DRAFT

GOVERNMENT OF MALAYSIA

JOHORE PORT DEVELOPMENT

FEASIBILITY STUDY

August, 1970

Economic Associates Ltd.,
Economic Consultants,
London.

Wallace Evans & Partners,
Consulting Engineers,
London & Penarth.

For
Hunting Technical Services Ltd.,
Boreham Wood, Herts, U.K.

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677, Jalan Petri,
P.O. Box 241
Johor Bahru.

18th August, 1970.

Chief Secretary to the
Government of Malaysia,
Economic Planning Unit,
KUALA LUMPUR.

Dear Sir,

We have pleasure in submitting the Draft Report of the Feasibility Study for the development of a new port at Johore Bahru.

This report presents the findings made during the course of this port study and the conclusions and recommendations drawn from this investigation.

Whilst we are satisfied as to the accuracy of the relevant data and the conclusions deduced, we are very much aware of the occasional lapses in presentation. This as you will appreciate has arisen because of the speed at which this report has been prepared to meet the request for its submission at the earliest possible opportunity.

We trust that this report meets with your requirements.

Yours respectfully,

P.J. Prynn
Associate
Economic Associates Ltd

E.J.W. Henry
Partner
Wallace Evans & Partners

for

Hunting Technical Services Ltd.

JOHORE PORT DEVELOPMENT
FEASIBILITY STUDY

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SECTION 1 INTRODUCTION

In accordance with instructions received from the Economic Planning Unit of the Prime Minister's Department of the Government of Malaysia, Messrs. Huntings Technical Services who are currently engaged on the preparation of the South East Johore Master Plan, arranged for Wallace Evans and Partners, Consulting Engineers of Penarth, United Kingdom, and Economic Associates Limited, Economic Consultants, of London to undertake this Feasibility Study for the development of new Johore Bahru Port. The official period for the study was from 1st July to 31st ~~September~~ September, 1970.

Work in Malaysia started on 26th June with the arrival of Mr. P.J. Prynn of Economic Associates who was joined shortly after by Mr. E.J.W. Henry, a Partner of Wallace Evans and Partners. During the ensuring period, visits have been made to inspect the site and a considerable number of interviews have been held with officials of various Federal Government and State Departments, various authorities and number of commercial firms. In addition, relevant data from a number of sources has been collected. The resulting information collected from these various sources has been analysed, forecasts prepared and the needs of the proposed new port developed to be incorporated in a series of alternative design layouts.

In order to check certain information and to ensure that the engineering aspects of the Report could be completed in time, it was decided that Mr. Henry should return to the United Kingdom to visit certain interested parties and to take advantage of the engineering back up available within Wallace Evans and Partners head office.

The consultants would like to express their appreciation to all these who have assisted in the preparation of this Report and have given valuable advice. A list of individuals interviewed is given in Appendix B. They also like to thank the assistance freely provided by the various members of the South East Johore and Pahang Tenggara Study Teams and Mr. Yahya A. Ghani the counterpart engineer provided by the Government.

SECTION 2 GENERAL REQUIREMENTS FOR DEVELOPMENT OF A NEW PORT

2.1 Location and Consideration of Study Area

The area for the proposed port in the vicinity of Johore Bahru as defined in the terms of reference, lies approximately 9 miles east of the town and extends along the coastline from Kampong Pasir Gudang (National Map Reference MS 153751) to the easterly tip of the island Pulah Tukang (MS 200735). The length of coastline between these points is approximately 3 miles.

Behind this length of coast is an area of about 5,000 acres which the Johore State government has frozen for planning purposes until February 1971. In addition to the port, it is intended that an industrial estate which could take advantage of nearby port facilities should be created. Other parts of the area would be used for housing and the necessary social infrastructure to support the port and industrial estate. The location of the study area is shown in Drawing 1. This shows its relationship to Johore Bahru and its position in the southern part of the State of Johore.

As stated in the terms of reference, the State Government is considering the initial purchase of an area of about 2,100 acres of which 1,500 acres would be used for industrial development and 300 acres for the long term development of the proposed port to be located within the study area. A suggested layout for the study area has been prepared by the State Engineer and Drawing No. 2 has been developed from this layout plan to show the relationship of these areas in a simplified form.

It is understood that the precise boundaries and areas of zoning are still to be delineated awaiting the submission of this Report, and that if considered necessary, the boundaries of the study area could be extended.

For reasons of planning and general economics, the port and industrial areas should be located adjacent to one another. However, there are a number of primary considerations such as depth of water available, accessibility by shipping, safe anchorages at times of storms etc. which will determine the location of a port. In addition to these, there are a number of other factors such as hinterland communications, availability of labour, ground conditions etc. but these ~~tend to be of less importance and~~ can ~~therefore~~ be considered as of secondary importance.

The primary conditions to be met when siting a port are dictated by geographical and topographical considerations, factors which have to be considered as generally unalterable because of reasons of cost. The problems associated with an industrial estate, however, are much less arduous, and are similar to those mentioned as of secondary importance in connection with locating a port. The general siting of the port is thus the first objective to be considered bearing in mind that in this instance the provision of an industrial estate located immediately in the vicinity of the port is required.

At present there is no major port facility south of Malacca on the west coast, neither are there any major ports on the south and east coasts of West Malaysia. Singapore has provided port facilities to serve these areas of West Malaysia.

Whilst the terms of reference do not include a study of possible port sites in the State of Johore which could undertake this function of serving the above mentioned areas, it has been thought prudent to make a brief study of the coastline to establish if there are any other possible port sites which may be more advantageous.

On the westerly side, the coastline facing the Malacca Straits is too shallow inshore to provide the depth of water necessary for a modern port. Between Bandar Maharain and Pulau Kukup the six fathom line (36' depth of water) lies at not less than one mile offshore. Major dredging works would be needed to provide the required depths of water for any port and its approach channels resulting in high capital cost. In all probability, it would be necessary to maintain these channels by maintenance dredging, a factor which could be of considerable expense.

The east coast of West Malaysia is similarly very shallow inshore and is subject to storms arising out of the North East Monsoon for five months of the year. These two factors have, to date, prevented the building of a deep water port along this coastline although the area would greatly benefit if this could be done. Such a port would undoubtedly assist the development of this large part of Malaysia at present virtually virgin forest. It is understood that studies for developing the present small ports of Kuantan and Kuala Trengganu are being made, but the likelihood is that these studies will indicate that the problems are such that it will be unrealistic to deepen them due to

the high costs involved. Certain improvements are likely to be made however to provide better access to the ports for the smaller coastal vessels that at present use them.

The only length of coastline of Johore remaining to be considered is the southernmost section between Pulau Kukup and the south-western area of Pengerang in the district of Kota Tinggi. This stretch of coastline has a more complicated topography than the east or west coasts as it includes a number of large inlets as well as the Johore Strait which separates the island of Singapore from the mainland.

This coastline is very sheltered and sea conditions are calm, severe wave conditions being virtually unknown. Deep water near to the coastline is to be found in a number of places. It is thus an area in which safe anchorages can be provided and a port without requiring any protection from waves.

On the western side of this stretch of coastline, that is from the Causeway connecting Malaysia and Singapore, deep water, greater than 36 feet, occurs in certain sections of the Johore Strait and in the Sungei Pulai. However, there is an area of shallow water between Tanjong Piai and Singapore Island which restricts access to certain narrow channels with only 20 feet depth of water at low spring tides. In the case of the western entrance to the Johore Strait, the Admiralty Pilot recommends the maximum draught for a vessel entering should not exceed 18 feet. Substantial dredging of the channel would be required to build a port in this area.

