

REPORT
ON
THE CONSTRUCTION OF PIERS AND PILES
IN THE EAST COAST OF EAST AFRICA

BY
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Foreword

In compliance with the request of the Malaysian Government, the Japanese Government agreed to undertake a survey for the construction of fishing ports in the East Coast of West Malaysia as a part of its overseas economic and technical cooperation services. The survey project was commissioned, under appropriation from the fiscal 1968 budget of the Japanese Government, to the Overseas Technical Cooperation Agency, an executing organ of the Japanese Government.

The Agency dispatched a 8-man survey team headed by Mr. Masao Akai of the Planning Division, Fishery Administration Department, Fishery Agency, to Malaysia from January 27 to March 8, 1969 for a basic survey of general fishery conditions of West Malaysia and the selection of suitable construction sites of fishing ports in the East Coast of the country.

The findings of the survey were compiled into an interim report which was submitted to the Malaysian Government before the Team's departure from Malaysia. Upon arrival in Japan, the Team made further studies based on data and information obtained during the survey, and prepared this report which is presented herewith as the "Report on the Construction of Fishing Ports in the East Coast of West Malaysia.

We would be more than pleased if this report proves useful in contributing to the promotion of the Malaysian fishing industry and to the desired construction of fishing ports in the East Coast, and serves to help developing the Malaysian economy and enhance the amity between our two countries.

Taking this opportunity, we should like to express our heartfelt appreciation to the officials concerned of the Malaysian Government whose unlimited cooperation has been most valuable in the execution of the survey.

August 1969

Respectfully submitted,



Keiichi Tatsuke
Director General
Overseas Technical
Cooperation Agency

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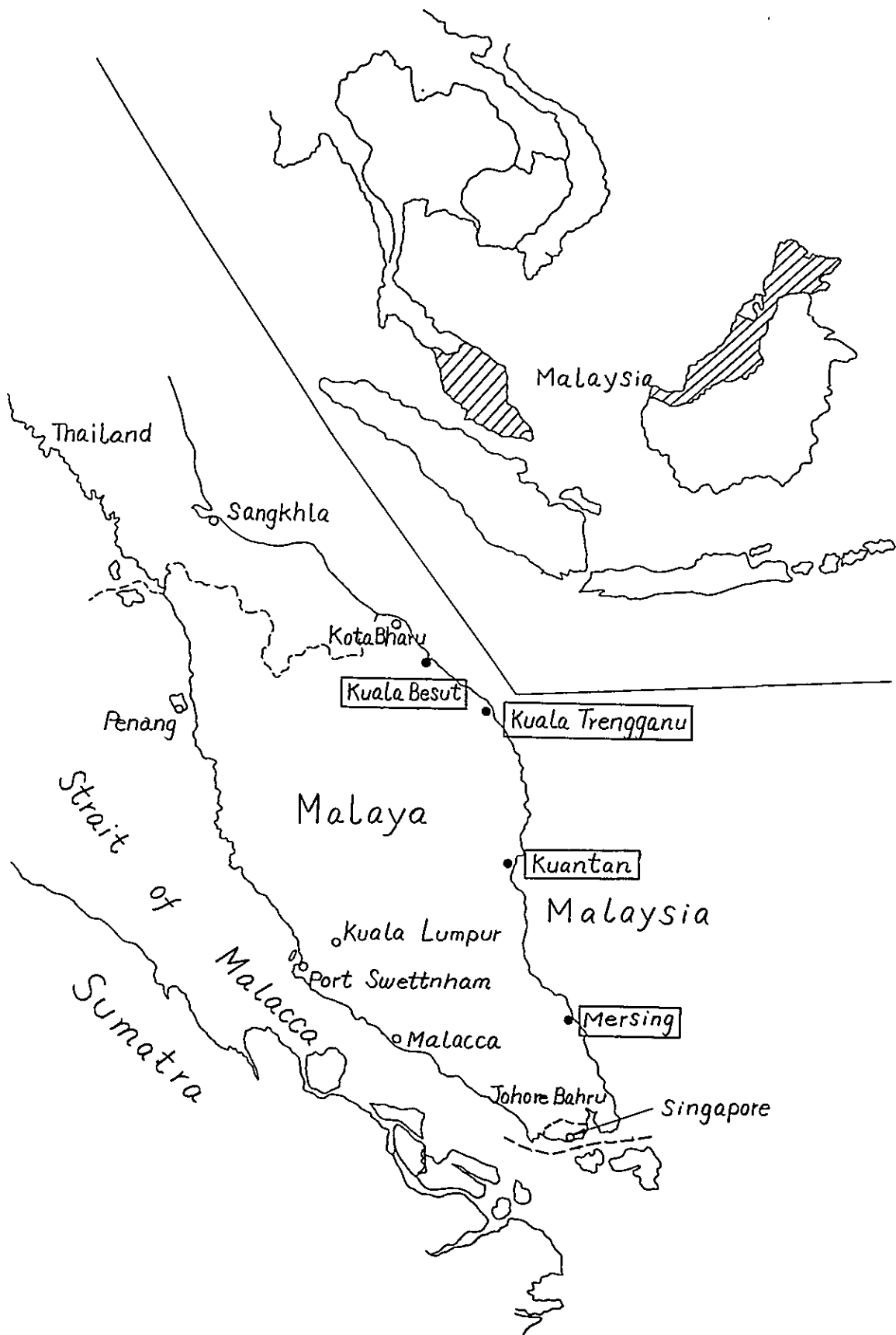
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Location Map

Introduction

1. Backgrounds

The fishing port construction scheme in Malaysia is part of the fishery development schemes forming a link in the Primary Malaysian Development Plan, and the fishing port construction scheme has already been decided on for the West Coast.

In the East Coast, however, the fishing port construction scheme has not yet been decided on. The Malaysian Government recognizes the need to construct at least one port as soon as possible. For this purpose, the Malaysian Government asked the Japanese Government in October of 1968 to carry out the survey on fishing port construction in the East Coast at an earliest occasion as well as to present recommendations on the most suitable scheme for fishing port construction.

The Japanese Government, on the basis of this request, dispatched a Survey Team in January of 1969 in order to make a survey on the planned fishing port construction in the East Coast of West Malaysia.

The dispatch of the Survey Team were commissioned to the Overseas Technical Cooperation Agency, an executing organ of the Japanese Government.

2. Purpose and Scope of Survey

The purpose of the present survey is to make a basic survey for constructing fishing ports at the proposed sites in the East Coast of West Malaysia selected by the Malaysian Government such as Kuala Besut, Kuantan, Mersing and Kuala Trengganu, to draw a conclusion on the suitable sites and to decide on their priority-order, and to estimate the rough cost of construction due to the fishing port scale and the area design at the four areas surveyed.

In the next survey, the following are expected to be carried out: fact-finding on fish-landings and marketing; topographical survey; sounding; soil survey including boring if necessary; sand drift survey; a feasibility survey including outline design and estimate of construction cost.

To achieve the survey purpose, the following matters were surveyed:

- (1) Prediction of the demand-and-supply trend of fishery products;
- (2) Goal of the fishery development and types of the coastal and offshore fisheries to be promoted and the size thereof;

- (3) Marketing and processing facilities for fishery products;
- (4) Determination of the areas and points where the fishing ports are to be constructed;
- (5) Determination of the nature of fishing ports and of the facility scale;
- (6) Layout plan of the fishing port facilities and rough estimate of cost;
- (7) Transportation of general goods;
- (8) Fishery development scheme by the Malaysian Government;

3. Formation of Survey Team

<u>Name</u>	<u>Belonging to</u>	<u>Assignment</u>
Chief, Masao Akai	Planning Division, Fishery Administration Department, Fishery Agency (F.A.)	Overall control
Member, Shigeo Kimura	Construction Division, Fishing Port Department, F.A.	General in connection with fishing port
” Shunichi Hozumi	Fishery Products Division, Fishery Administration Department, F.A.	General in connection with fisheries
” Matsuo Takahashi	The Japan Harbour Con- sultant Co., Ltd.	Fishing port facilities
” Hideo Asami	The National Federation of Fishermen’s Cooperative Associations	Marketing and processing
Member, Masatsugu Fukuya	Planning Division, Fishing Port Department, F.A.	Fishing port planning
” Koji Mitsuhashi	Agricultural Engineering Experimental Station	Analysis on hydrography
” Hachiro Kamiyama	Overseas Technical Cooperation Agency	Liaison

4. Activities of Survey Team

The Survey Team, on and after their arrival in Kuala Lumpur on 27 January 1969, repeatedly arranged or considered how to enforce the survey with in-charge officials concerned of respective organs of the Malaysian Government. Responding to the request of the Malaysian Government, one survey-site (Kuala Trengganu) and one inspection area (the Straits of Johore) were added to the originally selected sites of Kuala Besut, Kuantan and Mersing.

In the field survey, the Survey Team was divided into two groups: One was engaged mainly in the survey on fishing port construction and the other in the fishery production and marketing.

After finishing the survey, the Survey Team arranged the survey results into a summary in English, which was submitted as an interim report to the Malaysian Government, and left Kuala Lumpur for Japan on March 3. The Survey Team also conducted a survey on the fishing ports and affiliated facilities thereof in the Jurong area of Singapore and in Songkhla and Sumut Sakhon, Thailand.

Itinerary of Survey Team

- Jan. 27 The Survey Team left Tokyo International Airport at 09:00 and arrived in Kuala Lumpur at 17:55. Made arrangements for the survey with the Japanese Embassy.
- ” 28 Paid a courtesy visit to Ambassador Kojima at the Japanese Embassy. Confirmed the scope of survey and made arrangements for the team's activities with the Director and the Vice Director, Fishery Division at the Ministry of Agriculture and Cooperatives.
According to the request of the Malaysian Government, for addition to the originally selected survey sites, the following sites were supplemented: 1 survey-site, i.e. Kuala Trengganu and 1 inspection-area, i.e. the Straits of Johore.
- ” 29 Received a briefing of the answers to the questionnaire and considered the various data submitted by the Malaysian Government, at the Ministry of Agriculture and Cooperatives.
- ” 30 Completed the study of the answers to the questionnaire and of the data submitted by the Malaysian Government.
- ” 31 Moved from Kuala Lumpur to Penang. Made arrangements for the team's activities with the Director of Fishery Institute and its Fishery Officer. Made an inspection of the Fishery Institute, fishermen's training facilities and Malaysian-Japanese Joint Fishery Co., Ltd. Received a briefing of the general condition at the Penang Fishermen's Cooperative Association and made a reconnaissance of the trawl fishing base.

- Feb. 1 Because of the demise of Penang State Governor on the previous day, the Government staff had a holiday. Made an inspection of the Penang harbour facilities.
- ” 2 Moved from Penang to Singapore.
- ” 3 Paid a courtesy visit at the Japanese Embassy. Made arrangements for the team’s activities with Mr. Teo Tech Hiang, Vice Director and other officers at the Primary Industry Division of Singapore Government, received a briefing of the overall fishery condition, and inspected the fish-landing place, fishing boat repairing facilities, etc.
- ” 4 Made an inspection of the fish market “Ellenborough” early in the morning. Made an inspection of the newly-built fishing port and its affiliated facilities in the area of Juron. Visited the Southeast Asian Fishery Development Centre.
- ” 5 Resurveyed the fishing ports in the Juron area. Moved from Singapore to Kuala Lumpur.
- ” 6 Made an inspection of the wholesale and retail markets early in the morning. Received a briefing on the fishery product marketing at FAMA. Made a checking of machines and equipment for surveying the East Coast.
- ” 7 Moved from Kuala Lumpur to Kuantan.
Made arrangements for the team’s activities with Mr. Balachandran, fishery officer and received a briefing of the overall fishery condition.
- ” 8 Exchanged greetings with the Assistant Secretary at the Government of Pahang State. Received a briefing of the relationship between fishing port construction and town planning, natural conditions for locating fishing port, availability of materials, overall fishery condition and the outline of fishermen’s cooperatives, from the officers in charge of town planning, D.I.D. and P.W.D., the officer in charge of cooperatives, the Ministry of Agriculture and Cooperatives and Mr. Balachandran, respectively. Made a survey on the land of the sites suitable for constructing fishing ports and then an inspection of the piers and bridges in the neighbourhood.
- ” 9 Made an on-the-sea surveys of the suitable sites for fishing ports, and further made an on-the-land survey; made a measurement of the incline of sea-bed. Arranged and studied the results obtained.

- Feb. 10 Received a briefing of the weather conditions, sea conditions and the unit costs of materials for constructing fishing ports and others, from the officers in charge of weather observatories and P.W.D., respectively; after that, made plans based on the previous day's survey. Made an inspection of the fish-landing place, fish market, ice-making and cold-storage facilities, and then arranged and considered the results thereof.
- Feb. 11 Made an on-the-land inspection of the sites suitable for constructing fishing ports at the ebb-tide early morning. Made a survey of the fish-landing place and its neighbourhood and a survey on the sea of the river-mouth and its neighbourhood at Kemmaman.
- " 12 Moved to Kuala Trengganu. Made arrangements for the team's activities with the Vice Director of Fishery Division, the fishery officer and his assistant fishery officer of Trengganu State, etc. Made an inspection of fish-landing place, land facilities and the suitable sites.
- " 13 Paid a courtesy visit to the State Secretary at the Trengganu State Government. After that, received a briefing of the development schemes, natural conditions and overall fishery conditions from the officers in charge of development, D.I.D. and P.W.D. and the fishery officer, respectively. Made surveys on the land and on the sea at Chenering.
- " 14 Made an on-shore survey of Chenering at the ebb-tide early morning.
Moved to Kuala Besut.
Made an inspection of the fish-landing place, cold-storage facilities, processing plant and the river-mouth of Besut.
Exchanged opinions with the Vice Director of Fishery Division.
- " 15 Made an inspection of piers on the Besut River at ebb-tide.
Received a briefing of the town planning, natural conditions of location, building conditions and the overall fishery condition, from Mr. Wan Klalid, district officer, the officer in charge of D.I.D. and the assistant fishery officer, respectively. Made a plumbing of the river-mouth of the Besut River and its neighbourhood.
Moved to Kota Bharu, and made an inspection of the quarry in the neighbourhood.
- " 16 Moved from Kota Bharu to Kuala Lumpur.
Arranged and considered the survey result.
- " 18 Moved from Kuala Lumpur to Mersing.

- Feb. 18 Moved from Kuala Lumpur to Mersing.
Received a briefing of the overall fishery condition from the fishery officer of Johore State. Made an inspection of the fish-landing place and its neighbourhood.
- ” 19 Made an inspection of the fish-landing place, cold-storage facilities, etc.
Made surveys on the land and the sea of the suitable sites. Received a briefing of the overall fishery condition.
- ” 20 Received a briefing of the overall fishery condition, natural conditions of location and building conditions, from the fishery officer and the officers in charge of D.I.D. and P.W.D., respectively.
Made a survey of the suitable sites in Tg. Selantai.
- ” 21 Moved from Mersing to Johore Bharu.
Made an inspection of the east part of the Johore Straits. Exchanged views with the Director of Fishery Division.
- ” 22 Visited the Johore State Government with the Director of Fishery Division and exchanged greetings with the State Secretary; after that, received a briefing of the development schemes, natural conditions of location, building conditions, etc., from the officers in charge of development, D.I.D. and P.W.D., respectively.
Moved to Kuala Lumpur via Singapore.
Attended the reception held by the Minister of Agriculture and Cooperatives.
- ” 23 Arranged and considered the results of survey.
- ” 24 Made arrangements for the contents of interim report, date of its submission, etc. at the Fishery Division; decided to submit the interim report on March 1. Asked for presentation of supplementary information.
Began to prepare the interim report at this time. Obtained lacking materials and arranged all the available materials.
- ” 26 to
27 Carried on the preparation of the interim report.
- ” 28 Finished the preparation of the interim report.
- Mar. 1 Submitted the interim report to the Malaysian Government and exchanged questions and answers.
Visited the Japanese Embassy and greet the embassy staff before the team's departure for home.
- ” 2 Made an inspection of Malacca Port
Made preparations for returning to Japan.

- Mar. 3 Moved from Kuala Lumpur to Penang.
 Made a survey of the fishing boat and the fishermen's cooperative.
- " 4 Moved from Penang to Songkhla of Thailand.
 Telephoned to the Japanese Embassy in Thailand but could not contact them because of noises.
 Made an inspection of the fish market, cold-storage facilities and the nearest fishing village.
 Received a briefing of the overall condition, from the Director, Research Division of Fishery Department.
- " 5 Made an inspection of harbour facilities.
 Moved from Songkhla to Bangkok.
- " 6 Made an inspection of the wholesale market and the retail market in Bangkok.
 Received a briefing of the overall condition about F.M.O. and marketing. Received a briefing of the removal of the Bangkok wholesale market from the Director of Fishery Department at the Fishery Department.
 Received a briefing of the overall fishery condition and the actual condition of the Southeast Asian Fishery Development Centre; from Messrs. Ino and Nomura of this Centre.
- " 7 Visited the Japanese Embassy to offer greeting. Visited Samut Sakhon in the suburbs of Bangkok, and made an inspection of the affiliated facilities and the building site of the Southeast Asian Fishery Development Centre.
- " 8 Left Bangkok for Japan.

SUMMARY AND RECOMMENDATIONS

Summary and Recommendations

1. Gist

The Malaysian Government, supposing that the rubber and tin industries as nuclear ones in Malaysia will fail to go on developing favourably as in the past due to the international change of demand and supply, drew up a five-year national development scheme (Primary Malaysian Development Plan – 1966 to 1970) with the intention to cope with this situation. The implementation of a number of counter-measures is now under way.

As regards the status of fishing industry in the Malaysian economy, it is not very high in terms of output which is not necessarily great as compared with those of other industries, but can be estimated fairly great judging from the actual circumstances that 70 to 80 per cent of the national animal protein intake is provided from fishery products, that the number of persons engaged in the fishing industry is on almost the same level as that in the mining industry, and, that the exports of fishery products has made a contribution to the improvement of the international balance of payments, etc.

Into the Primary Malaysian Development Plan, therefore, is incorporated the fishery development scheme, as a part of which the fishing port development scheme was drawn up. This was, however, planned only for the West Coast, but not for the East Coast; and no projection has yet been set up for the latter.

The fisheries on the East Coast are on a remarkably low level as compared with those on the West Coast as will be detailed in this Report. This is chiefly because the heavy seas or river floods during the northeast monsoons prevent the East Coast fisheries from their activities.

As a result, in order to achieve the fishery development on the East Coast, it is a prior question to construct fishing ports which will provide the basis for the year-round fishery activities. The Malaysian Government recognizes this very well. But a scheme for the fishing port construction in the East Coast was not incorporated into the Primary Malaysian Development Plan, because no sites had been found available for constructing fishing ports there.

Resulting from the present survey, however, it has turned out that there are suitable sites available for constructing fishing ports in respective surveyed areas of the East Coast and, how the fishery development should be orientated in the future has also been clarified. The construction of fishing ports, therefore, should be proceeded with on the basis of the Report.

Kuantan located at about the centre of the East Coast of West Malaysia is expected to become the most important site for constructing fishing ports, because it is found at an important traffic position leading to Kuala Lumpur and Singapore both of which are major consuming-centres in fishery marketing and the development scheme of other industries is now prepared in the hinterland of the fishing port zone.

In other surveyed areas as well, the necessity is realized that the fishing ports suitable for respective areas should be constructed in the future.

It is hoped that these fishing ports will contribute much to the development of fisheries in the East Coast, through functioning effectively in the future.

In addition, it is deemed proper that the priority-order of the measures in the fishery development scheme of the Primary Malaysian Development Plan should be given to the construction of fishing ports first of all, along with the training of fishermen, so far as the East Coast is concerned.

2. Recomendations on Future Development of Fishing Industry in Surveyed Areas

(1) General observation

The general level of the fishing industry along the East Coast of West Malaysia is not so high as compared with the West Coast, due to the lack of investments and to the inferior fishery techniques. However, considering the potentiality of unexploited fishery resources, it is expected that the landing per fisherman on the East Coast would rise up to the same level as the West Coast, if a proper development scheme be implemented effectively and well-equipped fishing ports be provided. The survey-results do not promise any prospect for the development of long-distance fishery in the near future. But if the well-equipped fishing ports for offshore and coastal fisheries be constructed, the offshore resources would be rapidly exploited by introducing large type trawlers & purse seiners, and the productivity of coastal fisheries would also be raised by introducing modern fishery techniques which will make all-year-round fishing operations possible.

Moreover, for the purpose of making easier the development accompanying the construction of fishing ports, it is essential that the Government conduct active surveys on the fishery resources off the East Coast and take proper measures on the basis of the results of these surveys.

Also, to meet the requirements for the marketing of increasing fishcatches, it is necessary to provide cold-storage, fish-meal plants and other processing-plants, and, to provide financial assistance to maintain and operate the above facilities. The above measures will make it easy to control the demand and supply of the increased fishcatches as well as their price.

On the basis of the above observations, it is presumed that well-equipped fishing ports and proper management thereof will result in the rise of fishermen's income and the inducement of private investments in the fishing industry.

Also, as regards the fishermen not only in the East Coast but in the whole area of West Malaysia, it is pointed out that their cooperation-consciousness is very low. This would be one of the biggest causes for the situations that various measures by the Government are compelled to

become ineffective and that the fishery development has been retarded. It is necessary that an energetic leadership be taken for the cooperation of fishermen as well as for bringing up the fishermen's cooperatives.

(2) Goal of Fishery Development in Surveyed Areas

	Kuala Besut Area	Kuala Trengganu Area	Kuantan Area	Mersing Area
Types of fisheries to be developed rapidly	Mainly large type trawlers & purse seiners	Mainly large type trawlers & purse seiners	Mainly large type trawlers & purse seiners	Mainly coastal fisheries & large type purse seiners
Number of fishing boats used	270	300	580	560
Out of the above, number of large type fishing boats (over 30 G.T.)	65	100	300	95
Fish Landings (Unit: tons)	24,800	33,300	93,000	45,400

3. Recommendations on Construction of Fishing Ports

(1) Sites suitable for the construction of fishing ports at respective areas and the reason thereof

At present the fishing ports in respective areas are located at the river mouths. It is very difficult technically and economically to manage and maintain the existing fishing ports, because the anchorage basings or waterway becomes shallow due to the accumulating of the sediments transported out of rivers as well as of the neighborhood drift sand. Therefore, instead of constructing fishing ports by river conservancy works, other proper points were selected as sites for fishing ports. In Kuantan, Kuala Trengganu (Tg. Chenering Area) and Mersing, there are capes which form natural breakwaters for subduing the north-easterly wind and waves during the monsoon seasons.

The inside areas of these capes, therefore, are deemed to be the most suitable sites for constructing fishing ports.

The location of the fishing port sites selected and the reasons for these sites being preferable have been indicated in the following tables.

Sites suitable for fishing port in respective areas and
and the reason therefor

	Kuala Besut	Kuala Trengganu	Kuantan	Mersing	
Suitable sites for fishing ports	The coast north of the river-through	The coast of Tg. Chenering	The coast of Tg. Tembeling	The coast of Tg. Selantai	
Reason for the above	1. Comparatively close to the fishing ground				
	2. For anchoring of fishing boats, calm anchorage is easy to obtain				
	3. Stones for fishing port construction are easy to obtain from nearby, Mersing, breakwaters are not necessary.				
	4. Procurement of the sites for some land-functioning facilities is possible.				
				5. Key point for the transport of fishcatch to Kuala Lumpur and Singapore	5. Comparatively close to the great consuming centre of fishcatch (Singapore).
		6. 1 mile away from the centre of city		6. 2 miles away from the centre of city	
				7. Service for general cargoes is possible.	

Notes: ☒ means there is not found any reason for the sites suitable as fishing port.

(2) Functions of the fishing ports to be constructed

As the fishing ports meeting the requirement of the fishery industry mentioned in section 2, they should be provided with the following minimum functions.

Functions required	Kuala Besut	Kuala Trengganu	Kuantan	Mersing
1. Fishing operations	o	o	o	o
2. Fishcatches' handling preserving, processing, etc.	o	o	o	o
3. Fishery marketing	o	o	o	o
4. Fishermen's welfare	*	*	o	*
5. Fishing port management	*	*	o	*
6. General cargo	*	*	o	*

Notes: * Asterisked functions should be provided as occasion demands.

As regards Kuantan, the construction of a modern fishing port provided with all functions of (1) to (6) is recommended.

