CHAPTER 10 FINANCIAL ANALYSIS

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10-1 General

As already mentioned in Chapter 8, it is proposed that a port authority as the administrative body of Kelantan Port be established.

Kelantan Port is a port that will have an important role and potentialities for: (1) developing into a port comparable in size to other major ports in the future, (2) playing a role as the nucleus of regional development, (3) becoming a foreign trade base, and so forth. It has, therefore, been proposed that the port not be under the unified control of a Federal Government agency, but be administered by a port authority to be established as an automonous body aiming at its future development while reflecting the actual situation of the locality.

That the port authority manages Kelantan Port as the port administrator means not only that the port is organizationally independent of the government but that is should also be financially independent.

The port authorities of major ports in the Malay Peninsula administer ports on a self-supporting basis, employing the business accounting system; they are not subsidized by the government.

However, as is the case of Johore Port and Kuantan Port, new ports are to be constructed after raising the total amount of development funds by the Federal Government. Since the completed facilities are to be transferred to the newly established port authorities without cost, they will not be obliged to bear the burden of repayment, e.g. redemption of principal and interest on loans, payment of dividend, etc. The facilities transferred from the Government may thus be regarded as assets constructed by the port authorities with their owned capital.

Accordingly, the financial problem for a newly-established port authority will center on the situation of operating revenue/expenditure.

10-2 Purpose and Assumptions

As already stated, when a new port is developed in Malaysia, development funds are to be entirely provided by the Federal Government. It is, therefore, not necessary for the port authority to be newly established to be concerned with raising of funds or the repayment of principal and interest on the raised funds.

Accordingly, the purpose of the present financial analysis is to examine whether or not the port authority concerned will be financially self-supporting after the port is opened to the public on the following assumptions:

1) The port authority will be established as the port administrator at the same time as the completion of Kelantan Port;

2) The authority will succeed to all the facilities at no cost from the Federal Government.

3) The authority is to adopt "the self-supporting accounting system", enabling the authority to meet ordinary operating costs and to renew the facilities.

4) The level of port charges, the source of revenue, is to be fixed within the range of charges imposed by competing ports.

The present financial analysis will thus mainly concern the operating revenue and expenditure of the port authority.

The analysis will be confined to the public commercial port facilities, the object of control and management by the port authority. The fishing port facilities and others are outside the jurisdiction of the port authority. Further, as already stated in Chapter 8, they have no revenue and are not suitable for financial analysis.

Accordingly, it is assumed here that the port authority will succeed to those facilities listed in Table 10-1 from the federal Government with the opening balance shown in Table 10-2.

The volume of cargo handled and the number of vessels calling annually are shown in Table 8-2 in Chapter 8.

In the case of Kelantan Port, 1) it is a newly developed port, 2) 80% of the construction costs should be invested in such non-profit making facilities as breakwaters, channels, land and access roads, 3) therefore, the project itself has strong characteristics of an advance investment. In view of these factors, it may be said that the purpose and assumptions of the present financial analysis constitute a realistic method while observing the current system of Malaysia.

On the basis of the purpose and assumptions outlined above, the analysis will proceed below. And besides, as a case study, limiting its scope to profit-making facilities, an attempt will be made to examine the raising of funds and the profitability of investment.

Table 10-1 Succeeded Fixed Assets

(Unit: M$1,000)

Facilities	Value
Seawall, Breakwater & groin	26,889
Channel, Mooring Basin & Reclaimed Land	11,444
Quay	7,244
Transit Shed	1,468
Building	1,044
Oil Tanks	1,040
Road & Pavement	3,209
Green Area	50
Drainage	3,285
Water Supply	1,059
Electric Power Supply	1,763
Navigation Aids	1,817
Port Service Vessels	1,092
Cargo Handling Equipment & Vehicles	862
Land	1,568
Total	63,834

Table 10-2 Opening Balance (Beginning of 1988)

(Unit: M$1,000)

Assets		Liabilities	
Fixed Assets	63,834	Capital	63,834
Non-Depreciable Assets	39,901		
Depreciable Assets	23,933		

10-3 Estimation of Revenue and Expenditure

10-3-1 Revenue
(1) Approach to port charges

The revenue of the port consists of port charges. As it is a newly established port, the level of port charges to be fixed poses an important problem. Since the self-supporting system as already defined is to be the policy of the port, the tariff should be fixed, as a rule, on the basis of the cost principle which will enable the authority to meet operating costs and to renew the facilities.

If, however, the level of charges based on the cost principle is far above that of other competing ports, it will cease to be realistic, because the port will lose its competitive power in terms of port charges against the other ports. Accordingly, the level of charges of competing ports should be examined first.

(2) Charge level of the Port of Penang

As mentioned in Chapter 4 "Demand Forecast", the Ports of Penang and Kuantan may be regarded as the competing ports for Kelantan. In this analysis, however, only the Port of Penang will be considered for comparison for the reason that as the cargo handling system of Kelantan is modelled on that of Penang, it will be convenient for comparing the charges.

Based on the data obtained at the Port of Penang, the unit charge of cargo per ton may be computed from the correlationship between the revenues and the tonnage of cargo. Of various revenues, only port dues, pilotage dues, tug charges, wharfage, general charges, wharf handling charges and storage charges will be used for computation. Though a part of the unit charge should be correlated to the tonnage of vessels, only the correlationship between the revenue and the tonnage of cargo is obtained here, taking into consideration that it will ultimately be proportionate to the tonnage of cargo. The tonnage of container cargo and the revenue accrued is excluded from the computation.

Thus, the unit charge per ton of conventional cargoes handled by the Port of Penang will be M$10. For reference, part of the tariff in force at Penang is shown in Table 10-3.

Table 10-3 Principal Port Charge of Port Penang

Pilotage Dues	M $60 ~ $300 (According to L.O.A of ships)
Tug Charges	M $250 (Vessels above 600 G.R.T.)/1st hour.
Port Dues	20 cents (Vessels loading/discharging more than 500 t. of cargo)/G.R.T.
	50 cents (Petroleum Tankers)/G.R.T.
Wharfage	M $2.6 (Vessels of over 600 G.R.T.)/G.R.T. ----- Dry cargo
	M $2.0 (Vessels of over 600 G.R.T.)/G.R.T. ...... Liquid Cargo in Bulk
General Charge	M $1.2/t
Wharf Handling Charge	M $4.5/t ..... Import M $4.0/t ..... Export
	M $1.0/t ..... Liquid Bulk Cargo through pipeline
Storage Charges	M $1.4/t for the 7th day rising to $4.00/t on the 14 the day
	(6 days free storage for exports)
	M $.14/t for the 4th day rising to $9.00/t on the 14th day
	(3 days free storage for imports)

(3) Establishment of the charge level

In the light of the charge level at the competing port, the charge of M$10 or less per ton of cargo handled at Kelantan may be regarded as a realistic level with a sufficient competitive power. The charge level of M$10 per ton of cargo handled is recommended for Kelantan.

There still remains a problem as to whether the charge level is at cost-basis and at a reasonable level, enabling Kelantan Port to meet ordinary operating costs and to depreciate and renew the facilities.

The level of charges will now be examined in order below. If it is found not to be at a "reasonable level", the raising of the level itself or other countermeasures in accounting will be considered.

(4) Types and unit prices of port charges

Though the charge systems at major ports in Peninsular Malaysia are fairly complex, varying from port to port, as a result of a comparative study and in view of the scope of business stipulated in Chapter 8, seven types of basic charges are established as below.

The unit prices of these charges are to be fixed within the range of the charge level computed under the preceding paragraph, and the unit price of each item is also to be made as close as possible to that of Penang.

Further, the charges fixed here are not the charges to be enforced but merely standard charges. Accordingly, detailed charges corresponding to vessel types, tonnage classes, cargo types, etc. will not be fixed, and only average unit prices are to be established.

① Port dues: 50 cents per gross ton of entering vessels

② Pilotage charge: M$120 per movement

③ Tug charge: M$120 per movement
50% of domestic cargo vessels is to use the service

④ Wharfage: M$2.5 per gross ton of entering vessels

⑤ Wharf handling charge: M$5.0 per ton of cargo

⑥ Storage charge: M$1.5 per ton of cargo
70% of dry cargo is to be stored

⑦ Miscellaneous: 25 cents per ton of cargo, including water supply to vessels, rentals of cargo handling equipment, rent of wharf side sites, etc.

(5) Revenue from port charges

The annual total revenue from the port charges is M$3,868,000 with the breakdown given in Table 10-4.

Table 10-4 Revenues

Item	Unit Charge	Revenue
Port Dues	50 cts/G.R.T.	M$ 244,100
Pilotage Charge	M$ 120/Movement	109,200
Tug Charge	M$ 250/Movement	182,500
Wharfage	M$ 2.5/G.R.T.	863,500
Wharf Handling Charge	M$ 5.0/t	1,942,000
Storage Charge	M$ 1.5/t	430,000
Miscellaneous	25 cts/t	97,100
Total		3,868,400

10-3-2 Expenditure

Expenditure may be calssified into six items: personnel costs, general administrative costs, labor costs, maintenance/operation costs, miscellaneous costs and depreciation expense. They are to be computed as below

If there are profits (net profits) after depreciation, 45% of the profit will be deducted for taxes (income tax: 40%; development tax: 5%). The surplus is to be retained as internal reserve.

(1) Personnel costs

Based mainly on the financial data of the Port of Penang, per capita price has been established at M$700 per month as the average personnel costs of all occupations. As computed in Chapter 8, the size of the proposed port authority staff is 140 persons.

(2) General Administrative costs

The ratio of general administrative costs to the personnel cost at major ports is 5% or less; here the annual total is estimated to be M$450 per employee.

(3) Labor costs

As stipulated in Chapter 8, cargo handling at Kelantan is to be carried out by the port authority; but labor is to be supplied by cargo handling companies. It is, therefore, necessary to take such costs into consideration; they are estimated to be M$300 monthly per head on the basis of the average wages of laborers at Penang Port. As computed in Chapter 8, the number of labours is 90.

(4) Maintenance/operation costs

① Maintenance/operation costs

The maintenance/operation costs of various facilities have been computed on the basis of the ratio of such costs to the construction costs of various facilities as shown in Table 10-5.

Table 10-5. Maintenance Cost

Facilities	Percentage of Construction Cost	Maintenance Cost
Seawall, Breakwater, Groin	0.2%	M$ 45,000
Quay	1.0	60,600
Transit Shed	1.0	12,300
Building	1.5	13,100
Oil Tanks	2.0	17,400
Roads & Pavement	1.0	26,800
Green Area	1.0	400
Drainage	0.5	13,700
Water & Electric Power Supply	2.0	47,200
Navigation Aids	3.0	45,600
Port Service Vessel	10.0	95,000
Folklifts	15.0	75,000
Crane & Vehicles	5.0	12,500
Total		464,600

② Maintenance dredging costs

The annual volume of maintenance dredging is estimated to be 155,000 m³. The costs are estimated to be M$5.0 per 1 m³.

(5) Miscellaneous costs

3% of the total amount of the above costs is appropriated to miscellaneous costs.

(6) Depreciation

Of the fixed assets shown in Table 10-1, "protective facilities" (breakwaters, groin, seawalls), "habor facilities" (channels, anchorages), reclaimed land and acquired land are excluded from depreciation as non-depreciable assets. As for depreciable assets, service lives of each facilities have been assumed as shown in Table 10-6, and the average service life weighted by individual costs is 27.7 years. Based on this average service life, the annual amount of depreciation may be computed by the straight line method, assuming no residual value.

On the basis of the above, annual expenditures may be computed as shown in Table 10-7. The fixed assets schedule is as shown in Table 10-8.

Table 10-6 Service Life of Facilities

Items	Service Life (years)
Quay	50
Transit Shed	30
Building	30
Roads & Pavement	25
Green Area	50
Drainage	50
Water & Electric Power Supply	30
Navigation Aids	25
Vessels	15
Forklifts	5
Crane & Vehicles	7
Oil Facilities	25
(Seawall, Breakwater, Groin	50)

Table 10-7 Management and Operation Cost

(UNit: M$1,000)

Items	Amount
(1) Personnel Cost	1,176
(2) General Administrative Cost	63
(3) Labor Cost	324
(4) Maintenance/Operation Cost	1,240
1. Maintenance/Operation Cost	465
2. Maintenance Dredging Cost	775
(5) Miscellaneous Cost	84
Total	2,887

Table 10-8 Fixed Asset Schedule

(Unit M$1,000)

Item \ Year	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Fixed Assets at Beginning of Year	63,834	62,970	62,106	61,242	60,378	59,514	58,650	57,786	56,922	56,058	55,194
Non-Depreciable Assets	39,901	39,901	39,901	39,901	39,901	39,901	39,901	39,901	39,901	39,901	39,901
Depreciable Assets	23,933	23,069	22,205	21,341	20,477	19,632	18,749	17,885	17,021	16,157	15,293
Depreciation	864	864	864	864	864	864	864	864	864	864	864
Fixed Assets at End of Year	62,970	62,106	61,242	60,378	59,514	58,650	57,786	56,922	56,058	55,194	54,330
Non-Depreciable Assets	39,901	39,901	39,901	39,901	39,901	39,901	39,901	39,901	39,901	39,901	39,901
Depreciable Assets	23,069	22,205	21,341	20,477	19,613	18,749	17,885	17,021	16,157	15,293	14,429

The revenue/expenditure status is shown in Table 10-9. According to the statement, profits are expected after depreciation, and net profits are also to be expected even after taxes. This is partly due to the fact that "the protective facilities" and "habor facilities" are treated as non-depreciable facilities; but it is mainly due to the fact that there is no burden of interest payable as already stipulated in the section on the Purpose and Assumptions.

Since it will be possible to meet ordinary operating costs and to depreciate the facilities with the proposed level of charges, no specific problem concerning the revenue/expenditure is expected to arise at Kelantan. In this sense, the proposed level of charges may be said to be a reasonable one.

Further, Table 10-10 shows that depreciation will be made annually with the result that net current assets will accumulate. It will thus be possible to afford future investments. We may, therefore, conclude that the port authority will be financially self-supporting.

On the other hand, only minimum costs have been appropriated to management and operation costs of Kelantan Port, e.g. organization, personnel, equipment, etc. Accordingly, various business efforts such as keeping expenses to a minimum and manipulating with the tariff to impose will be required.