The waters in the eastern side of Singapore Island, Sungei Johore and the Johore Straits however, provide deep water close inshore at a number of points. These waters are also very sheltered from storms and resulting wave action. They form an ideal area to build a port.

With regard to Sungai Johore, there are a number of shoals which restrict passage of ships into the upper reaches. Probably the best siting for a shipping facility in this area would be in the vicinity of Bukit Jonglak approximately two miles north east of Pulau Tekong Besar. The distance from the shoreline to the 6 fathom line (36 feet) is however about 3,500 feet which would make the building of a port a formidable task. It might however be considered suitable for a specialised offshore tanker terminal.

Within the eastern area of the Johore Strait, there are several points where 6 fathoms of water occur close to the Johore coastline. The longest stretch of deep water near the coastline lies within the study area and without doubt this area must be considered the best location for a port in the State of Johore when judged on the nearness to adequate deep water and safe anchorage.

As mentioned previously there are other factors which will influence the location of a port. It should be as near as possible to the markets it is to serve and to the origin of primary products destined for export. Adequate labour, land, water and power supplies, are also needed particularly when the port is associated with an industrial estate. In these respects, the study area is superior to any other possible location in Johore State. In addition, a port located at the eastern end of the Johore Strait is best situated for the development of trade between East and West Malaysia and the coastal trade up the east coast of West Malaysia.

2.2 Location of Johore Bahru and its Relationship to the West Malaysian Communications Network

The commercial development of Malaysia has been in the past largely determined by accessibility to the sea. The country is divided by mountain ranges running down the length of the country. Development on the western side of the mountains has been assisted by coastline conditions suitable for a number of small ports or anchorages adequate for nineteenth or early twentieth century ships. On this coast, two ports of principal entry now exist, Penang and Port Swettenham.

The eastern side of the peninsula, however, has to date not been extensively developed, partly because of the lack of suitable ports and safe anchorages arising and of the difficult coastline and the difficulties of communications across the mountains. Road and rail communication to the south are easier but longer. The existing trade pattern of this area is thus rather complicated, traffic passing through either Penang, Port Swettenham or Singapore.

The southern area of West Malaysia forms part of the hinterland of the port of Singapore as this port is at present the best located for this area.

Figure 1 illustrates the road and railway networks and the positions of these ports.

The areas of general distribution in West Malaysia are shown on Figure 2+.

It should be noted that these areas are not in fact precisely delineated and are influenced by a large number of factors. Some of these are:-

a) Overseas shipping patterns
b) Port facilities
c) Types of commodity
d) Internal pattern of distribution
e) Nature of road communications
f) Accessibility to railroads
g) Coastal shipping.

The result of these factors can, for example, determine the routing, via different ports, of timber exports from and incoming goods to the same area. The areas shown in Figure 2 must therefore be taken only as an approximate guide suitable to indicate the likely areas served by each port with particular reference to major commodities being moved.

From Figure 2 it will be seen that the hinterland to Singapore is mainly the State of Johore and parts of the States of Pahang and Trengganu. These areas could be similarly served by a new port at Johore Bahru. It is unlikely that such a new port will serve other areas of West Malaysia as these will lie within the zones of interest of Port Swettenham and Penang. The only exception to this trade pattern would be if the establishment of a major industrial estate at the port produced large volumes of commodities for national distribution. At this time there are no indications that this is likely to occur on the scale needed for it to be taken into account during the study period up to 1975.

Figure 3 illustrates the possible hinterland of a new port at Johore Bahru with particular reference to bulk and timber products as these, as shown later, are the most likely commodities which will

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+ This is based on Map III.5 appearing on page 91 of the Nathan Report "Transport Development in Malaysia". This report which has been drawn on extensively in the current study, is described and commented on in Section 2.7 below.

pass through the port. The extent of this area of influence of the port, however, is subject to an efficient communication network, particularly of roads and coastal shipping.

2.3 Relationship between the Port of Singapore and a New Port at Johore Bahru

As already seen, the hinterland area to be served by a port at Johore Bahru will be roughly the same as that of the port of Singapore. The two ports will therefore be in direct competition. This is bound to be severe due to their close proximity. Each port will have some advantages and disadvantages over the other. Whereas Johore Bahru is nearer the same hinterland, this difference is relatively small and against this must be weighed the accumulated knowledge, expertise and long established trading organisations to be found in Singapore.

As discussed later, the major export and import trades at present which could beneficially use Johore Bahru are as follows:-

Exports

a) Palm oil
b) Timber
c) Rubber
d) Canned pineapples

Imports

a) Animal feeding stuffs
b) Fertilisers

All these commodities at present are being handled through the port of Singapore, but for various reasons could be attracted to Johore Bahru if it can be demonstrated that the resulting costs of transportation and administration are lower. Some of the factors which will result in lower costs and increased efficiency can be listed as follows:

a) Lower port dues
b) Development by private interests of specialised handling facilities for cargoes which can be operated with minimum restrictions
c) Low cost land for port orientated industries
d) Less congested landward approaches to the port
e) Shorter haulage distances

f) Provision of more efficient and speedier administrative proceedings by the port and customs authorities.

Irrespective of such natural and man-made advantages it will be appreciated that the port of Singapore has, and will continue to have for a long time to come, a number of features which are virtually impossible to equal, let alone improve. Some of these are:

a) Singapore is an established port of call for the world wide liner traffic. These shipping lines are likely to show considerable resistance to the need to call at a second port so close by.
b) The services provided by banks, insurance, broking agencies etc.
c) In a similar manner, the readily available supplies and services needed to maintain an ocean-going ship such as fuel, virtualling, stores, and repair facilities.
d) A highly experienced skilled and semi-skilled labour force to operate the port and the services which go with it.
e) Singapore is the centre for the entrepot trade of South-East Asia.

These factors are going to have a greater influence on the general cargo trade then on bulk commodities. It is in the latter category that a new port at Johore Bahru must seek to establish itself initially. General cargo must be looked upon as a long term objective which can be developed by the port once the basic port facilities are there and the authorities are prepared to pursue a policy which would minimise the considerable advantages held by the port of Singapore.

2.4 General Method of Port Justification

The first stage in justifying any proposed port must be to estimate the volumes of traffic which will arise under a set of reasonable assumptions about port charges, the general growth of trade, the internal infrastructural network and the attitude of shippers and shipping companies. These traffic estimates can then be related to the physical facilities which would be required to handle them and the construction cost estimated.

In general, it is not enough merely to demonstrate that a

potential traffic exists. It should also be shown that the operation of the new port will give rise to cost savings sufficiently great to represent an adequate return on the capital invested in the port and that the capital could not be invested even more advantageously in a port facility at some alternative site or even in improving an existing port. Furthermore, the function of the port as a stimulant to industrial development must be examined and any benefits stemming from this should be quantified and added to the transport cost savings.