(3) Necessary facilities of the fishing ports

In order to meet the requirements mentioned in (2), the fishing ports should be equipped with the following facilities:

Functions required	Necessary facilities of fishing ports
(1) Fishing operations	Breakwaters, sand groins, revetments, wharves, landing places, piers, slipways, channels, basins, navigation aids, lighting facilities for entry and clearance of fishing fleets, repairing yards, engine repairing yards and fishing equipment drying grounds. Water and oil supply facilities for fishing fleets.
(2) Fishcatches' handling, preserving, processing and marketing	Wharves, landing places, cranes, selling places, warehouses for storing fish-catches, open yards, ice-making plants, refrigerating and cold-storage facilities, processing plants, roads and bridges, etc.
(3) Fishermens's welfare	Fishermen-houses or lodgings, etc.

Functions required	Necessary facilities of fishing ports
(4) Fishing port management	Offices
(5) General cargo	Anchorage basins, wharves, cranes, sheds, open yards, warehouses, etc.

4. Project of fishing port construction and the estimate of rough cost required therefor

In order to satisfy the foregoing goals to be reached in ten years with respect to fish landings, number of fishing boats, etc., various facilities required for fishing ports have been decided on, the estimated scale of moorage quay, etc. has been computed, and their layout plan has been decided on.

Plan scheme has been divided into two phases, i.e. the first Plan (five years) and the second term (five years). In the first Plan, the project for facilities has been designated particularly as the first step in order to permit the fishing ports to fulfil their minimum functions.

As a result, the layout plans of the proposed fishing port construction at the four surveyed points are as shown in table in 1 to 4 attached hereto, and the estimated construction cost is as indicated in the following table. However, the costs tabulated below are only for the fundamental facilities such as contour facilities, mooring facilities and water-area facilities as well as for the site expenditure, and do not include the cost of constructing other facilities such as selling places, cold-storage and processing facilities.

Cost of Constructing Each Fishing Port (Unit: MS Million)

Item		K. Besut	K. Trengganu	Kuantan	Mersing
First Plan	First Step	6.3	1.8	2.8	2.6
	Second step	2.2	1.5	6.0	1.0
	Total	8.5	3.3	8.8	3.6
Second Plan		1.2	3.2	10.0	4.2
Grand Total		9.7	6.5	18.8	7.8

In addition, since this project is designed to attain the aforementioned goals, it is also possible to set up such another scheme intended to provide the fishing ports with the minimum functions. In this case, it goes without saying that the cost will be reduced.

5. Upbringing of engineers

For the purpose of constructing fishing ports, bringing up special engineers is an urgent business; therefore, it is essential to dispatch engineers to advanced countries where they would be provided with the training on the fishing port construction techniques.

DETAILED DESCRIPTION

Detailed Description

Part 1 Outline of Malaysian Fishing Industry

Chapter 1 Production

1-1 Increase of production

The total fish landings of West Malaysia in 1967 were 301,856 tons, which means an increase of 27 per cent over the previous year, 236,607 tons, and about three-times as large as the landings recorded a decade before.

This rapidly increased production was brought about because of the following: (1) the necessity of fishery development has been recognized from the viewpoint of ensuring the supply of protein foodstuff since the Independence in 1957; as a result, this has politically been incorporated into the First and Second National Development Plans; (2) the motorization of fishing nets of synthetic fibre have been put into force; (3) the active fishing methods such as trawl fishing have been introduced. Especially in recent years, the fish-landings by the trawl fishing which was introduced from Thailand in 1963 have been on a remarkable increase, and so the total fish-landings have been on a sharp increase proportionately. The number of trawlers permitted in 1968 was 185; besides these boats, there seem to be over 1,000 non-permitted small-type trawlers which operate combinedly with other fishery types.

1-2 Motorization of fishing boats

The number of existing fishing boats as compared with that in a decade before is as shown in the following table. The table indicates that the total number of fishing boats has decreased but the motorization is advanced.

Table 1-1 Motorization of Fishing Boats

	1957	1967
Non-powered boats	17,541 number (73.6%)	7,204 number (35.6%)
Powered boats:		
Outboard-engine boats	4,742 " (19.9%)	2,887 " (14.3%)
Inboard-engine boats	1,541 " (6.5%)	10,145 " (50.1%)
Total	23,824 " (100.0%)	20,236 " (100.0%)

Notes: Source, Fisheries Division (Hereinafter the same in all tables)
The total number of fishing boats decreased about 15 per cent during the past decade, but that of powered boats (covering outboard-engine boats) increased to about two-fold.

Out of the powered boats as of 1967, however, 90 per cent represents the small-type boats under 15 G.T.; so far as the fishing boats of over 30 G.T. class are concerned, there are 300 boats of 30 to 60 G.T., but the number of boats over 60 G.T. is only 10.

1-3 Fishermen

There are about 350 fishing villages along the coastal lines of some 1,300 miles in all States of West Malaysia, where 62,000 fishermen are taking residence.

The racial composition of fishermen is, in the entire West Malaysian area, of 56 per cent Malaysians, 42 per cent native Chinese and 2 per cent Indians, Pakistanis and others.

Because of the difference in social or economic developments, there are many native Chinese in the West Coast and many Malaysians in the East Coast. Also, the fishermen's living standards are extremely low and they live in simple houses by the sea.

1-4 Primary fishery-types

At present there are about 70 fishery-types employed in the West Malaysian States; the number of cases permitted by the Government by fishery-types is as many as 12,000.

The following table shows the working condition by primary fishery-types and the primary, commercial fish-species (Table 1-2).

The fishery-types many in the number of fishing units throughout West Malaysia are those using floating gill-nets and line angling; the structure of these fishing gears is simple, and the fishcatch per fishing unit is insignificant.

The fishery-types big in the composition-scale are those using fishing stakes, seine nets and trawl nets; the fishery-types producing a lot of fishcatch per fishing unit are those by seine nets and trawl nets. These types of fisheries will, in the future, develop rapidly into the nucleus of fisheries.

Since 1959, the Malayan Marine Industry, a joint venture with Japan in the Penang area, has been engaged in the long distance tuna-long-line fishing using 8 boats, with the Mauritius Islands as its fishing base and exploiting the Indian Ocean as the fishing ground.

Table 1-2 Working Condition by Primary Fishery-Types and Primary, Commercial Fish Species in West Malaysia

	Number of cases permitted	Number of operations		Fish landings	Composition rate of landings	Primary, commercial fish-species
		Number of fishing units	Composition rate of fishing units			
Fishing stakes *	617	659	<u>%</u> 4	<u>Thousand tons</u> 31	<u>%</u> 7	Sardines, anchovy, mackerel, shrimp, etc.
Seine net	1,870	1,710	12	105	35	Mackerel, anchovy, horse mackerels, sardines, etc.
Drift net	6,080	4,443	31	23	8	Spanish mackerel, dorab, shrimp, mackerel, horse mackerels, etc.
Lift nets	608	283	2	16	5	Horse mackerels, mackerel, sardines, etc.
Scoop nets	16	420	3	2	1	Shrimp, etc.
Bag nets	1,148	902	6	22	7	Shrimp, sardines, etc.
Barrier nets	125	127	1	2	1	Shrimp, jew fish, etc.
Hook and line	838	2,890	19	18	6	Skipjack, snapper, barracuda, etc.
Traps and pots	480	285	2	6	2	Mackerel, horse mackerels, jew fish, etc.
Shellfish collecting	222	251	2	27	9	Cockle, etc.
Trawl nets	180	1,286	9	58	19	Shrimp, jew fish, horse mackerels, etc.
Miscellaneous	175	1,099	8	2	1	
Total	12,359	14,355	100	302	100	

Notes: * includes purse seine nets in addition to seine nets.

1-5 Primary fish species

The nuclear fish species landed in West Malaysia are migratory fish, but demersal fish will come to be increasingly landed along with the development of trawl fishing.

The landings by primary fish species are as follows: (Table 1-3).

Table 1-3 Landings by Primary Fish Species

1967

Primary Fish Species	Fish Landings tons	Composition ratio %
Anchovy	14,800	4.9
Mackerel	57,200	19.0
Scad	8,700	2.9
Horse mackerels	10,400	3.4
Sardines	9,100	3.0
Snapper	4,900	1.6
Spanish mackerel	6,100	2.0
Shrimp	31,700	10.0
Miscellaneous	158,900	53.2
Total	301,800	100.0

Out of these fish species, any fish species other than snapper, shrimp and a number of species included in "Miscellaneous" of Table 1-3 are migratory fish. Mackerel are landed the most, followed in order by shrimp, anchovy, horse mackerel, sardines, etc.

Besides, there are many fish species representing 1-2 per cent in the composition ratio, which are included in "Miscellaneous"; fishes for fertilizers with a composition rate of 16 per cent are also included in "Miscellaneous."

Cockle (26,425 tons for 1967), crabs, squids, etc. are also landed.

1-6 Fish landings by Areas

As regards the fish landings by States in West Malaysia, there are lots of landings in Perak, Penang, Kedah and Selangor.

These four states account for 77 per cent of total landings. In these States, purse seine and trawl net fisheries are the two primary fishery-types. These four States are followed by the States of Trengganu and Johore in the East Coast, where purse seine net fishing is the primary fishery-type.

Up to date, the difference in fishery productivity between the East and the West Coast has been remarkable, the East Coast being lower in productivity. As the following table (Table 1-4) shows, 80 per cent of total landings in West Malaysia is occupied by the landings in the West Coast; the primary landing places are Panghor of Perak State, Ketam Island of Selangor State, Pangkor Island of Perak State, Kuala Kurau of Perak State and Kuala Kedah of Kedah State.

Table 1-4 Fish Landings by Primary Landing Places in 1967

West Coast	Landings tons	East Coast	Landings tons
Muar	3,170	Tumpat	5,328
Batu Pahat	1,120	Besut	6,099
Malacca	1,648	Kuala Trenggau	9,345
Pulan Ketam	34,328	Dungun	3,738
Pulau Pangkor	33,035	Kemaman	4,093
Panchor	34,657	Kuantan	5,748
Kuala Kurau	22,315	Mersing	8,838
Penang Island	19,023	Sedili	13,177
Kuala Kedah	29,142		
Others	64,862	Others	2,135
Total	243,300		58,500
Grand total	301,800 tons		

1-7 Inland Water Fisheries

The Government, along with the development of marine fisheries, has strived for the promotion of the fish culture utilizing rice fields, lakes and marshes, reservoirs, rivers, abandoned mining-ponds, culture ponds, etc., which are deemed as supply sources of protein for inland inhabitants as well as one of combined income sources of farm households. Among many supply sources, the rice fields in the four States of Perlis, Kedah, Perak and Selangor are most extensively utilized as fish farms.

The number of stocked seed-fish increased from 36,000 in 1957 to over 2,000,000 in 1965; the square measure of fish culture farms increased from 360 acres in 1957 (770 acres for culture ponds) to 4,254 acres in 1967 (7,500 acres for culture ponds). The annual haul in 1967 is estimated at 27,000 tons. The species of key stocked-fish are Lampam Jawa, carp and telapia. As stocked fish have increased in this way, the haul have increased, and the Government has taken the encouraging measures for fish-farm households as follows:

- (1) Seed-fish are delivered free from the seed-fish raising farms;

(2) Drugs which kill the fishes that eat fishes raised in abandoned mining ponds and culture ponds are delivered free; in this case, technical assistance and other fostering steps are provided;

(3) Governmental extension workers give advices on the spot;

(4) For the sake of the fish-farm households and the farm households who intend to begin fish-farming, courses are held with regard to fish culture; 1,100 trainees participated in the courses during the 10 years after 1958 inclusive.

(5) To solve problems involved in fish culture studies are made by the Governmental research personnel and the staff of the Malacca Tropical Fish Culture Laboratory.

The future problem of the inland water fishery is to increase the harvest, and particularly to produce the fish species which are the favourite with consumers by a short period of culture.

Chapter 2 Fishing grounds and fishery resources

Research has hardly been made on the fishery resources of West Malaysia. West Malaysia is surrounded by the sea; there is a vast continental shelf of 40 to 100 miles along the 1,300 miles coastal lines. The Survey Team visited Thailand after its termination of its survey work. On that occasion, the Survey Team learned that, judging from the operation-condition of the Thai Trawler fisheries surveyed, the West Malaysian waters can be fully qualified as demersal-fish grounds.

Also, as regards the migratory fish, the landings of each primary fish-species during the past decade have been increasing; this trend will assumably last 10 years from now.

As regards demersal-fish resources, Dr. Tiews reported that there is found 600,000 tons of resources in 50,000 square miles within the sea area shallower than a depth of 50m around West Malaysia.

The report on the joint survey by three countries of Malaysia, Thailand and Germany which was conducted in 1967 (See the notes below) states that the demersal-fish resources off the East Coast is quite abundant. The report also states that the landings included a considerable amount of fishes for non-human consumption. The utilization of these fishes will become a subject in the years to come as fishery exploitation goes on.

So far as the present situation is concerned, the fishery resources in the sea water areas around West Malaysia is quantitatively grasped in a very insufficient way; therefore, in setting up a fishery development scheme, the Government should, in parallel with the increase of fishing-boats and the consolidation of fishing-port facilities and others, take necessary measures including surveys on fishery resources so as to achieve a planned result.

Notes: The survey was carried out about off the East Coast of Malaysia by a Thai experimental ship of 23 m. length and 76 G.T. from March 1, 1967 to April 11, 1967.

Chapter 3 Marketing

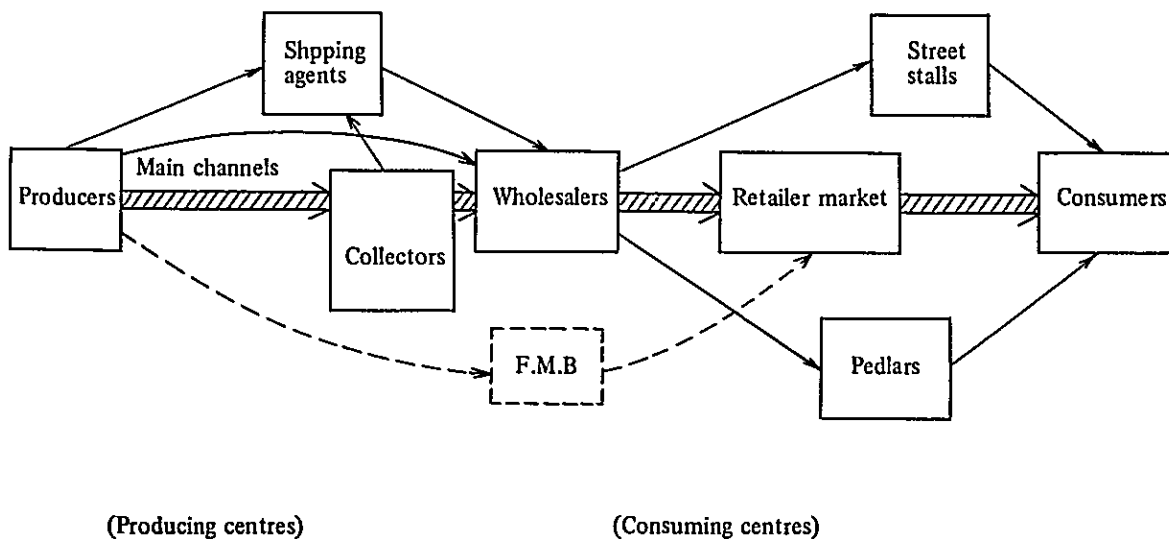
3-1 Marketing Channels of Fishery Products

The marketing channels are somewhat complicated. The principal channels of fresh fish are as follows: producer → collector → wholesaler → retailer → consumer. Besides, there is a channel in which producers ship through shipping agents and an exceptional case that producers ship themselves (Figure 1-1).

In these marketing channels, wholesalers play an important role.

There are many cases that wholesalers combine the function of collectors or retailers or both. Also, there is a case that collectors take the leadership in the marketing channel of the fishery-product from production to consumption by advancing operation funds and living expenses to fishermen; in this case, they have a strong economic influence on fishermen. The fishery products transported in the wholesale market in a consuming centre are traded to retailers by wholesalers upon conversation between the both. The retailers who have purchased the fishery products sell them to stores in the retail markets, stores on the street, pedlars in the city, and in the long run the products are traded to consumers.

Fig. 1-1 Marketing Channels of Fishery Products



The Government, in order to stabilize producer prices in the marketing course of agricultural products, has set up F.A.M.A.

For fishery products, the Government has brought up before the Parliament, a similar bill calling for the establishment of F.M.B. in the market of such big consuming centres of fishery products as Kuala Lumpur and Ipoh.

This bill aims at the undermentioned improvements to be attained by wholesale activities controlled by F.M.B.:

- (1) To finish within two days the payment to fishermen which takes seven days at present;
- (2) to set up the grading for selling;
- (3) To prevent the excessive competition of wholesalers.

3-2 Condition of Marketing

The principal consuming centres of fishery products in West Malaysia are Kuala Lumpur and Ipoh on the west and the neighbouring country, Singapore. Fishery products, iced and boxed, are transported by lorry to wholesale markets. Their prices fluctuate by the market condition in Kuala Lumpur and Singapore which are both big consuming centres and have a lot of receipts of fishery products.

As regards the formation of prices by fish species, prices are formed depending on the daily demand and supply because the fishery products are chiefly composed of fresh fish.

The prices of mackerel, sardine, horse mackerel, etc. fluctuate in a large measure, but the prices of such high-priced species as spanish mackerel, dorab, etc. are relatively stabilized partly because of the small size of their transactions.

The Government of Singapore strived not only for the merger of five markets in the City which were moved to the Juron industrial district into one business body but also for the consolidation of the new market and its affiliated facilities; this body started its business in Feb. 1969.

As a result, this has become the biggest and most consolidated market among all the market in the neighbouring countries. Since this market seems to further influence the fishery product marketing of West Malaysia in the future, the forthcoming trends should be sufficiently grasped.

As regards the marketing range, it may be said that the destination of the products from producing centres north of the line connecting Kuantan and Malacca is Kuala Lumpur and that the destination from the producing centres south of the above line is Singapore.

As in those of other Southeast Asian countries, native Chinese are economically dominant in the commercial and marketing sectors of West Malaysia. For this reason, the exchange of information between traders is extremely close and effective. Particularly in the Malay Peninsula, the coordination of prices or demand-supply situation is very smooth.

3-3 Prices of Fishery Products

The prices of fishery products have been about stabilized for the past years. Primary fish species are divided into the two groups of high-and low-priced fishes:

Table 1-5 Prices of Primary Fish Species and Price Fluctuation

(1967)

Fish Species	Price in M\$ per kg (1)	Rate of Price Fluctuation (%) (2)
Threadfin (slice)	4.17	42
Shrimp (big size)	3.85	69 - 140 (medium size)
Butter fish	3.66	63
Threadfin (whole)	3.16	75
Snapper (slice)	2.42	200
Spanish mackerel	2.20	116
Dorab	2.03	120
Horse mackerel	1.11	300
Trevalley	1.04	300
Sting ray	0.76	300
Drums	0.76	300
Mackerel	0.71	900

Notes: (1) represents an average of retail prices in the four markets of Penang, Ipoh, Kuala Lumpur and Malacca in 1967;

(2) represents $\frac{\text{an average of higher prices minus an average of lower prices}}{\text{An average of lower prices}} \times 100\%$ of the wholesale prices in March 1967 through December 28, 1967 at Kuala Lumpur.

Threadfin, shrimp, Butter fish, Spanish Mackerel Dorab, etc. belong to the high-price group; horse mackerel, mackerel, jew fish, shark, etc. are mass-caught fishes of low-price group. The landings of the low-price group fish-species are generally large but are subject to considerable fluctuations due to fishing conditions and others. Therefore, the margin of price fluctuations is big. Thus, fishery products are consumed a lot as fresh fish which enjoy strong every day demand. Therefore, the fluctuation of landings affects directly the retail prices.

3-4 Marketing and Processing Facilities

To see by years how the fishcatches landed are handled, the rate at which fishcatches are destined to markets as iced fresh fish has been rising, while the rate at which fishcatches are destined to markets as cured fish has been falling (See Table 1-6).

This trend seems to be due to the increasing preference of consumers for fresh fish and the improvement and consolidation of ice-making and cold-storage facilities.

As regards the processing of fishery products, anchovy, snapper and others are processed particularly as processed fish-species Fish species which are normally supplied fresh are processed in areas where the ice supply is short or the transport of fishcatches is inconvenient and also in the case where it is difficult to ship fishcatches without losing freshness or where landings are too large.

Table 1-6 Ratio of the fishcatch disposal

	Total fish-catch	Iced fresh fish	Cured fish	Dried shrimp	Salted and fermented shrimp	Fish for fertilizers	Total
	1,000 piculs	%	%	%	%	%	%
1957	1,863	55	19	11	5	10	100
58	1,883	63	12	10	4	11	100
59	1,993	70	12	5	6	8	100
60	2,343	63	11	9	6	11	100
61	2,531	60	14	10	5	11	100
62	2,859	68	14	4	5	9	100
63	3,078	73	13	3	3	8	100
64	3,228	75	8	5	4	8	100

Existing facilities for fishcatch treatment are briefed below:

(1) Ice-making plants (68 plants, ice-making capacity - 1,855 tons a day, ice-storing capacity - 3,255 tons)

The supply of ice is generally insufficient but in certain limited district it is sufficient. So far as the Team surveyed, there were not a few idle plants.

(2) Refrigerating and cold-storage facilities (37 plants, cold-storage capacity - - 9,063 tons)

These are the refrigerating and cold-storage facilities for coordinating the shipment of fresh fish temporarily; the storage duration is a few days in all cases.

The survey of the Team showed that the cold rooms constructed in the East Coast under the assistance of the Canadian Government have not demonstrated their full ability; as regards the cold rooms, there are 8 plants, 21 rooms - - - 3,600 tons of cold-storage capacity.

However, if the fisheries developed and the landings increased, not only ice-making facilities but refrigerating and cold-storage facilities would have to be consolidated.

(3) General processing-facilities

As regards fishmeal and canning plants, nothing is known except 3 to 4 fishmeal plants in Kuala Lumpur.

In Penang, however, there is a plant owned by the Malayan Marine Industry which produces 10 tons of canned tuna a day; these canned tunas are exported mostly to America.

In each of the fishing villages in the aforementioned, general fishes to be cured are salted in a simple salting tank by fishermen during a whole day and night; after that, they are dried in the sun for a day or two at the wooden drying facilities established on the beach.

3-5 Transport condition

Fresh fish, wooden-boxed with ice, are chiefly transported by lorry. The amount of ice to be used varies according to the transport distance, but 100 to 200 katies (1 katy = some 600 gr) of ice are used per box containing about 200 katies of fishery products.

The amount of fishery products loaded on a lorry is about 5 to 6 tons.

In some areas, for instance, Endau, ice is loaded on the way back from consuming centres to which fishery products are transported.

The transport hours of fishery products from key producing centres to Kuala Lumpur are as follows:

Table 1-7 Time required for Transporting Fishery Products from Primary Producing Centres to Kuala Lumpur

Producing centres	Hours
Kedah (West Coast)	6
Kuantan (East Coast)	8
Kuala Trengganu (East Coast)	11
Kota Bharu (")	12
Songkhla (Thailand)	15

Time required for transporting fishery products from Mersing to Singapore is 3.5 to 4 hours. Ordinarily, each market starts its business at 03:00 hrs. and so each lorry loaded with fishery products leaves the producing centre so as to be in time for that time.

3-6 Marketing Cost

The transport cost for fishery products, traders' margin and price-formation in the marketing stage, etc. are as follows:

1. Transport cost

(1) West Coast:

Table 1-8 (a) Transport Cost in Case of Long Distance

Shipping place – Destination	Mileage	\$ per picul	¢ per mile
Kuala Lumpur-Singapore	250	3.00	0.12
Alor Star -Singapore	560	7.00	0.125
Alor Star-Kuala Lumpur	300	5.00	0.167

(b) Transport Cost in Case of Short Distance

Shipping place – Destination	Mileage	\$ per picul	¢ per mile
Kuala Lumpur – Malacca	90	2.00	0.200
Kuala Lumpur – Seremban	42	1.00	0.240

(2) East Coast:

Table 1-9 Transport Cost in Case of Medium and Long distance

Shipping place – Destination	Meleage	\$ per picul	¢ per mile
Kuala Trengganu-Kuala Lumpur	313	8.00	0.256
Kuala Trengganu-Kuantan	142	4.00	0.282

As is clear in the above tables, the longer the transport distance, the less the unit transport cost, and the transport cost in the East Coast is higher than in the West Coast.

2. Cost of Wooden Boxes

The wooden box in use is 87 cm long, 48 cm wide and 58 cm high; it contains 2 piculs of fishery products and costs ¥240 to ¥480, i.e. \$2 to \$4.