Table 10-9 Statement of Revenue and Expenditure

(Unit: M$1,000)

Item \ Year	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Revenue	3,868	3,868	3,868	3,868	3,868	3,868	3,868	3,868	3,868	3,868	3,868
Expenditure	2,887	2,887	2,887	2,887	2,887	2,887	2,887	2,887	2,887	2,887	2,887
Profit before Depreciation	981	981	981	981	981	981	981	981	981	981	981
Depreciation	864	864	864	864	864	864	864	864	864	864	864
Profit after Depreciation	117	117	117	117	117	117	117	117	117	117	117
Income/Development Tax	53	53	53	53	53	53	53	53	53	53	53
Net Profit	64	64	64	64	64	64	64	64	64	64	64
Accumulated Net Profit	64	128	192	256	320	384	448	512	576	640	704

Table 10-10 Balance Sheet

(Unit: M$1,000)

Item \ Year	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Assets											
Fixed Assets	62,970	62,106	61,242	60,378	59,514	58,650	57,786	56,922	56,058	55,194	54,330
(Non-Depreciable Assets)	39,901	39,901	39,901	39,901	39,901	39,901	39,901	39,901	39,901	39,901	39,901
(Depreciable Assets)	23,069	22,205	21,341	20,477	19,613	18,749	17,885	17,021	16,157	15,293	14,429
Net Current Assets	928	1,856	2,784	3,712	4,640	5,568	6,496	7,424	8,352	9,280	10,208
Total	63,898	63,962	64,026	64,090	64,154	64,218	64,282	64,346	64,410	64,474	64,538
Liabilities											
Capital	63,834	63,834	63,834	63,834	63,834	63,834	63,834	63,834	63,834	63,834	63,834
Reserve & Provision	64	128	192	256	320	384	448	512	576	640	704
Total	63,898	63,962	64,026	64,090	64,154	64,218	64,282	64,346	64,410	64,474	64,538

10-5 Evaluation based on Financial Ratios

As evaluation indicators, the operating ratio and the return on net fixed assets may be obtained by the formulae below.

(1) Operating ratio

$$= \frac{operating\ expenditure}{operating\ revenue} \times 100$$

(Note: To ascertain the income position)

(2) Return on net fixed assets

$$= \frac{Profits\ after\ depreciation\ and\ before\ interest\ payment}{Net\ fixed\ assets\ at\ end\ of\ period} \times 100$$

(Note: To ascertain the earning capacity)

Table 10-11 Financial Ratios

Item \ Year	1988	1993	1998
Operating Ratio	74.6%	74.6%	74.6%
Return on net fixed assets	0.19%	0.20%	0.22%

We may conclude from these indices as follows:

Since the port authority does not raise funds by itself, as already mentioned, there will be no specific problem concerning the ordinary operating revenue/expenditure status. On the other hand, since 80% of the total investments for this project will be concentrated in the non-profit making infrastructure of the port, the profitability will be bound to be low.

10-6 Case Study

10-6-1 Approach to this case study

It may be said that the financial analysis which has been made above has achieved an objective in view of the nature of the project — it is a new development project with investments concentrated in non-profit making facilities — and the system of port development employed in Malaysia.

On the other hand, if a financial analysis is to be made on the basis of the business accounting system, the method which excluded the raising of funds may be not necessarily an adequate one. Accordingly, a case study will be made below to examine the raising of funds and the profitability of the present project.

10-6-2 Assumption

(1) The case study is to cover 42% of investments in the commercial port, centering on profit-making facilities. The breakdown is given in Table 10-12.

Table 10-12 Construction Cost (Object of Case Study)

(Unit: M$1,000)

Facilities	Amount		
	Local Currency	Foreing Currency	Total
Seawall	2,306	1,075	3,381
Reclamed Land	543	1,737	2,280
Quay	1,078	6,166	7,244
Transit Shed	613	855	1,468
Building	749	295	1,044
Oil Tanks	434	606	1,040
Port Road	1,592	122	1,714
Asphalt Pavement	312	28	340
Drainage	2,453	832	3,285
Water Supply	338	721	1,059
Electric Supply	522	1,241	1,763
Vessel	—	1,092	1,092
Equipment/Vehicles	—	862	862
Total	10,940	15,632	26,572

(2) The development investment funds are to be raised as below.
  1   Local currency: development funds provided by the Federal Government (which shall be regarded as the owned capital of the authority)
  2   Foreign currency: borrowings from overseas.

(3) As regards the borrowings from overseas, since the project concerns a port development in a developing area, low-interest loans are to be procured with the following conditons:
   Interest: 4% per annum.

Term of Loan: 25 years (including 7-year deferment term for principal).

These conditions are the same as those for Bintulu Port from the Overseas economic Cooperation Fund (1979).

(4) No maintenance dredging costs are to be included in expenditure.

(5) After completion of the port, the port authority is to take over the debts from the Federal Government.

10-6-3 Revenue

Revenues shall be equal to those of the main analysis.

10-6-4 Expenditures

(1) The personnel costs, general administrative costs and labor costs are to be equal to those given in the main analysis.

(2) The maintenance/operation costs are to be M$1,991,000, computed at the ratio of maintenance/operation costs adopted in the main analysis.

(3) The miscellaneous costs are to be 3% of the above costs.

(4) The interest payable is shown in Table 10-13.

Table 10-13 Long Term Loan Schedule

(Unit: M$1,000)

Year	Investment			Loan Repayment Ammount	Loan Balance at End	Interest on Loan
	Federal Government Fund	Long-Term Loan	Total			
1983	1,153	537	1,690		537	
1984	1,153	538	1,691		1,075	21
1985	1,607	6,648	8,255		7,723	43
1986	4,453	4,271	8,724		11,994	309
1987	2,574	3,638	6,212		15,632	480
1988					15,632	625
1989					15,632	625
1990				869	14,763	625
1991				869	13,894	587
1992				869	13,025	556
1993~1997				4,345	8,680	2,257
1998~2002				4,340	4,340	1,388
2003~2007				4,340	0	521
Total	10,940	15,632	26,572			

(5) Depreciation is to apply to those facilities other than seawalls and reclaimed land, to be computed with the same approach as the one employed in the main analysis. The weighted average service life is to be 28 years. The fixed assets schedule is as shown in Table 10-14.

Table 10-14 Fixed Asset Schedule

(Unit: M$1,000)

	1987	1988	1989	1990	1991	1992	1997	2002	2007
Fixed Assets at Beginning of Year	—	26,572	25,825	25,078	24,331	23,584	19,849	16,114	12,379
Land/Seawall	—	5,661	5,661	5,661	5,661	5,661	5,661	5,661	5,661
Assets to be Depreciation	—	20,911	20,164	19,417	18,670	17,923	14,188	10,453	6,718
Investment	26,572	—	—	—	—	—	—	—	—
Depreciation	—	747	747	747	747	747	747	747	747
Fixed Assets at End of Year	26,572	25,825	25,078	24,331	23,584	22,837	19,102	15,367	11,632
Land/Seawall	5,661	5,661	5,661	5,661	5,661	5,661	5,661	5,661	5,661
Assets to be Depreciated	20,911	20,164	19,417	18,670	17,923	17,176	13,441	9,706	5,971

10-6-5 Financial Statements

On the basis of the above, three financial statements have been parepared: Statement of revenue/expenditure (Table 10-15), Statement of Source/Application of Funds (Table 10-16) and Balance Sheet (Table 10-17). According to these statements, no problem is expected to arise with the situation of revenue/expenditure, and the financial ratios are fairly favorable as shown in Table 10-18.

Table 10-15 Statement of Revenue and Expenditure

(Unit: M$1,000)

Item \ Year	1983 ~1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998 ~2002	2003 ~2007
Revenue	—	3,868	3,868	3,868	3,868	3,868	3,868	3,868	3,868	3,868	3,868	19,340	19,340
Expenditure	—	1,991	1,991	1,991	1,991	1,991	1,991	1,991	1,991	1,991	1,991	9,955	9,955
Profit before Depreciation	—	1,877	1,877	1,877	1,877	1,877	1,877	1,877	1,877	1,877	1,877	9,385	9,385
Less Depreciation	—	747	747	747	747	747	747	747	747	747	747	3,735	3,735
Profit after Depreciation	—	1,130	1,130	1,130	1,130	1,130	1,130	1,130	1,130	1,130	1,130	5,650	5,650
Interest on Loan	853	625	625	625	587	556	521	486	451	417	382	1,388	521
Profit after Interest on Loan	—	505	505	505	543	574	609	644	679	713	748	4,262	5,129
Income/Development Tax	—	—	—	227	244	258	274	290	306	321	337	1,918	2,308
Net Profit	—	505	505	278	299	316	335	354	373	392	411	2,344	2,821
Accumulated Net Profit	∆853	∆348	157	435	734	1,050	1,385	1,739	2,112	2,504	2,915	5,259	8,080

Table 10-16 Statement of Source and Application of Funds

Year \ Item	1983~1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998~2002	2003~2007
Source of Funds (A)													
Depreciation	—	747	747	747	747	747	747	747	747	747	747	3,735	3,735
Profit after Depreciation	—	1,130	1,130	1,130	1,130	1,130	1,130	1,130	1,130	1,130	1,130	5,650	5,650
Government Funds	10,940												
Long-term Loans	15,632												
Total	26,572	1,877	1,877	1,877	1,877	1,877	1,877	1,877	1,877	1,877	1,877	9,385	9,385
Application of Funds (B)													
Capital Expenditure	26,572												
Interest on Loan	853	625	625	625	587	556	521	486	451	417	382	1,388	521
Repayment of Long-term Loan	—	—	—	869	869	869	869	869	869	869	869	4,340	4,340
Income/Development Tax	—	—	—	227	244	258	274	290	306	321	337	1,918	2,308
Total	27,425	625	625	1,721	1,700	1,683	1,664	1,645	1,626	1,607	1,588	7,646	7,169
Increase/Decrease of Net Current Assets (C=A−B)	△ 853	1,252	1,252	156	177	194	213	232	251	270	289	1,739	2,216
Net Current Assets at Beginning of Year (D)		△853	399	1,651	1,807	1,984	2,178	2,391	2,623	2,874	3,144	3,433	5,172
Net Current Assets at End of Year (E=C+D)	△ 853	399	1,651	1,807	1,984	2,178	2,391	2,623	2,874	3,144	3,433	5,172	7,388

Table 10-17 Balance Sheet

Year \ Item	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	2002	2007
Assets													
Fixed Assets	26,572	25,825	25,078	24,331	23,584	22,837	22,090	21,343	20,596	19,849	19,102	15,367	11,632
(Land/Seawall)	5,661	5,661	5,661	5,661	5,661	5,661	5,661	5,661	5,661	5,661	5,661	5,661	5,661
(Net Fixed Assets to be depreciated)	20,911	20,164	19,417	18,670	17,923	17,176	16,429	15,682	14,935	14,188	13,441	9,706	5,971
(Construction in Process)	—	—	—	—	—	—	—	—	—	—	—	—	—
Net Current Assets	△ 853	399	1,651	1,807	1,984	2,178	2,391	2,623	2,874	3,144	3,433	5,172	7,388
Total	25,719	26,224	26,729	26,138	25,568	25,015	24,481	23,966	23,470	22,993	22,535	20,539	19,020
Capital Employed													
Government Funds	10,940	10,940	10,940	10,940	10,940	10,940	10,940	10,940	10,940	10,940	10,940	10,940	10,940
Long-term Loan	15,632	15,632	15,632	14,763	13,894	13,025	12,156	11,287	10,418	9,549	8,680	4,340	0
Other Reserves & Provisions	△853	△348	157	435	734	1,050	1,385	1,739	2,112	2,504	2,915	5,259	8,080
Total	25,719	26,224	26,729	26,138	25,568	25,015	24,481	23,966	23,470	22,993	22,535	20,539	19,020

Table 10-18 Financial Ratios

Item \ Year	1988	1992	1997	2002	2007
Operating Ratio	51.5	51.5	51.5	51.5	51.5
Return on net fixed assets	4.4	4.9	5.8	7.3	9.7

10-6-6 Internal rate of return (F.I.R.R.)

In order to examine the investment effects in the present case from the financial standpoint, the internal rate of return may be obtained by comparing the amount invested with the profit before depreciation and before the payment of interest. The computation period is to be 25 years. As shown by Table 10-19, it will be 4.6%, which is higher than the rate of interest on borrowings; it may thus be regarded as an appropriate figure from the viewpoint of investment in infrastructure.

10-6-7 Comments

We may thus conclude from the above results that the financial analysis of the project, centering on the profit-making facilities, shows that it will be possible to meet ordinary operating costs, to renew the facilities and to repay debts.

10-6-8 Reference cases

For reference purposes, several cases may be considered to compute the internal rate of return for trial.

1) Case 2: where the maintenance dredging costs are added to the expenditure in the case study
    (Table 10-20): FIRR = 1.4%

2) Case 3: where the revenue in the main analysis is raised by 50%
    (Table 10-21): FIRR = 1.9%

3) Case 4: where the revenue in the main analysis is raised by 50% and, further, the main-tenance dredging costs are excluded from the expenditure
    (Table 10-22): FIRR = 3.3%

4) Case 5: where the revenue in the main analysis is doubled
    (Table 10-23): FIRR = 5.1%

Judging from the above figures, we may conclude that the finance of the port authority based on the business accounting system will be viable even in the case of the proposed project by discarding the assumption that the level of charges be kept to that of the competing port and, instead, by approximately doubling it.