In the case of the proposed port at Johore Bahru this analysis has to be modified because of the fact that virtually all the external trade of the region is at present handled by the Port of Singapore, which is, of course, in a foreign country. It is almost undoubtedly true that if Malaysia and Singapore were considered as a single entity the saving in transport costs consequent upon setting up a port at Johore Bahru would be very small. Some congestion exists on the Causeway at the moment but this could be largely remedied at much lower cost than building a new port by enlarging the customs and immigration facilities at either end, as these constitute the major bottlenecks. Similarly, the landward approaches to Singapore harbour are fairly heavily congested. The proposed port at Johore Bahru will have only a limited effect on this problem since most of the cargoes likely to be handled would otherwise be handled at the new port of Jurong whose approaches are less congested. In addition, considering the matter purely from the point of view of minimising overall transport costs, the creation of a third port so close to the two already established in Singapore can only add to shipowners costs. Ships could then have to call at three different ports to deal with cargo related to the same basic hinterland. These increased costs will inevitably be passed on to shippers in the form of higher freight rates making imports more expensive and exports less competitive.

However, this simple analysis - which is couched purely in terms of overall transport costs - ignores two very importance factors. The first of these is the function of a port as a catalyst for industrial development; an entry point for the raw materials required by the manufacturing sector and a natural site for those industries processing Malaysian agricultural produce for exporting to world markets. The other factor is that Singapore is a foreign country and clearly as far as Malaysian investment decisions are concerned the structure of

transport costs facing Malaysia, rather than the overall structure, must be the criterion.

The reduction in costs to Malaysia cannot be measured only in terms of the difference in dollar costs of transport, for if goods are handled in Malaysia rather than Singapore employment is created in Malaysia. Unemployment is an acute problem in Malaysia whereas in Singapore it appears that the opposite problem is being encountered and that a shortage of labour exists, certainly in some sectors. Thus, if unemployment opportunities can be transferred from Singapore to Malaysia this is not a neutral effect and may be regarded as a considerable benefit to Malaysia. This may be expressed by costing unskilled labour in Malaysia at a 'shadow price' which represents its existing productivity in monetary terms. This is measured by whatever output is foregone by taking labour from its previous occupation (if any), and will obviously tend to be a very low when substantial unemployment exists. Work done by the Overseas Development Group of the University of East Anglia who are currently working on the South East Johore Master Plan Study suggests a shadow price of labour of only about M$40 a month.

The time constraints imposed on this Report (which are discussed briefly in the next section) have made a full scale cost benefit analysis, of the sort implied above, impossible. However, an indication of the benefits likely to be generated by the proposed port could be gained by comparing the estimated operating costs (with unskilled labour costed at $40 a month) with the actual user costs which would be incurred at the Port of Singapore. The resulting savings could then be related back to the capital cost of the port to give a rate of return. This should be greater than the opportunity cost of capital if the scheme is to be viable in isolation. A lower rate than the full opportunity cost of capital would be acceptable, if the benefits of industrial stimulation were sufficiently great to cover the difference between the two.

2.5 Limitations of the Economic Aspects of the Report

The limited time period which was imposed on this study, quite rightly in view of the urgency of coming to a decision, has meant the detailed study of international trade sector by sector, of the structure of costs facing shippers and agents, and of the intangible elements which have a major effect on the volume of traffic using a port, could not be fully investigated. Instead it has been necessary to apply

a fairly broad treatment to traffic forecasts and cost estimates. This approach is justified because it became clear at a fairly early stage of the investigations that the key to the viability of the port at Johore Bahru was the traffic likely to develop in a limited number of bulk export commodities. Most of the attention has been focused on these commodities, with only a more limited consideration being given to other traffic. The commodities whose future prospects, shipping requirements and general development have been examined in some detail are palm oil, timber and rubber which between them constitute some 79 per cent of all West Malaysian exports tonnage currently passing through Singapore. Unless a traffic of sufficient size to warrant a port can be created out of these commodities, a port at Johore Bahru is unlikely to be justified at all. Most of the other items traded, both for export and import, travel in comparatively small consignments and from a wide variety of different origins and estinations. This traffic places a very high priority on frequency and regularity of sailings and is only likely to pass through an established port. If a port were to become established at Johore Bahru with regular world wide sailings then undoubtedly some of this general dry cargo would flow through it. But it must be emphasised that this is essentially unpredictable, being determined largely by non-cost factors, and while it may be of great importance over the longer term, is unlikely to have a major impact during the period under study, that is, up to 1975.

2.6 Structure of the Report

The form taken by this Report follows fairly closely the structure suggested by the Terms of Reference (reproduced in Appendix A). Traffic forecasts are first developed, in some details for the bulk export trades and rather more broadly for other traffics. The requirements of these various projected trades are discussed. Next the industrial development likely to be stimulated by the port is examined both in general terms and regarding the specific requirements of those industries which have already expressed an interest in the industrial estate associated with the port.

The designs range from a single berth upwards. This has been done in order that a range of basic capital costs can be established. They have been prepared in such a manner as to allow for additional berths to be added as trade develops and for specialised handling equipment to be incorporated if and when the volumes of a certain commodity to be handled warrant it.

These designs are costed both as to their capital and operating costs, the latter being expressed both in terms of market prices and "shadow wage" rates as discussed in Sub-section 2.4. The benefits in terms of the payments to Singapore foregone and the employment created are estimated and the costs and benefits combined to give a rate of return on the project as a whole.

Finally, a section on port operational matters discusses some of the practical problems which are likely to be encountered in setting up the port and suggests ways in which these should be tackled.

2.7 Sources of Information

Extensive interviews have been carried out in Johore, Singapore, Kuala Lumpur, Port Swettenham, London and elsewhere with shipping interests, industrialists, importers, exporters and others concerned with port and general economic matters. A list of some of the organisations and individuals contacted is given in Appendix B. Similarly, all the relevant published statistics of Malaysia and Singapore have been consulted.

Special reference is made, however, to the report entitled "Transport Development in Malaysia", This report was conducted for the Government of Malaysia, the U.N. Development Programme and the World Bank by Robert R. Nathan Associates, Inc. in cooperation with Frederic R. Harris Inc. and Coverdale and Colpitts during 1967 and 1968. The main conclusion of this report (hereafter referred to as the Nathan Report) with regard to Johore Bahru is contained in Paragraph 183 of Annex D - Ports. "We can find no justification for the development of a major port at Johore Bahru from either a technical or economic standpoint."

This conclusion does not take into account the regional income distribution effects or the industrial stimulation effects of port investment (which were not included in Nathan's terms of reference) and is thus not accepted by the present study. However, the Nathan Report has been an invaluable source of information and economic forecasts. Although its conclusion has been rejected, its economic forecasts have been drawn on extensively to the present study.

Interviews have also taken place with the teams of consultants currently studying development planning in Johore and Pahang Tenggara. They have made it clear that, with the exception of the

timber arising from forest clearance, no produce originating from their areas will require port facilities before 1975. Thereafter, a considerable volume of commodities for export will be produced and this is discussed in Section 9 on the longer term perspective.

SECTION 3

FORECASTS OF POTENTIAL TRAFFIC

In this Section a series of forecasts are developed of the potential volumes of individual commodities and general cargoes likely to be generated within the combined hinterlands of Johore Bahru and Singapore. These total traffic forecasts are then further considered from the point of view of shipping and handling requirements and the proportion which might use a Johore Bahru port is estimated. Commodities which have been singled out for detailed examination are:

Palm oil
Timber
Rubber
Canned Pineapple
Fertilizer
and Animal Feedstuff.