3. Ice Charge

Ice charge required in the East Coast: In Kuala Besut and the northern part of Trengganu, 1 block of ice which is about 90 kg costing \$3.0 – \$3.7 is used per box. In the northern part of Mersing, one box contains 1.5 to 2 piculs, i.e. about 90 to 120 kg which costs \$1.5 to \$2.0.

4. Margin for Traders

The margin included in the retail price for traders who deal with fishery products is assumed to be within the following limits: Collectors – 5 to 10 per cent
Wholesalers – 5 to 10 per cent

5. Price Formation in the Marketing Phase with the Retail Price set at 100%

The price formation in respective phases in case of the shipment is made through primary marketing channels is about as follows: This case allows for 20 per cent for ice, package and transport charges as well as 2 per cent for the waste of fishery products over the respective phases of marketing.

Prices at Marketing Phase	Ratio
Retail price	100%
Wholesale price	90 – 95
Collector price	80
Producer price	65 – 60

Chapter 4 Consumption

In West Malaysia, they generally tend to consume fishery products comparatively a lot irrespective of the race (See Fig. 1-2). Particularly in the medium and low brackets, fishery products are the staple food next to rice.

The output of fishery products in West Malaysia in 1967 was 301,800 tons. Imports of fishery products marked 55,600 tons, exports, 71,100 tons; therefore, the domestic consumption was 286,300 tons (Table 1-10).

The nucleus of the imports is frozen food, which is consumed mostly by foreigners. Out of the domestic consumption, 77,000 tons are estimated to be destined for feedstuffs or fertilizers; therefore, it follows that about 210,000 tons are consumed for human consumption. Thus, the per capita consumption comes up to about 25 kg a year.

Also, according to the survey of 1949 household samples conducted by Professor Berube in 1965, the per capita consumption of fishery products was 32.6 kg.

The survey of the Team revealed that some 4-member households in Kuala Lumpur consume about 600 gr a day and some 3-member households in Kuantan, 1,200 gr.

Generally, fresh mackerel and horse mackerels are most largely consumed, while spanish mackerel dorab are highly evaluated as high-quality fishes.

As for the recipe of fish, there are many cases that mackerel, horse mackerels, etc. are boiled and used for curried food. The reddish or red coloured fish are not liked; therefore, snapper, etc. are salted and dried into white colour and then come to be served on the table.

Besides, iced fish, seem to be disliked as inferior-quality fish.

As regards the future trends of consumption, Professor Berube states in his report that the consumers at large have come to purchase more fish in proportion to the rise of their income, and have shifted to purchase more of higher-quality fish species.

However, as for the brackets of over \$1,000 a month, the growth of fish purchased will level off.

But, in the medium and low brackets, the increased income would join hands with the increased consumption of fish for the time being, he reported.

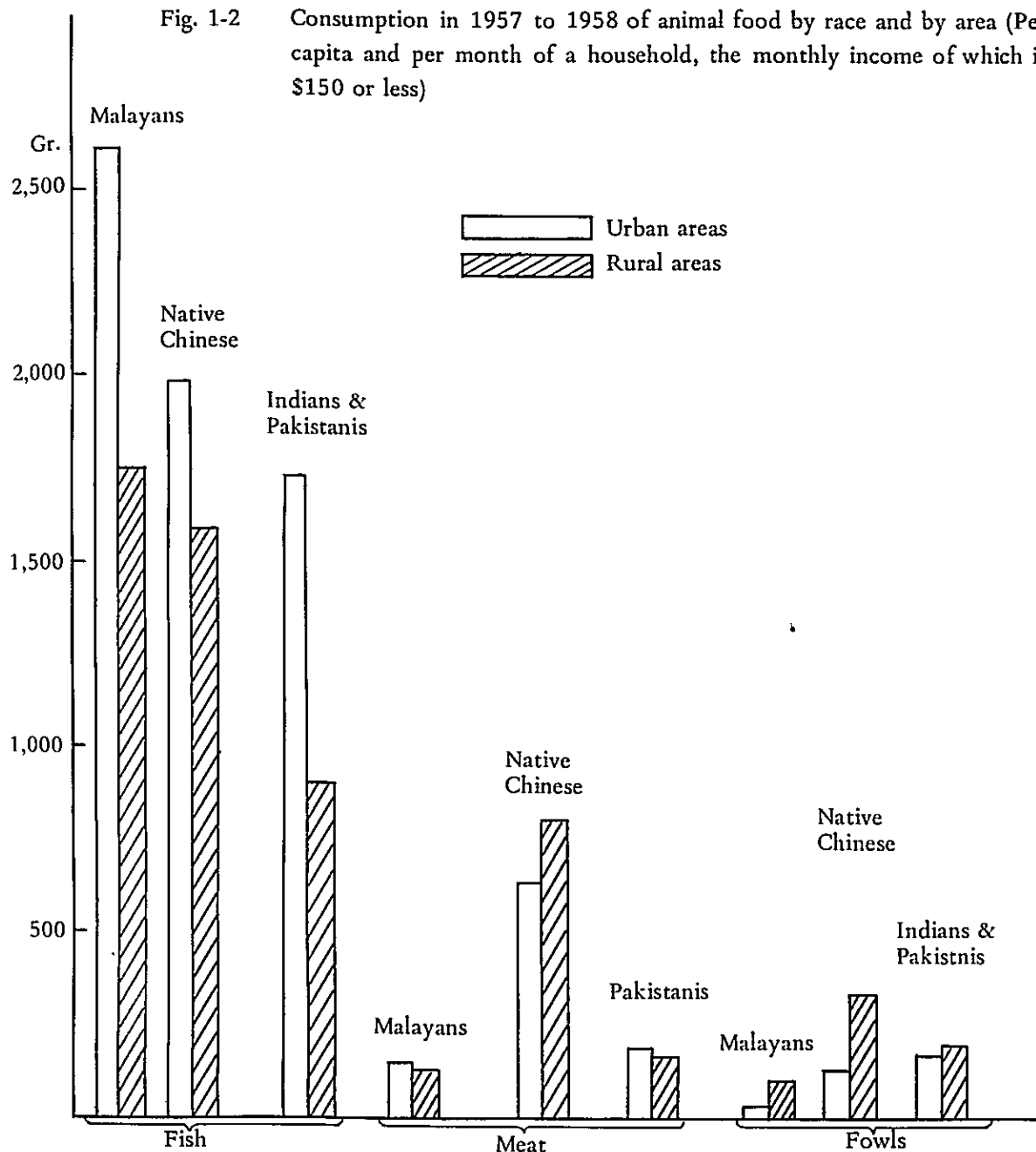
The demand for fishery products is unlikely to level off for the time being.

Table 1-10 Demand and supply of fishery products

1967

Supply		Demand	
Production	301,800 ton	Domestic consumption	286,300 tons
Imports	55,600 tons	Exports	71,100 tons
Total	357,400 tons	Total	357,400 tons

Fig. 1-2 Consumption in 1957 to 1958 of animal food by race and by area (Per capita and per month of a household, the monthly income of which is \$150 or less)



Part 2 Fishing Industry in the East Coast

Chapter 1 General Condition

1-1 Comparison of the East Coast with the West Coast

The fish landings in the East Coast area were 45,000 tons in 1961; after that, a somewhat increasing trend went on and the landings came up to 59,000 tons in 1967. In comparison with the West Coast, the landings in the East Coast in 1965 accounted for only one-thirds or so of those in the West Coast; in 1967, two years after that, the difference of became larger, i.e. about one-fourths.

In this way, there occurred a great difference between the East Coast and the West Coast in the development of fishing industry after 1966, with an outstanding growth noted on the West Coast.

The fishery condition in 1967 is compared between the East and the West Coast in Table 2-1.

Table 2-1 Comparison of the 1967 Fishery Index between the East and the West Coast

	Entire West Malaysia	East Coast	West Coast
Number of fishermen (A)	62,100 (100%)	22,100 (36%)	40,000 (64%)
Number of fishing boats (B)	20,200 (100%)	5,800 (29%)	14,400 (71%)
Fish-landings (C)	301,800 tons (100%)	58,500 tons	243,300 tons
(C)/(A)	4.86 tons	2.65	6.08 tons
(C)/(B)	14.9 tons	10.1 tons	16.9 tons

Source: Fishery Division - - - hereinafter from the same source.

The above table shows that the number of fishermen and fishing boats in the East Coast is respectively one-half and one-thirds of that in the West Coast; the landings of the former are further less, i.e. under one-fourths; and the landings per fisherman and per fishing boat are on a very low level.

As the main reason for the retarded fishery-development in the East Coast, the unfavourable natural conditions are pointed out. This constitutes a great obstacle in the way of the development of not only fishing industry but general economy; and the retarded economic development in turn prevents the growth of fishing industry.

Table 2-2 Transition of Fish Landings in the East and the West Coast

Unit: 1,000 tons

Item \ Year	1961	1962	1963	1964	1965	1966	1967
East Coast	45	48	58	53	55	54	59
West Coast	105	122	126	139	143	183	243
Total	150	170	184	192	198	237	302

The configuration of the East Coast is such that the sea is shallow to a good distance from the shore and there are no proper fishing ports. Fishing boats must inevitably take advantage of rivers as moorings. The rivers are shallow at their mouths, where sand bars are apt to be formed due to strikes of northeast monsoons. Accordingly, it is difficult to switch fishing boats over to large type. Also, even if the switchover comes to be realized, it only allows for the building of shallow-bottomed, unstable fishing boats.

For this reason, the operation-range of fishing boats is limited to the coastal area; particularly during the monsoon season, the operation-efficiency goes down remarkably.

1-2 Fishermen

The number of fishermen in the entire East Coast area has been 22,000 or so in past years; 95 per cent of fishermen is occupied by Malaysians. On the contrary, in the West Coast, 62 per cent of fishermen are occupied by native Chinese. Therefore, the racial composition of fishermen in the East and the West Coast is very characteristic.

The educational level of the East Coast fishermen is generally low, with few leaders who have finished higher education.

Fishing villages are isolated, forming closed social environments. The fishermen do not seem to be enough of positive nature and to be sufficient in their will to work.

As for the economic condition in the fishing village, the system of fishermen's cooperatives has not made progress partly due to the shortage of funds. Many fishermen borrow in advance from their middlemen the funds to procure fishing boats and gears and other necessary funds required for their fishing operation, and their fishcatches are appropriated to the repayment of these debts. In other words, a traditional system not matching the modern age is being carried on by the fishermen.

Those who are temporary employees for fisheries likely number quite a few partly because of the unstable fishing operations. As in the case of other industries, the monthly income of these temporary employees is said to be on a low level of \$60 – \$70.

1-3 Fishing Boats

As of 1967, there were about 5,800 fishing boats in operation over the East Coast area; out of which the powered boats excepting those with outboard-engines numbered about 3,000, which accounted for 52 per cent of total.

Since then, the motorization of fishing boats has been on a steady upward trend, 94 per cent of powered boats are occupied by small-type boats of under 15 tons, with large-type boats of over 30 G.T. numbering only 21.

The large-type boats engage in the purse seine fishery or the seine net one. In addition to above, there are 15 trawlers of 50 G.T. which were supplied under the Governmental assistance in 1968.

Chapter 2 Primary Fishery-Types and Fish Species

2-1 Primary Types of Fisheries

The main fishery-types producing large landings and having a large number of fishing-units are seine net, floating gill-net, lift net, bag net, hook and line and trawl net fisheries (Table 2-3).

Although the fishing methods aiming at catching migratory fish have chiefly made progress on the East Coast until recently, the size of fishing gear has, in the meantime, come to be switched over to large type ones partly because of the fishing nets' switchover to synthetic fibre from cotton yarn and the motorization of fishing boats. In other words, coupled with this modernization, positive fishing methods have being introduced. For instance, in West Malaysia fishing stakes which are a non-positive fishing method numbered 2,009 units in 1961, but reduced to 517 units as of 1967. On the other hand, the floating gill-net, a positive fishing method, numbered 5,493 units in 1961 but increased to 6,080 units as of 1967, and the drag net, numbered 2499 units in 1961, reduced to 1,870 units because of their switchover to large type, nevertheless, their fish landings increased to 105,400 tons from 49,000 tons.

2-2 Primary Fish Species

Primary fish species caught are: With seine net fishing, anchovy, horse mackerels and mackerel; with drift net fishing, Spanish mackerel, dorab, etc.; with lift nets, horse mackerels; with hook and line, Spanish mackerel and tunas.

Out of these fish-species, the migratory fishes such as horse mackerels and mackerel are subject to a large catching-fluctuation according to fishing conditions. Fishes for fertilizers and shrimp with bag nets as well as shrimp and jew fish with trawl fishery, respectively are main commercial fish species. These demersal species can become comparatively stabled fishcatches.

Although shrimp are caught a lot during monsoon seasons, their catch is very few during the other seasons (Table 2-4).

Table 2-3 Number of Working Fishing Units by Fishery-Type on the East Coast and the Fish Landings Thereof in 1967

Fishery-type \ Item	Number of working fishing units (A)			Landings per fishing unit (B/A)
		Amount	Composition-ratio	
Fishing stakes (large type)	94	tons 2,903	% 5.0	tons 30.9
Fishing stakes (small type)	74	349	4.7	4.7
Seine net	310	12,510	40.4	40.4
Drift net	792	7,437	9.4	9.4
Lift net	219	15,593	71.2	71.2
Scoop net	38	70	0.1	1.8
Bag net	241	5,081	8.7	21.1
Barrier net	2	368	0.6	184.0
Hook and line	1,001	6,803	11.6	6.8
Traps and pots	129	2,141	3.7	16.6
Miscellaneous	504	751	1.3	1.5
Trawl net	281	4,526	7.7	16.1
Total	3,685	58,532	100	15.9

Table 2-4 Landings of Primary Fish Species on the East Coast in 1967

	Amount	Composition - ratio
	tons	%
Skipjack	3,292	5.6
Butter fish	221	0.4
Anchovy	2,703	4.6
Mackerel	7,140	12.1
Snapper	1,417	2.4
Horse mackerels (Selar)	1,531	2.6
" (Selar Koming)	7,765	13.2
Scad	3,785	6.4
Sardines	6,763	11.4
Spanish mackerel	2,681	4.6
Dorab	801	1.4
Shrimp	2,112	3.6
Drum	946	1.6
Total	58,532	100

Mass-caught fishes are horse mackerels and mackerel, and the landings of these fishes accounted for 34 per cent of total landings in 1967 on the East Coast. These are the important fish species on the East Coast, particularly because they are cheap, mass-caught fishes. The landing percentage of butter fish, dorab and Spanish mackerel occupies only 6 per cent, but these belong to consuming centres.

The demersal fish species for human consumption are snapper and shrimp whose landings occupy 8 per cent. In the future, a substantial increase can be expected in their landings when the trawl fishery is introduced.

Anchovy and snapper are processed into the boiled and dried product and the salted and dried one, respectively.

Chapter 3 Present Condition of Fishing Grounds and Fishery Resources

3-1 Present Condition of Fishing Grounds

The fishing grounds already exploited along the East Coast are the shallow sea areas within 30 miles off the shore, and the operation-area of every fishery-type is established (Table 2-5).

The lift net and the traps-and-pots fishery use as fishing grounds the deep sea area 30 miles off the shore; seine net, drift net and trawl net fisheries which catch demersal fish species use the grounds centering on and around the point 15 miles off the shore; also, the coastal fishing grounds are used by the hook & line and trawl net fisheries which both catch shrimp.

Table 2-5 Extent of the Fishing Grounds Already Exploited by Primary Fishery Types on the East Coast

Fishery-type	Mileage off the shore
Seine net	10 – 20 miles
Drift net	About 15 miles
Lift net	20 – 30 miles
Traps and pots	30 miles
Hook and line	3 – 10 miles
Trawl (in case of shrimp catching)	3 – 4 miles
Trawl (in case of demersal fish catching)	10 – 15 miles

Although the operation by Malaysian fishing boats is not being conducted in the sea area farther than 30 miles off the shore, these fishing grounds are being used by the fishing boats of neighbouring countries.

That is, in the sea areas off Trengganu in the northern East Coast, the trawlers of 60 to 80 G.T., based at Songkhla of Thailand, etc. are frequently at operation.

In the sea area of the central part “Kuantan” to off the southern part “Mersing”, there are some operations by trawlers based at Singapore.

3-2 Resources

As regards the fishery resources off the East coast, it seems that can be said that virtually no research has so far been made. It can merely be said that the following two joint surveys were made: that of demersal fish resources by three countries of Malaysia, Thailand and West Germany in 1967 and that on the possibility of Trengganu State fishery development conducted in cooperation of the Dutch Government. In the reports of these surveys, there are only two references made to resources.

In the above survey on demersal fish resources, trawl fishing experiments were conducted by a trawl fishing research ship, and it has turned out that quite a few demersal fish resources are found.

As regards the resources in surface and bottom layers in the offing, it is not in reason to draw a conclusion from one or two surveys of a limited period since such an attempt will often lead to a wrong conclusion. Such being the case, the resources survey will surely become the most important programme in the future.

Chapter 4 Marketing and Processing

4-1 Marketing

The fishery products landed in the East Coast are traded at fish landing places; many of these are shipped by traders called "middlemen" or "collectors" to the wholesale markets in consuming cities; this shipment is carried out in a shape of fresh fish boxed and iced.

The destination and shipment rate varies by areas. In the northern districts such as "Kuala Besut area" and "Kuala Trengganu area", about 80 per cent of the landings is considered to be shipped to the nearest Kota Bharu or farther to Kuala Lumpur and Singapore, etc.; in the central district "Kuantan area", about 60 per cent to Kuala Lumpur, Singapore, etc.; and in the southern district "Mersing area", about 95 per cent to Singapore.

The rest of shipments excepting raw material fish for processing is destined to local consumption; also, mass-caught fishes are chiefly destined to local consumption. These fishes are traded to consumers in retail markets, or, by street stalls, pedlars, etc.

However, as regards the demand and supply at fish landing places during the monsoon season in which there are only a few landings, local demand is not satisfied and so fishcatches are sometimes carried in from the fareway West Coast districts.

4-2 Processing

The surplus fishery products after shipment and the fresh fish consumption during the increased landings, such red-coloured fish-species as snapper which are disliked by consumers, are salted and dried by fishermen.

In the processing work of fishery products, there are no professional processors; it is common that the members of a fisherman's family help him with the processing work. For this purpose, there are, in fishing villages, many of the cylinder-shaped salting tanks made of concrete as well as many of the simple drying works made of wood.

Besides, in the anchovy processing which is a special case, catches are fully boiled in a boiler on board a fishing boat and then dried at a drying-works on the land; the manufacture is traded in a shape of dried fish.

The rate of raw material fish for processing in the East Coast in 1967 accounted for 17 per cent of total landings. The rate in "Trengganu State" in the north was the highest in the East Coast, or 33 per cent.

Part 3 Government Development Plan

Chapter 1 Malaysian Economy and Governmental Development Plan Thereof

The Malaysian economy has been backed up by exporting the products of the primary industry such as rubber and tin. In the development of the economy in recent years, the weight of their output for export in GNP has been lowering.

That is, the GNP growth of 7 per cent per annum for five years from 1961 to 1965 has become stagnant during the 3-year period after 1966 because of the falling of rubber prices and the levelling-off of tin output. GNP growth rate of only 5% has been maintained, supported by the increased output for domestic consumption.

Also, the Malaysian economy is pressed for achieving a rapid development in the future because of the high population growth of 3 per cent per annum. Accordingly, developing various industries is a pressing matter in coping with the prevailing situation. Therefore, on the basis of a success of the second economic development 5-year plan which was put into practice in West Malaysia from 1961 to 1965, the primary Malaysian Plan started including East Malaysia for five years from 1966 to 1970. This plan covers the economic development and repletion of defence forces and aims at realizing a wide range of economic and social development.

The goal of this plan is to promote the economic and social integration of people and states, including the rise of income level, increase of employment opportunities, expansion and repletion of educational or training facilities, versatility of the Malaysian industry, etc.

For the purpose of carrying out this plan, the Governmental expenditure of \$4,550 million is appropriated, out of which \$3,812 million is allocated for the economic development. During the three years from 1966 to 1968 after the plan is put into practice, 55 per cent of the economic development appropriations was paid out for various works, and the progress of the plan seems to be going on smoothly as a whole. As for the actual economic development, on the other hand, the growth rate of GNP has reached the level of 5 per cent surpassing the 4.4 per cent, the projected goal during this period.

Agriculture, forestry and fishery of West Malaysia, which embody about 50 per cent of the total working population, are the most important industries, occupying about 30 per cent of the West Malaysian GNP.

Therefore, in the Primary Malaysian Plan, a large proportion of the economic development appropriations has been allotted for the development of these industries. To be precise, the appropriation for agriculture, forestry and fishery amounts to \$900 million, which accounts for about one-thirds of the West Malaysian economic development expenditure of \$3,812 million.

The agricultural development plan included the expanded creation of agricultural schools, strengthening of education or training of farmers, promotion of research activities, promotion of technique extension, encouraging of gum replantation, encouraging of switchover to other agricultural products from rubber, etc. The plan also included expanded creation of livestock control centres and veterinary centres and so on for livestock industry.

For the fishing industry, the strengthening of education and training of fishermen, constructing of fishing ports, promotion of technique-extension, etc. are included in the plan.

Besides, there are other schemes for developing agriculture, forestry and fishery, such as: irrigation and drainage works for agriculture including a big-scale dam construction of the Muda River, land exploitation for immigrants, upbringing of cooperatives, etc. The following agencies are established to provide indirect assistances to these works: MARA Trust Agency (charged with the raising of people's living standard) and Federal Agriculture Marketing Authority (charged with the improved marketing of agricultural and fishery products)

Chapter 2 Fishery policies and Development Plan for the West Malaysian Fishing Industry

It goes without saying that the objects of the Government policy for fisheries coincides with those of the Primary Malaysian Development Plan. These key points are as follows:

- (1) To achieve an increase in quantity as well as an improvement in quality in the demand and supply of fishery products;
- (2) To achieve the rise of fishery productivity and the betterment of fishermen's social and economic status through the introduction of fishery techniques, improvement of fishery management and a proper utilization of financing system;
- (3) To solve the problems being in the way of the fishery development as well as to coordinate them within the fisheries.

For the purpose of carrying out the development of the West Malaysian Fishery under the Primary Malaysian Plan, the Government is expected to pay out a total sum of \$17.3 million.

The details and expenses of key projects included in this plan are as in the following table (Table 3-1):

Table 3-1 Development Plan on the West Malaysian Fishery
(Key Projects)

Key Projects	Expenses
(1) Fishing port development (including the construction of fishing ports such as Kuala Kedah, Penang and Lumut and their affiliated facilities)	<u>Unit: in \$ million</u> 4.9
(2) Fishery education and training (including the creation of the Penang Fishermen's Training Centre, for which a loan from the U.N. Development Special Fund (\$4 million) is expected)	2.9
(3) Consolidation of research institutions (Penang Processing Experimental Station, Fishing Boat Technique Laboratory and Kuala Trengganu Processing Experimental Plants will be set up.)	1.3
(4) Fostering funds for fisheries (the granting of subsidy and cooperatives' fostering are included)	3.4
(5) Improvement and extension work (including the inland water culture)	1.2
(6) Construction of fishery inspection boats, etc. (including the construction of research boats)	3.1
(7) Administration (including the consolidation of local administrative organizations)	0.5

Moreover, the Government, considering an urgent necessity of works to be commenced, has decide on their priority order. Upon this basis, the top-priority has been placed on the strengthening of education and training of the fishermen who must directly shoulder the fishery development in the future. In the next place, the introduction of such modern fishing methods as trawl fishing and others is emphasized, followed by the providing of necessary funds to facilitate fishery investments, the consolidation of such nuclear facilities as fishing ports and others, the expansion of research institutions in order to achieve the development of fishery resources and their reasonable utilization, and the spread of research results.

The Government recognizes that there are some problems in putting the above projects into practice.

First of such problems is the difficulty to secure technical personnel who can play a leading role, and the second, which is a social problem, is how to organize the fishermen who are conservative and on a low level of education and whether or not they will grow to have a nature and qualification required in the forthcoming, up-to-date fisheries.

Looking into the progress of the Government fishery development projects, it is noted that not more than \$4.06 million has been paid out up to 1968 which is the third year of the planned period. Reasons for this are that the number of Government staff in charge has been deficient, that the foreign funds have not been available as originally expected, and that the reciprocity on the part of fishermen has been insufficient, etc.