Table 10-19 Financial Rate of Return (Case Study)

(Unit: M$1,000)

Year		Project Cost	Net Revenue	Present Value Discounted at 4.6%	
				Project Cost	Net Revenue
1	1983	1,690		1,690	
2	1984	1,691		1,617	
3	1985	8,225		7,545	
4	1986	8,724		7,623	
5	1987	6,212		5,189	
6	1988		1,877		1,499
7	1989		1,877		1,433
8	1990		1,877		1,370
9	1991		1,877		1,310
10	1992		1,877		1,252
11	1993		1,877		1,197
12	1994		1,877		1,145
13	1995		1,877		1,094
14	1996		1,877		1,046
15	1997		1,877		1,000
16	1998		1,877		956
17	1999		1,877		914
18	2000		1,877		874
19	2001		1,877		835
20	2002		1,877		799
21	2003		1,877		764
22	2004		1,877		730
23	2005		1,877		698
24	2006		1,877		667
25	2007		1,877		4,164
Residual Value			10,377		
Total		26,572	47,917	23,664	23,747

FRR = 4.6%

Table 10-20 Financial Rate of Return (C-2)

(Unit: M$1,000)

Year		Project Cost	Net Revenue	Present Value Discounted at 1.4%	
				Project Cost	Net Revenue
1	1983	1,690		1,690	
2	1984	1,691		1,668	
3	1985	8,255		8,029	
4	1986	8,724		8,368	
5	1987	6,212		5,876	
6	1988		1,102		1,028
7	1989		1,102		1,014
8	1990		1,102		1,000
9	1991		1,102		986
10	1992		1,102		972
11	1993		1,102		959
12	1994		1,102		946
13	1995		1,102		933
14	1996		1,102		920
15	1997		1,102		907
16	1998		1,102		895
17	1999		1,102		882
18	2000		1,102		870
19	2001		1,102		858
20	2002		1,102		846
21	2003		1,102		834
22	2004		1,102		823
23	2005		1,102		812
24	2006		1,102		800
25	2007		1,102		8,222
Residual Value			10,377		
Total		26,572	32,417	25,631	25,507

FRR = 1.4%

Table 10-21 Financial Rate of Return (C-3)

(Unit: M$1,000)

Year		Project Cost	Net Revenue	Present Value Discounted at 1.9%	
				Project Cost	Net Revenue
1	1983	8,116		8,116	
2	1984	7,907		7,760	
3	1985	20,455		19,699	
4	1986	12,801		12,098	
5	1987	14,555		13,499	
6	1988		2,915		2,653
7	1989		2,915		2,604
8	1990		2,915		2,555
9	1991		2,915		2,508
10	1992		2,915		2,461
11	1993		2,915		2,415
12	1994		2,915		2,370
13	1995		2,915		2,326
14	1996		2,915		2,282
15	1997		2,915		2,240
16	1998		2,915		2,198
17	1999		2,915		2,157
18	2000		2,915		2,117
19	2001		2,915		2,077
20	2002		2,915		2,039
21	2003		2,915		2,001
22	2004		2,915		1,963
23	2005		2,915		1,927
24	2006		2,915		1,891
25	2007		2,915		18,678
Residual Value			26,428		
Total		63,834	84,728	61,172	61,462

FRR = 1.9%

Table 10-22 Financial Rate of Return (C-4)

(Unit: M$1,000)

Year		Project Cost	Net Revenue	Present Value Discounted at 3.3%	
				Project Cost	Net Revenue
1	1983	8,116		8,116	
2	1984	7,907		7,654	
3	1985	20,455		19,169	
4	1986	12,801		11,613	
5	1987	14,555		12,782	
6	1988		3,690		3,137
7	1989		3,690		3,037
8	1990		3,690		2,940
9	1991		3,690		2,846
10	1992		3,690		2,755
11	1993		3,690		2,667
12	1994		3,690		2,582
13	1995		3,690		2,499
14	1996		3,690		2,419
15	1997		3,690		2,342
16	1998		3,690		2,267
17	1999		3,690		2,195
18	2000		3,690		2,125
19	2001		3,690		2,057
20	2002		3,690		1,991
21	2003		3,690		1,928
22	2004		3,690		1,866
23	2005		3,690		1,806
24	2006		3,690		1,749
25	2007		3,690		13,817
Residual Value			26,428		
Total		63,834	100,228	59,334	59,025

FRR = 3.3%

Table 10-23 Financial Rate of Return (C-5)

(Unit M$1,000)

Year		Project Cost	Net Revenue	Present Value Discounted at 5.1%	
				Project Cost	Net Revenue
1	1983	8,116		8,116	
2	1984	7,907		7,523	
3	1985	20,455		18,518	
4	1986	12,801		11,026	
5	1987	14,555		11,929	
6	1988		4,849		3,781
7	1989		4,849		3,598
8	1990		4,849		3,423
9	1991		4,849		3,257
10	1992		4,849		3,099
11	1993		4,849		2,949
12	1994		4,849		2,806
13	1995		4,849		2,669
14	1996		4,849		2,540
15	1997		4,849		2,417
16	1998		4,849		2,299
17	1999		4,849		2,188
18	2000		4,849		2,082
19	2001		4,849		1,981
20	2002		4,849		1,885
21	2003		4,849		1,793
22	2004		4,849		1,706
23	2005		4,849		1,623
24	2006		4,849		1,545
25	2007		4,849		9,479
Residual Value			26,428		
Total		63,834	123,408	57,112	57,120

FRR = 5.1%

PART III MASTER PLAN FOR
KELANTAN PORT

PART III MASTER PLAN FOR KELANTAN PORT

Concept of Master Plan

Now the State of Kelantan has no port on its 80 km coastline because of the unfavorable natural and oceanographical conditions. For this reason, it has lagged behind other states in social and economic development.

In PART II, we presented the First Phase Development Plan for Kelantan Port with 1987 as the target year. Technically, construction is fully possible. The economic efficiency of the project seems to be somewhat unsatisfactory from the result of the economic analysis but not so unsatisfactory as to make the whole project impractical. The social effect of port development would be immeasurable considering the fact that its indirect effects difficult to determine quantitatively would be tremendous. The port would produce an immense impact on the state economy and induce the start of regular regional development. Sound financing, mainly for port operation, is anticipated. Thus, we do not foresee any probelm in starting the execution of the First Phase Development Plan.

In PART III, we shall describe the master plan for Kelantan Port. Essentially, a port represents social capital. As such, it exerts a profound influence on the economic activities of its hinterland when completed and put into operation. Further as the economic activities of the hinterland are invigorated by the new port, and their development is accelerated, there arises the need for new port facilities. This favorable cycle further enhances the position of the first port.

Since Kelantan Port would be constructed on a shoreline which now lacks facilities, it should first be opened as a mini-port. Yet, it will have an immense impact on the economy of the hinterland and there is no doubt that, in the near future, port demand will exceed its handling capacity and new facilities become necessary. To enable this port to meet future demand through the smooth progress of facility construction, it is necessary to have a carefully prepared general scheme for the future development of the port.

The primary purpose of this study of the master plan for Kelantan Port is to assess the possibility of port development and determine the direction of its development subsequent to the First Phase Development. Further, as described in detail in Chapter 6, the port must have long breakwaters, groin, and channels because it will be located in the shoaling beach and it needs to protect port facilities and calling ships from monsoon waves and drift sand. The IRR is small as far as the scope of the First Phase Development Plan is concerned because these facilities are not conducive to port revenues. Generally, the protective facilities for a port are determined without much regard to the scale of its mooring facilities. In the case of Kelantan Port, the considerable space is enclosed by the breakwaters after completion of the First Phase Development. If mooring facilities are further constructed in step with the growth of cargo volume handled at the port, the cost of construction of the protective facilities, channels and basins will be small; therefore, the investment return after the Second Phase Development Plan will be, indeed, high. Taken together with the facilities covered by the First Phase Development Plan, the economic feasibility of all facilities will greatly improve, making the project more worthy of investment. This is strong proof that the anticipatory investment in port facilities is necessary even if economic feasibility is unattainable at the initial stage of the project when the scale is small. (In

the case of Kelantan Port, the project is barely feasible economically even at the initial stage.) The second purpose of studying the master plan for Kelantan Port is to explain these circumstances.

Further, it is possible to follow a strategic policy of positioning the anticipatory port construction as the nucleus of regional development, attaching importance to the port's function to invigorate the hinterland's economy. The State of Kelantan is less developed than any other state in Malaysia and the GDP per capita is less than half of the national average. Its economy relies on agriculture, forestry and fisheries. Secondary industries are practically non-existent. Given this industrial structure, a radical increase in productivity cannot be expected and the gap separating it from other states will steadily widen. Kelantan Port will indeed play an important role in developing the state economy, and eliminating the gap with other states. The third purpose of this study of the master plan is to consider how Kelantan Port should function as the nucleus of regional development.

Therefore, the master plan for Kelantan Port discussed and finally proposed in PART III presents a long-range outlook on the future of this port and, unlike a short-term plan, does not make definite conclusions on what is to come. Much less, it does not, of course, obligate the port administrators to realize everything proposed in it.

Importance of Forming Master Plan

The master plan for Kelantan Port gives 2000 as the target year. This target year has been adopted according to the judgment that a period of 20 years or so is suitable for forming an overall view of the project. However, there are problems detrimental to planning work such as the absence of long-term economic plans at the Federal and State levels. This period of 20 years is sufficient to fundamentally reform social and economic structures. If, for example, economic growth at an annual rate of about 7% continues for 20 years, the economic scale will be four times the present level by the end of this period. The period is also sufficient for the construction of large scale infrastructures central to regional development, thus bringing about a society that is entirely different from what it is today. Furthermore, these changes will not occur suddenly, like a revolution, but will occur in a continuous time series. So much so that, the setting of policy targets, the selection of the means to accomplish them and the operation and control of policy measures are, indeed, important.

In this case of this project, no definite information is available on the basics of any national policy targeted for 2000. However, the study them, was able to gain through contacts with the government officials concerned the impression that the present fundamental policies of the country will continue in the future. So, the team decided to proceed with its work by setting targets on the assumption that present policies will be extended. In this connection, it is considered that accelerating regional development by vitalizing the underdeveloped economy of Kelantan precisely confirms to the national policy — the eradication of proverty and the elimination of income gaps — and that the positive development of the Kelantan State will have top priority in the development policy of the Federal Government.

More than 90% of the population in the State of Kelantan is Malay, and most of these Malay people engage in agriculture or other primary industries. It is, therefore, the duty of the state

government to take steps to increase their incomes and raise their living standard so that they at least approximate the national averages. The construction of Kelantan Port clearly is one of the top-priority measures to be carried out by the state government to achieve this end.

The roles to be played by ports are many and diverse but Kelantan Port in particular is expected to play the following roles.

(1) Nucleus of New Physical Distribution System

When the new port is constructed, thick "pipelines" for the distribution of goods will come into existence between it and major cities both at home and abroad, thereby forming a physical distribution system different from that which existed in the past. In other words, the local means of transportation will be diversified as marine transportation is added to the traditional means of land transportation, and it will be possible for large quantities of goods to be transported at stable, low cost. By efficiently functioning as the center of the physical distribution system, the port is expected to be able to help reduce and stabilize prices by cutting the transportation costs of goods produced overseas and in other states of the country, and to encourage local producers toward further production by increasing the competitive capacity of goods produced in the state and shipped elsewhere.

(2) Nucleus for Accleration of Development of Fishery Industry, and Rationalization of Distribution of Fishery Products

Rivers in the State that empty into the South China Sea mostly have their estuaries blocked by littoral drift. So, fishing boats operate inefficiently, taking advantage of the tide flow, and of course, increasing the size of fishing boats is difficult. But if the new port is constructed, it will be available for constant use by large fishing boats, and it is expected that more fishermen will become engaged in pelagic fisheries and that catches will greatly increase. Consumers will be able to get fresh fish at reduced prices through the handling of fishery products in the state instead of having more than a half the fishery products consumed in the state supplied from Thailand or other state of Peninsular Malaysia, as has been the case in the past. Other beneficial effects include the increase of added value from producers through the opening of modern freezing facilities and markets and the steady supply of protein to consumers through improvements in the distribution mechanism.

(3) Nucleus of Coastal Industrial Base

Heavy industries handling large quantities of bulk materials and heavy-weight goods, and export-oriented light industries wanting to reduce their transportation costs tend to be set up near ports. Thus, a coastal industrial zone is formed in the vicinity of the port area. Even if the port management body does not actively try to attract industries, industries naturally concentrate in the hinterland of the port because of its favorable geographical conditions. In this case, random, vermiculate development of the area must be prevented by preparing industrial zones in the port area, and inducing the formation of an industrial complex there.

A port with an adequate capacity is absolutely necessary for the formation of such a coastal industrial zone, and the port is expected to serve as the nucleus of the zone.

The Master Plan for Kelantan Port purports to decide the layout of port facilities necessary

and sufficient for the efficient performance of these important roles and forms a land use plan for the coastal area.

Basic Policy of Master Plan

(1) Examination of Policy Target

When deciding the Master Plan for Kelantan Port with 2000 as the target year, study work must be done in accordance with the officially expressed government policy targets if these are clearly defined. But Federal and State Governments rarely have a long-term plan ready with a long time span of 20 years or thereabout. Thus, work on forming a master plan starts with the study of the development policy for the State of Kelantan on which the master plan is based. Of course, we do not intend — and we certainly are not in a position — to plan or propose any policy for the Federal Government or the State Government. All we may do for the convenience of our work is to establish what we consider from the various circumstances to be the general line of policy targets that the policy makers seem likely to adopt. Therefore, it is realistic to assume that the present policies of the nation will not drastically change in the future, and to make certain modification in the present policy targets by referring to the course of past development in developed countries and neighboring countries under similar conditions.

The Federal Government has the Overall Perspective Plan covering the period up to 1990 and uses it as a guideline in executing its policies. During the 10-year period from 1990 to 2000, the policy targets shown in this plan and the Fourth Malaysia Plan are assumed to be maintained without any great changes. Specifically, we anticipate that, in the meantime, vigorous efforts toward social and economic development will be made to accomplish the two major targets of the "Eradication of Poverty" and "Reconstruction of Society".

The Malaysian economy has continued to develop so high annual rate of 8% that Malaysia now ranks among the semi-developed countries. It can safely be expected that the country's economy will steadily continue its fast growth at an annual rate of 7% or so for a long time to come. Reasons for this assumption include its political stability, the smooth progress of industrialization projects and a foreign trade balance of which continued heavy surpluses can be expected because of the country's abundant natural resources, such as tin ores and petroleum, and its price-competitive agricultural and forestry products including rubber, palm oil and timber. A rate of 7%, somewhat lower than the present growth rate, is assumed here since there is no instance where rapid growth of more than 8% continued for more than 20 years in any developed country.

But as far as the economic circumstances for the State of Kelantan are concerned, we regret to say that any remarkable development cannot be expected for this state for some time because of its many disadvantages in regional development, including the great distance from the west coast of the peninsula, which is central to the Malaysian economy, the great delay in the construction of social infrastructures, and its industrial structure which lacks manufacturing industries worthy of the name and is heavily dependent on primary industries. For fear of the further widening of economic gaps with other states, the Federal Government and the State Government will not allow this situation to take its natural course, but are certain to implement strong measures for the development of the state as a top policy priority.

Perhaps, the basic policy target in forming a development plan for Kelantan will be "to eliminate the backwardness of the state and bring it up to the level of other states". The role of social capital, and particularly of ports, must be noted in connection with the various actions to be taken to accomplish this target. The per-capita GDP of this state in 1980 is only 45% of the national average. Since the construction of social infrastructures takes some time, in spite of any efforts by the Federal Government, the immediate effect of social infrastructures in raising the economic level cannot be expected until some time after the start of development. If the construction of social infrastructure progresses and begins to produce certain effects, other economic activities will grow at an accelerated pace. Since nearly a decade is necessary for the completion of social capital formation, it will not be until 1990 that the economy of Kelantan can "take off". Economic growth is also greatly affected by the intensity with which social infrastructure is formed. Specifically, the rate of acceleration in developing the economy of the state after its "take off" greatly differs, depending on whether the construction of social infrastructure is limited to the scale required just for moderate growth at the natural rate of increase from the present economic scale or whether social infrastructure proportionate to the future scale of the economy after expanded equilibrium will be constructed in advance as an ambitious attempt. In other words, the progress of development depends on whether the policy makers decide to implement a policy which channels the development of the economy in a desired direction, taking advantage of the anticipatory construction of social infrastructure as a strategic step toward regional development.

