, natural condition surveys, and a socio-economic study.

The comparison between the two proposed areas, Sabak-Kemasin area and Semerak area, is shown in Table S-1.

Table S-1 Comparison of Sabak ~ Kemasin Area and Semerak Area as A Port Development Site

Item No.	Comparative Items	Sabak ~ Kemasin Area	Semerak Area
1	Technical Evaluation		
1-1	Length of breakwater	A ¹⁾	A ¹⁾
1-2	Amount of capital dredging	A	A
1-3	Soil conditions	AA	A
1-4	Land use for a port area	AAA	AA
2	Socio-Economic Evaluation		
2-1	Geographical conditions	AAA	A
2-2	Land transport conditions	AAA	AA
2-3	Relationship to other development projects	AAA	AA
2-4	Distance to the consuming area	AAA	A
2-5	Distance to the producing area	AAA	AA
2-6	Distribution of fishermen	AAA	A
2-7	Competition with other fishing ports	AAA	A
2-8	Distribution of laborers	AAA	A
2-9	Distribution of natural resources	A	AA
2-10	Prospect of future development	AAA	A

The First Phase Development Plan

1. Objective and Basic Line

The objective of the First Phase Development Plan is to develop a minor commercial cum fishing port as a physical distribution center, and a coastal and pelagic fishery base, in order to promote industrialization in Kelantan, and to improve the standard of living of Kelantan's people, especially fishermen.

The basic lines to achieve the above objectives are as follows.

- ① To construct commercial port facilities which will mainly enable the import of consumer goods, construction materials, fuels, fertilizers, and export agricultural and forest products.
- ② To construct fishing port facilities which make it possible to go fishing even in the north-west monsoon season, and supply fresh fish to Kelantan's people.
- ③ To improve and construct access roads connecting the Port to the hinter-land.

2. Target Year

The target year of the Plan is the year 1987, and the project period is five years from 1983 to 1987.

3. Estimate of Port Needs

(1) Cargo Traffic Volume

The estimate of the cargo volume by commodity is made by analyzing the data on population, gross domestic product, agricultural, forest and land developments, and cargoes transported by rail, of Malaysia, Peninsular Malaysia and Kelantan.

The results of the estimate in the target year 1987 are shown in Table S-2.

Table S-2 Estimate of Cargo Traffic

(000 tons)

Commodity	Domestic		Foreign		Sub-Total		Total
	Inbound	Outbound	Import	Export	Inbound	Outbound	
Wood Products				49		49	49
Rubber				41		41	41
Palm Oil				47		47	47
Fertilizer			41		41		41
Cement	72				72		72
Petroleum Products	139				139		139
Rice		53				53	53
Miscellaneous			49		49		49
Total	211	53	90	137	301	190	491

(2) Number of Calling Ships

The number of ships calling at the port are estimated by the cargo traffic volume, and the cargo volume loaded or discharged per ship. The results of the forecast in the target year are summarized as follows;

<u>Type and Size</u>	<u>Annual Number of Calling Ships</u>
Conventional Cargo Vessels	
5,000 DWT	45
1,000 DWT	157
Oil Tankers	
2,000 – 3,000 DWT	24
1,000 DWT	174

(3) Fish Landings, and Number of Fishing Boats and Fishermen

Future marine fish landings can be estimated by using the data on population, per head consumption of fish, target of self-sufficiency of fish, quantity of trashfish, and export of fish in Peninsular Malaysia and Kelantan. The number of fishing boats is forecasted, considering the target marinefish landings and estimated annual gear group landings. And the number of fishermen is estimated by analyzing the data of the past records of fishermen's population, in Peninsular Malaysia and Kelantan, and by considering the per gear number of fishermen.

The results of the estimates are as follows;

Fish Landings	13,000 tonnes
Number of Fishing Boats	159 boats
<u>Gear/Tonnage</u>	<u>Number</u>
Trawl Nets	
~ 9.9	10
10 ~ 19.9	20
20 ~ 49.9	24
50 ~ 99.9	
Purse Seine Nets (Fish)	
20 ~ 49.9	15
Purse Seine Nets (Others)	
10 ~ 19.9	10
Drift/Gill Nets	
~ 19.9	30
Lift Nets	
10 ~ 19.9	20
Hook & Lines	
~ 19.9	30
Number of Fishermen	1,290

4. Major Port Facilities

Planning of port facilities is made considering such various factors as the estimates of cargo volume and fish landings, the dimension of the commercial vessels and fishing boats, the maneuver of ships, natural conditions, the distribution of cargo fish catches fishing operations, etc.