However, despite the delayed disbursement for the projects on the part of the Government, the growth of fishery production by far exceeded the annual growth rate (6 per cent) aimed by the Government. The growth in 1966 showed an increase of 10 per cent over the previous year, and that in 1967, 27 per cent, a specially large margin of growth rate.

As for the construction of fishing ports and their affiliated facilities, the facts on the progress of projects for the West Coast are that the following two schemes were already brought to a close of the survey necessary therefor: the Kuala Kedah fishing port construction scheme aimed at the development of offshore fisheries under the assistance of the Canadian Government and the "Penang two fishing ports construction scheme" aimed at the development of offshore and long-distance fisheries under the assistance of the French Government. However, no surveys have yet been made on the "Lumut fishing port construction scheme" aimed at offshore fisheries.

Chapter 3 Development of the East Coast Fishing Industry

The fishery development has been carried on in the entire West Malaysia due to the modernization of fishing boats and fishing gear and the switchover to large type fishing boats. In this situation, the fishery production on the West Coast has taken long strides by the introduction of trawl fishery in past years. On the contrary, the fishery development on the East Coast has been at a very slow tempo, therefore, if this situation goes on, the East coast is liable to be left behind in the fishery development.

As compared with the above-mentioned progress of the West Coast fishery development, the East Coast fishery development is much protracted, and this is due, most likely, to the fact that the development of the general economy is at a low level and that undeveloped fishery is affected by it. Furthermore, it is pointed out that the fishing operation activities of the East Coast decline during the northeast monsoon season over five months every year, that unfavourable social and economic conditions discourage fishermen's willingness to work, that the Governmental or private investments in fisheries are not sufficient, etc.

Among the Governmental projects which were executed before the enforcement of the Primary Malaysian Plan, for the fishery development of the East Coast there are two fishery schools set up as one of the educational or training projects: One fishery school at the Penang area which trains 30 fishermen in the course of 10 months every year; the other at the Kuala Trengganu area which trains 90 fishermen in the course of three months every year.

As regards the consolidation of fishery-interested facilities, there have been established navigation aids, small-scale quays, water supply facilities, fuel oil tanks, etc. in the major fishing bases as well as simple erections on the islands off Trengganu for the convenience of offshore fisheries. Furthermore, as a measure to raise the fishermen's social and economic status, a system is established under which the funds for procuring fishing boats, fishing gears, etc. are financed through the fishermen's cooperatives to be brought up.

Besides, to stabilize producer prices, a joint service was offered by the Malaysian and the Canadian Government under the "Colombo Plan", whereby refrigerators were set up at the eight major fishing bases of the East Coast in 1962. As a measure to improve on the fishermen's life the projects intended to help fishermen settle down in the both areas of Mersing and Kuala Trengganu have been put into force.

As regards the Governmental schemes after the enforcement of the Primary Malaysian Plan, they are making a slow but steady progress toward the goal of Plan. Some schemes being put in force are notable for the introduction and the spread of new techniques. That is to say, the small-type trawl fishing which catches shrimp during the monsoon season has been introduced in the whole area of the East Coast for a few years and has scored a success. This served as an incentive to the introduction of large type trawl fishing boats (of 50 G.T. class) similar to those of the West Coast, and in 1968, 5 trawlers each were put into the fishing bases of the three areas of Kuala Besut, Kuala Trengganu and Kuantan under the government loan and through the fishermen's cooperatives. Also, in order to promote the extension work of fishery processing techniques, an ice-making plant and a processing experimental plant incidental thereto will be constructed in the area of Kuala Trengganu in 1969.

Furthermore, the Government, until before the survey of the Team on the schemes of fishing port construction, presumed that there had been no sites suitable for the construction of fishing ports in the East Coast because of the natural conditions peculiar to this district. Therefore, although the Government realized the necessity of fishing port construction for the development and expansion of fisheries, this matter was not incorporated into the Primary Malaysian Plan. And the scheme up to date is planned to the extent that the river-mouths where fishing bases are located are dredged for the convenience of fishing boats to enter and leave the port.

Part 4 Conditions of Location in the East Coast

Chapter 1 Natural Conditions

1-1 Overall Pictures

Several mountain-ranges made up of granite and Paleozonic lime stone traverse the Malay Peninsula (West Malaysia) from the north to the south.

The inter-mountain areas are hilly, and 2190 m at most above the sea level.

There are many plateaus covered with latelite (red clay peculiar to the tropics) in the inland areas; most of the coast lines form the plains composed of alluvial soil.

Since West Malaysia is on low latitudes and forms a long and slender peninsula, it has an oceanic and tropical climate, a small and annually-common difference of atmospheric temperature and a lot of precipitation during a whole year.

Especially during the period of May to September is there a lot of rainfall on and around the west coast of the Malay Peninsula because of the southwest seasonal winds, and during the period of November to March when northeast monsoons go on, is there a lot of rainfall on and around the East Coast.

Because of the high temperature and lots of rainfall, there are growing groups of damp vegetations such as nipa palms and so on in the coastal shallows, banks of rivers, marshes, etc.

The natural conditions on and around the East Coast of West Malaysia are, by ground, weather and sea conditions, outlined as follows:

1-2 Ground Conditions

1-2-1 Configuration of the ground: The configuration on the coast is, generally speaking, flat and monotonous, but the coastal line is dotted with promontories or islands here and there.

1-2-2 Rivers: All of the rivers run slowly in a meandering way, and pour into the sea. There are silted sediments of the earth and sand flowing down from upper streams in the neighbourhood of river-mouths. As a result, the blockade or changed position of river-mouths comes about here and there; the river improvement is seldom conducted and the rivers are flooded at least once a few years.

1-2-3 Soil: Most of the coasts are made up of the comparatively fine-grained sand (0.3 mm or so in mean diameter); there are rocks around most of the promontories or islands.

1-2-4 Seismic tremors: "Circumpacific earthquake zone" is off or far from the Malay Peninsula, so the Peninsula itself hardly generates seismic tremors which will cause damage to structures; therefore, it is not necessary that earthquakes be taken into account as design external force.

1-3 Weather Conditions

1-3-1 Winds: The wind during the southwest monsoon season of May to September as well as that during the northeast monsoon season of November to March blow in a totally opposite direction. Generally speaking, the wind during the southwest monsoon season goes over the mountain ranges of Sumatra and the Malay Peninsula and reaches the East Coast, and so the force of the wind is small; however, the wind during the northeast monsoon season blow over the South China Sea, without being blocked by islands or mountain ranges, and so the force of the wind is comparatively great. The wind velocity, even during the northeast monsoon season, hardly exceeds an average of 17 m/sec in hourly records (such an excess was never recorded during 1965 to 1967).

1-3-2 Rain: There is a little rainfall during the southwest monsoon season (or dry season) and a lot of rainfall during the northeast monsoon season (or rainy season). The rainfall varies according to the observation points, ranging from 140 mm to 220 mm per month during the dry season and from 200 mm to 1,000 mm per month during the rainy season. The most rainfall per day is about 600 mm and the rainy days are 210 or so per year; therefore, the mean rainfall of rainy days is about 15 mm on an average.

1-3-3 Temperature: The yearly mean atmospheric temperature is 26°C (79°F); the difference of temperature due to seasons is about 3°C. The difference between the maximum temperature and the minimum one during a day is great. That is, the maximum temperature during a day is 30.5°C on an average, and, the minimum, 22.7°C; the difference of the both is 7.8°C.

1-3-4 Humidity: The yearly mean humidity is 86%, but 70% to 75% in the daytime, and 95% or so at night when temperature goes down; therefore, the humidity is easier to bear for its high temperature.

1-3-5 Days of Clear Sky: Completely cleared-up days hardly exist, but there are 240 days averaged during a year in which clouds are more or less existent. Also, there are 216 rainy days on an average during a year. This represents that a lot of rainfall called "squall" which is peculiar to the tropics continues to drop for only one or two hours in most cases. Even during the rainy season the rain rarely lasts to fall during a whole day.

1-3-6 Others: Foggy days are a few, i.e. average 11 days during a year. The days involving thunder average as many as 127 during a year, because these thunderbolts are mostly involved by squalls.

Moreover, typhoons never strike in this region; this region is not struck by typhoons originating in other regions. Accordingly, it is not necessary at all that typhoons be taken into consideration.

1-4 Sea Conditions

1-4-1 Waves: As winds blow toward the sea from the shore during the dry season, there are many of calm days in which the coast is almost waveless.

The East Coast is struck by the waves generated due to comparatively strong northeast winds during the rainy season. The seabed of the East Coast is shallow to some distance from the shore, and the shallow seas of less than 100 m in water-depth last as far as 200 km offshore. Accordingly, even if waves develop over the sea area from the Formosan Strait to the South China Sea, their deteriorating rate is great and the waves which reach the coast are of only 3 m or so in height. (See Table 5-1 as to elements of the waves in each area.)

1-4-2 Tide: The difference of tide is comparatively great, i.e. 3 m or so despite the monotonous coastal lines because the East Coast is close to the equator.

The average sea level, suffering the change of weather conditions according to the seasons, rises during the rainy season compared with the dry season, and its difference is about 0.35 m. (See Table 5-1 as to elements of the tide in each area.)

1-4-3 Tidal currents and longshore currents: There are no records of actual measurement, but the East Coast is faced in front with the open sea differently from the West Coast. And so outstanding longshore currents and others do not seem to be existent.

1-4-4 River currents: The rivers usually run slowly and so their tractive force is not great enough to block the accumulation of earth and sand on and around river-mouths. However, after a long spell of rain during the rainy season, there are some cases where the earth and sand already piled up is washed away and then renewed river-mouths are made up.

1-4-5 Sand drift: As most parts of the East Coast are made up of shelving beaches, it can be that there is a fairly active movement of sand drift. There are neither survey records on the movement of sand drift on the coast nor are there where such structures as jetties and breakwaters have ever been constructed. Accordingly, the following two are totally unknown: one is the present condition on the movement of sand on the coast; the other, the change of the sand-movement accompanied by the construction of structures on the coast.

1-4-6 "Tsunami": There is no record of damages suffered by "tsunami" (tidal waves caused by earthquakes.) nor any threat of being struck by one.

Judging from the three points of ground, sea and weather conditions mentioned above, the extraordinary external forces such as earthquakes, "tsunami" and typhoons need not be taken into consideration.

In addition, the sea is very calm during the dry season, and the weather is so stable during

this season that the weather forecast is not necessary. Therefore, it may be said that the construction of structures on the coast during the dry season will be endowed with very favourable natural conditions.

However, the East Coast of West Malaysia is of very shelving beaches as already mentioned. If structures are to be constructed on the coast, it is necessary that a sufficient survey be made on the movement of sand drift affected by the construction. Before the construction of fishing ports, the field survey and the model experiments should be made carefully.

Chapter 2 Socioeconomic Conditions

2-1 Population and Industries:

Bordering the central mountains in West Malaysia, the East Coast area is sparsely populated. But only the Kota Bharu area, neighbouring Thailand in the north, has been developed exceptionally since old times and is densely populated like West Coast. Generally in the East Coast, population is concentrated on and around the river-mouths of the several short rivers which pour into the South China Sea; in this area are formed small cities, villages or settlements.

The fishing villages are centered on and around the river-mouths and the whole area is starred with 97 large and small fishing villages. Trengganu State is an area with the largest number of fishing villages and fishermen.

Most of the population in the East Coast are Malayans, who are engaged in agriculture and living in a self-sufficient economy in villages out off from the marketing channels. Agriculture is not developed and the farm land of rice, rubber, oil palm, etc. is extremely small in area. Greater part of the land is covered with woods and forests. For this reason, the plantation of oil palm and the exploitation of forests are positively promoted under the Primary Malaysian Plan.

In the coastal area, the coastal fishery is developed which exploits fishing grounds as far as 30 miles off the coast.

2-2 Labour Condition:

As for the labour condition, the manpower in agricultural sector seems to be excessive because of the retarded agricultural exploitation. However, there is an extreme shortage of skilled labourers and technicians whose wages are on a fairly high level. As for the fishery labour condition, fisheries themselves are largely subject to the weather condition and usually require much of the part-time manpower. There is a lot of employment in the fishery sector, and many of the employes come back to agricultural work with the monsoon season setting in.

2-3 Consumption of Fishery Products:

The living standards of the population in the East Coast seem to be at a very low level as compared with that of urban districts. The consumption of fishery products as well is considered to be on a low level; but as there are many Malaysians who like fish diets, the future demand for fishery products is expected to grow largely with the increasing income in the future. While most part of the present fish-landings over the entire East Coast area is shipped to the West Coast area, mainly to such cities as Kuala Lumpur and Ipoh as well as to Singapore, the consumption in the East Coast is extremely limited. But if the supply comes to be very insufficient, fishery products are transported in from the West Coast.

2-4 Transport Condition:

As for the transportation in the East Coast, the truck transportation is mostly relied on, because the sea transport is undeveloped and the railway transport requires too long a time. Sea transport is limited to the transportation of ores at Dungun, Rompin and others because proper harbours do not exist.

As for the roads, the following three are the only arteries now in existence. One artery running north to south along the coastal line (Kota Bharu-Mersing) and two arteries connecting the East Coast and the West Coast (one linking Kuantan and Kuala Lumpur; and the other linking Mersing and Johore, which has a branch connecting Mersing and Kluang). The East Coast district is far behind other parts of West Malaysia in the construction or repairing of roads. For this reason, the forthcoming economic development of the East Coast district should involve the construction or repairing of roads as one of the major requirements. Therefore, a scheme for the highway between Kota Bharu and Butterworth will necessarily be incorporated into the Governmental development plan after 1970. In light of the existing transport situation of fishery products, the Kuantan district situated at a forking point of the roads in the East Coast will, become more and more important, because of its proximity to destinations and the increasing landings in the future.

Part 5 Planning of Fishing Ports

Chapter 1 Fundamental Consideration in Planning Fishing Ports

1-1 Planning of Fishing Ports in the Entire West Malaysia

The macroscopic scheme of the fishing port construction in West Malaysia should be worked out with consideration given to the following: (1) In which places of West Malaysia should they be constructed?; (2) What functions should they have?; (3) To what extent and scale?

The Malaysian fishing industry, from the viewpoint of supplying food particularly animal protein, plays an important role in the national economy; all the more in this light, it is essential to achieve a positive promotion of the fishing industry.

For this purpose, a programme must be drawn up for the construction of fishing ports which serve as bases for fishing operations. Such a programme should be planned not only on the basis of the actual condition of fisheries and fishing ports but also considering the economic, social and natural conditions of location. Account must also be taken of the future trends of fishing industry, expected increase in the number of fishing boats, increase in fishery production, improvement on marketing channels, strengthened basis of fishing village community.

1-2 Planning of Fishing Ports in the East Coast

The fundamental idea in drawing up the plan for fishing ports in the East coast is to formulate a macroscopic scheme on the basis of surveys on all areas of the East Coast.

1-3 Goals of Fishing Port Construction Scheme

The Survey Team has set the following goals for the future status of fishery developments.

- (1) Fish landings in the entire East Coast in 1978 has been set at 240,000 or 250,000 tons. This figure represent the amount already gained in the entire West Coast area in 1967. If the fishery growth of the West Coast goes on at its present rate, the landing per fisherman in the East Coast would come to a balance with that of the West Coast in 1978.
- (2) Achievement of the above objective demands that each of the following four items be fulfilled before 1978.
 - (1) The number of fishermen must increase to more than 2,000;
 - (2) With the switchover of fishing boats into large type and with the introduction of large-type boats, the number of large-type purse seiners and trawlers must increase to more than 560;

- (3) By these large-type boats, over two-thirds of the target landings must be secured;
- (4) The fisheries by small-type boats must go on at the present growth rate, accompanied by increased landings.

(3) As for the targets of each survey area, the number of fishing boats of each fishery-type in 1978 was first computed on the basis of the above conditions (2); this number was apportioned to each of the survey areas according to respective conditions of fishing grounds. Thus, the number of fishing boats which use fishing ports and the fish-landings were estimated for survey area (See Table 4-1).

1-4 Plans for Individual Fishing Ports in Respective Areas

The fundamental idea in drawing up the individual scheme is to enforce the undermentioned works while considering the social, economic and natural conditions. However, "Establishment of execution plan" was not made.

- (1) Selection of the sites suitable for fishing ports;
- (2) Decision on the scale of fishing port facilities and the layout thereof;
- (3) Estimate of the approximate construction cost;
- (4) Establishment of execution plan.

Table 4-1 Goal to be arrived at in number of fishing boats and fish-landings by State, area and by fishery-type in the East Coast of West Malaysia in 1978

Fishery-types	Mean tonnage fishing boats	Annually mean fish-landing per fishing boat	Tengganu State and Kelantan State						Pahang State						Area of northern part of Johore State												
			Kuala Besut			Kuala Trengganu (including Chenering)			Kuantan			Others			Total			Merang			Others			Total			
			No. of fishing boats	Annual fish-landing	No. of fishing boats	Annual fish-landing	No. of fishing boats	Annual fish-landing	No. of fishing boats	Annual fish-landing	No. of fishing boats	Annual fish-landing	No. of fishing boats	Annual fish-landing	No. of fishing boats	Annual fish-landing	No. of fishing boats	Annual fish-landing	No. of fishing boats	Annual fish-landing	No. of fishing boats	Annual fish-landing	No. of fishing boats	Annual fish-landing	No. of fishing boats	Annual fish-landing	
Fishing stakes	5	50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
Drag net	4-12	70	9	630	9	630	107	7,490	30	2,100	95	6,650	-	-	-	-	-	-	-	-	22	1,100	28	1,400	50	2,500	
Flotting gill net	6	10	35	350	35	350	430	4,300	48	480	152	1,520	-	-	-	-	-	-	-	-	23	1,610	27	1,890	50	3,500	
Lift net	10-30	70	7	490	6	490	87	6,020	5	350	15	1,050	-	-	-	-	-	-	-	-	180	1,800	220	2,200	400	4,000	
Scoop net	8	5	3	15	3	15	34	170	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	80	5,600
Bag net	5	25	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hook and line	5	10	42	420	42	420	516	5,160	48	480	152	1,520	-	-	-	-	-	-	-	-	45	450	55	550	100	1,000	
Trap and pots	10	25	6	150	6	150	68	1,700	5	125	15	375	-	-	-	-	-	-	-	-	9	225	11	275	20	500	
Miscellaneous	6	3	25	75	25	75	300	900	24	72	76	228	-	-	-	-	-	-	-	-	22	66	28	84	50	150	
Miscellaneous (combining other fishery-types)	-5	2	(25)	50	(25)	50	(300)	600	(24)	48	(76)	152	-	-	-	-	-	-	-	-	(22)	44	(28)	56	(50)	100	
Small-type trawl fishery	15	16	14	224	14	224	32	512	11	176	29	464	-	-	-	-	-	-	-	-	45	720	55	880	100	1,600	
Small-type trawl fishery	-10	8	(21)	168	(21)	168	(48)	384	(17)	136	(43)	344	-	-	-	-	-	-	-	-	(68)	544	(82)	656	(150)	1,200	
30 G.T. type trawler fishery	30	200	14	2,800	21	4,200	-	-	85	17,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	20	4,000	
60 G.T. type trawl fishery	60	300	18	5,400	42	12,000	-	-	140	42,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Purse seine net	30	400	35	14,000	35	14,000	-	-	75	10,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Total			208	24,772	238	33,372	1,574	27,236	471	92,967	534	12,303	1,005	105,270	562	45,384	563	13,266	1,125	58,650	562	45,384	563	13,266	1,125	58,650	

Grand total (fish-landings in the East Coast) 249,300 tons

Note: Figures in () in "Miscellaneous and Small-type trawl fishery combining other fishery-types" overlap with those of any other fishery-type. Seine-net, lift net and purse-seine-net fishing boats, respectively have a small, belonging boat

Chapter 2 Planning of fishing ports in four survey-areas

2-1 Conditions of location of fishing ports

Table 5-1 Characteristics of natural conditions in four survey-areas

Name of areas	Name of points selected	Geographical features	Features of nature of the soil	Tide	Wave (estimates)	Affected rivers	Sand drift	Distance from the established fishing centres
Kuala Besut	Kuala Besut	Flat sandy-beach 3km away from the left bank of the Besut River; shelving beach	Fine sand (0.2-0.3m/m) in 0.3m/m in mean diameter)	H.H.W.L. 2.53m L.L.W.L. 0.15m M.S.L. 1.31m Largest tidal difference 2.01m D.L. = C.D.L.	Height of deep water wave 2.5m Period 7.0Sec Direction of deep water wave NE Wave height in the front of port entrance 2.4m Wave length 57m Wave direction N→E 52° Water-depth 6.5m Time of highest tide	The Besut River	Existent	(Straight distance) 3km away from K. Besut 5km away from K. Senerak
Kuala Trengganu	Tg. Chenering	South side of Cape Chenering; this projecting cape serves as a shelter against attacking waves. Comparatively shelving beach.	The land part at low tide inside the cape is of rocky ground; 200m southward away from the cape are found sand beaches. But since there are hills backward close to the beach, rocky ground might be found under sand.	Highest tide level	Period 8.6Sec Wave direction in deep sea NE Wave height in the front of port entrance Wave height in the front of port entrance 7.7m Wave direction N→E 52° Water-depth 5.5m (Highest tide level)	No	Existent	9km away from Trengganu 5km away from Ibai 7km away from Marang

Name of areas	Name of points selected	Geographical features	Features of nature of the soil	Tide	Wave (estimates)	Affected rivers	Sand drift	Distance from the established fishing centres
Kuantan	Tg. Tembeling	Situated on the left bank of the Kuantan River and at the south side of Cape Tembering 5km away from Kuantan City; this projecting cape serves as a shelter against waves. Very much shelving beaches.	The inside of the cape is of rocky ground with projecting rocks (land part at low tide); others are of fine sand (0.2 mm or so in mean diameter)	Highest tide level 3.51 m Lowest tide level 0.18 m Mean tide level 1.58 m Largest tidal difference 3.38 m DL = 0 m chart	Height of deep water wave 2.5m Period 10.8Sec Wave direction in deep waters NE Wave height in the front of port entrance 2.6m Wave length 85m Wave direction N-E 69° Water-depth 8.0m	The Kuantan River	Existent	5km away from the Kuantan River 5.5 km away from Kp. Lumpur
Mersing	Tg. Selantai	South side of the cape 8km away from the centre of Mersing City; Situated inside the cape; there are several islands in front; and so the shelter effect against waves is excellent. Shelving beaches	The land part at low tide inside the cape is of rocky ground; others are of fine sand	Highest tide level 3.14m Lowest tide level 0.06m Mean tide level 1.55m Largest tidal difference 2.96m DL = 0 m chart	(Time of highest tide) Height of deep water wave 1.9m Period 7.7 Sec Wave direction in deep sea NE Wave height in the front of port entrance 1.9m Wave length in the front of port entrance 55m Direction of waves N-E 52° Water-depth 6.6m (Highest tide level, etc.)	No	Existent	8km away from Mersing 30km away from Endau