It is true that the judgment of policy makers is, indeed, important in deciding what development strategy should be framed in this connection. But this requires an accurate and objective perspective on the development potentials of the region concerned. It is the responsibility of policy makers to form an overall development strategy by using every skill and by devising ways to bring their plans into full play by backing them with an adequate support system.

We repeatedly studied the development policy of the State of Kelantan and reached the conclusion that the State Government would never allow the economic gap with other state to widen but will take positive and effective steps for its regional development with the strong support of the Federal Government. Thus, we developed the following scenario concerning policy targets.

During the 1980s, the economy of the Kelantan State will gradually develop, achieving an economic growth rate higher than the national average, as the construction of transport infrastructures makes rapid progress by the opening of the East-West Highway, the construction of the South-North Highway, the expansion of the Kota Bharu Airport, and the construction of Kelantan Port. Consequently, the per capita GDP of the state, 45% of the national average in 1980, may well increase by 10 percent in 1990 to equal 55% of the national average — a level which we believe to be an economic scale suitable for use as a policy target. Next, the 1990s will see a remarkable development of the economy of this state as may latent underground resources are mined by continuous development efforts. In 2000, 70% of the national average will be within easy reach for the per capita GDP in Kelantan. If development is tackled more ambitiously, even 80% can be a realistic policy target. By about 2010, Kelantan will have ceased to be a backward state and should reach the national average for GDP. After that, it will attain an

important status as a nucleus for the whole Malaysian economy. The state has growth potential which merits this forecast. Indeed, it seems to be the last remaining undeveloped region in Malaysia.

(2) Policy for Long Term Development of Kelantan Port

It is necessary to form a development policy for Kelantan Port by carefully studying how, in view of the policy targets set in the preceding section, the port should be constructed so that it can effectively function in developing the economy of Kelantan.

There are three important factors which require special consideration in forming a long-term development policy for Kelantan Port. Firstly, the port must be constructed rapidly, on a priority basis, as a small but efficient port that can be used quickly, since the State of Kelantan now has no available port. Secondly, the national physical distribution network will inevitably be reorganized after construction of the new port and, in this connection, a situation may arise where the port cannot meet demand if it is only of a scale which caters to the needs of Kelantan alone. Also, the effects of the construction of the port on the economy of its hinterland may be unexpectedly extensive. Therefore, the plan for Kelantan Port must have sufficient room for expansion to cope flexibly with unexpected increases in port demand. Thirdly, measures must be prepared for the eventuality that government circles may make strategic use of Kelantan Port in the execution of policies if they tackle regional development with increased zeal.

Thus, a development policy for Kelantan Port that can meet the above-mentioned requirements is as follows: First, it is necessary to select port facilities that can be constructed rapidly — within five years, at most — and to plan their layout and carry the plan into effect, as previously detailed in Chapter 6. In doing so, there must be a definite outlook that takes the lines of future expansion of the port into full consideration to ensure the smooth progress of this expansion. The outlook to be used as the Master Plan for Kelantan Port may differs in two cases; namely, depending on whether the economic frame as of 2000 is equivalent to 70% or 80% of the national average per capita GDP. We believe that a port scale proportional to the economic frame equivalent to 70% is a normal and reasonable level but, considering the fact that the Kelantan State has the largest development potential area left of any area in Malaysia, it is small wonder if some circles strongly demand that 80% be adopted, instead, as a more ambitious development target. So, in anticipation of the need that may arise in the latter case to form a coastal industrial zone in the immediate hinterland, we decided to show an example for reference' sake, taking into account a policy of developing an industrial port zone.

Decision of Master Plan

The Master Plan for Kelantan Port consists of an outlook on how the Kelantan Port Authority will proceed with the construction after the First Phase Development Plan expected to end in 1987.

As stated in Chapter 3, the area between Sg. Kemasin and Sg. Pg. Datu has been selected as the site of Kelantan Port because of its natural and socio-economic advantages.

A GDP of M$4,425 million in 1970 constant prices and a population of 1,306,600 have been assumed as the economic frame of Kelantan for 2000 from the assumption that the per-capita

GDP the state will reach the 70% level of the national average in that year. As the result, the volume of cargo to be handled at Kelantan Port is indicated in Table 5-6; this cargo will be loaded and discharged at the commercial port zone and the fishing port zone.

The port facilities will not very large if they are constructed adjacent to the facilities constructed under the First Phase Development Plan and if they are planned with room for future expansion. As can be seen from the result of cargo traffic computation given in Chapter 5, the main facilities comprise four berths for 10,000-DWT ships, two berths for 5,000-DWT ships, and a fishing boat mooring facilities of 655 m. Port facilities of this scale have considerable freedom of arrangement in the selected area.

However, the rigorous natural conditions of the seashore make it absolutely necessary to extend the breakwaters and the groin to points with certain water depths in order to protect the port facilities from waves and drift sand. Thus, the optimum shape of the protective facilities of this port are determined by fixed conditions. The layout of mooring facilities to be included must be studied accordingly.

We planned and comparatively studied three master plan alternatives. In doing so, we also studies the layout of an industrial port section likely to be necessary in the future.

The details of these plans are shown in Fig. 11-1 and Table 11-1, 11-2 for Plan C, and in Appendix for the remaining two alternatives, Plan A and Plan B. Under Plan A and Plan B, the port is located between Sg. Kemasin and Sg. Pg. Datu, and separated from the two rivers. Plan C proposes making active use of Sg. Kemasin as a port area in view of the fact that this river hardly discharges any earth or sand.

Comparative study has revealed that Plan C is not only preferable for port administration because of the clear-cut division of the commercial port section, the fishing port section and the industrial port section, and the least expensive construction cost but has decisive advantages including the avoidance of double investment in the estuary training walls necessary for the purpose of flood control for Sg. Kemasin area. Therefore, this plan is the one most recommended.

And Fig. 11-2 shows the access road plan for the Master Plan (Plan C).

Long Term View of the Development of Industrial Port Zone

When Kelantan Port is put into operation, the construction of industries in the port hinterland will progress. It is, therefore, necessary to form a well-coordinated coastal industrial area by systematically inducing factories to locate on suitable land lots determined in advance. The construction of the industrial port zone must be carefully planned at the present time since there is every likelihood that government authorities may, as a strategy of regional development, undertake to vigorously construct a coastal industrial area by actively trying to induce factories to locate in this area.

Assuming that government circles initiate a positive development policy aimed at increasing the per capita GDP in Kelantan to 80% of the national average by 2000, it is necessary to construct a 500-ha coastal industrial area and a corresponding industrial port zone at Kelantan Port. Even if the target year is 2010 instead of 2000, there is no doubt that an industrial port zone of considerable scale will become necessary anyway.

The delayed development of the state of Kelantan is attributable to the fact that its industrial

structure leans toward primary and tertiary industries. Its primary industries which engage 70% of its workers employ too many for their small production scale and low productivity.

Generally speaking, the development of manufacturing industries is used as a lever for regional development because manufacturing industries have the character of leading economic development due to their generally high growth rate, their great effects on other industries and their great capacity to absorb workers. They also help to cut imports, thereby saving foreign exchange, and increase personal incomes, thereby evoking demand for products and increasing production — which is, indeed, a favorable economic cycle.

In the State of Kelantan, where no important manufacturing industries have existed in the past, conditions for the start of manufacturing industries will greatly improve after the construction of Kelantan Port. The state will be basically ready for positive industrialization. A general survey of conditions for industrialization in Kelantan shows that the state has many extremely favorable conditions. The abundant water of the Kelantan River remains virtually untouched. This probably is the only water resources left undeveloped in Peninsular Malaysia. Also, many useful underground resources are known to exist in the mountains of Ulu Kelantan, though they have not yet been throughly explored. The production of natural gas from the off-shore sea bottom is promising. Further, the state could produce abundant timber and agricultural raw materials. The labor situation is also favorable as large numbers of excellent and industrious workers can be hired for low wages. The vast flatland around Kelantan Port provides firm ground and is relatively easy to buy. The power, which will be hydraulically generated at the Temmengor Dam now under construction, will be supplied to Kelantan, and will be available far in excess of consumption demands. Thus, the coastal area around Kelantan Port will have almost ideal conditions for industrialization. No area with all these favorable conditions can be found in Malaysia or any other Southeast Asian countries. The only weakness of the state is that it has no capital accumulation. But if the State Government overcomes this deficiency by launching a positive drive with the support of the Federal Government to induce the establishment of Malaysian and foreign factories, it will be possible to achieve great success in exploiting all local potentials.

The results of our study concerning the types of industries likely to be constructed in the coastal area are shown for reference in Appendix.

Fig. 11-1 MASTER PLAN OF KELANTAN PORT (PLAN C)

Fig. 11-2 Access Road Plan

Existing Road

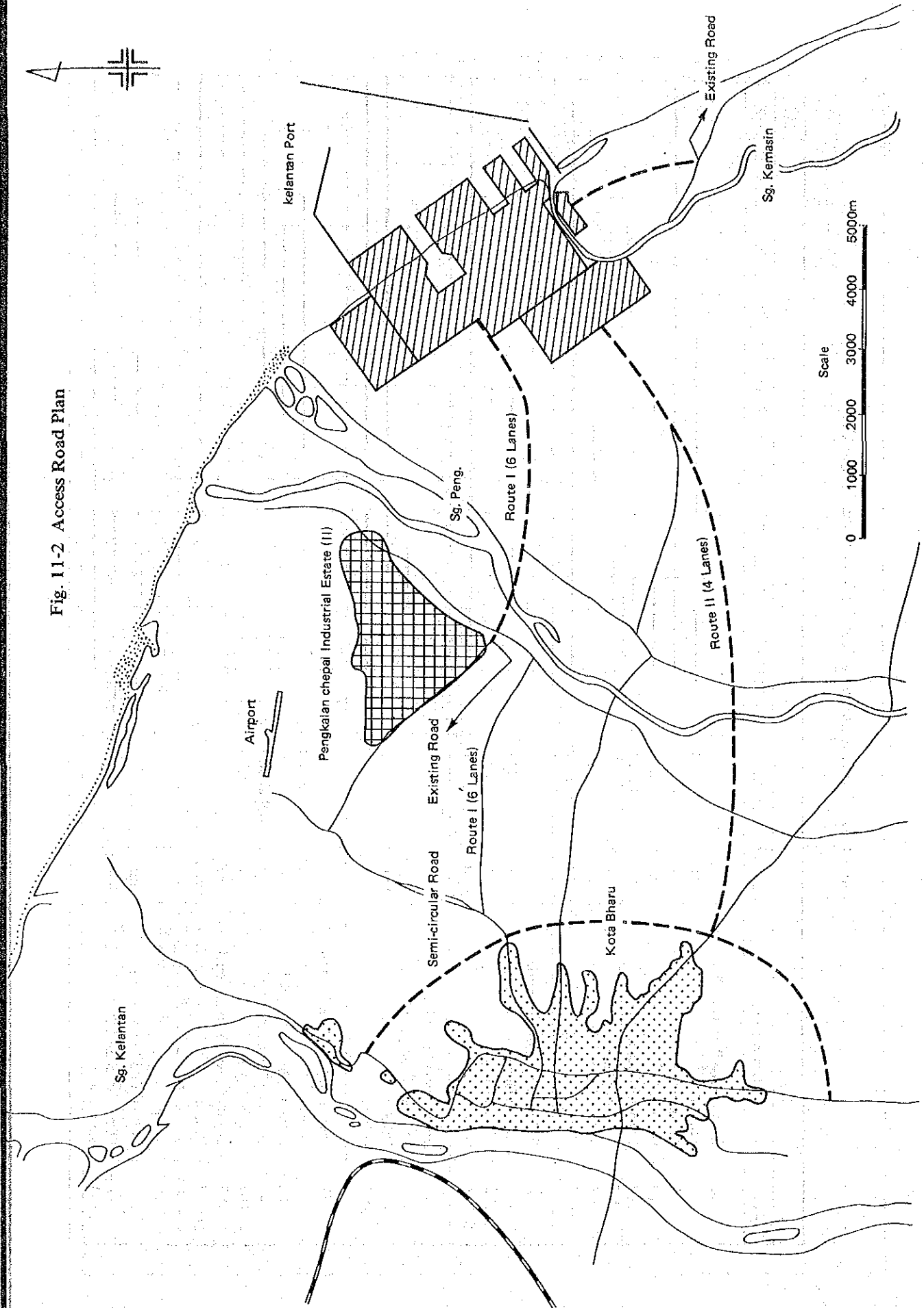Sg. Kemasin

kelantan Port

Scale

0 1000 2000 3000 4000 5000m

Sg. Peng.