The other items currently traded through Singapore are dealt with in more general terms as there is no individual item which appears to have sufficient importance to be worth a detailed examination within the time limits imposed on this study.

It is important to emphasise that a basic assumption underlying all these traffic forecasts is that government policy is neutral. That is to say, it has been assumed that there will be no radical changes in government policy as it effects a Johore Bahru port in the next five years.

3.1 Bulk Export Commodities

Palm Oil

Although oil palm has been planted commercially in Malaysia since the First World War, it is only comparatively recently that output has started to rise rapidly. This has been the result largely of the relative price movements of rubber and palm oil on world markets which has caused many estates to convert substantial acreages from rubber to oil palm cultivation.

Total West Malaysian production of palm oil since 1959 is given in Table 3.1.

Table 3.1 Total West Malaysian Palm Oil Production

Year	Tons	Per Cent Change
1959	71,541	
1960	90,343	+26.3
1961	93,348	+ 3.3
1962	106,462	+14.1
1963	123,649	+15.9
1964	120,106	- 2.9
1965	146,333	+21.8
1966	183,394	+25.3
1967	213,402	+16.4
1968	260,687	+22.2
1969	320,755	+23.0

Source: Monthly Statistical Bulletin of West Malaysia (Department of Statistics, Kuala Lumpur)

It is almost certain that the current rapid growth will continue. New land being developed by the Federal Land Development Authorit seems likely to be predominantly placed under oil palm and this might involve additional areas of as much as 30,000 acres a year. Forecasts of oil palm acreages and palm oil production by States in 1975 were made in considerable detail in the Nathan Report whose main conclusions are embodied in Table 3.2.

Table 3.2 : Estimated Oil Palm Acreages & Palm Oil Production, by States, 1968 and 1975

State	Acreage 1968	Acreage 1975(est)	Est. 1975 Production (tons)	Increase (tons)	Distribution of Increases
Johore	121,000	319,900	336,200	253,000	28.4%
Kedah	1,260	3,900	7,000	6,900	0.7
Kelantan	2,290	-	20,400	20,400	2.3
Malacca	1,870	5,000	5,100	5,100	0.6
Negeri Sembilan	6,380	27,500	31,100	27,600	3.1
Pahang	12,580	222,000	283,400	276,800	31.0
Penang PW	3,900	6,900	9,800	5,900	0.6
Perak	55,260	76,200	121,400	86,700	9.7
Perlis	-	-	-	-	-
Selangor	81,970	150,600	233,700	131,500	14.7
Trengganu	10,820	58,700	81,700	80,200	8.9
TOTAL	297,330	~~784,000~~ 870,700	~~1,127,800~~ 1,129,800	~~892,100~~ 894,100	100.0

Source : Nathan Report, page 145

These figures are reinforced by a later study made by the Oil Palm Growers Council in July 1969 which was based on answers to a questionaire circulated to all oil palm growers and backed up by "other relevant data". In Table 3.3 which summarises the Oil Palm Growers Council data, only those areas which are likely to be within the hinterland of a port at Johore Bahru have been included. The question of hinterlands has already been discussed in Sub-section 2.2 and clearly within the time available to this study detailed investigations of the area served at lowest cost by Johore Bahru have not been possible. It is generally agreed that the existing hinterland of Singapore covers most of Johore, parts of Southern Pahang and possibly parts of Southern Malacca. This will constitute the main area of competition between a new port at Johore Bahru and Singapore for all traffics. In the case of palm oil, the area of influence will also extend up the eastern branch of the railway line and along the East Coast to include the eastern parts of Pahang, Trengganu and possibly also Kelantan. Palm oil from these areas will be collected in tanks already being constructed by the Federal Land Development Authority at Kuantan and Kuala Trengganu and carried down to the main distribution point by small coastal tankers.

Table 3.3 : Potential Sources of Palm Oil Exports through Johore Bahru/Singapore as Indicated by Estimated Production.

(rounded to the nearest 500 tons)

	1970	1971	1972	1973	1974	1975
South Johore	119,500	150,000	181,000	209,000	237,500	263,500
Malacca (West Coast)	500	1,500	2,500	3,500	4,500	5,500
Pahang (East Coast)	15,000	32,500	59,000	98,500	146,500	193,500
Trengganu (East Coast)	10,500	20,000	33.500	53,500	66,500	79,500
Kelantan (East Coast)	1,000	2,000	3,500	5,500	6,500	7,500
TOTAL	146,500	206,000	279,500	370,000	461,500	549,500

(Based on answers to O.P.G.C. Questionnaire and other relevant data)

The estimates given in Table 3.3, which were made in July, 1969, have since been modified, particularly that constituent relating to the FLDA. The Palm Oil Bulking Company (which is described below) in April, 1970, produced a revised set of forecasts to the year 1974. These have been extended to 1975 by simple extra-polation. The total forecasts set out in Table 3.4 is divided into three constituent parts; F.L.D.A., members of the

Palm Oil Bulking Company and other members of the private sector.

Table 3.4 : Revised Forecasts of Palm Oil Production within Sphere of Influence of a Johore Bahru Port

(tons)

	1970	1971	1972	1973	1974	1975
F.L.D.A.	32,300	36,000	52,200	77,000	97,000	125,000
P.O.B.C.	115,000	132,400	138,600	154,500	166,900	183,200
Other private	400	17,200	47,400	80,400	107,600	141,800
TOTAL	147,700	185,600	238,200	311,900	371,500	450,000

Source : Palm Oil Bulking Company and FLDA.

This remarkable forecasted increase of 200 per cent in 5 years is not inconsistent with the Nathan Report forecasts which predicted increases of 160 per cent and over sixteen times in Johore and Pahang respectively. These two states constitute the two major components of Johore Bahru's hinterland.

The oil coming out of this area is currently all handled through Singapore, the vast majority through the storage tanks of the Palm Oil Bulking Company. This is a non-profitmaking company whose share-holdings approximate broadly to the acreage of oil palms of the contributing estates. The company maintains the only palm oil bulking installation in Singapore and members deliver oil to the installation at their own expense. The oil is sold through the Malayan Palm Oil Pool (which is described below) and shipment is arranged by the company on the advice of the selling agents in London. At present the capacity of the Singapore installation is being increased from 11,000 tons to 16,000 tons. By the end of the year further increases in capacity will have been completed to give a total storage capacity of 21,500 tons. Further increases in capacity beyond this figure are physically possible but only by eliminating some of the smaller tanks from the tank farm. This would result in a serious loss of flexibility in the operation of the installation which the Palm Oil Bulking Company wish very strongly to avoid. Thus, the effective potential capacity of the Singapore installation is 21,500 tons and any capacity required over and above this will have to be constructed on a new site.

Overall future requirements for bulking capacity are based on a total storage capacity in the producing country of three months production. This is judged desirable by the selling agents as it gives them sufficient flexibility in their selling policy to achieve the best prices for Malaysian oil. There is some difference of opinion as to the way in which this storage

capacity should be distributed between the estates and the bulking installation, but at the moment the estates have an effective average storage capacity of only a little over one peak month and the Palm Oil Bulking Company is thus basing its future plans on a storage capacity of two peak months production. Their planning period is a four year one because this is the period between the planting of an oil-palm and its ~~first~~ First fruiting, which allows production in four years time to be fairly accurately assessed on the basis of the palms already planted. The forecast 1974 production of 371,500 tons, would require, on a two peak month storage basis, an installation having a total capacity of 92,900 tons. Since 21,500 tons already exist in Singapore a further 71,400 tons capacity will have to be provided elsewhere. In fact, to provide additional flexibility a planning figure of 77,500 tons is being adopted by the Palm Oil Bulking Company.