Table 5-2 Characteristics of the fishing industry in four survey-areas

Name of areas surveyed	Location	Fishing villages and fishermen	No. of fishing boats	1967 key fishery-types and fish landings (Weight)	1967 key fish-species and fish-landings	Fishing grounds in use	Fishing season	Marketing facilities	Shipment
Kuala Besut	Situated in the northern part of the East Coast or an important fishing base in the East Coast Kelantan State, Trengganu, an important fishing base in the East Coast	No. of fishing villages 8 Population of fishermen 2,020	Non-powered 268 Powered 272 Total 540 Powered Less than 10G.T. 10-30 G.T. More than 30 G.T. Besides, 50G.T. trawlers 5	Seine net 4669 (77%) Drift net 60 (1) Lift net 197 (3) Hook and line 100 (2) Traps and pots 375 (6) Trawl 634 (10) Miscellaneous 16 (0) Total 6050 (100)	Skipjack 271 (0.4%) Anchovy 796 (13.2) Mackerel 602 (10.0) Snapper 238 (3.9) Horse mackerel 449 (7.4) Scad 500 (8.3) Sardines 1726 (28.5) Spanish mackerel 80 (1.3) Shrimp 160 (2.6) Drums 12 (0.2) Total fish-landings 6050 (100)	Sea area as far as 20 nautical miles off-shore. (Main fishing ground lies within a few miles off the shore)	Best Season Apr.-May Off-season Nov.-Mar.	Fish-landing place (capacity-40 tons) Cold-storage (Ice-making plant 4 tons per day; Ice-storing-30 tons)	80% of total fish-landings is shipped to Kota Bharu, Kuala Lumpur, Singapore, etc.
Kuala Trengganu	Situated in the northern part of the East Coast and the capital of Trengganu State With neighbouring Besut Dungun, an important fishing base in the East Coast	No. of fishing villages 11 Population of fishermen 4,615	Non-powered 325 Powered 698 Total 1023 Powered Less than 10G.T. 10-30G.T. More than 30G.T. Besides, 50G.T. trawlers 5	Seine net 264 (28%) Drift net 2464 (26) Lift net 2262 (24) Hook and line 917 (10) Traps and pots 259 (3) Trawl 269 (3) Miscellaneous 459 (5) Total 9271 (100)	Skipjack 6791 (7.3%) Anchovy 407 (4.4) Mackerel 2241 (24.1) Snapper 125 (1.3) Horse mackerel 1401 (15.1) Scad 1214 (13.1) Sardines 917 (9.9) Spanish mackerel 301 (3.2) Shrimp 207 (2.2) Total fish-landings 9271 (100)	Sea area as far as 30 nautical miles off-shore	Best season Apr -July Off-season May -Mar.	Fish-landing place Retail market Ice-making plant 25 tons per day, ice-storing-20 tons) Cold-storage -not established	70-80% of total fish-landings are shipped to Kuala Lumpur, Singapore, etc.
Kuantan	Situated at the centre of the East Coast and the Capital of Pahang State; along with the nearby Kemaman, is a main fishing base in the East Coast	No. of fishing villages 18 No. of fishermen 2,151	Non-powered 143 Outboard engine 68 Powered 294 Total 506 Powered Less than 10G.T. 10-30G.T. More than 30G.T. Besides, 50G.T. trawlers 5	Fishing stakes 23 (0%) Drift net 1062 (19) Drift net 1113 (20) Left net 1810 (32) Hook and line 1158 (20) Traps and pots 184 (3) Trawl 299 (5) Miscellaneous 55 (1) Total 5702 (100)	Skipjack 371 (0.6%) Anchovy 412 (9.1) Mackerel 370 (6.5) Snapper 153 (2.7) Horse mackerel 1309 (23.0) Scad 344 (6.0) Sardines 342 (6.0) Spanish mackerel 278 (4.9) Shrimp 176 (3.1) Drums 67 (1.2) Total fish-landings 5702 (100)	Sea area as far as 30 nautical miles off-shore (There seem to be found many demersal fish resources)	Best fishing season Aug -Aug) Off-season (Jan -Mar)	Fish-landing place Retail market Cold-storage 2 (capacity-180 tons) Ice-making-60 tons/day Ice-storing-26 tons	The 60 per cent of fish-landing is shipped to Kuala Lumpur, Singapore, etc

Name of areas surveyed	Location	Fishing villages and fishermen	No of fishing boats	1967 key fishery types and fish landings (Weight)	1967 key fish-species and fish-landing	Fishing grounds in use	Fishing season	Marketing facilities	Shipment
Mersing	Situation in the south of the East Coast and a city situated in the east of Johore State, with the nearby Endau, a main fishing base in the East Coast	No of fishing villages 9 No. of fishermen 2,252 (There are many fishermen working away from Trengganu State	Non-powered 97 Outboard engine 90 Powered 372 Total 559 Powered Less than 10G.T. 268 10-30G.T. 95 More than 30G.T. 9	Fishing stakes 1839 (21)% Seine net 1205 (14) Drift net 847 (10) Lift net 847 (18) Hook and line 1026 (12) Traps and pots 281 (3) Trawl 1973 (22) Barrier net 27 (0) Total 8768 (100)	Skiplack 453 (5.2)% Anchovy 187 (2.1) Mackerel 255 (2.9) Snapper 207 (2.4) Horse mackerels 1552 (17.7) Scad 215 (24) Sardines 1350 (15.4) Spanish mackerel 650 (7.4) Shrimp 199 (2.3) Drums 666 (7.6) Total fish-landings 8768 (100)	Sea area as far as 20 nautical miles off-shore The off-shore area is dotted with many islands; around these islands are formed good fishing grounds	Best fishing season (July-Sept.) Off-season (Nov.-Mar.)	Fish-landing place-2 Retail market plant-1 Ice-making-50/day Ice-storing-60 tons	The 90-95 per cent of fish-landings is shipped to Singapore.

2-2 Existent Fishing Port Facilities and Their Utilization

The present situation is that fisheries are conducted by small-type boats using rivers as fishing ports in respective areas. The rivers are left in natural state without improvement or plans for improvement. Even if anchorage basins or channels become shallow because of the sediments of earth and soil flowing from upper reaches and the sand drift on the coast, they are left as they are.

In Kuantan, however, if channels or anchorage basins are silted up, they are dredged by the Boarding Office's grab dredgers.

In all areas, the fishing port facilities are in unsatisfactory state, provided only with a minimum of necessary facilities such as guiding lights, jetties, sorting sheds and cold-storage rooms.

There are, in Kuala Trengganu, a good, general retail market and a dockyard constructed by the Government investment.

This dockyard builds fishery inspection boats and fishing research boats for the Government.

2-3 Selection of Sites

At present, rivers are used as fishing port sites in each area. The anchorage basins or channels become shallow on account of the sand and earth running down the rivers and of the sand drift on the coast. Therefore, the maintenance and administration of fishing ports is causing great economic and technical difficulties.

Such being the case, the idea of constructing fishing ports by river improvement has been dropped, and suitable sites have been selected from among places not located at the river-mouth.

In Tg. Chenering of Trengganu Area, Kuantan and Mersing, the projecting capes as natural breakwaters subdue the northeasterly wind and waves during monsoon seasons. Therefore, the inside of capes is deemed suitable for fishing ports. The location of suitable sites and its reason are indicated in Table 5-3.

2-4 Determination of Scale of Fishing Port Facilities and Layout Thereof

2-4-1 Fishing port planning

This section deals with various facilities required for fishing port, the scale of such facilities and their layout plan.

The layout of fishing port facilities must be determined with due account taken of the following matters:

- (1) Functions of the fishing ports;
- (2) Target-year of plan;
- (3) Current influence of fishing port e.g. fishcatches, fishing boats put into use, etc.;
- (4) Optimum scale matching conditions in (1) through (3);
- (5) and the fishery development in the future.

In the scheme of fishing port construction of this time, all of the four sites are assumed to serve as offshore fishing bases.

The amount and layout of facilities have been determined on the basis of the influences of fishing ports estimated to be reached within a ten years period henceforth, or by 1968 which is set as the target-year.

The facilities for fishing port are roughly divided into:

- (1) Fundamental facilities, i.e. contour, mooring and water facilities;
- (2) Functional facilities, i.e. navigation aid, facilities for fishcatch handling, preservation, processing of fishcatches, etc.;
- (3) Affiliated facilities, i.e. affiliated industrial facilities, fishermen's welfare facilities, etc.

Detailed study on these facilities is expected to be made in the next feasibility-survey. Accordingly, as regards the decision on the abovementioned three groups of facilities, the present report is confined to the enumeration of necessary facilities and to the consideration of their general layout.

In the next feasibility-survey, the computation of the size for the facilities (2) and (3) stated above will be made; therefore, the layout might be altered on that occasion.

As the target-year is set a decade ahead as stated above, the construction of fishing ports is planned to be in ten years, which is divided into the first five year term and the second five year term. For the first 2 years of the first plan, a minimum of necessary facilities to be constructed has been pointed out.

Therefore, fishing ports may be put in use, at the earliest, one year after the construction

Table 5-3 Sites suitable for fishing port in respective areas and and the reason therefor

	Kuala Besut	Kuala Trenggnu	Kuantan	Mersing	
Suitable sites for fishing ports	The coast north of the river-through	The coast of Tg. Chenering	The coast of Tg. Tembeling	The coast of Tg. Selantai	
Reason for the above	1. Comparatively close to the fishing ground				
	2. For anchoring of fishing boats, calm anchorage is easy to obtain				
	3. Stones for fishing port construction are easy to obtain from nearby, in Mersing, breakwaters are not necessary.				
	4. Procurement of the sites for some land-functioning facilities is possible.				
				5. Key point for the transport of fishcatch to Kuala Lumpur and Singapore	5. Comparatively close to the great consuming centre of fishcatch (Singapore).
		6. 1 mile away from the centre of city		6. 2 miles away from the centre of city	
				7. Service for general cargoes is possible.	


Notes:  means there is not found any reason for the sites suitable as fishing port.

Table 5-4 List of fundamental facilities

Name of areas		Kuala Besut	Kuala Trengganu	Kuantan	Mersing
Name of facilities					
The contour	Breakwaters	o	o	o	o
	Sand groins	x	x	o	o
	Revetment	o	o	o	o
Mooring	Fish landing quays	o	o	o	o
	Servicing quays	o	o	o	o
	Mooring quays	o	o	o	o
	Repairing quays	x	x	o	x
	Quays for general cargoes	o	o	o	o
	Slipways	o	o	o	o
Water area	Approach channels	o	o	o	o
	Anchorage basin	o	o	o	o

- Notes:
- o means "necessary"; this is included in the plan
 - x means "not necessary"; for the time being; this is not included in the plan.
 - Δ means "as occasion demands, to be set up"; this means pending in the plan; however, sites are earmarked.

work is started, and at the latest, two years after the commencement of work. Further, attention has been paid so that an expansion of fishing ports may be pushed while the fishing ports are in use. This projection may be said to be economically effective in using the fishing ports.

It goes without saying that detailed survey will be required in constructing the fishing ports actually, and that further alteration of the plan may be necessitated depending on the results of the survey.

2-4-2 Fundamental facilities

(1) Fundamental facilities

As the term suggests, the fundamental facilities are various basic facilities forming a fishing port.

- (1) Contour facilities, i.e. breakwaters, revetments, etc.,
- (2) Mooring facilities, i.e. landing quays, servicing quays, slipways, etc.;
- (3) Water facilities, i.e. channels, anchorage basins, etc.

As regards the decision on the required (planned) length of the mooring facilities in (2) above computation is made as given in paragraph (2) below.

The facilities necessary for each surveyed area are shown in the following Table 5-4.

(2) Decision on the length of mooring facilities

(1) Decision on the fishing boats using fishing ports

In drawing up a fishing port plan together with the decision on the features of fishing port, the fishing boats using that particular fishing port must first be considered.

The fisheries of the East Coast of West Malaysia, as stated before, are divided into the already-established fishery types and the new fishery types which have to be developed. The former types are lift nets, drag nets, hook and line, etc. and the latter are trawl and purse-seine fisheries.

The fishing boats of the East Coast in 1978 are divided by tonnage echelon as follows:

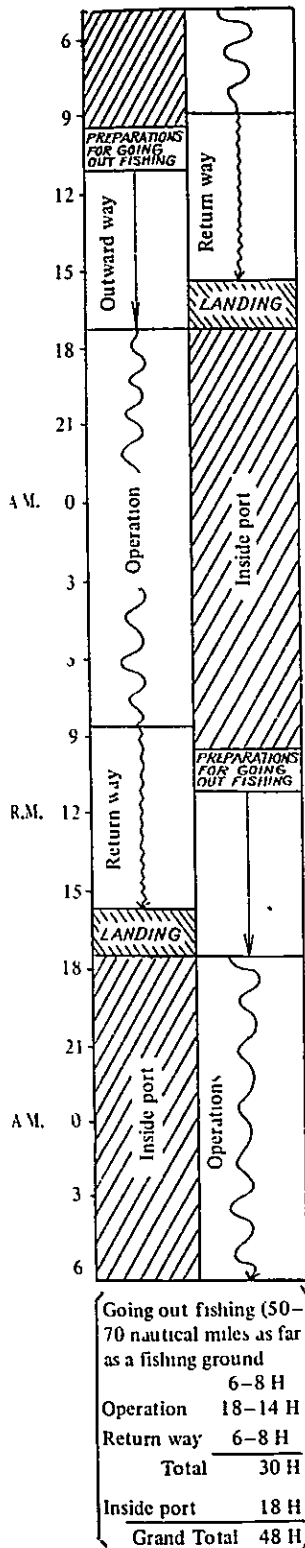
- (a) Non-powered fishing boats and outboard-engine fishing boats – chiefly composed of small belonging-boats with lift net, drag net and angling boats;
- (b) Powered fishing boats of under 10 G.T. – chiefly composed of angling, gill-nets and belonging-boats with purse-seine net;
- (c) Powered fishing boats of 10 to 15 G.T. – chiefly composed of lift net, drag net, small-type trawlers, etc.;
- (d) Powered fishing boats of 30 to 50 G.T. – chiefly composed of lift nets and trawlers;
- (e) Powered fishing boats of 30 to 50 G.T. – trawlers and purse seiners.
- (f) Powered fishing boats of over 50 G.T. – chiefly of 60 G.T. trawlers.

The tonnage echelon of these fishing boats using fishing ports are as in Table 5-5.

(2) The condition of fishing boat operation

The operation condition of the fishing boats using fishing ports, i.e. subjected fishing boats, is discussed below:

Fig. 5-5



1). As regards the fishing boats classified under in (a) to (d) the operation of one-day trip.

For this one-day trip, there are: (a) Day-time operation: going out fishing in the morning and returning port toward the evening; (b) Night-time operation: going out fishing at night and returning port in the morning.

Judging from the present condition of operation, the rate of operation in ten years is likely to get to the following percentage:

- (a) 70%
- (b) 30%

2) The trawl and purse-seine fisheries in (e) and (f) are expected to develop very much, and present a state differing largely from the present condition of operation. Therefore, consideration taken as in the following:

(i) Purse-seine fishery of 30 G.T.

Although this type of purse-seine fishery is not put into force now, the Government is making efforts for the development of this fishery in the years to come. Since the operation will be centering around 50 miles off the shore, the operation of one period of 2-days trip will be realized instead of the present 1-day trip operation

Fishing operation chart, Fig. 5-5, will clarify the condition of fishing ports in use. That is, the fishing boats waiting for the time of their going out fishing on a mooring quay, move to the ice supplying quay where ice is supplied and then go out fishing. These fishing boats arrive at a fishing ground in 6 - 8 hours and operate for 14 - 18 hours chiefly during the night. They return port so as to be in time for the market to be opened in the evening. They move to the quay for supply of fuel after landing fishcatch at the landing quay and then return to the mooring quay in order to make preparations for the fishing of the next day. These operations are based on the 1 period = 2-day trip.

On the basis of assumption that a half of total boats operates per day and that a half of total boats uses all kinds of mooring facilities, landing quays, servicing quays, mooring quays, the basic numerical value of the length of facilities is calculated.

However, there are some days when the total fishing boats using a port must be held inside the port on account of heavy seas, etc. This will be separately considered.

(ii) 30 G.T. trawler fishery

It is expected that 30 G.T. trawlers use almost the same fishing grounds as the 30 G.T. purse-seiners. Therefore, it may be said that the former is the same as the latter in the number of navigation days and in how to use the port facilities. Therefore, as regards the computation of the length of facilities, the same ways with i) is taken.

(iii) 60 G.T. trawler fishery

The 50 G.T. trawlers are now operating. But all of them navigate only a day. It is no exaggeration to say that the profits due to the switchover to large type boats are hardly gained at present.

In time with the switchover of 50 G.T. type into improved 60 G.T. type in the future, the following operation condition will probably be realized: a period of 4 days; 1-day anchoring in port; about 3 days of operation.

On the basis of above operations, fishing boats will, in the port, move to the fuel-supplying quay after the fish-landing early in the morning and then return to mooring quay for the going-out preparations of the next day. The next day, they are supplied with provisions and move to the ice-supplying quay in order to be loaded with ice and then go out fishing; thus, they return port early morning 3 days after.

Therefore, for the computation of mooring facilities, the number of one-fourths of total fishing boats put into use is employed as basic numerical value. It goes without saying that the holding of whole boats at heavy seas will be considered separately.

(iv) Size of fishing boat

As the size of fishing boat is the deciding factor in determining the total area of various facilities, respective factors of fishing boats were decided on the basis of the field survey as shown in Table 5-6.

Table 5-6

Ship's size	Actual ship's length	Actual ship's breadth	Actual draft	1 berth-length	1 mooring length	Planned water-depth
Non-powered, outboard engine			0.5	10	3.0 m	-1.0 m
10 G.T.	15 m	4.0 m	1.4	20 m	5.0	-2.0 m
15 G.T.	17 m	4.0 m	1.5		5.0	
30 G.T.	20 m	5.0 m	1.7	25 m	6.0	-3.0 m
50 G.T.	22 m	5.5	1.9		6.0	
60 G.T.	24 m	6.0	2.0		30 m	

Notes: 1 berth-length means the length of the quay required when a fishing boat lies alongside a quay.
1 mooring-length means the length of the quay when a fishing boat lies lengthwise on a quay

(v) How to compute the length of quay

As stated before, quays are grouped by function into fish-landing quays, servicing quays, mooring quays (waiting quay for departure) and repairing-quays and so forth.

How to compute the respective quay length required is briefly explained here.

(1) Fish-landing quay

As for the landing operation overboard a large type boat, fishcatch is landed on a quay by manpower or derricks from the fore fish-holds of a fishing boat; and the fishcatch is carried into a market hall. In order to facilitate this operation, it is necessary for the fishing boats to be brought alongside the quay.

As for the hours spent on a quay, 3 hours early morning and 3 hours toward evening seem to be proper, considering the transport to markets, auctioning place or consuming centres. It is important that as many fishing boats as possible use the landing-quay within these limited hours.

For computing the length of an extended mooring quay, the following methods can be employed: Monte Carlo method, waiting line theory, rotation method, etc.

For the fishing ports in the East Coast of West Malaysia, the rotation method seems the most rational and adaptable for the following reasons.

((1)) The mooring quay is used only for 3 hours; ((2)) although no information is available on the entry condition of boats, entries will be on an average when considered from the viewpoint of time computation; ((3)) and so, the waiting time of a fishing boat will not exceed the hours required to land its fishcatch.

Therefore, the computation of the length of fish-landing quay will be made by "Alongside-Quay Rotation Method."

(2) Servicing quay

Commodities supplied at the servicing quay include water, foodstuff, fuel oil and ice.

(i) Water

Water is supplied chiefly while a boat is on to the fish landing quay and, sometimes when it is on to the mooring quay. Installation of pipes is needed.

(ii) Foodstuff

Foodstuffs are supplied before departure from the mooring quay (waiting-quay for departure): facilities are not particularly needed.

(iii) Fuel oil

For this purpose, a quay for exclusive use is needed; supply is effected on the exclusive landing quay, and the boat moves to a quay for recess. Laying of pipes is needed.

(iv) Ice

Ice is supplied at the exclusive quay before departure of boats. Exclusive ones such as chutes are needed.

As explained above, a quay for exclusive use is needed in order to supply a boat with ice or fuel oil. Accordingly, it follows that the necessary extended-length must be calculated. For this calculation the "Alongside Quay Rotation Method" will be employed since the time spent at these quays will be short, i.e. 1-2 hours and the using time of quays as uniformly distributed.

(3) Mooring quay

The length of quay is sought lengthwise in 1-row-line. The number of fishing boats, as a calculation basis in this case, will be the same as that used for the fish-landing quay measures for heavy seas will be considered separately.

(4) Slipways and repairing quays

The slipway is designed so that small boats belonging to a purse seiner (under 2 G.T. type) may be held. It is desirable that the length of slipway be decided so that any number of fishing boats may be held in a 1-row-line. From an economical viewpoint, the length of slipway should be decided so that a 2-row-line way may be applied to Kuala Besut, Kuala Trengganu and Kuantan and that a 3-row-line way, to Mersing, provided that the operation is not hindered by such arrangement.

In addition to the holding of small boats, the facilities for repairing fishing boats should be set up. Of course, for the new building of fishing boats and the repairing thereof, dockyards should be established.

For minor repair works which can be completed within five days, two pairs of oblique rails and a workshop will be set up in Kuala Besut, Kuala Trengganu and Mersing, assuming that the repair work will be effected at the respective ports.

As for Kuantan which holds a lot of fishing boats and at the same time is a central fishing port in the East Coast, a full-fledged dockyard should be built separately.

The repairing quay should be constructed in the dockyard in Kuantan. In other three ports, a part of the mooring quays should, for the time being, be used as repairing quays, and necessary measures should be taken as occasion demands in the future.

(5) Time required for landing and supply

The time required for a fishing boat to be brought alongside a quay, to land fishcatch, to be supplied with oil and water and to leave the quay, should be the "hours spent for using the mooring quay per boat."

The landings and amount of supply per boat determine the hours to be spent by a boat. Values in Table 5-7 will be adopted which have been determined by the field survey with consideration given to the control hours required in Japan.

Table 5-7

Ship's size		Hours in use of fish landing guay	Oil-supply hours	Ice-supply hours
Less than 15 G.T.		10 minutes on an average	None	None
30 GT	Trawler	20 minutes on an average	5 minutes	6 minutes
	Purse seiner	30 minutes on an average		
60 G.T. trawler		45 minutes on an average	10 minutes	15 minutes

(6) Disposal of fishing boats at heavy seas

At heavy seas, all fishing boats based at a relevant port must be let to come to anchor safely.

It is desirable that all boats come to relevant mooring quays at heavy seas but this becomes very uneconomical. Therefore, the length required for mooring quay has been computed in order that all boats may be moored lengthwise in 2 row lines. As a result, it has turned out that the length required for normal fishing activities suffices in all four surveyed areas.

Accordingly, in this project, consideration has been taken to make the mooring possible lengthwise in 2-row lines at the time of rough weather.

(7) Quay for general cargoes

In Kuala Besut, Kuala Trengganu and Mersing, the mooring of 300 G.T. type freighters will be possible, if the fish-landing quays (which are not frequently used during the daytime) are concurrently used for general cargoes.

Since Kuantan, compared with other three areas, is assumed to have more cargo movement, the quay for exclusive use of cargoes should be designed 200 m. long so that three boats of 700 G.T. class may be moored at a time. Consideration has been taken so that the water-depth along the quay may be made larger to meet the possible necessity of mooring boats of over 700 G.T.

(8) Decision on the design length

Based on the foregoing explanation the length required for mooring quays having different functions in each fishing port has been computed as shown in Table 5-8. Using this required length, the design length will be decided with account taken of the layout plan (See Table 5-9).

Required length of quays

Table 5-8

Unit: m

Item		Kuala Besut	Kuala Trengganu	Kuantan	Mersing
For landing	-2.0 ^m	20	0	20	20
	-3.0 ^m	60	125	300	200
	Total	80	125	320	220
For servicing	-2	0	0	0	0
	-3	60	60	180	60
	Total	60	60	180	60
For mooring	-2	200	68	205	275
	-3	125	251	731	288
	Total	325	319	936	563
Total	-2	220	68	225	295
	-3	270	436	1211	548
	Total	490	504	1436	843
Slipway		100	55 ^m	115 ^m	60 ^m
Repairing facilities		2 pairs of rails (25m)	2 pairs of rails (25m)	Doackyard (100m)	2 pairs of rails (25m)

Table 5-9

Planned length of quays

Unit: m

Item		Kuala Besut	Kuala Trengganu	Kuantan	Mersing
Quay wall	-2 ^m	225	70	220	295
	-3 ^m	265	435	1220	550
	-4.5 ^m	0	0	200	0
	Total	490	505	1640	845
Slipways and repairing facilities		125	80	215	85

2-4-3 Functioning facilities

Facilities directly concerned with fishing activities are mainly referred to.

Name of facilities	Kuala Besut	Kuala Trengganu	Kuantan	Mersing
Selling places	o	o	o	o
Wholesale market	o	o	o	o
Buyer's office	o	o	o	o
Freezing facilities	o	o	o	o
Cold-storage facilities	o	o	o	o
Cargo-working machinery	o	o	o	o
Ice-making or storing facilities	o	o	o	o
Ice supply facilities	o	o	o	o
Water supply facilities	o	o	o	o
Oil supply or storing facilities	o	o	o	o
Warehouses (Fishing gear-fishcatch)	o	o	o	o
Fishing boat repairing facilities	o	o	o	o
Fishing gear repairing, drying place	o	o	o	o
Open yards	o	o	o	o
Roads	o	o	o	o
Parking lot	o	o	o	o
Management office	Δ	Δ	o	Δ
Radio stations	Δ	Δ	o	Δ
The customs	Δ	Δ	o	Δ
Fishermen's cooperatives	o	o	o	o
Navigation aid facilities	o	o	o	o

- Note: 1. means "necessary"; this is included in the plan
 2. means "not necessary"; for the time being; this is not included in the plan.
 3. means "as occasion demands, to be set up"; this means pending in the plan; however, sites are earmarked.