Route I (6 Lanes)

Route II (4 Lanes)

Airport

Pengkalan chepal Industrial Estate (II)

Existing Road

Route I (6 Lanes)

Semi-circular Road

Kota Bharu
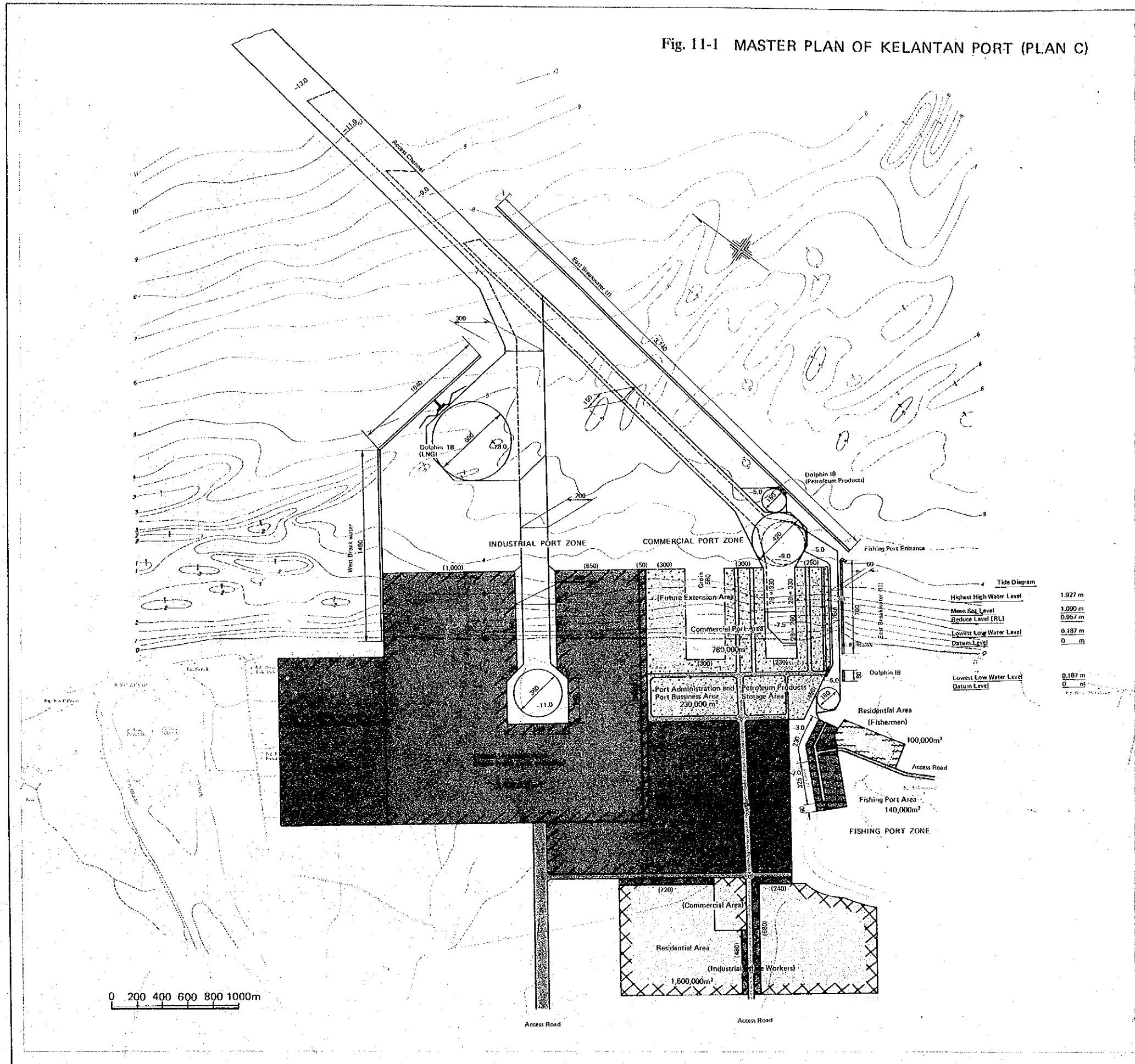
Sg. Kelantan

Table 11-1 Construction Schedule for Master Plan (Plan C)

No.	Description	Unit	Quantity
A	Commercial Port Zone Facilities		
A-1	Seawall	m	4,180
A-2	Breakwater	m	4,580
A-3	Groin	m	670
A-4	Dredging/Reclamation	m³	4,700,000
A-5	-7.5 m Quay	m	260
A-6	-9.0 m Quay	m	660
A-7~21	Others	Sum	1
B	Fishing Port Zone Facilities		
B-1	-2.0 m Quay	m	325
B-2	-3.0 m Quay	m	330
B-3~15	Others	Sum	1
C	Private Port Facilities		
C-1	-5.0 m Oil Dolphin Berth	berth	2
C-2	Oil Supply	Sum	1
C-3~4	Others	Sum	1
D	Industrial Port Zone Facilities		
D-1	Seawall	m	3,560
D-2	Breakwater	m	1,970
D-3	Dredging/Reclamation	m³	16,900,000
D-4	-11.0 m Quay	m	1,470
D-5	-13.0 m LNG Dolphin Berth	berth	1
D-6~7	Others	Sum	1
E	Engineering		
E-1	Natural Conditions Survey	Sum	1
E-2	Engineering Study	Sum	1
E-3	Supervision	Sum	1

Year columns: 1980 (81 82 83 84 85 86 87 88 89), 1990 (90 91 92 93 94 95 96 97 98 99), 2000 (00)

Table 11-2 Construction Cost of Master Plan (Plan C)

Item No.	Description	Unit	Quantity	Unit Price M$	Amount M$1,000
A	Commercial Port Zone Facilities				
A-1	Seawall	m	4,180	3,000	12,540
A-2	Breakwater	m	4,580	13,500	61,830
A-3	Groin	m	670	4,500	3,015
A-4	Dredging/Reclamation	m³	4,700,000	4	18,800
A-5	−7.5m Quay	m	260	15,600	4,056
A-6	−9.0 m Quay	m	660	22,700	14,982
A-7	Transit Shed	m²	27,000	250	6,750
A-8	Building	m²	12,000	350	4,200
A-9	Oil Tank (Palm Oil)	sum	1		1,280
A-10	Port Road	m²	280,000	35	9,800
A-11	Access Road	m²	100,000	40	4,000
A-12	Asphalt Pavement	m²	36,000	30	1,080
A-13	Green Area	m²	213,000	10	2,130
A-14	Drainage	sum	1		13,200
A-15	Water Supply	sum	1		2,180
A-16	Electric Power Supply	sum	1		2,500
A-17	Navigation Aids	sum	1		3,300
A-18	Port Service Vessels	sum	1		2,850
A-19	Cargo Handling Equipment/Vehicles	sum	1		1,500
A-20	Mobilization/Demobilization	sum	1		2,565
A-21	Land Acquisition	m²	861,000	4	3,444
A-22	Sales Tax (5%)	sum	1		4,466
	Sub Total (A)				180,468
B	Fishing Port Zone Facilities				
B-1	−2.0 m Quay	m	325	4,700	1,528
B-2	−3.0 m Quay	m	330	6,600	2,178
B-3	Slip Way	sum	1		600
B-4	Wholesale Market/Office	m²	8,000	350	2,800
B-5	Cold-storage/Freezing Facilities	sum	1		5,600
B-6	Ice Factory/Ice Storage Facilities	sum	1		3,600
B-7	Oil Tank (Movable)	sum	1		80
B-8	Port Road	m²	24,000	35	840
B-9	Access Road	m²	40,000	40	1,600
B-10	Asphalt Pavement	m²	30,000	30	900
B-11	Drainage	sum	1		2,200
B-12	Water Supply	sum	1		860
B-13	Electric Power Supply	sum	1		900
B-14	Mobilization/Demobilization	sum	1		80
B-15	Land Acquisition	m²	272,000	4	1,088
B-16	Sales Tax (5%)	sum	1		571
	Sub Total (B)				25,425
C	Private Port Zone Facilities				
C-1	−5.0 m Oil Dolphin Berth	berth	2	690,000	1,380
C-2	Oil Supply	sum	1		18,800
C-3	Mobilization/Demobilization	sum	1		268
C-4	Land Acquisition	m²	195,000	4	780
C-5	Sales Tax (5%)	sum	1		398
	Sub Total (C)				21,626
D	Industrial Port Facilities				
D-1	Seawall	m	3,560	3,900	13,884
D-2	Breakwater	m	1,970	8,900	17,533
D-3	Dredging/Reclamation	m³	16,900,000	4	67,600
D-4	−11.0 m Quay	m	1,470	41,600	61,152
D-5	−13.0 m LNG Dolphin Berth	berth	1	5,500,000	5,500
D-6	Mobilization/Demobilization	sum	1		4,370
D-7	Land Acquisition	m²	6,853,000	4	27,412
D-8	Sales Tax (5%)	sum	1		3,178
	Sub Total (D)				200,629
E	Engineering				
E-1	Natural Conditions Survey	sum	1		1,700
E-2	Engineering Study	sum	1		1,600
E-3	Supervision	sum	1		7,800
	Sub Total (E)				11,100
F	Physical Contingency (15%)	sum	1		64,252
	Total (A+B+C+D+E+F)				503,500

APPNDIX

Table A-1 Kelantan: GDP by Industry of Origin, and Growth Rate

(M$ million in 1970 constant prices)

Sector	1975[1]	1978[1]	1980[2]	1990	2000	1981—1990	1991—2000
Agriculture, Foresty and Fishing	184.2 (42.1)	206.8 (38.9)	266 (36.6)	478 (26.0)	841 (19.0)	6%	6%
Mining and Quarrying	1.4 (0.3)	1.6 (0.3)	7 (1.0)	37 (2.0)	133 (3.0)	18%	14%
Manufacturing	27.7 (6.4)	41.9 (7.9)	55 (7.6)	276 (15.0)	1062 (24.0)	18%	14%
Construction	9.0 (2.1)	9.5 (1.8)	17 (2.3)	73 (4.0)	221 (5.0)	165	12%
Others	212.6 (49.1)	271.5 (51.1)	381 (52.5)	973 (53.0)	2168 (49.0)	10%	8%
Total	433.1 (100.0)	531.3 (100.0)	726 (100.0)	1837 (100.0)	4425 (100.0)	10%	9%

Source 1. Mid Term Review of The Third Malaysia Plan
        2. Economic Planning Unit (Except for GDP by Manufacturing and Others)

Table A-2 Average Daily Landings of Marine Fish 2000

Tonnage	Gear	Daily No. of Fishing Boats	Annual Landings (tonne)	Annual Operation Days	Operation Days Per Trip	Annual No. of Trips	Daily/Per Trip Landings (kg)	Daily Landings (kg)
-9.9	Trawl Nets	10	50				250	2,500
	Drift/Gill Nets	20	15	200	1	200	75	1,500
	Hook & Lines	20	15				75	1,500
10-19.9	Trawl Nets	20	80				400	8,000
	Lift Nets	20	90				450	9,000
	Purse Seine Nets	10	20	200	1	200	100	1,000
	Drift/Gill Nets	10	15				75	750
	Hook & Lines	10	15				75	750
20-49.9	Trawl Nets	14	150	250	3	80	1,875	26,250
	Purse Seine Nets	12	400				5,000	60,000
50-99.9	Trawl Nets	3	200	250	7	30	6,670	20,010
Total								131,260

Table A-3 Length of Landing Quay 2000

Boat Tonnage	Gear	No. of Boats	Depth of Water (m)	1 Berth Length (m)	Trip Days	Daily No. of Boats (M)	(A)	Daily Landing Hours at Quay (hr) (M)	(A)	Landing Time per Boat (min)	Rotation	No. of Berth Required (M)	(A)	Required Length of Quay (M)	(A)
9.9	Trawl Nets	10	2	15	1	3	7	3	3	10	18	0.2	0.4	2x15 =30	6x15 =90
	Drift Nets Grill	20				6	14					0.3	0.8		
	Hook & Lines	20				6	14					0.3	0.8		
10—19.9	Trawl Nets	20	2	15	1	6	14	3	3	10	18	0.3	0.8		
	Lift Nets	20				6	14					0.3	0.8		
	Purse Seine Nets (Others)	10				3	7					0.2	0.4		
	Drift Nets Grill	10				3	7					0.2	0.4		
	Hook & Lines	10				3	7					0.2	0.4		
20—49.9	Trawl Nets	40	3	25	3		14	3	3	30	6		2.3	30	4x25 =100
	Purse Seine Nets (Fish)	35					12						2.0		
50—99.9	Trawl Nets	15	3	30	7	3		3		45	4	0.8			

Note (M): Morning
(A): Afternoon

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Table A-4 Length of Preparation Quay 2000

Boat Tonnage	Gear	No. of Boats	Ice/Oil	Depth of Water (m)	1 Berth Length (m)	Trip Days	Daily No. of Boats (M)	Daily No. of Boats (A)	Daily Supply Hours at Quay (M)	Daily Supply Hours at Quay (A)	Supply Time per Boat (min)	Rotation	No. of Berth Required (M)	No. of Berth Required (A)	Required Length of Quay (M)	Required Length of Quay (A)
10–19.9	Trawl Nets	14	Ice	2	15	1	14		2		6	20	0.7		4x15 =60	4x15 =60
			Oil					14		2	5	24		0.6		
		6	Ice				6	6	2		6	20	0.3			
			Oil							2	5	24		0.3		
	Lift Nets	14	Ice				14	14	2		6	20	0.7			
			Oil							2	5	24		0.6		
		6	Ice				6	6	2		6	20	0.3			
			Oil							2	5	24		0.3		
	Purse Seine Nets (Others)	7	Ice				7	7	2		6	20	0.4			
			Oil							2	5	24		0.3		
		3	Ice				3	3	2		6	20	0.1			
			Oil							2	5	24		0.2		
	Drift Gill Nets	7	Ice				7	7	2		6	20	0.4			
			Oil							2	5	24		0.3		
		3	Ice				3	3	2		6	20	0.1			
			Oil							2	5	24		0.2		
	Hook & Lines	7	Ice				7	7	2		6	20	0.7			
			Oil							2	5	24		0.6		
		3	Ice				3	3	2		6	20	0.3			
			Oil							2	5	24		0.3		
20–49.9	Trawl Nets	40	Ice	3	25	3	14	14	2		6	20	0.7		50	50
			Oil							2	5	24		0.6		
	Purse Seine Nets (Fish)	35	Ice				12	12	2		6	20	0.6			
			Oil							2	5	24		0.5		
50–99.9	Trawl Nets	15	Ice	3	30	7	3	3	3	3	15	12	0.2			
			Oil								10	18		0.3		

Note (M): Morning   (A): Afternoon

Table A-5 Length of Mooring Quay 2000

Tonnage	Gear	No. of Boats	Depth of Water (m)	1 Mooring Length (m)	Daily No. of Boats	Mooring Method	Required of Quay Length (m)
10-19.9	Trawl Nets	20	2	5	20	Double	50
	Lift Nets	20			20		50
	Purse Seine Nets (Others)	10			10		25
	Drift/Gill Nets	10			10		25	}175
	Hook & Lines	10			10		25
20–49.9	Trawl Nets	40	3	6	14	Single	84
	Purse Seine Nets (Fish)	35			12		72	}180
50–99.9	Trawl Nets	15		8	3	Single	24

Table A-6 Required Length of Quay for Refuge 2000

Tonnage	Gear	No. of Fishing Boats	Water Depth (m)	1 Mooring Length (m)	Required Length of Quay (m)
10–19.9	Trawl Nets	20	2	5	175
	Lift Nets	20			
	Purse Seine Nets	10			
	Drift/Gill Nets	10			
	Hook & Lines	10			
20–49.9	Trawl Nets	40	3	6	225
	Purse Seine Nets	35			
50–99.9	Trawl Nets	15	3	8	120

Mooring Method: Double file system for less than 49.9
tonnage class boats and single file for 50–99.5 class boats

Table A-7 Daily Oil Supply to Fishing Boats 2000

Tonnage	Gear	Daily No. of Fishing Boat	Average Horse Power of Fishing Boat	Sailing Hours	Operation Days	Total Horse Power
- 9.9	Trawl Nets	10				
	Drift/Gill Nets	20	20	6	1	6,000
	Hook & Lines	20				
10-19.9	Trawl Nets	20				
	Lift Nets	20				
	Purse Seine Nets	10	25	6	1	10,500
	Drift/Gill Nets	10				
	Hook & Lines	10				
20-49.9	Trawl Nets	14	110	12	3	55,440
	Purse Seine Nets	12	60	10		21,600
50-99.9	Trawl Nets	3	200	12	7	50,400
	Total					143,940