By the end of 1971 forecast production will be of the order of 200,000 tons a year and the capacity of the Singapore installation at 21,500 tons will represent only about 0.5 peak months (at a rate of 12½% annual production in the peak month). This would be an extremely unsatisfactory state of affairs which might give rise to considerable difficulties with regard both to selling and shipping and could be disasterous in the event of, for example, a dock strike in one of the major importing countries. Thus, the need for a further installation is very urgent. The Palm Oil Bulking Company have made it clear that they would prefer a site on the Malaysian side of the Straits of Johore but any delay on the provision of such a site could well force them into creating facilities elsewhere to deal with their immediate problem.

The foregoing analysis assumes throughout that all palm oil being exported through Johore Bahru or Singapore is handled by a single organisation, namely the Palm Oil Bulking Company. Such an assumption may well be untrue as the Federal Land Development Authority, who it can be seen from Table 3.4 will be a major exporter through Johore Bahru by 1975, would like to establish their own separate installation.

The number of individual installations does not, of course, effect the analysis provided that they are all within the port area at Johore Bahru. However, the Federal Land Development Authority are currently seeking permission to site their installation in the Merdeka Park area, immediately east of the Cause-way within the Johore Bahru town area itself. Their main reason for choosing this site appears to be that it could be utilised very quickly and be in operation by every 1972 when required. However, from the point of view of overall planning such a development would be extremely undesirable and if an early decision on the siting of the new port can be made it would be possible to complete a similar new marine terminal within the ~~part~~ Port Study Area by the same date.

One of the principle aims in developing the port must be to concentrate all the facilities within a single area, ensuring orderly development, the common use of infrastructure, and avoiding a multiplicity of individual private facilities straggling along the Straits which would be hopelessly uneconomic. Another reason for having the bulk palm oil terminal within the port area is that it can stimulate the development of general trade (this point will be developed later).

It is thus strongly recommended for these reasons that the F.L.D.A. palm oil facility be within the port area and closely associated with the Palm Oil Bulking Company's installation so as to share the same marine terminal. The importance of timing though cannot be overlooked and if the port cannot be operational during 1972 then a site must be provided for the FLDA elsewhere. However, it must be emphasised that this would be a great loss to the port and should be avoided if at all possible. This is one of the most urgent problems facing the port development.

On the assumption that the F.L.D.A. installation is within the port area, the proportion of the total production of the combined hinterlands which will flow through Johore Bahru depends upon two important variables; the development of the world market for palm oil and the type of ship in which it will be carried. These two factors are very much interrelated. Virtually all Malayan palm oil is sold under the auspices of the Malayan Palm Oil Pool. This is a voluntary association of plantation companies and all major palm oil producers in Malaya are members. The main functions of the Pool are to find markets for palm oil and sell at the best prices, whilst eliminating market competition between Malaysian producers. Strict quality rules are laid down and all members receive identical rates per ton based on annual average contract prices. The world wide distribution of Malaysian Palm Oil through Singapore is given in the following table.

Table 3.5 : Destinations of Malaysian Palm Oil Shipped through Singapore 1969

	$M	Per cent
United Kingdom	31.7	64.2
Holland	5.2	10.5
Kenya	5.2	10.5
Israel	2.5	5.1
Iraq	0.8	1.6
Phillipines	0.6	1.2
Portugal	0.5	1.0
Japan	0.4	0.8
Other countries	~~2.6~~ 2.6.	5.1
	49.5	100.0

Source : Singapore External Trade Statistics, (Department of Statistics, Singapore).

The market for palm oil in the United Kingdom and Western Europe is static or even declining and it is clear that if the vastly increased projected tonnages of Malaysian palm oil are to be sold without a disasterous fall in the price a far wider range of markets will need to be exploited in the future. Although most of them are still small in absolute terms, the most rapidly growing markets at the moment are in Iraq, Japan, Russia, Kenya, Yugoslavia and other Eastern European countries. Palm oil still only represents some 3.5 per cent of the world market for fats and oils and so there appears to be no reason why the increased production should not find markets. These markets are likely to demand a radical change in the distribution pattern and this in itself will react on the physical methods of shipment employed.

The palm oil shipped through Singapore is at the moment carried almost exclusively in the deep tanks of cargo liners. These tanks range up to 1000tons in capacity, although there may be more than one tank on a single ship. The largest total shipment on a single ship is about 2,500 tons. It seems very likely that as the tonnages coming out of Malaysia increase in the future , packet tankers of up to 24,000 DWT will be introduced by some, ~~at least~~, of the shipping lines. Blue Funnel, who probably carry more palm oil out of Singapore than any other shipping line, intend to introduce a tanker service from 1971. Looked at from the point of view of freight rates only, there are considerable advantages in tanker shipment, but when the overall transportation cost is considered, including the terminal facilities required to receive bulk shipment of oil, the picture is not quite so clear. Undoubtedly, the major flows of oil to the United Kingdom and Western Europe will support a tanker service, (plans to construct a 30,000 cubic meter edible oil storage terminal on Merseyside were announced by Panocean in July), but the new and expanding markets of the world are unlikely to become large enough to support such facilities for some years to come. From enquiries made in London, however, there does appear to be a move in shipping circles to invest in special packet tankers and bulk storage facilities to provide a world wide bulk transportation system for liquid commodities, such as chemicals, oils and fats. Such tankers will not necessarily be carrying one type of cargo at any one time, and in many respects they can be likened to specialised tramp ships carrying their liquid cargoes to and from places as trade demands. The timing of these developments is somewhat uncertain but they should be making a marked impact on the palm oil trade by 1975. For the purpose of this study, a planning figure of 50 per cent tanker shipment has been adopted.

This has considerable implications for the split of oil shipment between Singapore and Johore Bahru. It is the intention of the Palm Oil Bulking Company to use the Johore installation principally for tanker shipments and continue to supply the liners from Singapore. This would indicate that in spite of having 78 per cent of their storage capacity in Johore, only 50 per cent of the oil would flow through it. Such a state of affairs is unlikely to exist and assuming that the Singapore installation handles 25 per cent more than its current output of 140,000 tons a year, i.e. 175,000 tons this would imply that 275,000 tons would use Johore Bahru. If only 50 per cent of the total production of 450,000 tons, or 225,000 tons is shipped in tankers, then this would still leave 50,000 tons a year to be carried in cargo liners from Johore Bahru.

The average shipment carried by a cargo liner in the first six months of 1970 was 600 tons, a figure which has remained unchanged for some years. This would imply some 80 shipments in cargo liners. The 225,000 tons carried in tankers, assuming an average shipment of 10,000 tons, could be carried in, say, 25 shipments.

In addition to the outward shipping movement, a considerable movement of coastal shipping will be involved in bringing the oil down from the east coast ports. The Engineering Export Association of New Zealand in their preliminary report on Port Development in Kuantan and Kuala Trengganu estimates that by 1975 some 46,000 tons of palm oil will be shipped out of Kuala Trengganu and some 100,000 tons from Kuantan. It is most likely that this traffic will be carried in small coastal tankers having a capacity of 600 tons and 1200 tons. Thus, with an average shipment of some 1000 tons, about 150 voyages would be involved by 1975.