Fig. S-1 shows the layout plan of the First Phase Development Plan (Plan C). And major facilities are planned as follows;

(1) Commercial Port Facilities

① East Breakwater (I)	Length 970 m
(II)	Length 840 m
② Groin	Length 570 m
③ Access Channel	Depth - 7.5 m, Width 110 m
	Depth - 5.0 m, Width 60 m
④ Basins	Depth - 7.5 m, - 5.0 m
⑤ Quay (2 Berths)	Depth - 7.5 m, Length 260 m
⑥ Dolphin (1 Berth)	Depth - 5.0 m
⑦ Transit Shed	Area 4,800 m ² (120 m x 40 m)
⑧ Open Storage	Area 4,400 m ²
⑨ Palm Oil Storage Tanks	4 tanks
⑩ Petroleum Product Storage Tank	15 tanks
⑪ Access Road and Port Road	

(2) Fishing Port Facilities

① Channel and Basin	Depth - 3.0 m, - 2.0 m
	Width 80 m
② Mooring Facilities	Depth - 3.0 m, Length 290 m
	Depth - 2.0 m, Length 175 m
③ Wholesale Market	Area 3000 m ² (100 m x 30 m)
④ Cold Storage Facility	1 unit
⑤ Freezing Facility	1 unit
⑥ Ice Factory and Ice Storage Facility	1 unit
⑦ Access Road and Port Road	

Fig. S-1 THE FIRST PHASE DEVELOPMENT PLAN
OF
KELANTAN PORT
(PLAN C)

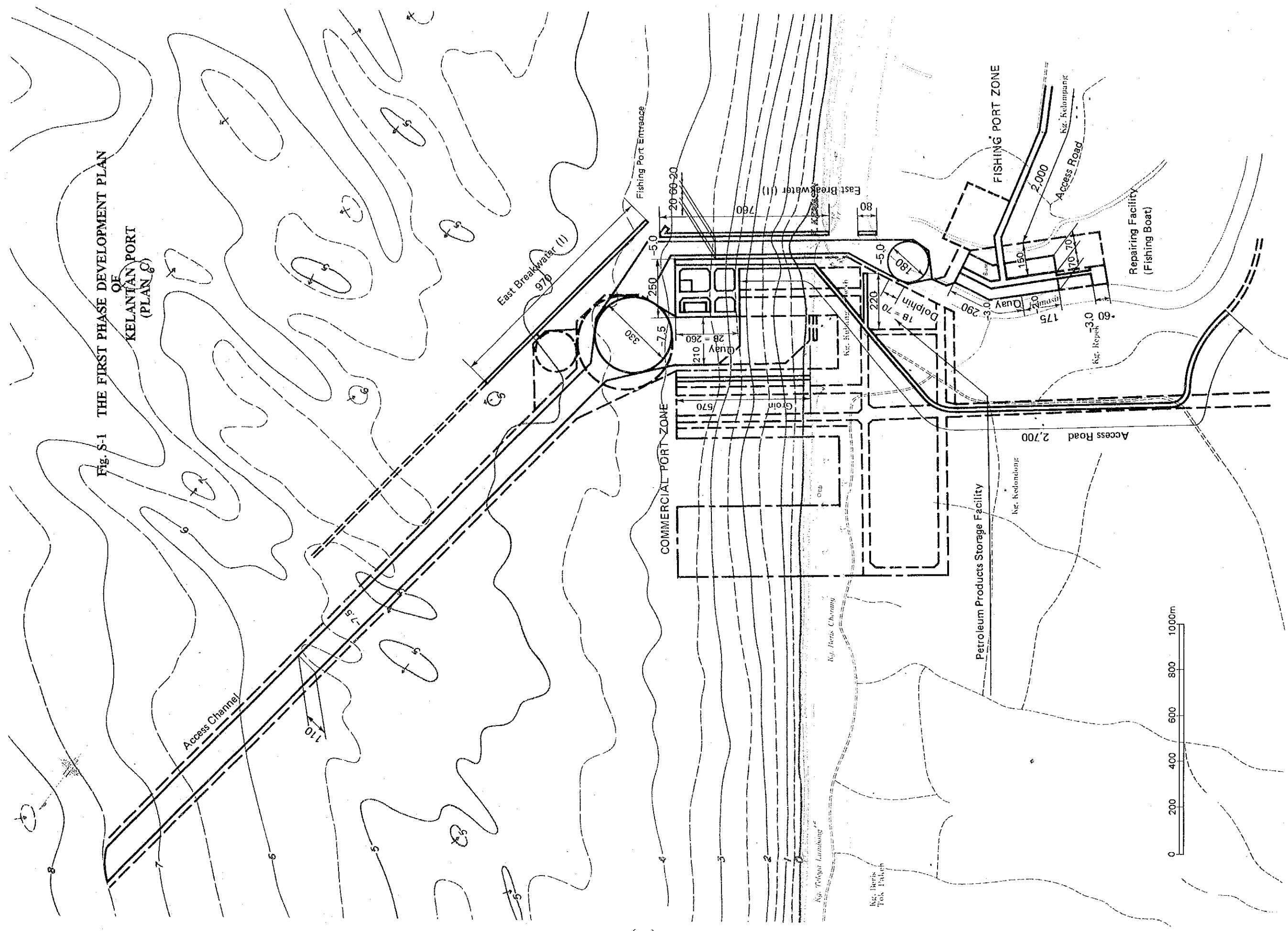


Table S-4 Construction Cost of the First Phase Development Plan (Plan C)