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Fig. A-1 Distribution of Marine Fish
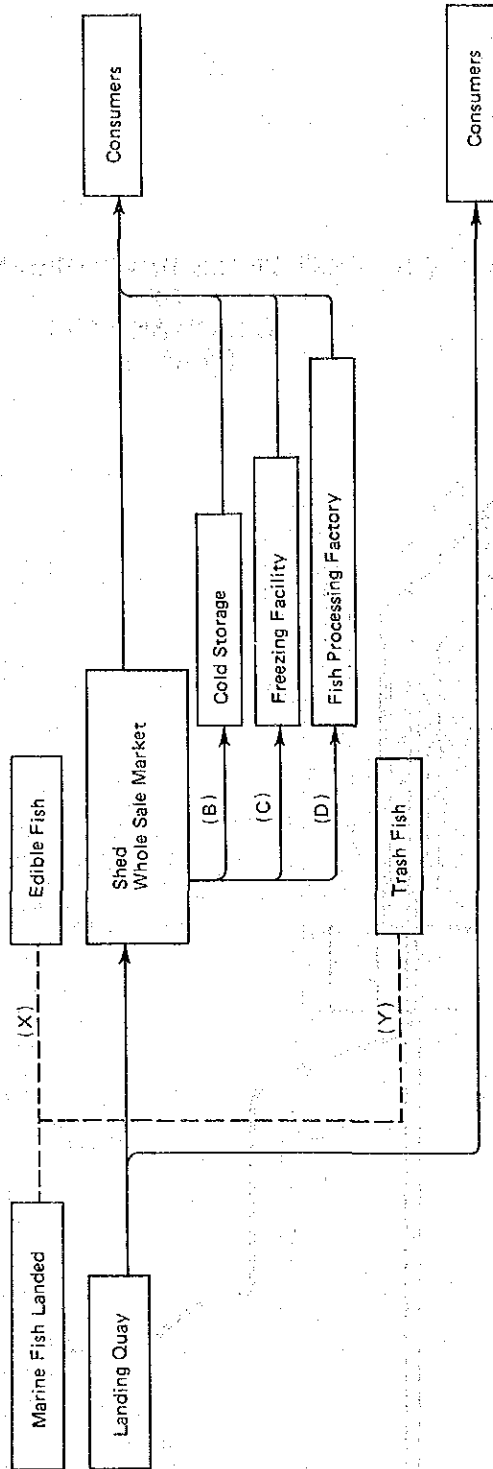
Share	Year	1987	2000
X		70	70
Y		30	30
A		40	40
B		30	20
C		20	20
D		10	20

(per cent)

Marine Fish Landed

Landing Quay

Edible Fish

(X)

Shed
Whole Sale Market

(B) Cold Storage

(C) Freezing Facility

(D) Fish Processing Factory

Trash Fish

(Y)

Consumers

Consumers

Fig. A-2 THE FIRST PHASE DEVELOPMENT PLAN
OF
KELANTAN PORT
(PLAN A)

Table A-8 Construction Cost of the First Phase Development Plan (Plan A)

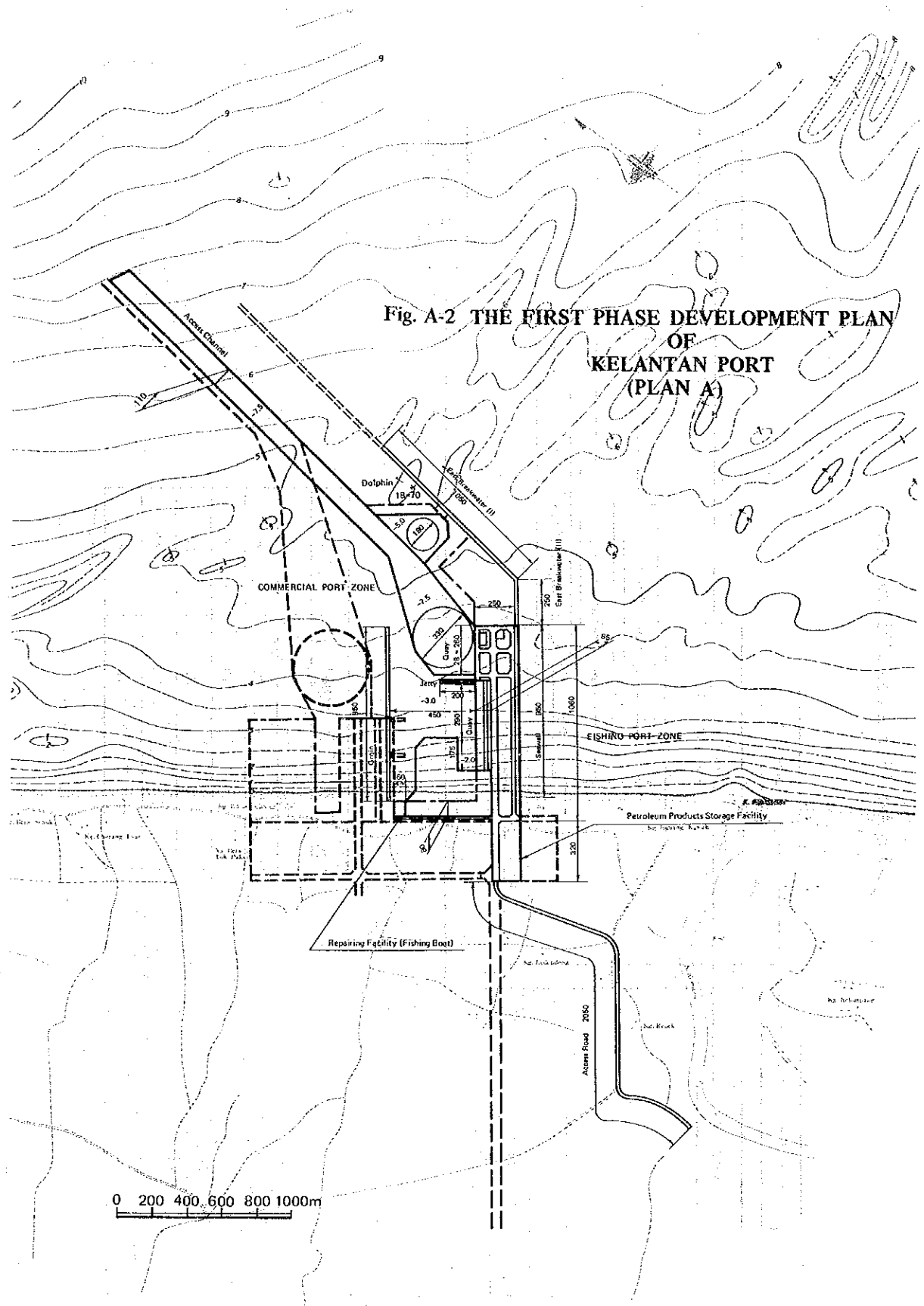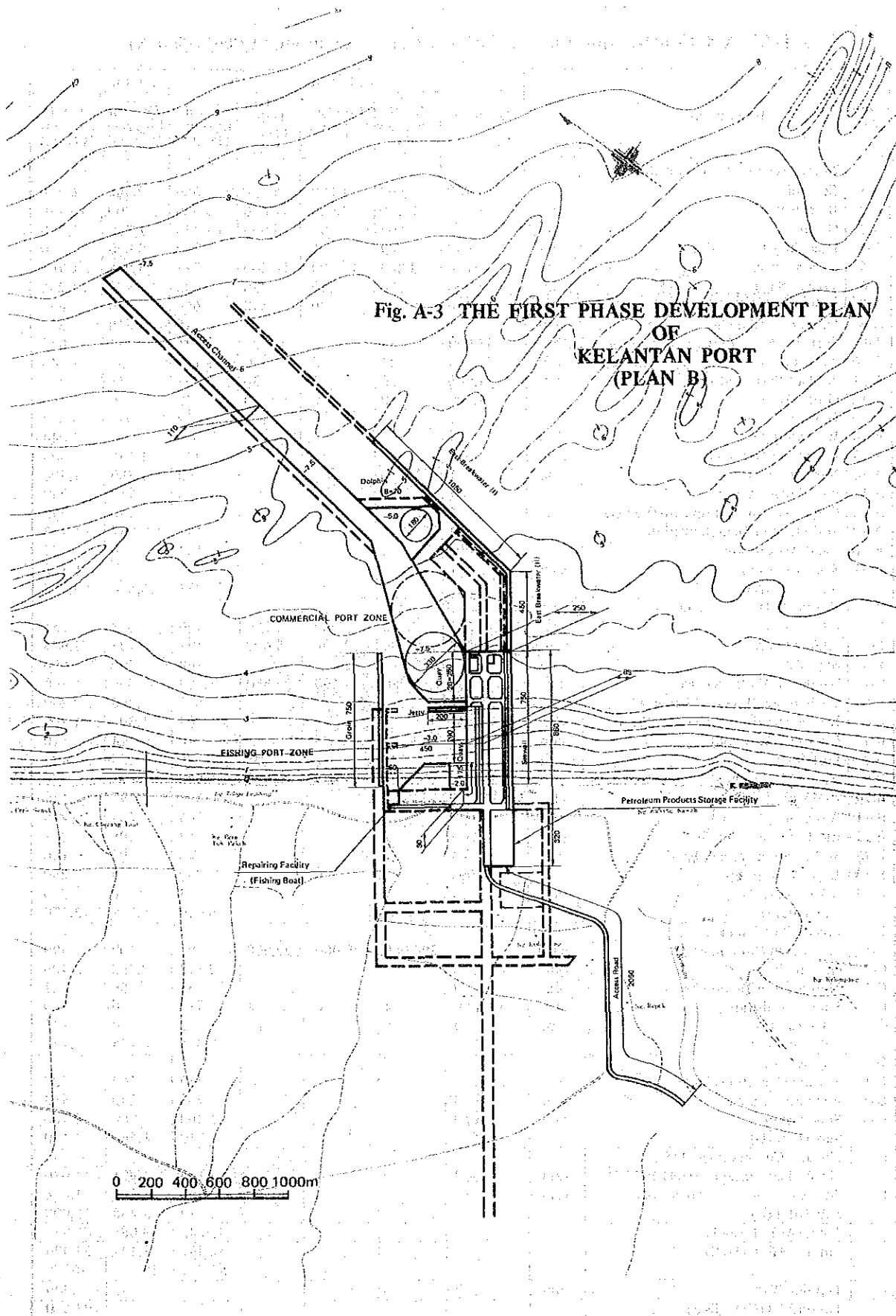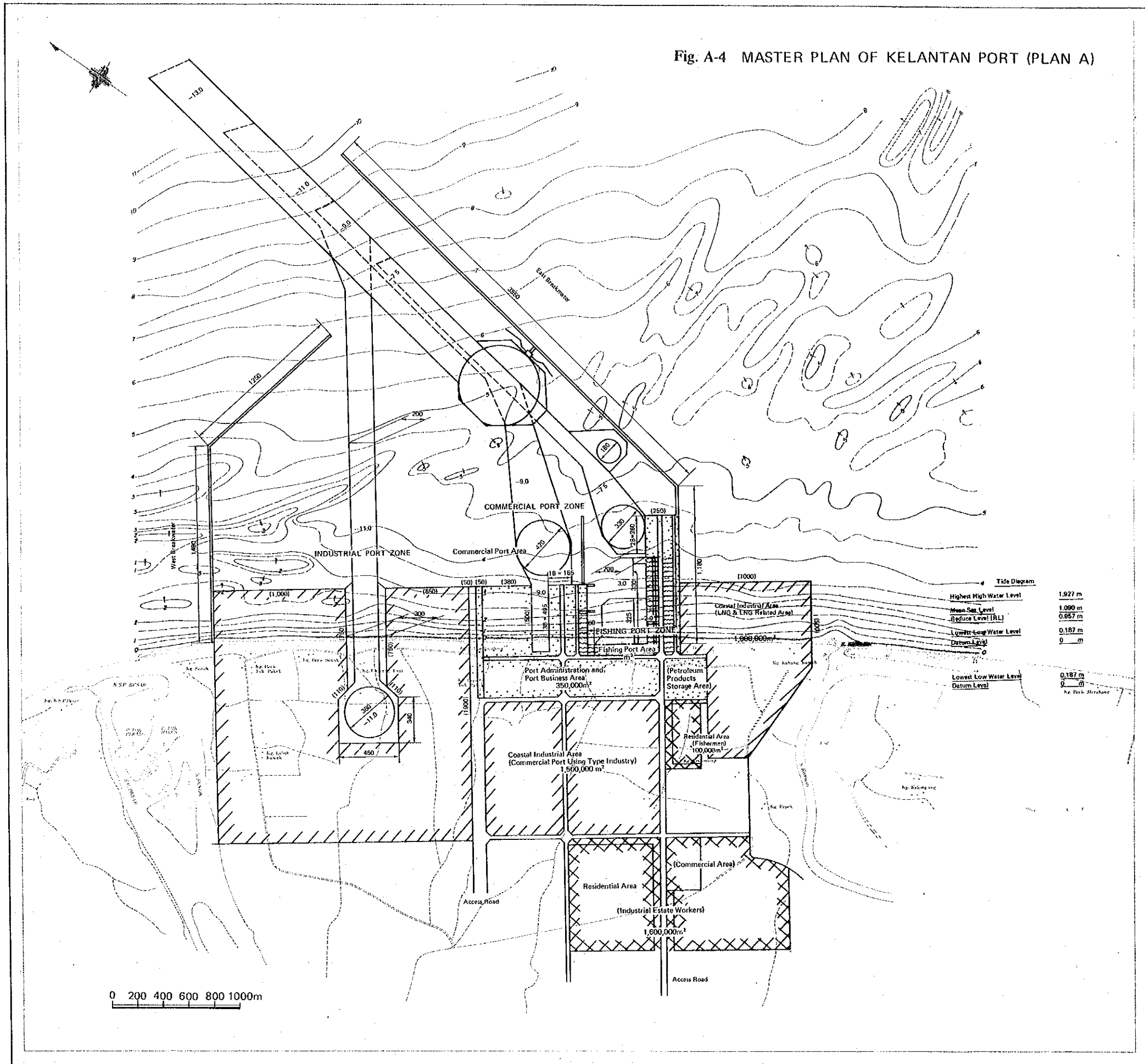| Item No.	Description	Unit	Quantity	Unit Price Local Currency M$	Unit Price Foreign Currency M$	Total Unit Price M$	Amount Local Currency M$1,000	Amount Foreign Currency M$1,000	Amount Total Amount M$1,000
A	Commercial Port Zone Facilities								
A-1	Seawall	m	1,250	3,600	1,600	5,200	4,500	2,000	6,500
A-2	Breakwater	m	1,300	8,400	4,000	12,400	10,920	5,200	16,120
A-3	Groin	m	1,150	3,800	1,200	5,000	4,370	1,380	5,750
A-4	Dredging/Reclamation	m³	1,900,000	0.9	3.1	4	1,710	5,890	7,600
A-5	−7.5 m Quay	m	260	2,800	15,300	18,100	728	3,978	4,706
A-6	Transit Shed	m²	4,800	100	150	250	480	720	1,200
A-7	Building	m²	2,400	250	100	350	600	240	840
A-8	Oil Tank (Palm Oil)	sum	1				340	510	850
A-9	Port Road	m²	87,000	33	2	35	2,871	174	3,045
A-10	Access Road	m²	31,000	37	3	40	1,147	93	1,240
A-11	Asphalt Pavement	m²	9,000	28	2	30	252	18	270
A-12	Green Area	m²	4,000	10	0	10	40	0	40
A-13	Drainage	sum	1				2,729	924	3,653
A-14	Water Supply	sum	1				310	734	1,044
A-15	Electric Power Supply	sum	1				447	1,156	1,603
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				185	957	1,142
A-20	Land Acquisition	m²	138,000	4	0	4	552	0	552
A-21	Sales Tax (5%)	sum	1				1,597	0	1,597
	Sub Total (A)						34,078	26,874	60,952
B	Fishing Port Zone Facilities								
B-1	−2.0 m Quay	m	175	2,400	1,900	4,300	420	333	753
B-2	−3.0 m Quay	m	290	3,100	2,500	5,600	899	725	1,624
B-3	Slip Way	sum	1				400	200	600
B-4	Wholesale Market/Office	m²	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	m²	12,000	33	2	35	396	24	420
B-9	Asphalt Pavement	m²	19,000	28	2	30	532	38	570
B-10	Drainage	sum	1				838	297	1,135
B-11	Water Supply	sum	1				166	280	446
B-12	Electric Power Supply	sum	1				59	208	267
B-13	Mobilization/Demobilization	sum	1				40	100	140
B-14	Land Acquisition	m²	70,000	4	0	4	280	0	280
B-15	Sales Tax (5%)	sum	1				303	0	303
	Sub Total (B)						6,649	5,929	12,578
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				2,117	3,292	5,409
C-3	Mobilization/Demobilization	sum	1				35	86	121
C-4	Land Acquisition	m²	195,000	4	0	4	780	0	780
C-5	Sales Tax (5%)	sum	1				122	0	122
	Sub Total (C)						3,344	3,778	7,122
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 Contengency (15%)								
E-1	Physical contingency ((A+B)×15%)	sum	1				6,109	4,921	11,030
E-2	Physical Contingency (C×15%)	sum	1				501	567	1,068
	Sub Total (E)						6,610	5,488	12,098
	Total (A+B+D+E−1)						48,646	39,084	87,730
	Total (A+B+C+D+E)						52,491	43,429	95,920
							54.7 %	45.3 %	100 %
F	Training Wall	sum	1						7,700
	Total (A+B+C+D+E+F)								103,620