The forecasts of volume and shipments can be summarised as follows:-

	1975	
Outwards	Tons	Shipments
Carried in packet tankers	225,000	25
Carried in cargo liners	50,000	80
Total palm oil shipped	275,000	~~93~~ 105
Inwards		
Coastal tankers	146,000	150
Road	129,000	-
Total palm oil received	275,000	150

Timber

The timber industry in Malaysia is an extremely unpredictable one and most forecasts which have been made in the past have proved to have been inaccurate. As the Nathan Report puts it +.

> "Estimates of future output and distribution of timber are difficult to make. There is considerable room for better utilization of available species, greater efficiency in cutting and drawing, and more integrated operation through the milling stage. These factors are speculative, and it is therefore difficult to predict the extent to which log, sawn timber and plywood exports will grow".

In spite of this difficulty exports of timber in one form or another are likely to be of great importance for a port at Johore Bahru and estimates must be made of their extent.

The existing pattern of trade over the causeway into Singapore is dominated by the export of logs. These are predominantly for sawing in Singapore although some are re-exported to Japan and elsewhere. The sawn timber produced in Singapore, together with some exported from Malaysia, is used partly within Singapore itself and partly for exporting. A world wide shortage of hardwoods and the consequently rising prices have resulted in very rapid expansion of the Malaysian timber industry over the past decade. This is illustrated in Table 3.6.

It may be seen immediately from this Table that the proportion of sawlogs directly exported from Malaysia rose steadily from 1958 to 1966 although more recently this trend has been to some extent reversed due to the more restrictive policy on export licences. As was mentioned above, the great majority of these exports are destined for Singapore. In 1968 the distribution of West Malaysian exports of logs was as follows:

	Tons Cubic (of 50 cu.ft)	Percentage
Singapore	857,666	91.1
Japan	78,318	8.3
Korea Republic	5,055	0.5
Hong Kong	34	-
TOTAL	941,073 941,073	100.0

Source : West Malaysian Annual Statistics of External Trade (Dept. of Statistics, Kuala Lumpur)

+ Nathan Report page 134.

Table 3.6 : Malaysian Timber Production & Exports 1958-69

'000 Cubic tons of 50 cu.ft.

	Sawlogs Produced (Approx)	Sawlogs Exported	Percentage of Sawlogs exported	Sawn timber produced	Sawn timber exported	Percentage of sawn timber exported
1958	1,151.5	192.8	16.7	503.1	127.0	25.2
1959	1,177.3	220.5	18.7	543.9	143.6	26.4
1960	1,589.0	275.5	17.3	729.4	217.4	29.8
1961	1,563.4	282.4	18.0	711.1	171.0	24.0
1962	1,632.5	305.1	18.6	755.7	196.0	25.9
1963	1,905.3	417.1	21.8	830.5	245.5	29.5
1964	2,105.1	492.8	23.4	946.5	324.0	34.2
1965	2,277.7	574.6	25.2	950.6	335.4	35.2
1966	2,691.0	777.4	28.8	1,004.1	334.6	34.3
1967	2,965.5	815.6	27.5	1,218.9	409.0	33.5
1968	3,586.8	941.1	26.2	1,418.4	564.5	39.7
1969	3,788.9	1,044.4	27.6	1,454.3	609.5	41.9
Average annual growth rate	12.8%	17.4%		10.5%	17.3%	

A small proportion of the logs destined for Singapore may be re-exported but since Singapore's total export of logs in 1968 amounted to less than 7,000 tons this is not significant.

Sawlog exports to Singapore will undoubtedly continue to rise at a rapid rate unless direct physical controls or an export tax is imposed, but the direct export of logs to countries overseas is likely to decline even further. This is the result both of Government policy to restrict export licences and also because of the anticipated decline of the primary timber industry in Japan. Rising land and labour costs over the next decade will probably render the sawmilling and plywood and veneer industries in Japan increasingly uneconomic and lead to a move of resources into more sophisticated industries. For these and other reasons it is not anticipated that sawlogs will ever move in significant volumes over a port at Johore Bahru (except possibly for import for processing and re-export) and this trade is not considered further.

The production of sawn timber, as can be seen from Table 3.6 has also been rising rapidly over the last decade and an ever increasing proportion of this output is exported. This is distributed to a very wide variety of destinations the major areas of which in 1968 are shown in Table 3.7. Most probably about three quarters of the timber shown in the trade statistics as being exported to Singapore was re-exported.

Table 3. 7 : Destinations of Malaysian Sawn Timber Exports 1968

	Tons Cubic (of 50 cu.ft.)	Percentage
Australia	84,455	15.1
Belgium	40,601	7.3
France	33,081	5.9
Japan	44,142	7.9
Holland	44,558	8.0
Singapore	123,905	22.2
South Africa	33,873	6.1
U.K.	65,471	11.7
U.S.A.	33,962	6.1
Mozambique	15,354	2.7
Other countries	39,747	7.1
TOTAL	559,149	100.0

Source : West Malaysia Annual Statistics of External Trade (Dept. of Statistics, Kuala Lumpur).

The true volume of sawn timber being exported from West Malaysia through Singapore to an ultimate destination overseas is not easy to determine from the published trade figures. Much of the sawn timber passing over the Causeway is consigned to a trader in Singapore and thus appears in the trade statistics as an export to Singapore even though that trader may immediately re-export it to, say, Australia. Figures published by the Malaysian Timber Export Industry Board+ for 1969 suggest that about 90,000 tons of Malaysian sawn timber were exported through Singapore. This represents about 15 per cent of all sawn timber exports from Singapore. It must be remembered that of the approximately 300,000 tons of sawn timber exported directly by Singapore in 1968 virtually the whole amount originated as West Malaysian logs. Thus, the picture which is built up of Singapore's present exports of sawn timber is that about 400,000 tons a year are exported. About 25 percent is sawn in West Malaysia and the remaining 75 per cent is in Singapore from logs originally imported from West Malaysia.

The picture of what the future traffic might look like either with or without a port at Johore Bahru cannot be built up so easily. The opinion of some experts on the timber industry in Malaysia is that expansion in the future is likely to be less dramatic and even that the output of sawn timber may become static as an increasing proportion of logs are manufactured into plywood and veneer. However, there are no indications from the trend of the published statistics that this is likely to happen and unless some other influence intervenes it appears likely that rapid rates of growth will persist. The only slight doubt which hangs over the Malaysian sawn timber industry relates to the quality of the product. The bulk of timber exports are still shipped in an undried, rough-sawn condition, but more rapid development of more efficient sawmills with related drying kilns and planning mills would remove any marketing doubts. Very large areas of Johore, Pahang and Trengganu will be permanently cleared of forest in the next five to ten years for agricultural development and the indications are that a far higher rate of timber extraction will be achieved in the future. For example, the recently inaugurated Sharikat Jengka timber complex is expected to achieve a utilisation rate of 20 to 25 tons per acre of timber land compared with the prevailing rate of 6 to 10 tons an acre+.