2-4-4 Affiliated facilities

Affiliated facilities to be required; however, no direct connection with fishing activities

Name of facilities \ Name of address	Kuala Besut	Kuala Trengganu	Kuantan	Mersing
Affiliated industries	△	△	○	△
Canned goods plants	△	△	○	△
Processing plants	△	△	○	△
Can manufacturing factories	△	△	○	△
Box manufacturing plants	○	○	○	○
Fish drying place	.			
Welfare facilities	△	△	○	△
Crew lodgings	△	△	○	△
Medical treatment facilities	△	△	○	△
Marketing facilities	△	△	○	△
Banks, post offices	△	△	○	△
Restaurants	△	△	○	△
Residence facilities	△	△	○	△
Police	△	△	○	△
Water supply and drainage facilities	○	○	○	○
Dumping facilities	○	○	○	○
Green belt, parks	△	△	○	△
Fishermen's houses	△	△	△	△
Schools	△	△	△	△
Mosque, etc.	○	○	○	○
Markets (retail)	△	△	△	△

- Notes: 1. means "necessary"; this is included in the plan
 2. means "not necessary"; for the time being; this is not included in the plan.
 3. means "as occasion demands, to be set up"; this means pending in the plan; however, sites are earmarked.

2-4-5 Layout of fishing port

- (1) Kuala Besut
Plan 1 attached hereto.
- (2) Kuala Trengganu
Plan 2 attached hereto.
- (3) Kuantan
Plan 3 attached hereto.
- (4) Mersing
Plan 4 attached hereto.

2-4-6 Standard structure of fishing port facilities

(1) Design conditions

(i) Tidal level

See Table 5-1, Chapter 2, Part 5.

(ii) Waves

See Table 5-1, Chapter 2, Part 5.

(iii) Crown height

(a) Armour blocks will be used in the frontage of a breakwater.

The crown height shown in Table 5-12, has been obtained by the following formula.

$$\text{Crown height} = \text{H.W.L.} + (0.8 \sim 1.0) \times \text{Wave-height}$$

(b) The crown height of the wharf, shown in Table 5-12, has been obtained by the following formula.

$$\text{Crown height} = \text{H.W.L.} + (0.5 \text{ m} \sim 0.7 \text{ m})$$

(c) The level of reclaimed land, shown in Table 5-12, has been obtained by the following formula.

$$\text{Level of land} = \text{H.W.L.} + (0.7 \text{ m} \sim 1.0 \text{ m})$$

Table 5-12

Area	Crown height of mooring quays	Level of reclaimed land	Crown height of breakwaters (m)
Kuala Besut	+3.0	+3.3	+4.50
Kuala Trengganu	+3.0	+3.3	+5.70
Kuantan	+3.7	+4.0	+6.00
Mersing	+3.5	+3.8	—

(iv) Surcharge

The surcharge on the quays is assumed to be 0.5 t/m^2 .

(v) Nature of soil

The nature of soil is unknown due to the lack of relevant data. However, the earth of the surveyed sites is generally assumed to be sandy soil, and the possibility of rockbed underlying at a shallow depth was taken into consideration.

(2) Selection of types of major structures

(i) Breakwater

The composite breakwater (high mound) has been chosen considering the following factors:

- (a) Stones are easily obtainable at low cost throughout all the surveyed sites.
- (b) The seabed with the exception of the Kuala Besut area is assumed for the most part to be sharply-rugged rocky.
- (c) The wave height is comparatively small and high waves occur within a limited time of the year.
- (d) Facilities, equipment and machinery necessary for the construction work at sea.

(ii) Quays

The sheet pile type seems to be suitable as the quay is located at the position where sufficient water depth is not available.

Judging from the results of the field survey, however, there is a high possibility of rockbed underlying at shallow depth excepting the Kuala Besut area.

Therefore, L-type block quay has been selected from among gravity-type quays for the quay, considering the following factors:

- (a) Facilities, equipment and machinery necessary for the construction works at sea are not available at any of the sites surveyed.
- (b) The assignment of large floating crane to the East Coast is not expected for the time being.
- (c) Wave height is relatively small and high wave occur only in limited time of the year.
- (d) Local contractors are not experienced in the construction work at sea.
- (e) In respective areas, stones are easy to obtain, and low in price.

In addition, in order to secure a maximum use of the quay, stairsteps will be installed at intervals of 25 m. to 30 m., as shown on the attached drawing.

- (3) Standard cross-section of structures as designed in accordance with conditions given in section (1) Chapter 5 is as shown on the attached drawings.

2-5 Estimated cost of construction

2-5-1 Calculation basis

The construction cost has been estimated upon the following basis:

(1) It will take about 10 years before the whole work is completed, but the present estimate does not include the possible increase of construction cost due to the rise of commodity prices and the interest to be paid during construction.

(2) Compensation for constructing fishing ports has been disregarded.

(3) The crown height has not been designed for each site because there is a slight difference in H.W.L. Instead, one single cross-section has been used for the ease of estimation.

(4) The pavement work which would involve aprons, has been designed to be carried out for excluding areas around market building and offices.

(5) The road pavement has been assumed to be carried out as far as the Rest House in Kuantan area and as far as the adjacent small river in Mersing area.

(6) With the exception of Kuala Besut area, the sand and rocks contained in dredged material have been assumed to be in the proportion of 80–85% to 15–20% because of the lack of boring data.

(7) In the areas of Kuala Trengganu (Tg. Chenering) and Mersing (Selantai), there are rocky hills near the proposed sites, and so it is advisable to cut and level these hills for effective utilization of land in the future.

In this project, however, stones necessary for the works will be obtained from the quarries owned by the Government, as the nature of rock available from these hills is unknown.

(8) Stones required for the construction of breakwaters should be fed out from the shore, using dump lorries, bulldozers, etc.

(9) The floating crane with a lifting capacity of 30 to 50 tons should be used for the installation of L-type blocks.

(10) The dredged materials should be used for the reclamation at an estimated cost of M\$0.8 per 1m^3 . Cost of reclamation materials from other sources required to cover the deficient of the dredged materials is estimated to be M\$3.4 per 1m^3 .

(11) Cost of materials and labour

The following rates are used for all the sites:

- (a) Stones—M\$3.4/m³, (b) Transport cost — $\text{d } 12/\text{t/mile}$,
- (c) Concrete — M\$67/m³ (d) Reinforcing bar — M\$420/t,
- (e) Form (wooden) — M\$16.7/m² (f) Skilled labourer — M\$8.3/day,
- (g) Common labourer — M\$5/day

(12) This Report does not include the shore facilities such as cold-storage, market hall, and administrative facilities.

(13) The present estimates are subject to change that may be necessitated by further detailed surveys and investigations of the proposed sites including topographical survey, sounding and soil investigation,

2-5-2 Estimated cost of construction

(1) Kuala Besut area

Name of structures	Unit prices	First plan				Second plan		Total	
		First step		Second step		Volume	Value(M\$)	Volume	Value(M\$)
		Volume	Value(M\$)	Volume	Value(M\$)				
North breakwaters	4,700	400 ^m	1,880,000				400 ^m	1,880,000	
South breakwaters	4,700	350 ^m	1,645,000				350 ^m	1,645,000	
Quay Wall (-3.0 ^m)	2,500	140 ^m	350,000			125 ^m	312,500	662,500	
Quay Wall (-2.0 ^m)	1,800			225 ^m	405,000		225 ^m	405,000	
Slipways and repairing Yards	3,400			125 ^m	425,000		125 ^m	425,000	
Channel revetment	1,700	500 ^m	850,000				500 ^m	850,000	
Revetment	800					150 ^m	120,000	120,000	
Drudging (-2 - -4m) Soil and Sand on land	1.7	70,000	119,000	35,000 ^m ³	59,500	15,000 ^m ³	25,500	204,000	
Dredging (-2 - -4m) Soil and sand underwater	4.2	160,000 ^m ³	672,000	55,000 ^m ²	231,000	25,000 ^m ³	105,000	1,008,000	
Land readjustment	1	50,000 ^m ²	50,000	190,000 ^m ²	190,000	140,000 ^m ²	140,000	380,000	
Apron and road pavement	25	8,000 ^m ²	200,000	32,000 ^m ²	800,000	14,000 ^m ²	350,000	1,350,000	
Others			484,000		139,500		107,000	730,500	
Total			6,250,000		2,250,000		1,160,000	9,660,000	

(2) Kuala Trengganu area

Name of structures	Unit prices (MS)	First plan		Second step		Second plan		Total	
		First step		Second step		Volume	Value(MS)	Volume	Value(MS)
		Volume	Value(MS)	Volume	Value(MS)				
Breakwaters	5,200			50m	260,000	200m ³	1,040,000	250m ³	1,300,000
Temporary sand groins (Newly-constructed and removal)	2,500	50m	125,000			250m ³	575,000	50m ³	125,000
Quay Wall (-3.0m)	2,300	185m	485,500			250m ³	575,000	435m ³	1,000,500
Quay Wall (-2.0m)	1,800			70m	126,000			70m	126,000
Slipways and repairing Yards	3,400			80m	272,000			80m	272,000
Revetment	1,200			150m	180,000	250m ³	300,000	400m ³	480,000
Temporary revetment	1,200	100m	120,000					100m	120,000
Dredging (-2m_ -3m) Sand and soil	4.2	60,000m ³	252,000	5,000m ³	21,000	35,000m ³	147,000	100,000m ³	420,000
" (")	34	10,000m ³	340,000	1,000m ³	6,000	5,000m ³	170,000	16,000m ³	544,000
Reclamation(by dredged soil)	1	70,000m ³	70,000	6,000m ³	6,000	40,000m ³	40,000	116,000m ³	116,000
" (shortage)	3.4	20,000m ³	68,000	54,000m ³	183,600	80,000m ³	272,000	154,000m ³	523,600
Land readjustment	1	50,000m ³	50,000	30,000m ²	30,000	60,000m ²	50,000	140,000m ²	140,000
Apror and road pavement	25	10,000m ²	250,000	9,000m ²	225,000	13,000m ²	325,000	32,000m ²	800,000
Others			129,500		165,400		241,000		533,900
Total			1,830,000		1,500,000		3,170,000		6,500,000

(3) Kuantan Area

Name of Structures	Unit Price (M\$)	First Plan				Second Plan		Total	
		First Step		Second Step		Volume	Value(M\$)	Volume	Value(M\$)
		Volume	Value (M\$)	Volume	Value(M\$)				
Breakwaters	4,900			200m	980,000			200m	980,000
Sand groins	1,700							500m	850,000
Quay Wall	2,700			200m	540,000			200m	540,000
Quay Wall	2,300	230m	529,000	495m	1,138,500			1,220m	2,806,000
Quay Wall	1,800							220m	396,000
Slipways	4,700							120m	564,000
Revetment	1,700			180m	306,000			470m	799,000
Dredging; soil and sand	4.2	135,000m ³	567,000	110,000m ³	462,000			50,000m ³	210,000
Rock	34	25,000m ³	850,000	20,000m ³	680,000				
Reclamation (by dredged soil)	1	160,000m ³	160,000	130,000m ³	130,000			50,000m ³	50,000
" (shortage)	3.4	10,000m ³	34,000	140,000m ³	476,000			1,230,000m ³	4,182,000
Land Readjustment	1	90,000m ²	90,000	240,000m ²	240,000			220,000m ²	220,000
Apron and Road Pavement	25	16,000m ²	400,000	25,000m ²	625,000			47,000m ²	1,175,000
Others			200,000		422,500			415,500	
Total			2,830,000		6,000,000			10,000,000	18,830,000

(4) Mersing Area

Name of Structures	Unit Price (M\$)	First Plan				Second Plan		Total	
		First Step		Second Step		Volume	Value(M\$)	Volume	Value(M\$)
		Volume	Value (M\$)	Volume	Value (M\$)				
Sand Groins	800	400m	320,000			400m	320,000	800m	640,000
Quay Wall	2,300	160m	368,000	170m	391,000	220m	506,000	550m	1,265,000
Quay Wall	1,800					295m	531,000	295m	531,000
Slipways and Repairing Yards	3,400					85m	289,000	85m	289,000
Revetment	1,200			60m	72,000	200m	240,000	260m	312,000
Temporary Revetment	800	150m	120,000					150m	120,000
Dredging: soil and sand	4.2	80,000m ³	336,000	10,000m ³	42,000		420,000	190,000m ³	798,000
rock	34	20,000m ³	680,000	3,000m ³	102,000		680,000	43,000m ³	1,462,000
Reclamation(by dredged sand)	1	100,000m ³	100,000	13,000m ³	13,000		120,000	233,000m ³	233,000
" (shortage)	3.4			37,000m ³	125,000		204,000	97,000m ³	329,800
Land Readjustment	1	60,000m ²	60,000	20,000m ²	20,000		140,000m ²	220,000m ²	220,000
Apron and Road Pavement	25	15,000m ²	375,000	5,000m ²	125,000		450,000	38,000m ²	950,000
Others			2,580,000		1,000,000		4,250,000		7,830,000
Total			2,580,000		1,000,000		4,250,000		7,830,000

Part 6 Studies and Works Required in Future

Actual execution of the aforementioned schemes demands further studies on the following matters:

1. General

- (1) In this report, the goal of fishery development goal after ten years has been set up for respective survey areas. The purpose of the report coincides with that of the Primary Malaysian Plan, which aims at achieving a balanced fishery levels for both the East and the West Coast by rectifying gaps in regional economy and by raising the income of low brackets.

This development goal, however, is based on a number of assumptions and so, in order to clarify the actual state of resources which have lost bearing upon the desired fishery developments, surveys on resources, fish-landing per fishing effort, etc. must be made in the future. And on the basis of the results of these results, more adequate development goals should be set up, together with the formulation of the project for fishing port construction.

- (2) Since the increasing landings are anticipated along with the fishery developments, it is essential that the marketing channels and the associated facilities such as ice-making, cold-storage and processing facilities be consolidated.

Improvement of marketing channels should be enhanced since the establishment of F.M.B. has already been determined.

Also, for the purpose of putting into force the joint selling system by fishermen, further energetic efforts must be made towards the formation of fishermen's cooperatives.

- (3) Since, along with the fishery developments, newly developed fish-species and fishes not suitable for human-consumption are likely to be increased in catch, it will be essential that research on consumption and processing of such species be made.
- (4) Since new fishing ports are expected to be built in areas about 1 to 6 miles away from the rivers in use now, the settlement plan of fishing villages and fishermen must be established.
- (5) The system for efficient maintenance, administration and operation of fishing ports must be studied.
- (6) Due to the lack of necessary data, the plan was drawn up on the basis of the field survey. But further detailed surveys such as topographical survey, sounding survey, soil survey, sand-drift survey, etc. are required to be made.

2. Respective Area

(1) Kuala Besut

- (i) Since the seashore in areas where fishing ports are to be constructed appear to be subjected, frequent sand-movement, the length and layout of breakwaters is to be decided on by model experiments.
- (ii) Because anchorage basins are made by excavating land, it is essential that compensation for sites and houses be taken into account.

(2) Kuantan

- (i) Same as (i) in Kuala Besut
- (ii) It is necessary to make studies on the general cargoes.
- (iii) Because the hinterland of fishing port is planned to be developed into resort area, the fishing port construction scheme must be put in execution in coordination with the development of the hinterland.

(3) Mersing

The scheme on construction of the roads connecting the present Federal road with the sites for fishing port construction should be drawn up in line with the regional development plan. As this scheme is excluded from the fishing port construction plan, it must be decided by further studies.

APPENDIX

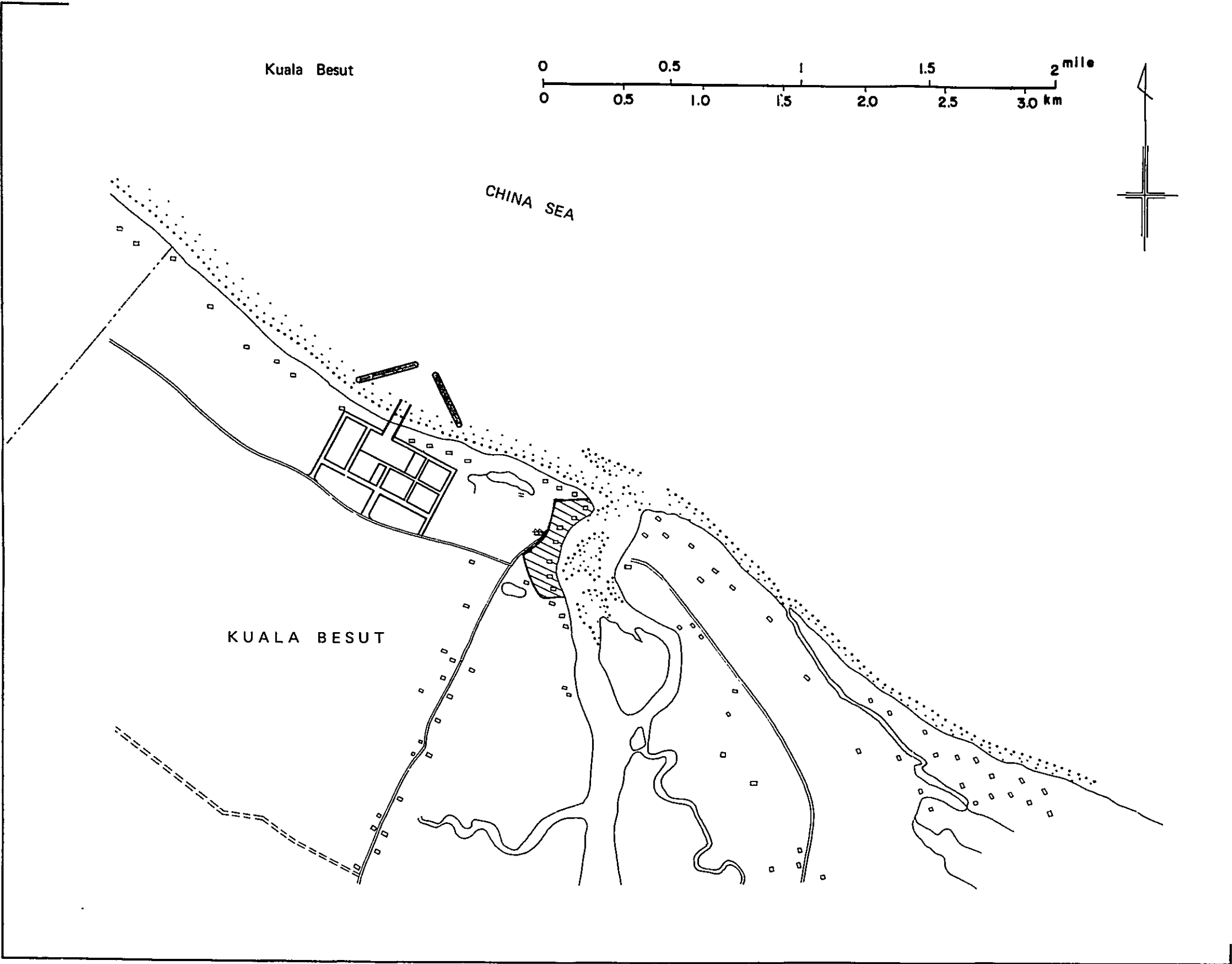
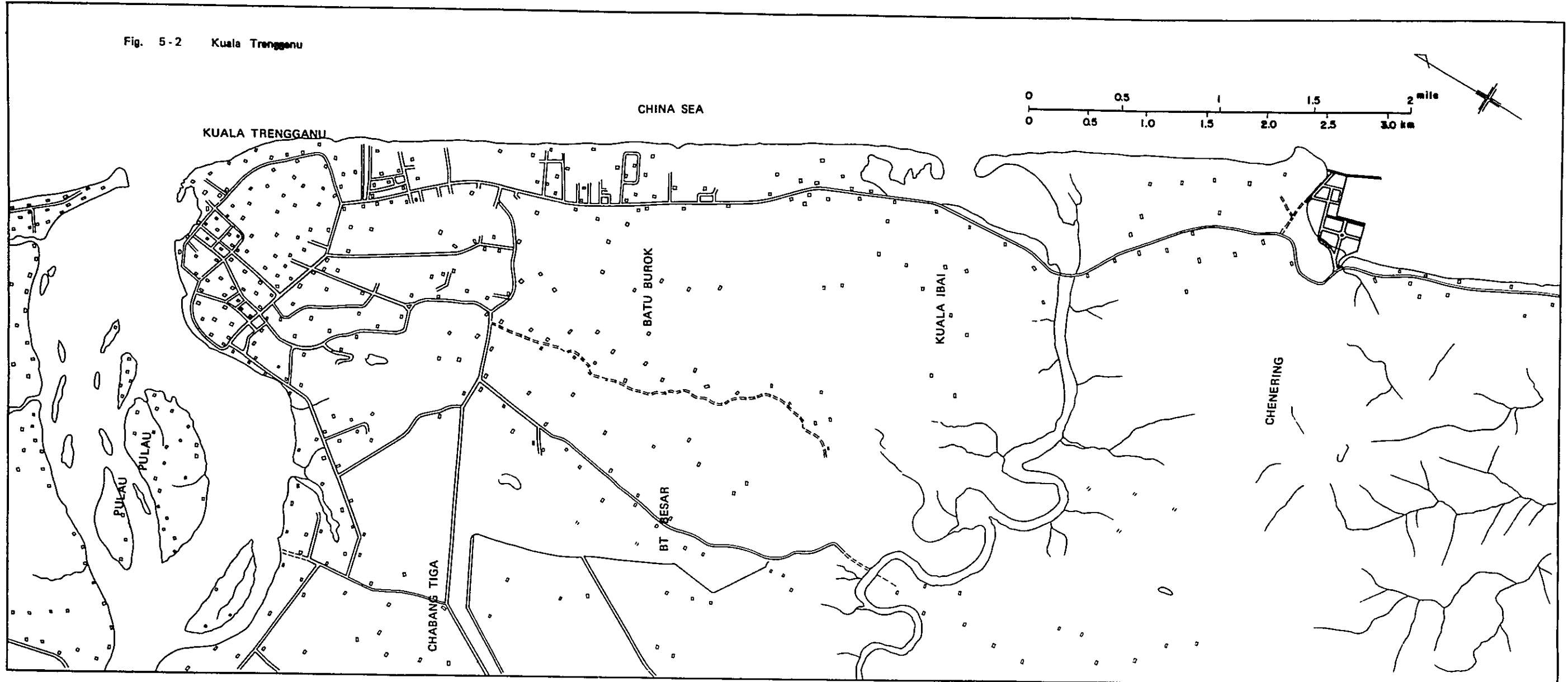