Fig. A-3 THE FIRST PHASE DEVELOPMENT PLAN
OF
KELANTAN PORT
(PLAN B)

Table A-9 Construction Cost of the First Phase Development Plan (Plan B)

Item No.	Description	Unit	Quantity	Unit Price Local Currency M$	Unit Price Foreign Currency M$	Total Unit Price M$	Amount Local Currency M$1.000	Amount Foreign Currency M$1.000	Total Amount M$1.000
A	Commercial Port Zone Facilities								
A-1	Seawall	m	1,050	3,400	1,600	5,000	3,570	1,680	5,250
A-2	Breakwater	m	1,500	7,900	3,700	11,600	11,850	5,550	17,400
A-3	Groin	m	950	3,700	1,100	4,800	3,515	1,045	4,560
A-4	Dredging/Reclamation	m³	1,800,000	0.9	3.1	4	1,620	5,580	7,200
A-5	–7.5 m Quay	m	260	2,800	15,300	18,100	728	3,978	4,706
A-6	Transit Shed	m²	4,800	100	150	250	480	720	1,200
A-7	Building	m²	2,400	250	100	350	600	240	840
A-8	Oil Tank (Palm Oil)	sum	1				340	510	850
A-9	Port Road	m²	71,000	33	2	35	2,343	142	2,485
A-10	Access Road	m²	31,000	37	3	40	1,147	93	1,240
A-11	Asphalt Pavement	m²	9,000	28	2	30	252	18	270
A-12	Green Area	m²	4,000	10	0	10	40	0	40
A-13	Drainage	sum	1				2,465	835	3,300
A-14	Water Supply	sum	1				298	702	1,000
A-15	Electric Power Supply	sum	1				433	1,110	1,543
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				183	950	1,133
A-20	Land Acquisition	m²	138,000	4	0	4	552	0	552
A-21	Sales Tax (5%)	sum	1				1,508	0	1,508
	Sub Total (A)						32,224	26,053	58,277
B	Fishing Port Zone Facilities								
B-1	–2.0 m Quay	m	175	2,400	1,900	4,300	420	333	753
B-2	–3.0 m Quay	m	290	3,100	2,500	5,600	899	725	1,624
B-3	Slip Way	sum	1				400	200	600
B-4	Wholesale Market/Office	m²	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	m²	12,000	33	2	35	396	24	420
B-9	Asphalt Pavement	m²	19,000	28	2	30	532	38	570
B-10	Drainage	sum	1				838	297	1,135
B-11	Water Supply	sum	1				166	280	446
B-12	Electric Power Supply	sum	1				59	208	267
B-13	Mobilization/Demobilization	sum	1				40	100	140
B-14	Land Acquisition	m²	70,000	4	0	4	280	0	280
B-15	Sales Tax (5%)	sum	1				303	0	303
	Sub Total (B)						6,649	5,929	12,578
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				2,117	3,292	5,409
C-3	Mobilization/Demobilization	sum	1				35	86	121
C-4	Land Acquisition	m²	195,000	4	0	4	780	0	780
C-5	Sales Tax (5%)	sum	1				122	0	122
	Sub Total (C)						3,344	3,778	7,122
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)×15%)	sum					5,829	4,796	10,625
E-2	Physical Contingency (C×15%)	sum					501	567	1,068
	Sub Total (E)						6,330	5,363	11,693
	Total (A+B+D+E–1)						46,512	38,138	84,650
	Total (A+B+C+D+E)						50,357	42,483	92,840
							54.2 %	45.8 %	100 %
F	Training Wall	sum							7,700
	Total (A+B+C+D+E+F)								100,540

Fig. A-4 MASTER PLAN OF KELANTAN PORT (PLAN A)
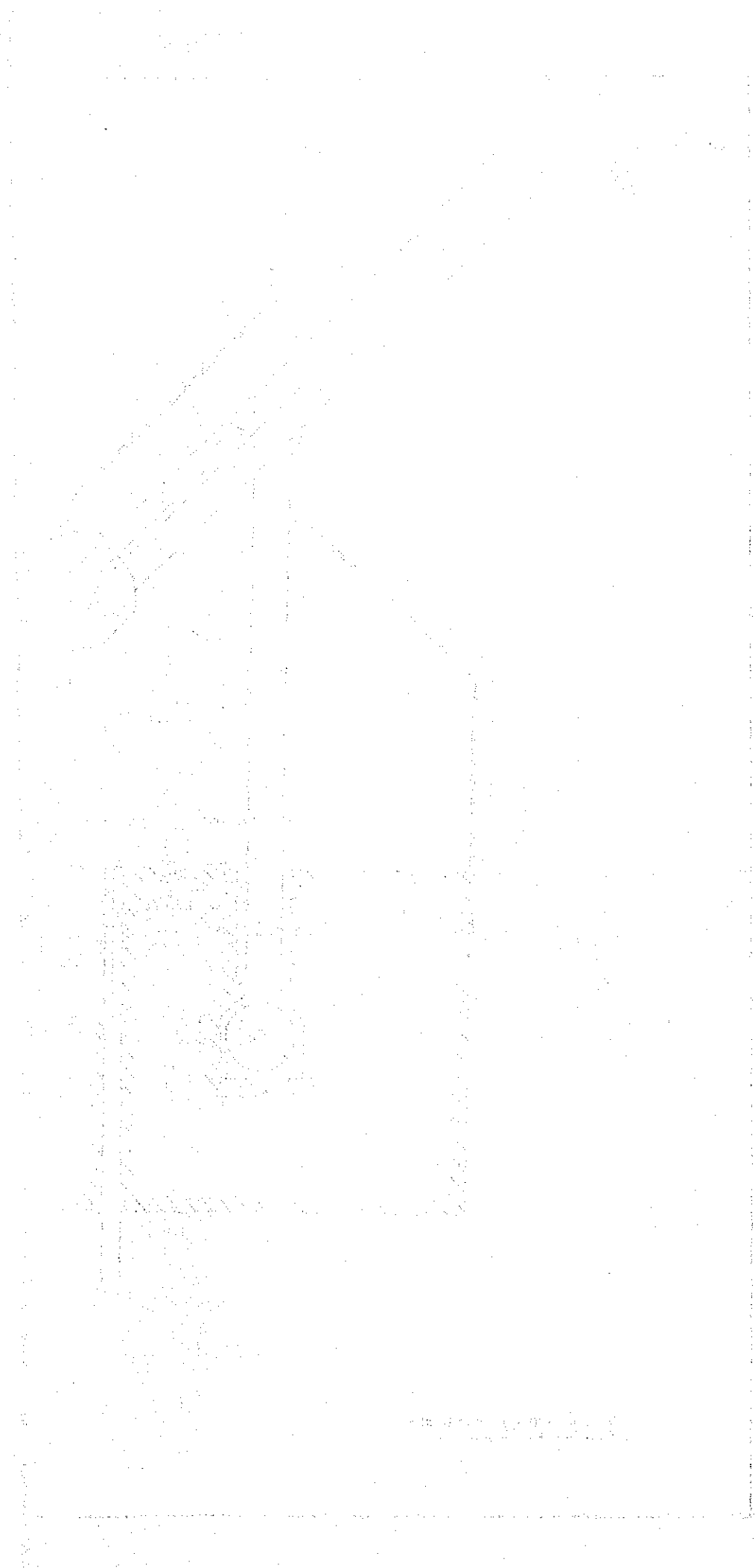
Table A-10 Construction Cost of Master Plan (Plan A)

Item No.	Description	Unit	Quantity	Unit Price MS	Amount MS 1,000
A	Commercial Port Zone Facilities				
A-1	Seawall	m	3,500	4,100	14,350
A-2	Breakwater	m	3,800	16,600	63,080
A-3	Groin	m	1,250	5,000	6,250
A-4	Dredging/Reclamation	m³	5,300,000	4	21,200
A-5	–7.5m Quay	m	260	18,100	4,706
A-6	–9.0m Quay	m	660	22,700	14,982
A-7	Transit Shed	m²	27,000	250	6,750
A-8	Building	m²	12,000	350	4,200
A-9	Oil Tank (Plan Oil)	sum	1		1,280
A-10	Port Road	m²	480,000	35	16,800
A-11	Access Road	m²	95,000	40	3,800
A-12	Asphalt Pavement	m²	36,000	30	1,080
A-13	Green Area	m²	196,000	10	1,960
A-14	Drainage	sum	1		18,265
A-15	Water Supply	sum	1		2,610
A-16	Electric Power Supply	sum	1		2,830
A-17	Navigation Aids	sum	1		3,300
A-18	Port Service Vessels	sum	1		2,850
A-19	Cargo Handling Equipment/Vehicles	sum	1		1,500
A-20	Mobilization/Demobilization	sum	1		2,638
A-21	Land Acquisition	m²	550,000	4	2,200
A-22	Sales Tax (5%)	sum	1		5,443
	Sub Total (A)				202,074
B	Fishing Port Zone Facilities				
B-1	–2.0m Quay	m	325	4,300	1,398
B-2	–3.0m Quay	m	330	5,600	1,848
B-3	Slip Way	sum	1		600
B-4	Wholesale Market/Office	m²	8,000	350	2,800
B-5	Cold-storage/Freezing Facilities	sum	1		5,600
B-6	Ice Factory/Ice Storage Facilities	sum	1		3,600
B-7	Oil Tank (Movable)	sum	1		80
B-8	Port Road	m²	18,000	35	630
B-9	Asphalt Pavement	m²	38,000	30	1,140
B-10	Drainage	sum	1		1,703
B-11	Water Supply	sum	1		580
B-12	Electric Power Supply	sum	1		400
B-13	Mobilization/Demobilization	sum	1		269
B-14	Land Acquisition	m²	170,000	4	680
B-15	Sales Tax (5%)	sum	1		507
	Sub Total (B)				21,835
C	Private Port Facilities				
C-1	–5.0m Oil Dolphin Berth	berth	2	690,000	1,380
C-2	Oil Supply	sum	1		27,100
C-3	Mobilization/Demobilization	sum	1		296
C-4	Land Acquisition	m²	195,000	4	780
C-5	Sales Tax (5%)	sum	1		563
	Sub Total (C)				30,119
D	Industrial Port Facilities				
D-1	Seawall	m	4,940	4,900	24,206
D-2	Breakwater	m	2,340	6,700	15,678
D-3	Dredging/Reclamation	m³	15,600,000	4	62,400
D-4	–11.0m Quay	m	1,470	41,600	61,152
D-5	–13.0m LNG Dolphin Berth	berth	1	5,500,000	5,500
D-6	Mobilization/Demobilization	sum	1		4,380
D-7	Land Acquisition	m²	6,714,000	4	26,856
D-8	Sales Tax (5%)	sum	1		3,417
	Sub Total (D)				203,589
E	Engineering				
E-1	Natural Conditions Survey	sum	1		1,700
E-2	Engineering Study	sum	1		1,600
E-3	Supervision	sum	1		7,800
	Sub Total (E)				11,100
F	Physical Contingency (15%)	sum	1		68,583
	Total (A+B+C+D+E+F)				537,300
G	Training Wall	sum	1		7,700
	Total (A+B+C+D+E+F+G)				545,000