It is of interest that the Nathan Report, already cited, projects a rate of increase of sawn timber production between 1970 and 1975 of 8 per cent and for exports of sawn timber of 13 per cent. This is well below the observed trend to date of an 17.3 per cent growth rate but there are good reasons for being conservative when making forward projection at rates such as these, and the Nathan projection has been used throughout this Report. Using this rate of growth, exports of sawn timber from West Malaysia through Singapore and Johore Bahru will rise from 90,000 tons in 1969 to about 190,000

+ Monthly Statistics of Timber Exports from West Malaysia and Singapore Vol. 1 No. 12

+ Straits Times 15th July, 1970.

tons in 1975.

The proportion of this projected trade which might use a port at Johore Bahru is dependent upon a wide range of imponderables the most important of which are the facilities available at Johore Bahru port, the method of shipment of sawn timber in the future and the degree to which the sawmilling industry switches back from Singapore to Malaysia.

Shipment of hardwoods has traditionally been handled by general cargo liners in very small individual lots. According to the Malaysian Timber Export Industry Board the average size of consignment in 1969 was only 15 tons. This, of course, makes the carriage of timber very unattractive to liner operators and recently they have cut down sharply on the hold space allocated to timber. This in turn has caused timber exports to accumulate at the docks and special charters have been arranged to deal with 5-6000 tons at a time. In 1969 there were 10 of these special charters and by the end of July 1970 there had already been a further 8. This would seem to be very much the future pattern and if so Johore Bahru will be well placed to capture a large sector of the trade. It is in any case being to some extent discouraged in Singapore because, unless specially designed wharfs are available, it can be an unattractive proposition to port operators. If at Johore Bahru there is a specially designed wharf with adequate storage space at the back of the berth on which to stack timber awaiting shipment and behind this again a central bundling yard at which bundling facilities are available cheaply to all-comers, there is no reason why over 50 per cent of the combined trade of Singapore/Johore Bahru should not be attracted to Johore Bahru. Another factor which will be discussed in further detail in Sub-section 4.2 that the industrial estate associated with the port provides in many ways an ideal site for a timber complex and any sawn timber produced there would almost certainly be exported directly over the wharfs rather than being trucked thirty miles to the Port of Singapore.

Thus, the maximum estimate of the sawn timber traffic through Johore Bahru would be that over 50 per cent of the potential 190,000 tons, say 100,000 tons in all, would be attracted to the port. It must be re-emphasised however that this estimate is highly conjectural. Three conditions are assumed in the estimate, but they could well not occur . The movement towards specialised timber carriers for hard woods may prove to be ephemeral. The growth of the timber export industry in the southern parts of West Malaysia may be less rapid that it has been in the past. It may be decided not to create a specialised timber handling wharf at Johore Bahru. If all the adverse factors mentioned above were to operate, the total timber trade may be growing at no more than 5 per cent a year and of the resulting 120,000 tons of exports in 1975, Johore Bahru might secure no more than one third, giving a total trade of only 40,000 tons a year.

A range of possibilities of from 40,000 tons to 100,000 tons is a wide one but as was stated earlier, timber is a very difficult industry for which to make forward projections. To a certain extent the position within this range will be determined by policy. If the export of logs to Singapore is discouraged by, for example, an export tax so that more West Malaysia timber is sawn in Malaysia and if sawmillers were encouraged to establish themselves at the Johore Bahru port industrial area, then even the high estimate could prove too low. On balance, the high estimate is more probable than the lower and perhaps the most likely outcome is about 85,000 tons a year in 1975.

Other Bulk Exports

Besides palm oil and timber, the other bulk exports from Malaysia are not likely to be of great significance for a port at Johore Bahru at least during the period up to 1975 which is the period that this study is concerned with. Nevertheless, the prospects and likely shipping pattern of the following commodities is briefly considered:

Iron ore
Bauxite
Coconut oil
Latex
Palm kernels.

Iron ore is found in several States and has been mined on a fairly large scale. Total West Malaysian production reached a peak of over 7 million tons in 1963 since when it has steadily declined in the face of competition from the far richer deposits in Australia. Although production was still 5 million tons in 1968, it is unlikely to remain at this level particularly as the richer deposits at Bukit Besi and Pekan are said to be nearly worked out. The existing exports are handled mainly through the two ports of Dungun and Kuala Rompin on the East Coast; the ore being carried in barges to ore carriers anchored offshore. The overall picture for 1966 is given in the table below:

Port	Tons
Dungun	1,587,000
Kuala Rompin	2,098,000
Batu Pahat	300,000
Muar	541,000
Swettenham	66,000
Penang	443,000
Lumut	155,000

Source : Nathan Report, page 138

In view of the declining demand and production, and the fact that Johore already has two established iron ports, Muar and Batu Pahat which are far closer to the mines than Johore Bahru, it seems extremely unlikely that any iron ore exports will pass through the new port.

The only major deposit of bauxite now being worked in Malaysia is in Southern Johore about 25 miles due East of the port site at Johore Bahru. Production, after reaching a peak of nearly a million tons in 1966 has since declined somewhat to only 786,000 tons in 1968. The ore is loaded into barges at Raumania Bay and lightered out to vessels anchored offshore, as in the case of iron ore. Although the deposits are only a comparatively short direct distance from Johore Bahru, the Sungei Johore, with its wide estuary separates them and the road journey via Kota Tinggi is about 60 miles. This makes it virtually certain that no bauxite would be attracted to a port at Johore Bahru in quantities significant for port planning. If however, the deposits are large enough and can be economically worked, the production of alumina could be considered. The handling of alumina will require special facilities and these could be provided within the port area.

Coconut oil exports have moved erratically over the past ten years, falling from a peak of 42,000 tons in 1961 to less than 15,000 tons in 1964 and since then recovering quite steadily to 38,000 tons in 1968. About one third of total West Malaysian exports pass through the Port of Singapore. It is extremely unlikely that any of this comparatively limited traffic can be attracted to Johore Bahru. Bulking facilities are available within the Port of Singapore and it is unlikely that similar facilities would be established at Johore Bahru unless the trade expands or because of the transfer of the trade to packet tankers which would be calling to load palm oil. If this was the case, the suggested loading facilities for palm oil could cope with this commodity with no increase in size.

Much the same considerations apply to the bulk export of liquid latex. The bulking installations at Singapore are owned by the large shippers e.g. Dunlop and the heavy capital investment involved makes it extremely unlikely that any competing or complementary facilities would be constructed at Johore Bahru unless there was a rapidly rising volume of exports and only very limited room for expansion at the site of existing installations. Neither of these conditions apply to the export of liquid latex where the volume exported through Singapore has remained more or less static at around 45,000 tons a year since 1965 and the existing facilities can cope quite adequately with this level of throughput. Unless there is some major change in this trade, it is likely to remain exclusively the province of Singapore. This does not necessarily apply to liquid latex

shipped in drums but these are not classified as a bulk export and will be dealt with at the same time as other rubber exports.

The export of palm kernels is similarly not a bulk trade, palm kernels being shipped in sacks of about 205 lb at the moment. However, with the rapid increase in palm oil production forecast over the next five years, it is quite possible that export volumes will become large enough to justify bulk shipments and bulk handling facilities in Malaysia. It is known that bulk handling facilities for the import of palm kernels already exist in Japan and that they would welcome shipment from Malaysia in this form. For every ton of palm oil produced, there is approximately 0.24 ton of palm kernel. This may be crushed to extract a lauric acid oil similar in its properties to coconut oil for which it is to some extent a substitute. Thus, if 450,000 tons of palm oil are produced in 1975 within the hinterland of Johore Bahru, there will also be a production of some 110,000 tons of palm kernels. At the moment, only about 40 per cent of production is exported, the remainder being crushed in Malaysia with copra. The resulting cake is sold as copra cake for animal feed and the oil used in the manufacture of cooking oil, margrine and soap. The ability of the local existing industry to absorb palm kernels may well not keep pace with the rapid predicted growth of production and this would cause the proportion seeking an export outlet to rise in the years ahead. If this proportion rose to 50 per cent, there would be a potential export trade of over 50,000 tons a year.