Fig. 5-2 Kuala Trengganu



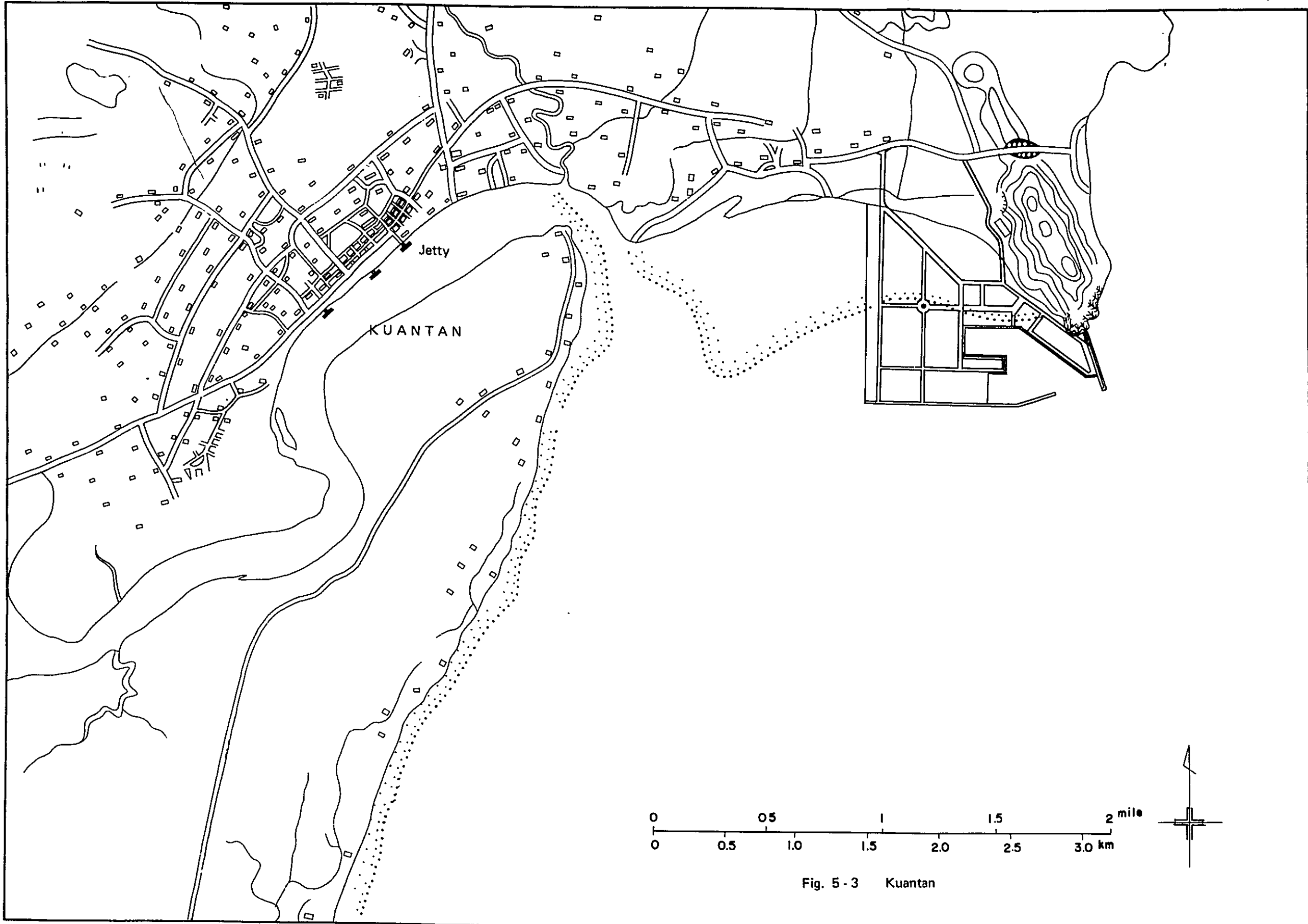


Fig. 5 - 3 Kuantan

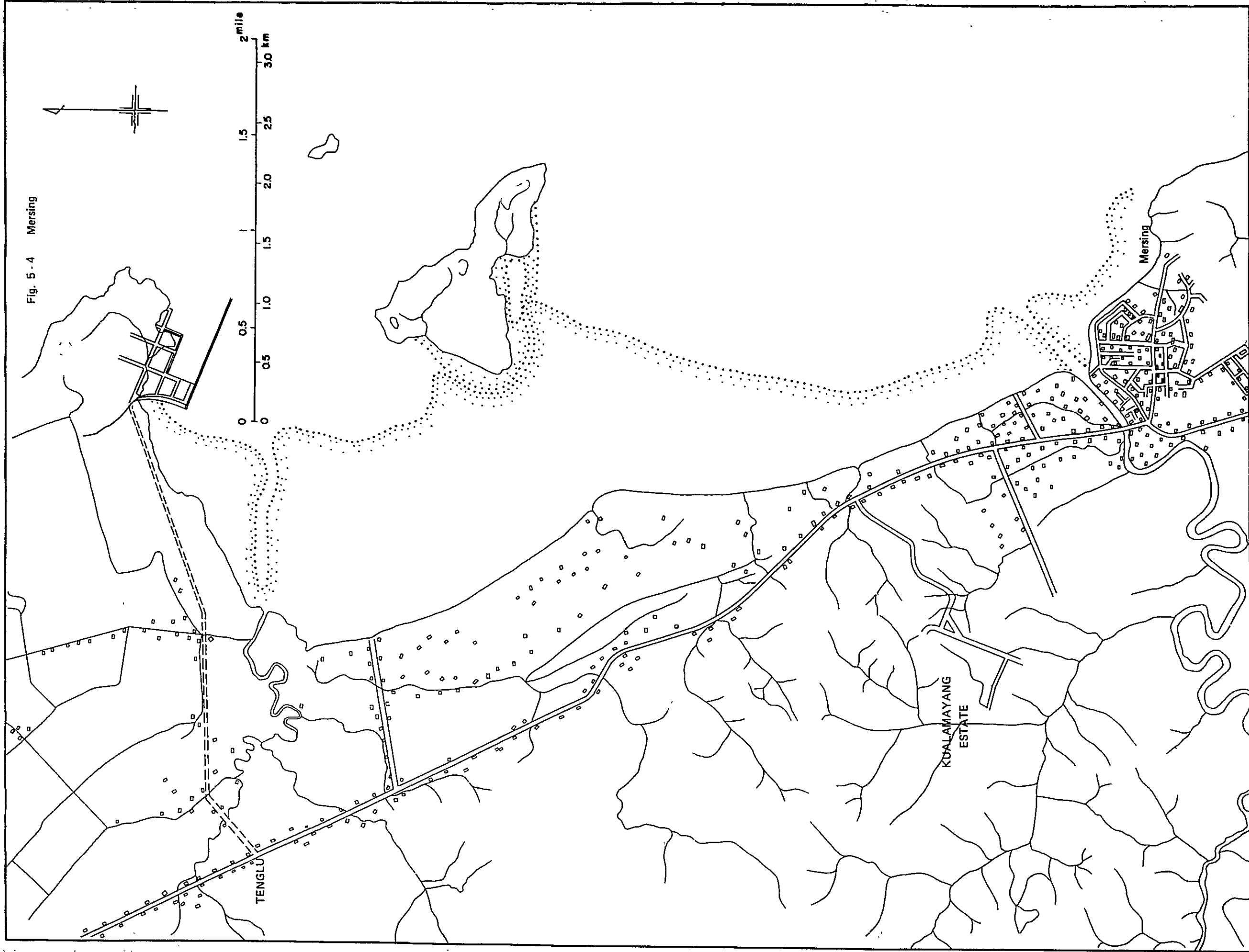
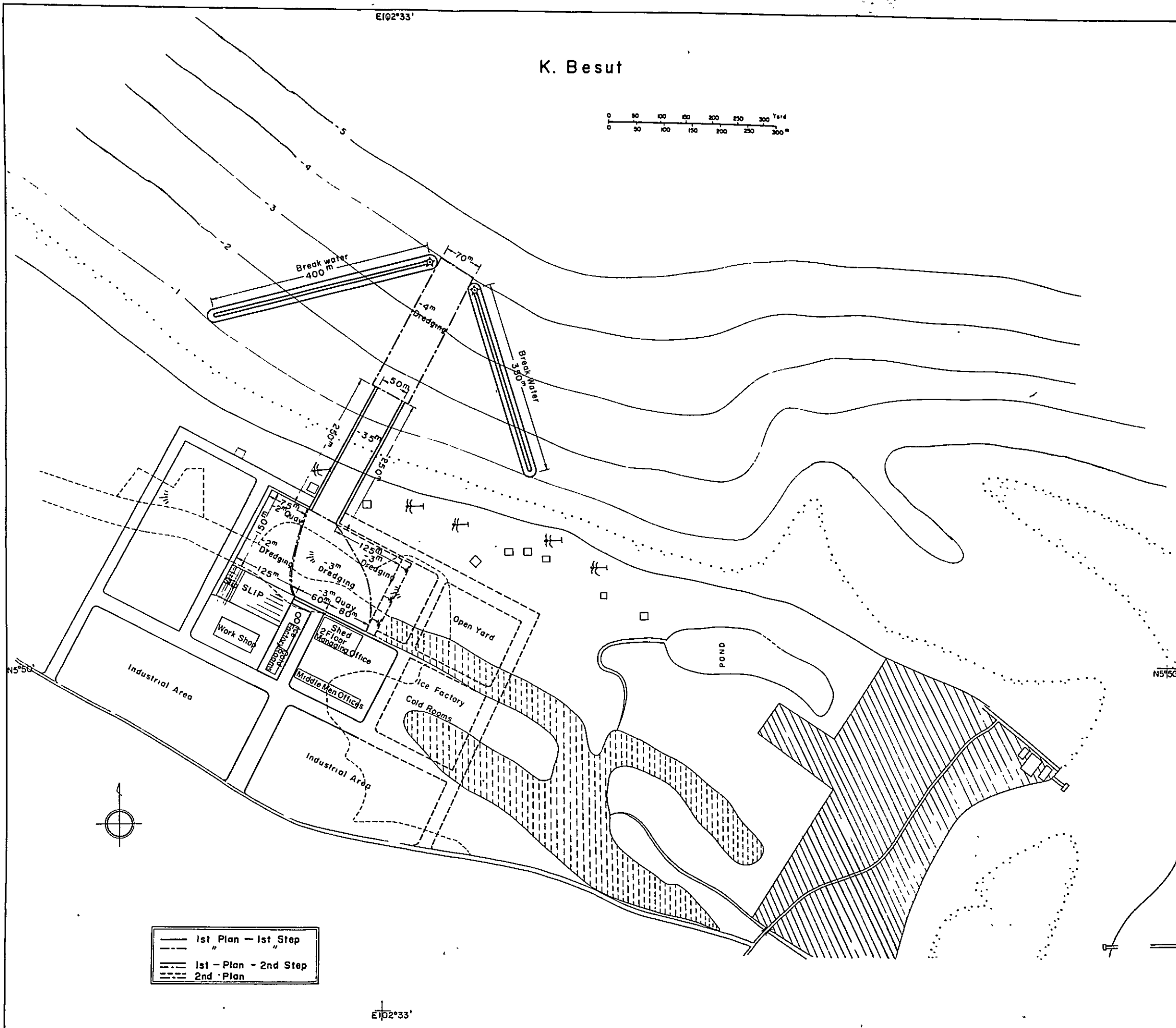
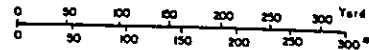


Fig. 5 - 4 Mersing

E102°33'

K. Besut



- 1st Plan - 1st Step
- - - " " "
- 1st - Plan - 2nd Step
- 2nd Plan

E102°33'

SELANTAI PLAN

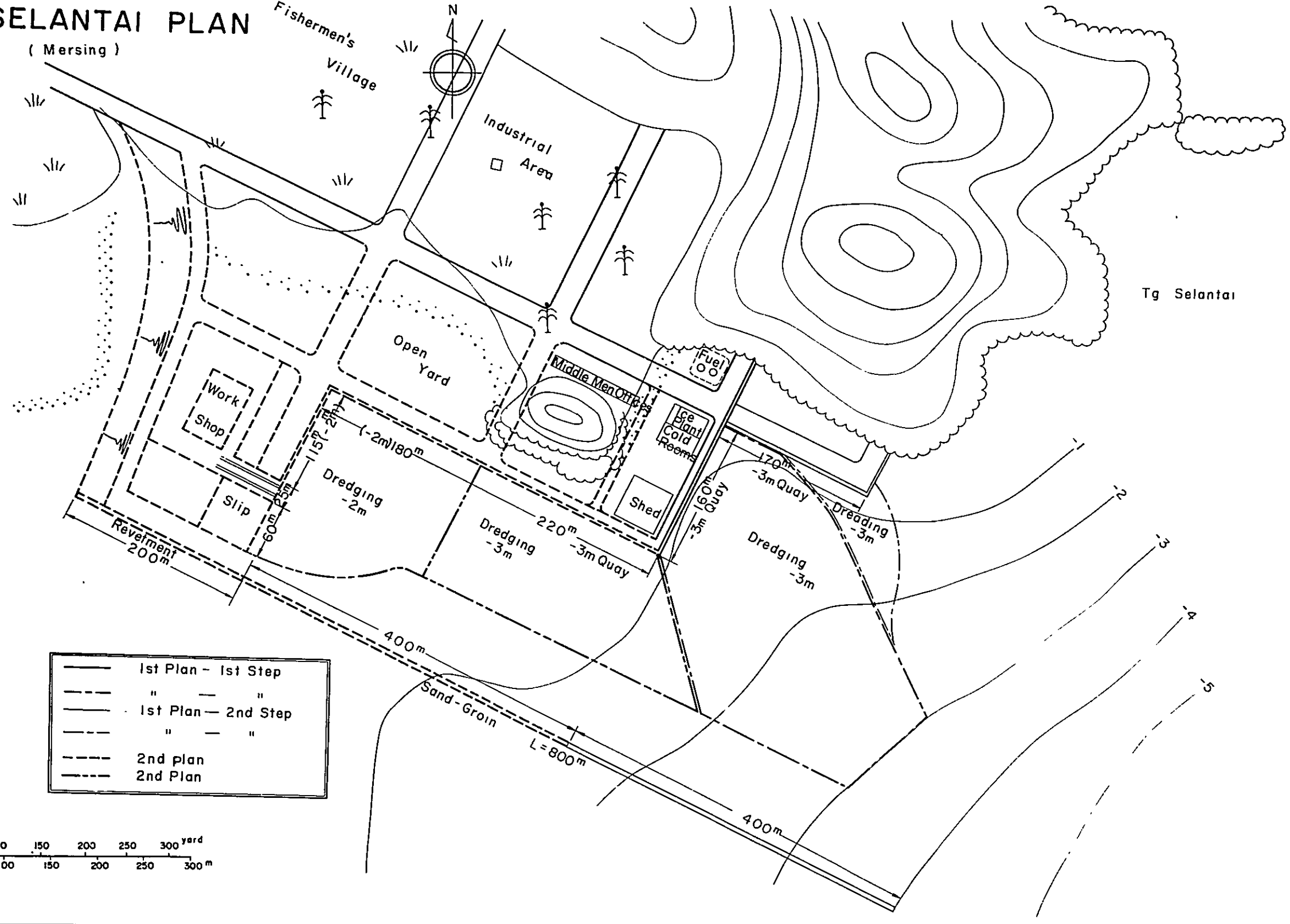
(Mersing)

Fishermen's
Village

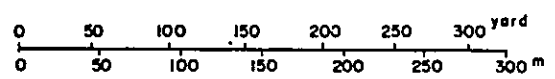


Industrial
Area

Tg Selantai



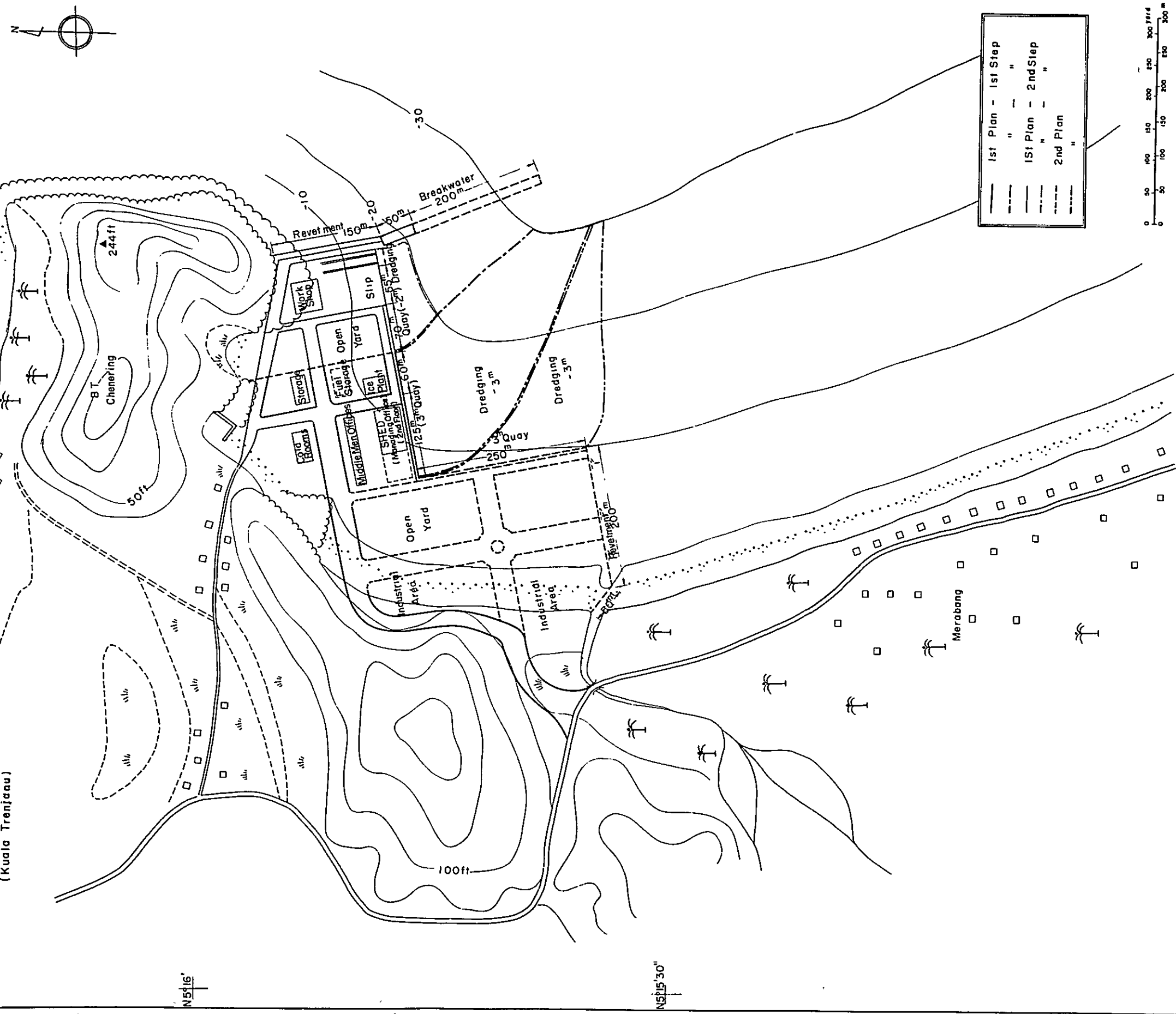
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	2nd Plan



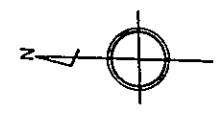
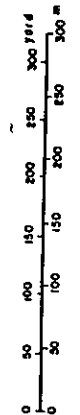
$N2^{\circ}30'$

CHENERING PLAN

(Kuala Trengganu)



—	1st Plan - 1st Step
- - -	" " " " " "
---	1st Plan - 2nd Step
----	" " " " " "
.....	2nd Plan
.....	" " " " " "



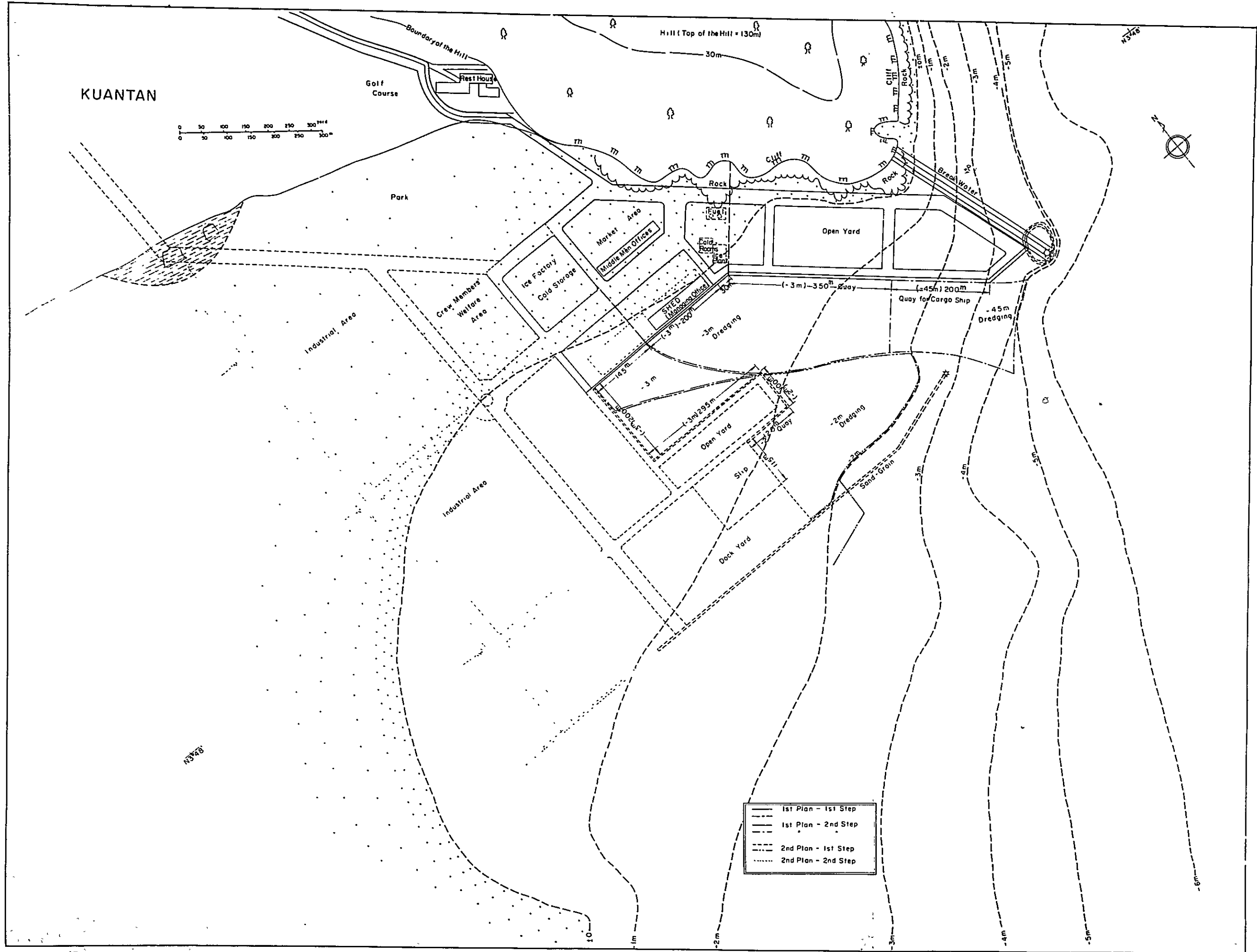
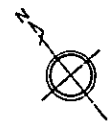
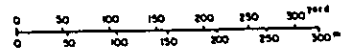
E103°11'15"

E103°11'15"

N5°16'

N5°15'30"