Item No.	Description	Unit	Quantity	Unit Price			Amount		
				Local Currency M\$	Foreign Currency M\$	Total Unit Price M\$	Local Currency M\$ 1,000	Foreign Currency M\$ 1,000	Total Amount M\$ 1,000
A-	Commercial Port Zone Facilities								
A-1	Seawall	m	880	2,100	1,000	3,100	1,848	880	2,728
A-2	Breakwater	m	1,810	5,800	3,300	9,100	10,498	5,973	16,471
A-3	Groin	m	570	3,400	1,000	4,400	1,938	570	2,508
A-4	Dredging/Reclamation	m ³	2,300,000	0.9	3.1	4	2,070	7,130	9,200
A-5	-7.5 m Quay	m	260	2,800	19,900	22,700	728	5,174	5,902
A-6	Transit Shed	m ²	4,800	100	150	250	480	720	1,200
A-7	Building	m ²	2,400	250	100	350	600	240	840
A-8	Oil Tank (Palm Oil)	sum	1				340	510	850
A-9	Port Road	m ²	39,000	33	2	35	1,287	78	1,365
A-10	Access Road	m ²	23,000	37	3	40	851	69	920
A-11	Asphalt Pavement	m ²	9,000	28	2	30	252	18	270
A-12	Green Area	m ²	4,000	10	0	10	40	0	40
A-13	Drainage	sum	1				1,970	670	2,640
A-14	Water Supply	sum	1				260	610	870
A-15	Electric Power Supply	sum	1				400	1,050	1,450
A-16	Navigation Aids	sum	1				300	1,200	1,500
A-17	Port Service Vessels	sum	1				0	950	950
A-18	Cargo Handling Equipment/Vehicles	sum	1				0	750	750
A-19	Mobilization/Demobilization	sum	1				179	938	1,117
A-20	Land Acquisition	m ²	341,000	4	0	4	1,364	0	1,364
A-21	Sales Tax (5%)	sum	1				1,202	0	1,202
	Sub Total (A)						26,607	27,530	54,137
B	Fishing Port Zone Facilities								
B-1	-2.0 m Quay	m	175	1,500	3,200	4,700	263	560	823
B-2	-3.0 m Quay	m	290	1,900	4,700	6,600	551	1,363	1,914
B-3	Slip Way	sum	1				400	200	600
B-4	Wholesale Market/Office	m ²	4,000	250	100	350	1,000	400	1,400
B-5	Cold-storage/Freezing Facilities	sum	1				800	2,000	2,800
B-6	Ice Factory/Ice Storage Facilities	sum	1				500	1,300	1,800
B-7	Oil Tank (Movable)	sum	1				16	24	40
B-8	Port Road	m ²	16,000	33	2	35	528	32	560
B-9	Access Road	m ²	40,000	37	3	40	1,480	120	1,600
B-10	Asphalt Pavement	m ²	15,000	28	2	30	420	30	450
B-11	Drainage	sum	1				1,090	380	1,470
B-12	Water Supply	sum	1				200	460	660
B-13	Electric Power Supply	sum	1				200	520	720
B-14	Mobilization/Demobilization	sum	1				12	38	50
B-15	Land Acquisition	m ²	172,000	4	0	4	688	0	688
B-16	Sales Tax (5%)	sum	1				373	0	373
	Sub Total (B)						8,521	7,427	15,948
C	Private Port Facilities								
C-1	-5.0 m Oil Dolphin Berth	berth	1	290,000	400,000	690,000	290	400	690
C-2	Oil Supply	sum	1				890	1,370	2,260
C-3	Mobilization/Demobilization	sum	1				32	78	110
C-4	Land Acquisition	m ²	195,000	4	0	4	780	0	780
C-5	Sales Tax (5%)	sum	1				61	0	61
	Sub Total (C)						2,053	1,848	3,901
D	Engineering								
D-1	Natural Conditions Survey	sum	1				370	160	530
D-2	Engineering Study	sum	1				240	240	480
D-3	Supervision	sum	1				1,200	960	2,160
	Sub Total (D)						1,810	1,360	3,170
E	Physical Contingency (15%)								
E-1	Physical Contingency ((A+B)x15%)	sum	1				5,269	5,242	10,511
E-2	Physical Contingency (Cx15%)	sum	1				307	276	583
	Sub Total (E)						5,576	5,518	11,094
	Total (A+B+D+E-1)						42,207	41,559	83,766
	Total (A+B+C+D+E)						44,567	43,683	88,250
							50.5%	49.5%	100%

6. Port Administration and Management

(1) Commercial Port

It is proposed to establish a port administrative and management body, Kelantan Port Authority, which will enable representatives of the people and the State Government to take part in the port management, in order to reflect the wishes of Kelantan's people.