Fig. A-5 MASTER PLAN OF KELANTAN PORT (PLAN B)
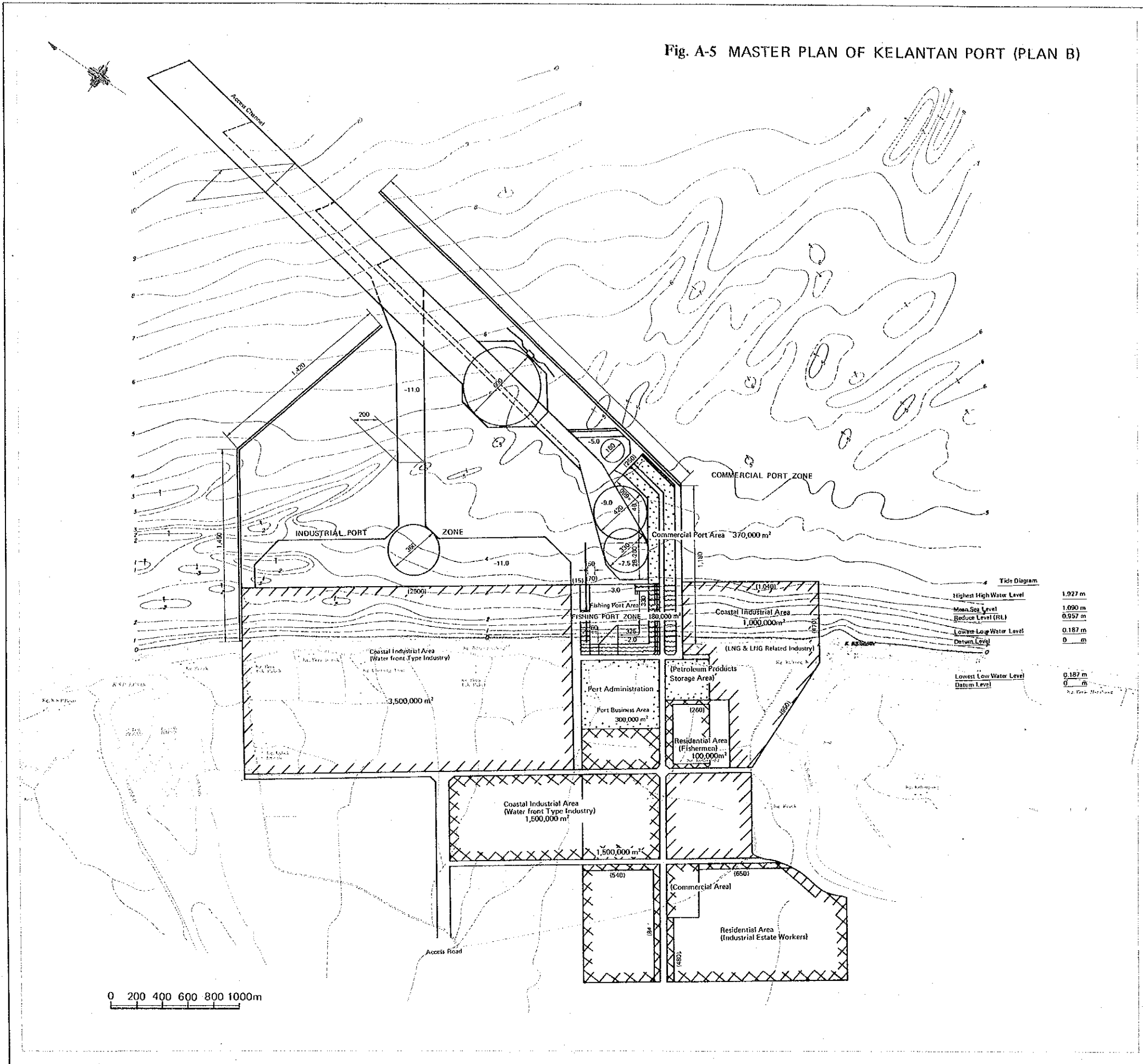
Table A-11 Construction Cost of Master Plan (Plan B)

Item No.	Description	Unit	Quantity	Unit Price MS	Amount MS 1,000
A	Commercial Port Zone Facilities				
A-1	Seawall	m	2,970	6,000	17,820
A-2	Breakwater	m	2,810	16,700	46,927
A-3	Groin	m	1,050	4,800	5,040
A-4	Dredging/Reclamation	m³	3,300,000	4	13,200
A-5	-7.5m Quay	m	260	18,100	4,706
A-6	-9.0m Quay	m	660	22,700	14,982
A-7	Transit Shed	m²	27,000	250	6,750
A-8	Building	m²	12,000	350	4,200
A-9	Oil Tank (Palm Oil)	sum	1		1,280
A-10	Port Road	m²	410,000	35	14,350
A-11	Access Road	m²	108,000	40	4,320
A-12	Asphalt Pavement	m²	36,000	30	1,080
A-13	Green Area	m²	263,000	10	2,630
A-14	Drainage	sum	1		16,500
A-15	Water Supply	sum	1		2,500
A-16	Electric Power Supply	sum	1		2,650
A-17	Navigation Aids	sum	1		3,300
A-18	Port Service Vessels	sum	1		2,850
A-19	Cargo Handling Equipment/Vehicles	sum	1		1,500
A-20	Mobilization/Demobilization	sum	1		2,553
A-21	Land Acquisition	m²	430,000	4	1,720
A-22	Sales Tax (5%)	sum	1		4,750
	Sub Total (A)				175,608
B	Fishing Port Zone Facilities				
B-1	-2.0m Quay	m	325	4,300	1,398
B-2	-3.0m Quay	m	330	5,600	1,848
B-3	Slip Way	sum	1		600
B-4	Wholesale Market/Office	m²	8,000	350	2,800
B-5	Cold-storage/Freezing Facilities	sum	1		5,600
B-6	Ice Factory/Ice Storage Facilities	sum	1		3,600
B-7	Oil Tank (Movable)	sum	1		80
B-8	Port Road	m²	18,000	35	630
B-9	Asphalt Pavement	m²	38,000	30	1,140
B-10	Drainage	sum	1		1,703
B-11	Water Supply	sum	1		580
B-12	Electric Power Supply	sum	1		400
B-13	Mobilization/Demobilization	sum	1		269
B-14	Land Acquisition	m²	170,000	4	680
B-15	Sales Tax (5%)	sum	1		507
	Sub Total (B)				21,835
C	Private Port Facilities				
C-1	-5.0m Oil Dolphin Berth	berth	2	690,000	1,380
C-2	Oil Supply	sum	1		27,100
C-3	Mobilization/Demobilization	sum	1		296
C-4	Land Acquisition	m²	195,000	4	780
C-5	Sales Tax (5%)	sum	1		563
	Sub Total (C)				30,119
D	Industrial Port Facilities				
D-1	Seawall	m	2,940	6,000	17,640
D-2	Breakwater	m	2,470	6,800	16,796
D-3	Dredging/Reclamation	m³	16,400,000	4	65,600
D-4	-11.0m Quay	m	1,470	41,600	61,152
D-5	-13.0m LNG Dolphin Berth	berth	1	5,500,000	5,500
D-6	Mobilization/Demobilization	sum	1		4,380
D-7	Land Acquisition	m²	6,895,000	4	27,580
D-8	Sales Tax (5%)	sum	1		3,262
	Sub Total (D)				201,910
E	Engineering				
E-1	Natural Conditions Survey	sum	1		1,700
E-2	Engineering Study	sum	1		1,600
E-3	Supervision	sum	1		7,800
	Sub Total (E)				11,100
F	Physical Contingency (15%)	sum	1		64,428
	Total (A+B+C+D+E+F)				505,000
G	Training Wall	sum	1		7,700
	Total (A+B+C+D+E+F+G)				512,700

Fig. A-6 Standard Cross Section of West Breakwater (B=11.50).

Armor Stone (1t)

+3.80
+2.60
1:4/3

1.25
1.00 1.00
B=11.50
7.50
5.50
4.00
1.00
1.00
2.30
5.00
2.00

+4.50
+3.10
1:4/3
0.90
D.L.±0.00

Rubble (50～200 kg)
Existing Sea Bed −4.50

Armor Stone (2t)
H.H.W.L +1.927
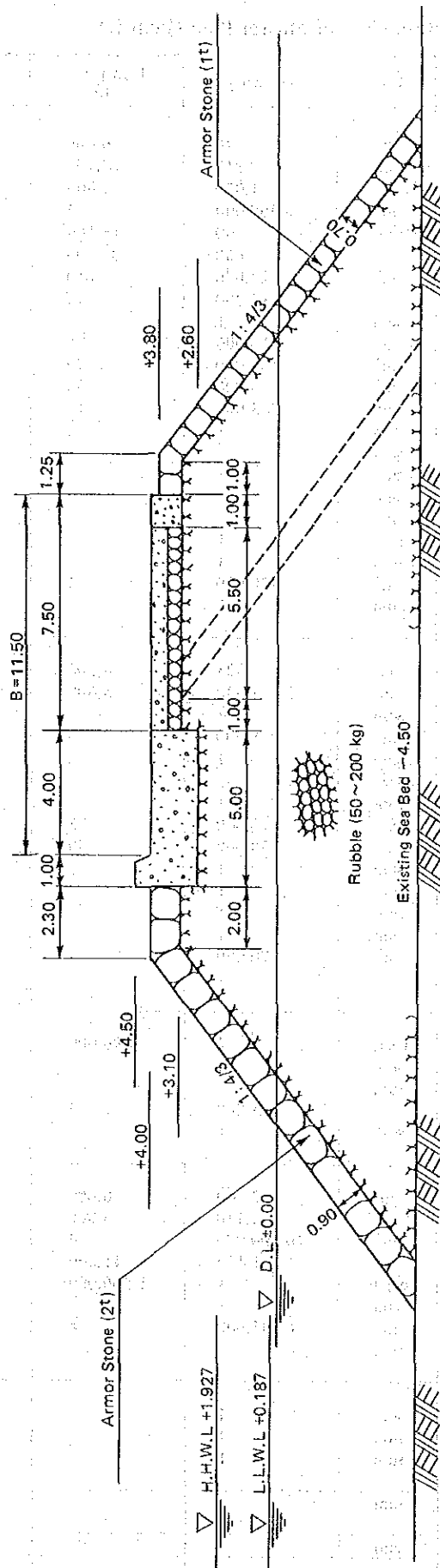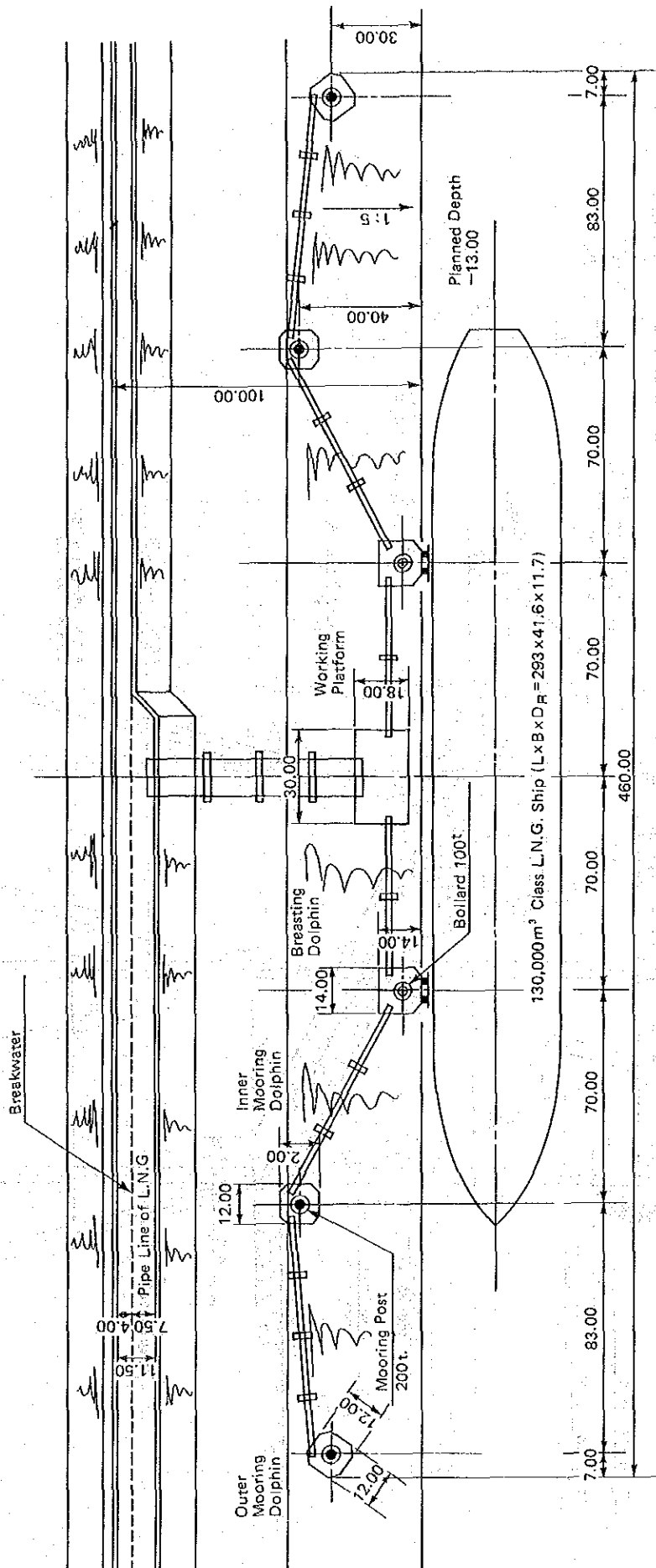L.L.W.L +0.187

−320−

Fig. A-7 Standard Cross Section of −11.0m Quay (P.C Pile Type)

Fig. A-8 Plan of −13.0m L.N.G. Dolphin Berth

II. COASTAL INDUSTRIAL ESTATE

Suitable industries in the coastal industrial complex are as follows:

① Industries based on agriculture, forestry and fishery: Manufacture of rubber goods, palm oil, kernel oil, paper and pulp, lumber, wooden products, furniture, foodstuffs, etc.

② Industries related to natural resources that will be developed in the future, such as natural gas and mineral resources: Manufacture of liquefied natural gas, fertilizers, methanol, cement, etc.

③ Industries related to consumer goods and construction materials: Manufacture of flour, forage, daily necessities, machinery, textiles, spices, ceramics, etc.

The planned scale of the coastal industrial estate expected to comprise these industries should be studied, and precisely determined after the economic frame of the year 2000 is set by the future Malaysia Plan. In this study, since the economic frame for the year 2000 has not been authorized by the Federal Government yet, the scale of the coastal industrial estate is determined to be 500 ha, by taking the following conditions into account:

① Industrialization policy of the Federal and State Government will continue until the year 2000 in Kelantan

② Estimation of the potential scale of the industrial estate from the Kelantan's economy in the year 2000

③ Location of two rivers, the River Peng, Datu and Kemasin

④ Conditions of water-front type industries' location

⑤ Scale of Pengkalan Chepa Industrial Estate Phase II development (1,000 acres)

⑥ Present situation of waterfront and commercial-port-using type industries in the coastal industrial zone in Japan

70 percent of the site is to be used for waterfront type industries, and 30 percent of it for commercial-port-using type industries. The former need industrial port facilities on their own yards to handle raw materials and products, while the latter can obtain economic merits by loading and discharging and products at the commercial port.

The value of output and value added are estimated at M$ 1930 million and M$ 480 million in 1970 prices, respectively, with reference to the values production of Japanese coastal industrial factories, etc.

JICA