KUANTAN

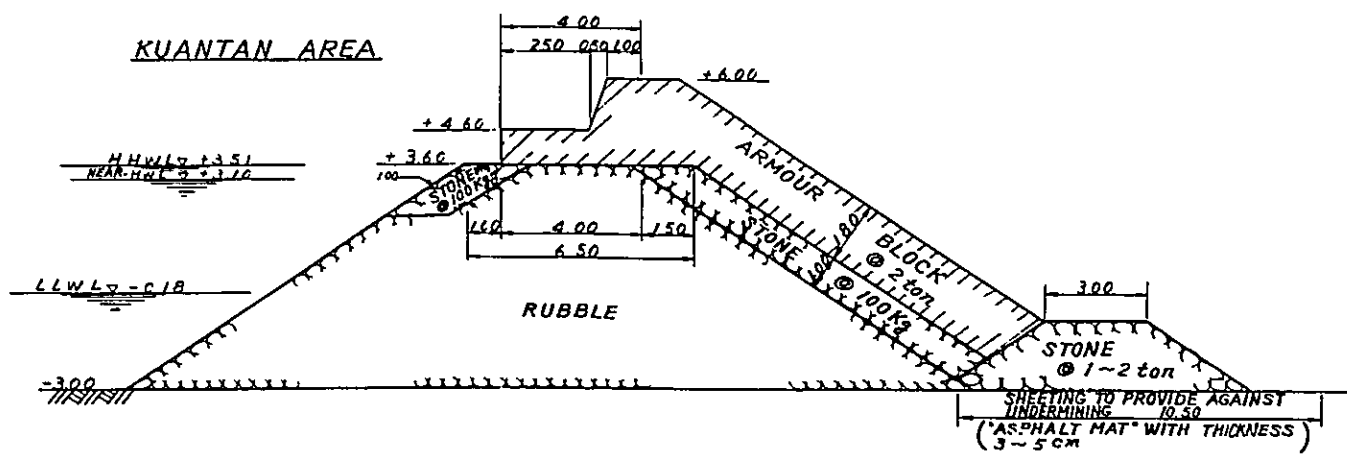
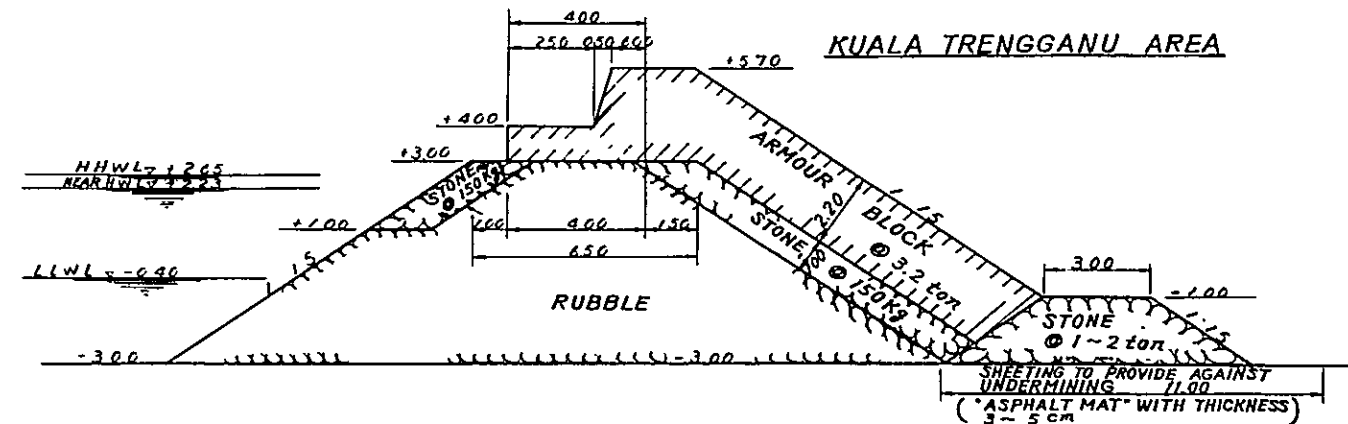
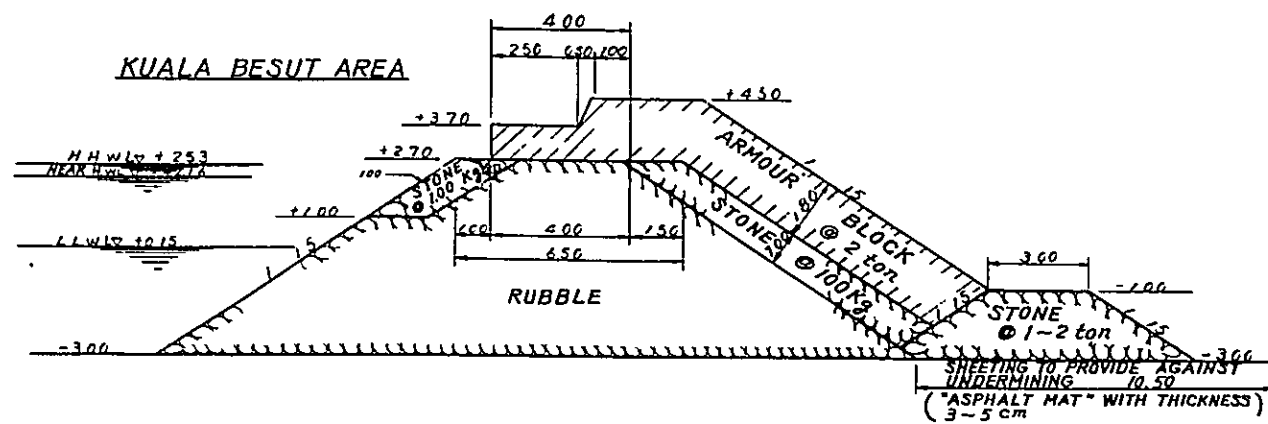


- 1st Plan - 1st Step
- - - 1st Plan - 2nd Step
- · · 2nd Plan - 1st Step
- · · 2nd Plan - 2nd Step

STANDARD SECTION OF BREAKWATER

$$S = 1 / 200$$

$$U = m$$



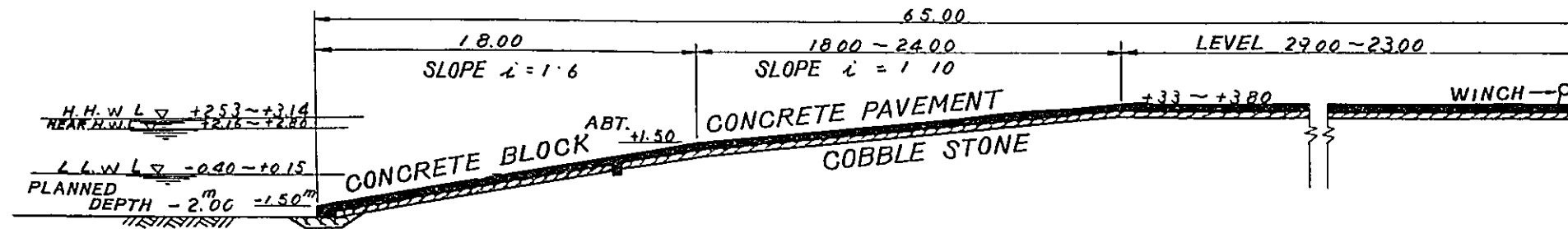
STANDARD SECTION OF SHIPWAY

S = 1 / 200

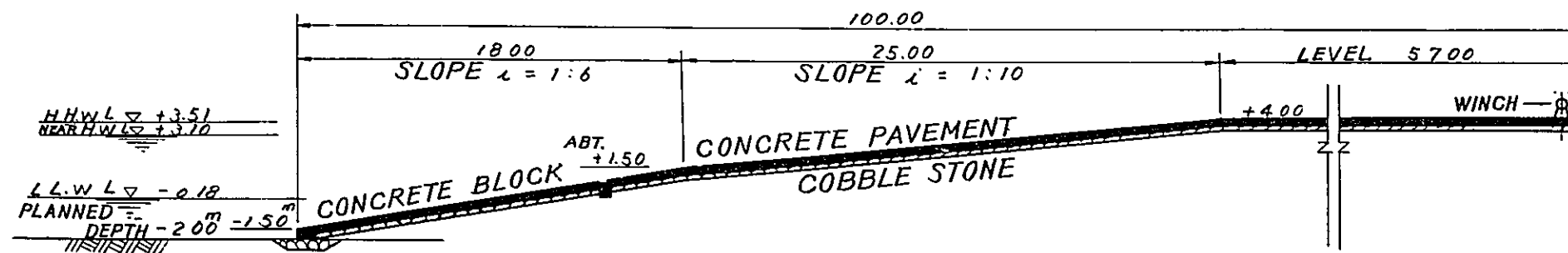
U = m

THE REPAIR SLIPWAY SHALL BE EQUIPPED WITH RAILS, AND CRADLES, TOGETHER WITH ALL THE NECESSARY MECHANICAL EQUIPMENT. THE LEVEL PORTION SHALL BE BUILT MUCH LONGER AS COMPARED WITH THE COUNTERPART SHOWN ON THE LEFT.

KUALA BESUT, KUALA TRENGGANU MERSING AREA



KUANTAN AREA

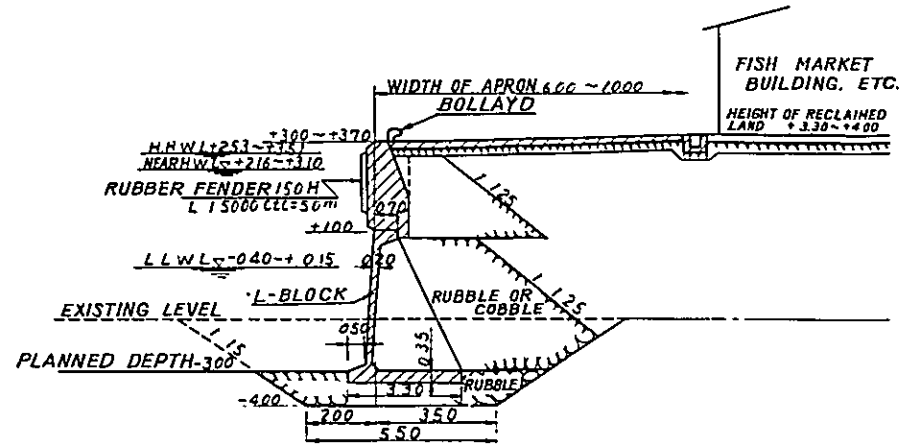


STANDARD SECTION OF WHARF

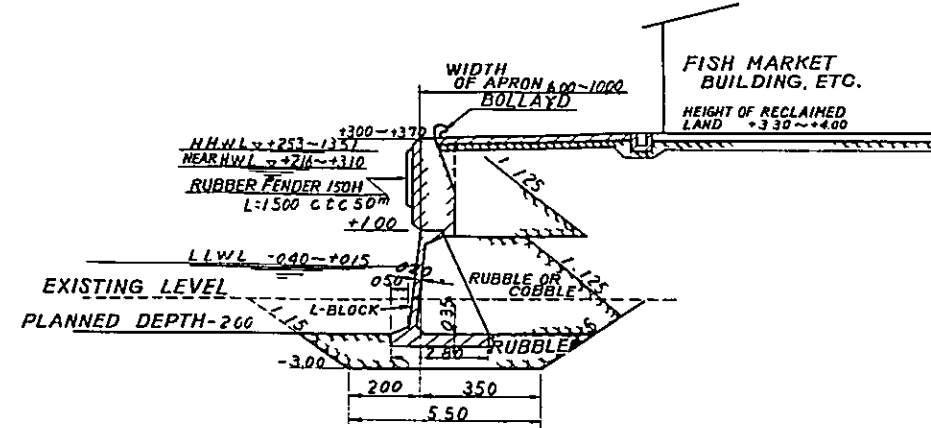
S = 1 / 200

U = m

-3.0m WHARF

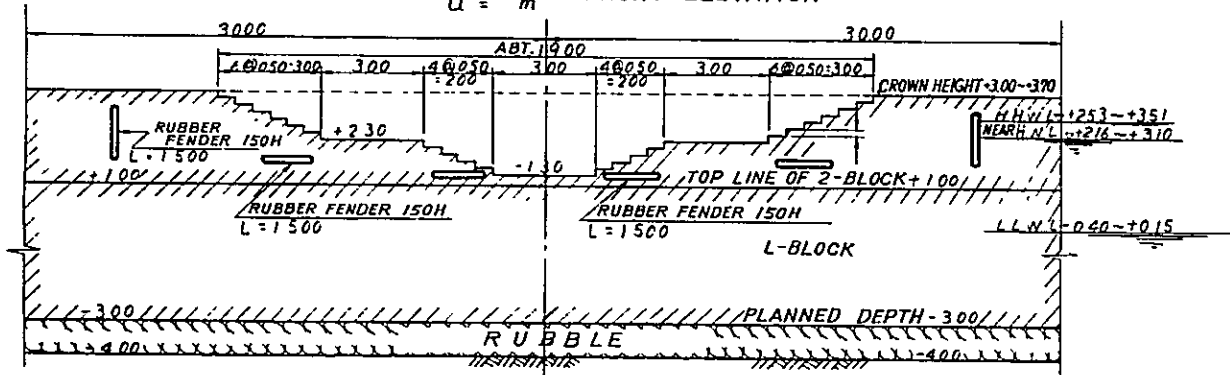


-2.0m WHARF

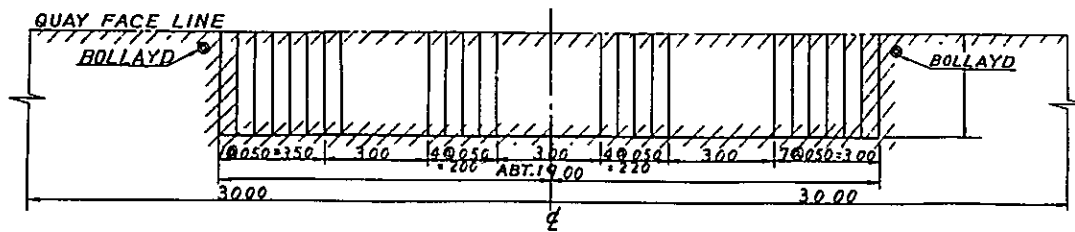


LANDING STEP OF -3.0m WHARF

S = 1 / 200
U = m FRONT ELEVATION

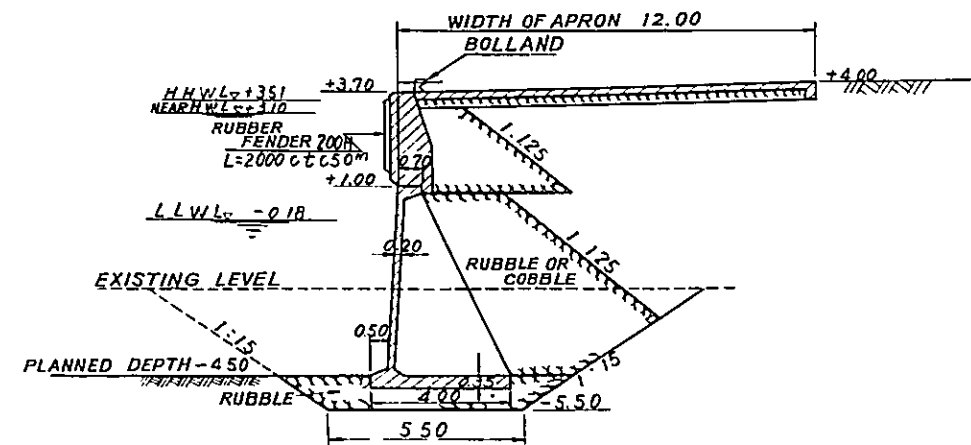


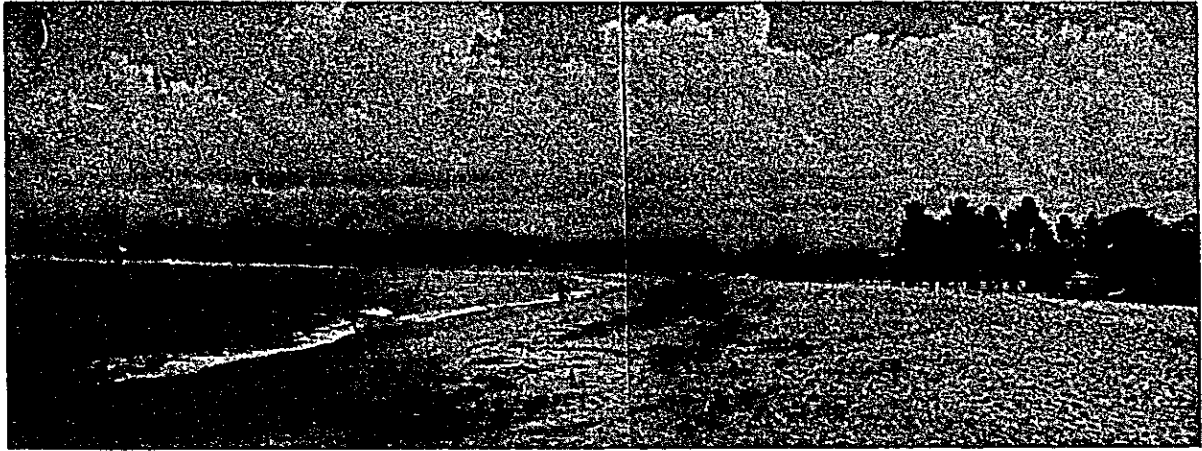
PLAN



GENERAL CARGO WHARF, KUANTAN AREA
STANDARD SECTION OF -4.5m WHARF

S = 1 / 200
U = m





K. Besut



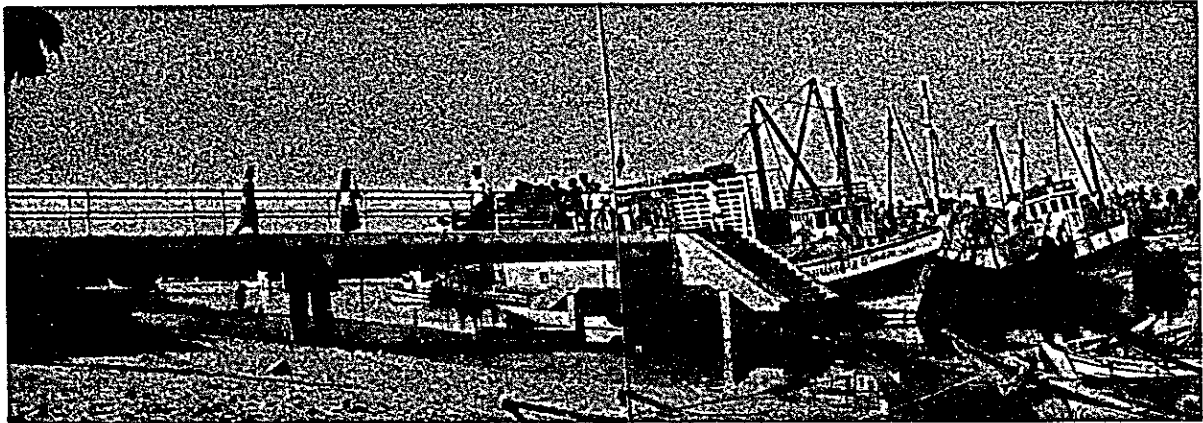
Kuantan

K. Trenga



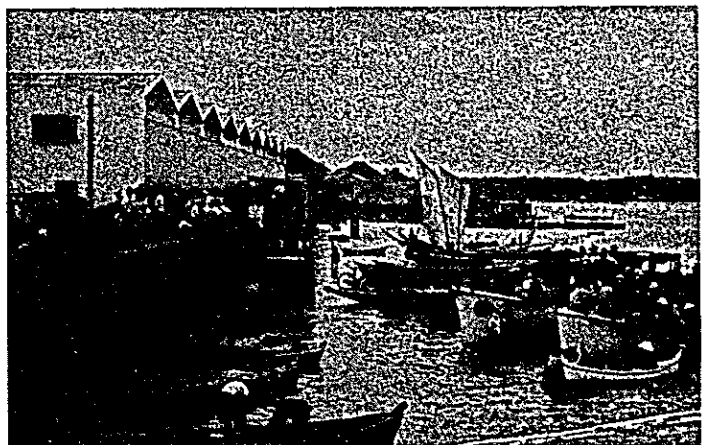


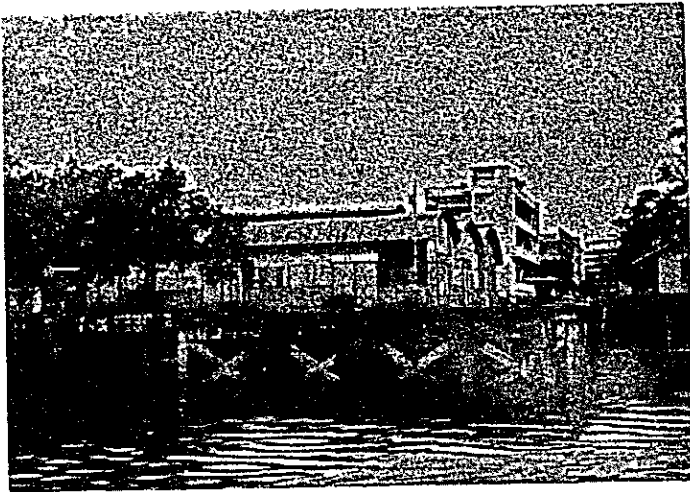
Mersing



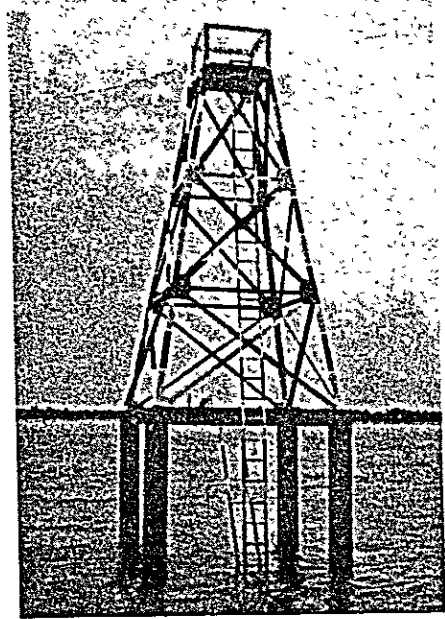
K. Besut

Trengganu

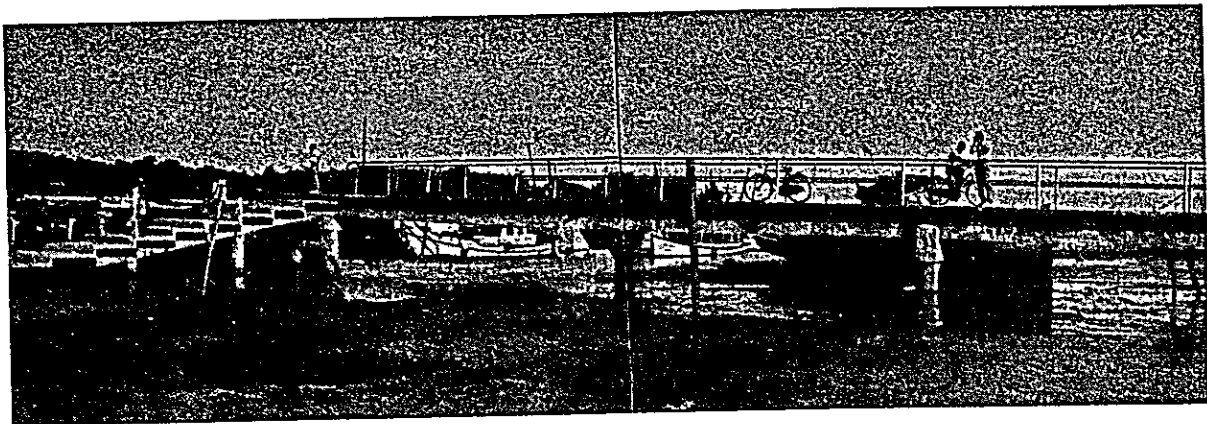




Kuantan



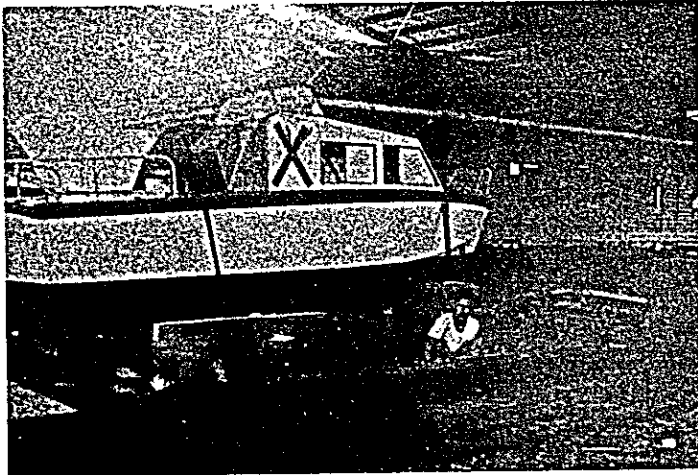
Mereing guid light



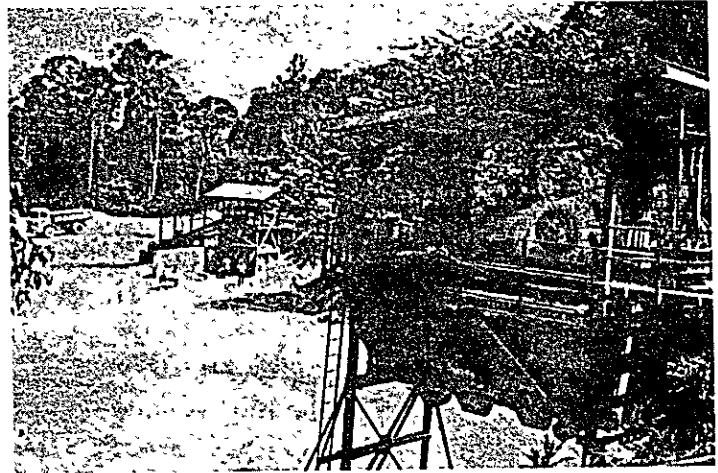
Kuantan

K. Trengganu

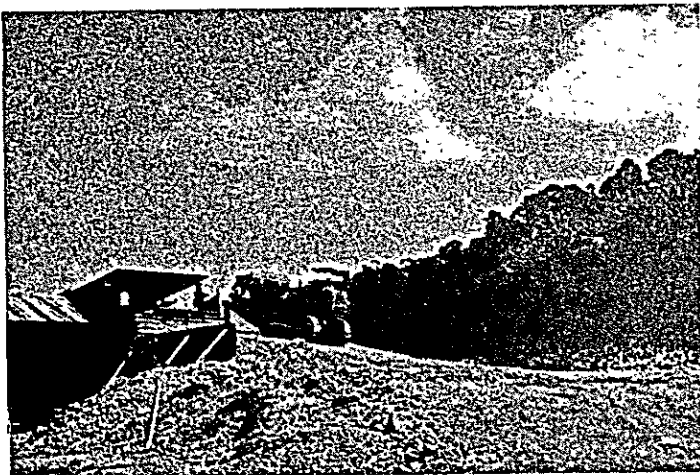




MARA Dock



K. Trengganu



K. Trengganu