The scope of business of the authority is determined in accordance with the stipulations of the Port Authority Act 1963. Main services provided by the authority are as follows;

- ① Pilotage, tugboat service provision of berths, and water supply for the ships
- ② Handling and storage of cargoes
- ③ Lease of cargo handling equipment
- ④ Security, fire fighting and rescue

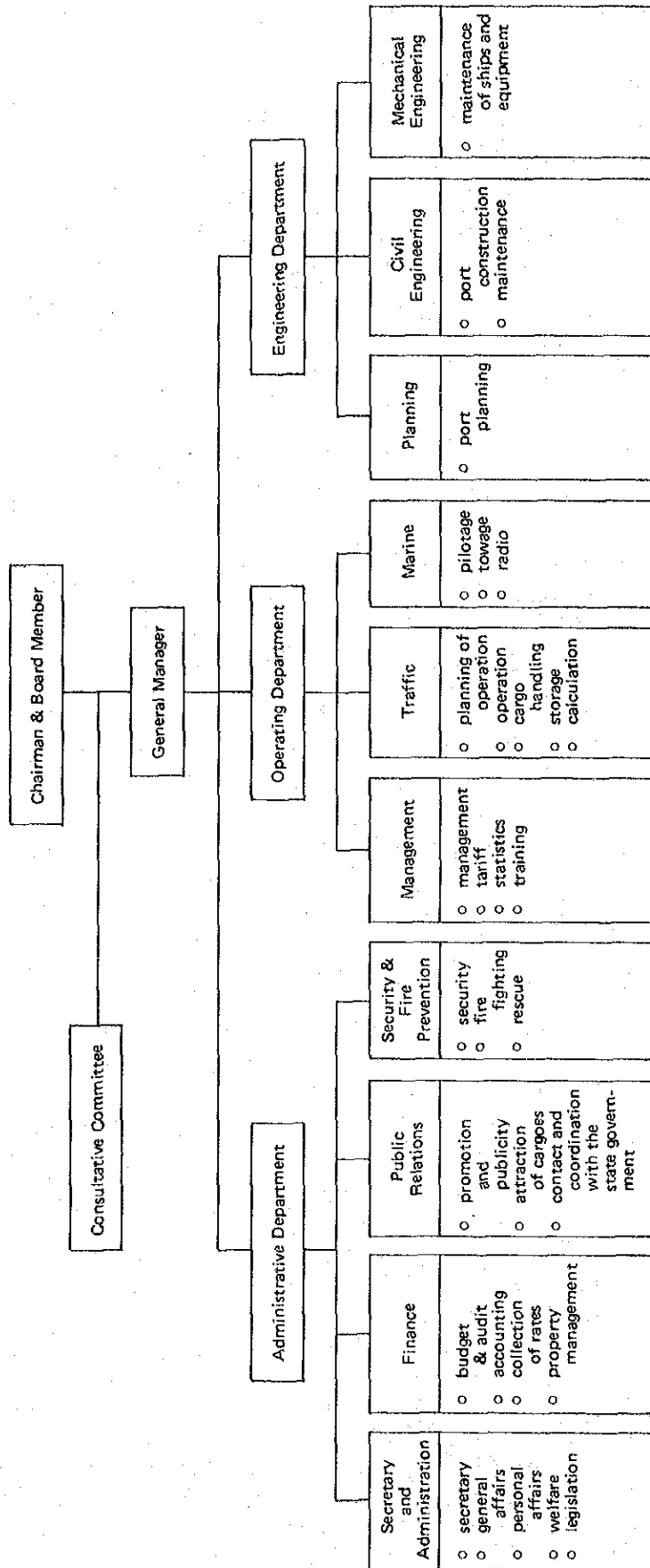
The authority will provide longshoring services except for labour supply which will be given by the private sector. But the stevedoring will be performed by private enterprises under arrangements with shipping companies.

Fig. S-2 shows the organization of the authority, and the total personnel will be 140 at the initial stage of the port opening.

(2) Fishing Port

It is necessary to establish a fishing port administration office of the Fisheries Department in order to assure the efficiency of the administration and management for the fishing port.

Fig. S-2 Organization Chart



7. Economic Analysis

(1) Method

The method of the economic analysis is as follows:

- ① The market pricing is basically employed to evaluate all the costs and the benefits.
- ② The alternative to which the Plan is compared is the "WITHOUT" case or the case without any investment.
- ③ The economic returns are evaluated through an internal rate of return (IRR).
- ④ Calculation of IRR is carried out over 30 years from 1983, the first year of the investment.

The average service life of the facilities/equipment is 33 years.

(2) Benefits

The benefits of the Plan are described below;

- ① Effect on the progress of the regional development
- ② Effect of increasing opportunities of employment, and income of the Kelantan's people
- ③ Reduction in cargo transportation costs
- ④ Promotion of trade with East and South East Asian countries
- ⑤ Increase of fish catch
- ⑥ Stabilization of fish prices by constant fish supply

Of the benefits listed above ③ and ⑤ are measurable, and taken into account in the analysis.

(3) Costs

Costs of the Plan are as follows;

- ① Construction Cost (including equipment cost)
- ② Operation and Maintenance Costs

(4) Economic Evaluation

The internal rate of return (IRR) are as follows:

Case I (Modified Labour Cost)	9.4 percent
Case II (Unmodified Labour Cost)	9.1 percent
Reference Case	12.3 percent

Considering the unmeasurable social and economic impact by the port development as well as these measurable effects, the Plan can be concluded to be economically feasible.

8. Financial Analysis

(1) Premises

- ① Kelantan Port Authority will be established at the same time when the First Phase Development Plan is finished.
- ② The authority will succeed all the facilities without cost from the Federal Government.
- ③ The accounting procedure of the authority will be made by "the self-supporting accounting system".
- ④ The port charges will be fixed on the level of competing ports.

(2) Revenue

The revenue consists of the following port charges;

- ① Port Dues
- ② Pilotage Charge
- ③ Tug Charge
- ④ Wharfage
- ⑤ Wharf Handling Charge
- ⑥ Storage Charge
- ⑦ Miscellaneous

The revenue is calculated as M\$3,868 thousand in 1988 and after based on the cargo and ship traffic estimate.

(3) Expenditure

The expenditure consists of the following items:

- ① Personnel Cost
- ② General Administration Cost
- ③ Labour Cost
- ④ Maintenance and Operation Cost
- ⑤ Miscellaneous
- ⑥ Depreciation Expense

The annual expenditure is estimated at M\$2,887 thousand and the annual depreciation amount is M\$864 thousand.

(4) Revenue/Expenditure Status

According to the revenue and expenditure status, it would be possible to finance ordinary operating costs, and to depreciate the facilities and equipment with the proposed port charges. Therefore, the port authority could be financially selfsupporting within the limits of the operating revenue/expenditure.

(5) Case Study

Besides the above analysis, several case studies are made to examine the investment effects on the finance in the study.

Master Plan

1. Position in Planning of the Master Plan

The Master Plan presents a long-range outlook on how the governments or the Kelantan Port Authority will develop the port after the First Phase Development Plan which is expected to come to an end in 1987. And the Plan does not obligate the administrators to realize everything proposed in it.

2. Roles of Kelantan Port

The target of the basic policy in forming a development plan for Kelantan would be "to eliminate the backwardness of the state, and raise the economic level to that of other states". The role of social overhead capital, particularly of a port, should be focussed on the accomplishment of this target.

Therefore Kelantan Port should be developed to play the following roles:

- ① Nucleus of the new physical distribution system
- ② Nucleus for acceleration of fishery development, and rationalization of fishery product distribution
- ③ Nucleus of the coastal industrial base

3. Target Year

The target year of the Plan is the year 2000.

4. Major Port Facilities and Land Use

Fig. S-3 shows the Master Plan (Plan C) including the land use plan.

Major port facilities are as follows:

(1) Commercial Port Zone

- | | |
|-----------------------------------|---------------------------------|
| 1) Breakwater | Length 4,580 m |
| 2) Access Channel | Depth - 9.0 m Width 150 m |
| | Depth - 5.0 m Width 60 m |
| ③ Basins | Depth - 9.0 m, - 7.5 m, - 5.0 m |
| ④ Quay (4B) | Depth - 9.0 m Length 660 m |
| (2B) | Depth - 7.5 m Length 260 m |
| ⑤ Dolphin (2B) | Depth - 5.0 m |
| ⑥ Transit Sheds | Area 27,000 m ² |
| ⑦ Palm Oil Storage Tanks | 6 Tanks |
| ⑧ Petroleum Product Storage Tanks | 75 Tanks |
| ⑨ Access Road and Port Road | |

(2) Fishing Port Zone

- | | |
|--|--|
| 1) Channel and Basin | Depth – 3.0 m, – 2.0 m
Width 80 m |
| 2) Mooring Facility | Depth – 3.0 m Length 330 m
Depth – 2.0 m Length 325 m |
| ③ Wholesale Market | Area 6,000 m ² |
| ④ Cold Storage Facility | 1 unit |
| ⑤ Freezing Facility | 1 unit |
| ⑥ Ice Factory and Ice Storage Facility | 1 unit |
| ⑦ Access Road and Port | |

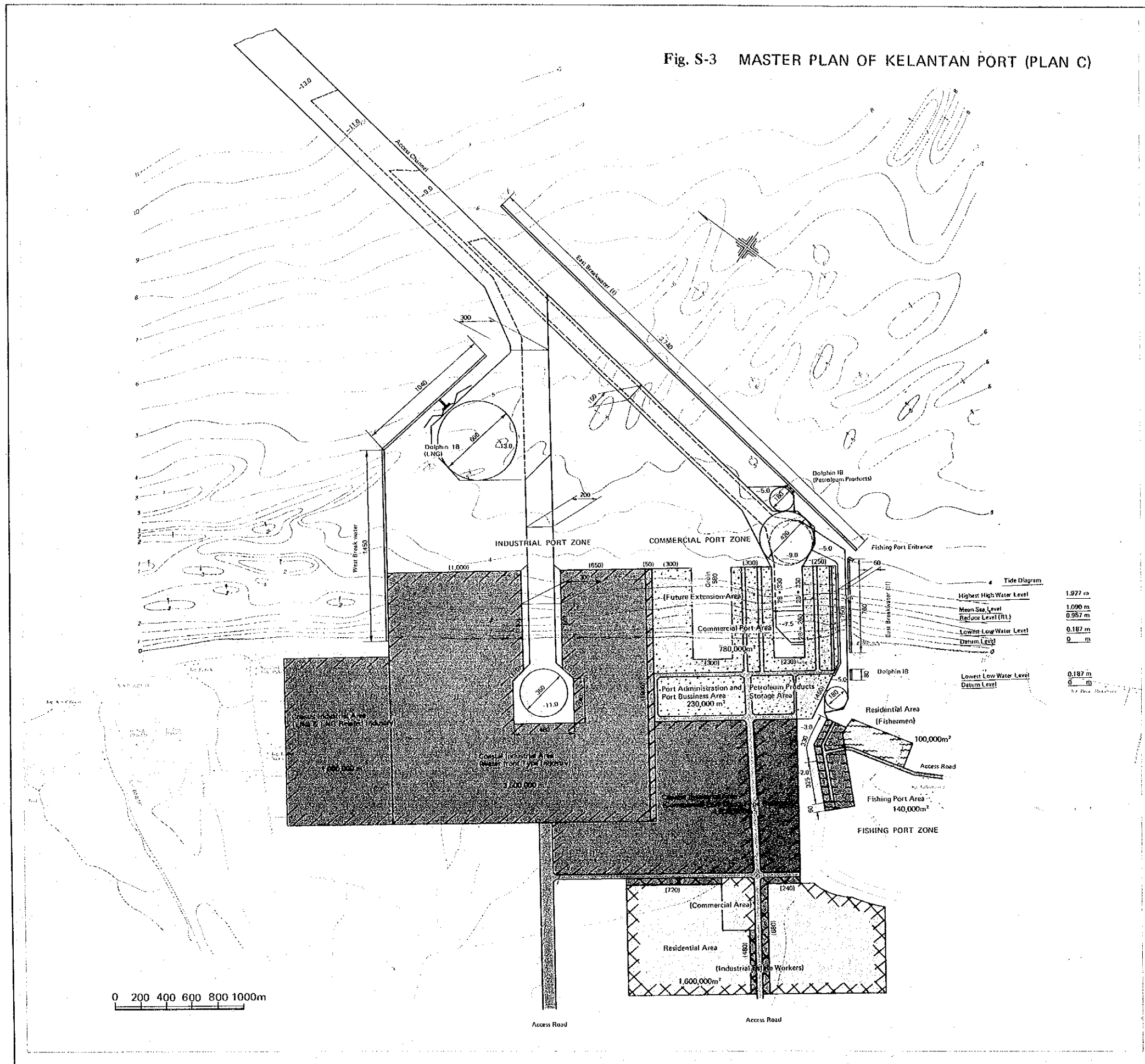
(3) Industrial Port Zone

- | | |
|--------------------|--|
| 1) Breakwater | Length 1,970 m |
| 2) Access Channel | Depth – 13.0 m Width 300 m
Depth – 11.0 m Width 200 m |
| ③ Quay (7B) | Depth – 11.0 m Length 1,470 m |
| ④ LNG Dolphin (1B) | Depth – 13.0 m |

5. Construction and Cost Estimate

The construction period is twenty-eight years from 1983 to 2000, excluding the study period of the natural condition survey and engineering study. The total construction cost is estimated at M\$503.5 million.

Fig. S-3 MASTER PLAN OF KELANTAN PORT (PLAN C)



INTRODUCTION

INTRODUCTION

1. Background and Progress

In response to the request of the Government of Malaysia, for technical cooperation for the port sector, the Government of Japan decided to perform the feasibility study on the port development in Kelantan. A preliminary study team was dispatched by the Japan International Cooperation Agency to Malaysia for a period of 14 days in May 1979 in order to make an agreement on the scope of work of the study. As a result of the preliminary survey, the final scope of work was signed between Mr. Bashah bin Nordin, Economic Planning Unit, Prime Minister's Department and Mr. Akio Ogo, Head of the study team, and two proposed sites for the development of Kelantan Port, Sabak-Kemasin area and Semerak area, were selected.

After this, a study team consisting of two groups, planning and economic group and natural condition survey group, was organized in order to formulate a master plan, and conducted an in situ investigation for a period of one month from September to October in 1979 by the former group, and about four months from September 1979 to January 1980 by the latter group. Based on this field survey and the analyses of the data, the Master Plan for Kelantan port was formulated as described in the Interim Report. And the report was submitted to the Government of Malaysia in May 1980.

Before submitting the Interim Report, a second study team, also consisting of a planning and economic group and a natural condition survey group, was organized in order to explain the report and execute a feasibility study on the First Phase Development Plan for Kelantan Port of five-year project period between 1983 to 1987. The former group carried out in situ study of 37 days from May to June 1980, and the latter for about two and half months from June to August in 1980.

In the discussions on the Interim Report, several requests, such as to make a new alternative of the master plan considering the training wall for the Kemasin-Semerak Integrated Rural Development Project, to re-examine the annual fish landings per gear, were made by the officials concerned.

In September 1980, in order to explain the Progress Report (II), or the intermediate result for the feasibility study, and to arrange necessary items for the further study work, a new study team was organized. The team consisted of two experts of the planning and economic study group, an official of Ministry of Transport, and an official of the Japan International Cooperation Agency, and was dispatched to Malaysia for a period of 10 days from September to October. At the meetings on the report, the future population, the gross domestic product, the port cargo traffic volume by commodity, etc. were discussed between the officials of the Malaysian side and the study team, and were agreed as described in the Draft Final Report.

In preparing for the Draft Final Report, three alternatives of the Master Plan and the First Phase Development Plan were examined. And it is concluded that the Plan C is most recommendable for the development of Kelantan Port, considering the safety of cargo vessel's and fishing boat's traffic, the construction cost for the First Phase Development Plan, the rural development project including a part of proposed port area, etc. Therefore, the main part of the Draft Final Report is occupied with the description of Plan C, and as regards the other two

alternatives, the plans and cost estimates are given in the Appendix. For 10 days in December 1980, the study team headed by Mr. Y. Takauchi visited Malaysia to explain the Draft Final Report to the Federal and State Governments. The Final Report was prepared after discussions between the Malaysian officials and the study team during this period.

2. Objective and Outline of the Study

The objective and the outline of the study based on the Scope of Work are indicated hereinafter.

2-1 Objective

The objective of the study is to determine the economic and technical feasibility of establishing a minor commercial cum fishing port in the State of Kelantan, and to formulate the Master Plan and the First Phase Development Plan (1983-1987) for the port, in order to promote the regional development in the State of Kelantan.

2-2 Outline of the Study

(1) Natural Condition Survey

To carry out the natural condition survey at the proposed port development sites. The survey items are as follows;

- 1) Sounding
- 2) Tidal current observation
- 3) Wave and tidal observation
- 4) Subsoil sampling
- 5) Geophysical sounding
- 6) Boring and soil investigation
- 7) Topographic survey

(2) Master Plan

To prepare the master Plan, covering the period up to the year 2000, based upon the government's economic development policy, the Kelantan's development potential, and the present condition and trend of marine transportation. The master plan will comprise the following items;

- 1) Basic conception on the development of Kelantan Port
- 2) Macroscopic projection of the port traffic in 2000
- 3) Land/water area utilization plan
- 4) Basic allocation plan of major marine terminal facilities
- 5) Basic alignment plan of roads (railways) and access channels
- 6) Rough cost estimation

(3) The First Phase Development Plan (1983-87)

To formulate the First Phase Development Plan, and to carry out the feasibility study to

identify the technical, economic and financial feasibility of the plan. The study items are as follows;

- 1) Projection of the port traffic by commodity group aiming at 1987
- 2) Allocation plan of marine terminal facilities
- 3) Alignment plan of roads (railways) and access channels
- 4) Preliminary structural design of marine terminal facilities
- 5) Construction work schedule
- 6) Cost estimation
- 7) Recommendation on operation and management of the new port
- 8) Economic Analysis
- 9) Financial Analysis

3. Method of Study

3-1 Planning and Economic Study

The method of an in-situ study by the planning and economic study group was to collect information through the interviews with government officials, etc. or from the printed materials, and to make field observations of the proposed port development sites, existing major and minor ports and fish landing centres, etc. After this survey, the formulation of the Master Plan and the technical and economic feasibility analyses of the First Phase Development Plan were made in Japan, based on those data collected in Malaysia.

Names of the authorities and organizations visited by the group are listed below;

- Agricultural Department
- Drainage & Irrigation Department
- Economic Planning Unit, Prime Minister's Department
- Federal Land Development Authority
- Fisheries Department
- Fisheries Development Authority
- Forestry Department
- Geology Department, University of Malaya
- Geological Survey Department
- Kelantan Development Office
- Kelantan Economic Development Corporation
- Kelantan Economic Planning Unit
- Kemubu Agricultural Development Authority
- Lands and Mines Department
- Malayan Railway
- Malaysian Industrial Development Authority
- Malaysian International Shipping Corporation
- Malaysian Rubber Exchange & Licensing Board
- Marine Department
- Meteorological Services Malaysia

- Ministry of Agriculture
- Ministry of Commerce and Industry
- Ministry of Transport
- National Electricity Board
- National Padi and Rice Board
- Port Authorities and Commission (Johore, Kelang, Kuantan, Penang)
- Public Works Department
- State District Offices (Bachok, Kota Bharu, Pasir Puteh)
- South Kelantan Development Authority
- Town and Country Department

3-2 Natural Condition Survey Group

At the proposed port development sites, the natural condition survey was made with the use of surveying equipments such as a wave recorder, a current meter, an echo sounder, a rotary boring machine, Sparker, etc.

The results of the field survey were analysed and compiled into a sounding maps, geological cross sections, an isobasement map, topographic maps, etc. And necessary data for planning and designing port facilities such as the datum level, physical characters of soils, etc. were calculated and analysed.

4. Organization of the Study Team

The study team consists of two groups, planning and economic study group and natural condition survey group. Members of each group are as follows:

4-1 The First Study Team (September, 1979 – March, 1980)

(1) Planning and Economic Study Group

Yoshio Takeuchi (Team Head)

Port Management and Administration

President, The Overseas Coastal Area development Institute of Japan (OCDI)

Keiichi Miyota (Deputy Team Head, Group Head)

Transport Economic and Economic Analysis

Director, Planning, OCDI

Daijiro Kaneko

Natural conditions

Chief of Hydrographic Laboratory, Port and Harbour Research Institute Ministry of Transport, Japan

Ryosuke Komine

Regional Planning

Senior Port Planner, OCDI

Akira Irie
Port Planning
Senior Port Planner, OCDI

Kazuhiko Nishijima
Design and Construction
Senior Structural Engineer, OCDI

(2) Natural Conditions Survey Group

Takeyasu Kikuta (Group Head)
Survey Management
Geophysicist, Kokusai Aerial Surveys Co., Ltd.

Tomoyuki Hashimoto
Submarine Geological Prospecting
Marine Geologist, KASC

Yukio Takeuchi
Soil Investigation
Soil and Foundation Engineer, KASC

Makoto Arasawa
Wave and Current Observation
KASC

Kenji Sakai
Operator of Echo Sounder
KASC

Susumu Mochizuki
Conductor of Survey Vessel
KASC

4-2 The Second Study Team (May, 1980 – February, 1981)

(1) Planning and Economic Study Group

Yoshio Takeuchi (Team Head)
Project Study Management
President, OCDI

Keiichi Miyota (Deputy Team Head, Group Head)
Regional and Transport Planning
Director, Planning, OCDI

Takeji Tanaka
Economic Analysis
Economist, OCDI

Masataka Takahashi
Port Management and Financial Analysis
Economist, OCDI

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Senior Port Planner, OCDI

Akira Irie
Design and cost estimation
Senior Port Planner, OCDI

(2) Natural Condition Survey Group

Takeyasu Kikuta (Group Head)
Survey Management
Geophysicist, KASC

Tomoyuki Hashimoto
Sounding and Tidal Observation
Marine Geologist, KASC

Yukio Takeuchi
Soil Investigation
Soil and Foundation Engineer, KASC

Kenji Sakai
Surveying and sounding
KASC

Toshiyuki Kaneko
Sounding
KASC

Narito Satoh
Surveying and Tidal Observation
KASC

Besides these groups mentioned above, a team for explaining the Progress Report (II) was organized and the members are as follows:

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Yukio Nishida
Director, Office of International Cooperation, Ministry of Transport

Ryosuke Komine
Senior Port Planner, OCDI

Kenji Shiratori
The Japan International Cooperation Agency (JICA)