This line of reasoning is admittedly extremely speculative but it is sufficiently firmly based for some agencies to be thinking seriously about establishing a site or other bulk handling facility and a port at Johore Bahru would be the most logical site. Thus, it may be said that a potential export traffic of 55,000 tons a year of palm kernels exists within the hinterlands of Johore Bahru, but far more examination of price, market, shipping and profitability will be necessary before it can be said with any certainty whether this potential traffic is likely to materialise.

3.2 General Exports

The volumes of general non-bulk traffic likely to be attracted to a new port are far more difficult to predict in principle than the bulk cargoes which tend to be transported in specialised carriers. These will be attracted to a new port if the volumes of any particular bulk commodity are sufficient to provide a worthwhile load for the ship in question. General dry cargoes are generally shipped in cargo liners, the economics of whose operation depend upon carrying comparatively large volumes of a wide variety of freight, quickly between two or more widely separated geographical areas. The cargo liners

are thus, very understandably not anxious to make too many calls within a single area as this will use valuable time and undermine the frequency and speed of the service upon which their competitive position depends. In the case of Johore Bahru the ship owners point out that they already call at Singapore less than twenty miles away and that for them to make two berthings within such a short distance is extremely uneconomic. Their reaction tends to be either to refuse to call at Johore Bahru or to think in terms of higher freight rates than those of the port of Singapore. This, of course, would immediately undermine the competitive position of Johore Bahru and direct any potential general cargo traffic back to Singapore.

This analysis, however, makes two very important assumptions neither of which is wholly true; that the shipping industry is a monopoly and that no single individual commodity is available in sufficient quantities to attract liner shipping. To a certain extent the shipping industry is monopolistic in the all the major shipping lines belong to one or more of the Shipping Conferences which draw up tariffs and exercise a very powerful influence. However, competition is by no means non-existent and if sufficient cargo were available at Johore Bahru it is certain that one or other of the shipping lines would be prepared to call to pick it up. What is considered to be sufficient inducement will vary from cargo to cargo and from shipping line to shipping line but in very general terms it is probably of the order of 500 tons of palm oil and perhaps 750 tons of general dry cargo, excluding timber. It would normally be very difficult to assemble 750 tons of general dry cargo for a single destination, ie. sufficient to attract of cargo liner without imposing a delay on some at least of that cargo which would be unacceptable to the shipper. However, one commodity does generally travel in single consignments sufficiently large to attract ships to Johore Bahru and that is palm oil. Thus, it becomes clear that the palm oil trade is likely to be the key to the development of general cargo traffic through Johore Bahru. Indeed, it is probably not going too far to say that without a palm oil terminal it is very hard to envisage the development of a port at all in Johore Bahru. This is why it is so vital that the port be developed quickly so that the Federal Land Development Authority and the Palm Oil Bulking Companies do not go elsewhere for their palm oil terminal. Unless the port is constructed quickly there may be no demand for its services at all.

To summarise, a necessary condition for general cargo traffic to materialise in any new port is frequent and regular sailings to the major ports of the world. Shipping owners are reluctant to provide this service at Johore Bahru on the grounds that they already provide it at Singapore. Palm oil, however, will be available at the new port in sufficient volumes to attract liners and thus provide the frequent sailings required by the general cargo traffic.

This line of argument depends entirely upon the assumption that palm oil continues to be carried in cargo liners. As was discussed in Sub-section 3.1. above, it seems to be a reasonable assumption that during the plan period up to 1975 at least some of the trade will continue to be carried in general cargo liners and a forecast was developed in this Sub-section of eighty sailings a year from Johore Bahru. This frequency of seven a month or nearly two a week should be sufficient to cater for the needs of the general cargo trade, but it should be re-emphasised that the method of future shipments of palm oil is one of the greatest imponderables facing the industry. It may well be that by 1975 the development of the packet tankers is such that all oil shipped through Johore Bahru will be carried by this class of vessel, although this seems very doubtful. However, the figure of eighty sailings a year, derived in Sub-section 3.1, being a residual, is subject to wide fluctuation and for this reason any predictions of general cargo traffic must be approached with the greatest caution.

The remainder of this Sub-section goes on to consider the potential volumes of export traffic likely to be generated by two of Johore's largest industries, rubber and pineapple canning. Finally, the other export cargoes are more briefly considered.

Rubber

The long term future of the natural rubber industry in Malaysia is, as it has been for many years, clouded in uncertainty. On the one hand competition from synthetic materials such as cis-polyisoprene is having a depressing influence on prices and, on the other, the use of stimulants such as ethrell promise greatly increased yields even from existing clones. However, due to the comparative long maturation period of the rubber tree, production within the plan period up to 1975 can be fairly accurately predicted as the trees from which it will come are already planted, although the use of artificial stimulants might have some effect.

The volume of rubber exports has been rising at an average rate of about 5 per cent a year over the past ten years as is illustrated in Table 3.8.

Table 3.8 : Total Malaysian exports of crude natural rubber 1959-69

Year	Volume (tons)
1959	782,875
1960	766,797
1961	790,562
1962	791,016
1963	841,483
1964	847,804
1965	886,915
1966	939,778
1967	974,569
1968	1,104,780
1969	1,264,855

It is widely anticipated that this rate of growth will continue at least until 1975. In the Nathan report, forecasts were made to 1975 of production by States and then allocated to the ports of export according to the pattern existing in 1967. These forecasts are reproduced in Table 3.9.

Table 3.9: Rubber Production & Distribution 1967 & Estimated 1975

Area	Production 1967 Tons	Likely Port of Export 1967		Estimated 1975 Tons	Production Percent
		Port	Tons		
Kedah/Perlis	113,448			152,299	10.8
Perak	139,354			219,811	15.5
Penang/ Butterworth	26,047			19,299	1.4
	-			-	-
Subtotal	278,849	Penang	228,014	391,359	27.7
	-			-	-
Pahang (50%)	27,785			61,618	4.4
Selangor	128,472			160,453	11.3
Negeri Sembilan	126,668			173,425	12.3
Malacca (69%)	46,494			57,300	4.0
	-			-	-
Subtotal	329,419	Swettenham	372,497	452,795	32.0
	-			-	-
Malacca (31%)	21,214	Malacca	21,214	25,743	1.8
Johore	217,281			402,170	28.4
Kelantan	36,880			50,187	3.5
Trengganu	14,282			30,624	2.2
Pahang (50%)	27,785			60,618	4.4
	-			-	-
Subtotal	296,228	Singapore	338,625	544,599	38.5
Total all areas	925,710		1,023,554	1,414,496	100.0

Source : Nathan Report, Table IV.1

This forecast, however, does not seem to take into account the preferential concession rate for shipments by rail to Port Swettenham (introduced in its present form in April 1967). This reduced the proportion of West Malaysian rubber being shipped through Singapore immediately from 32.9 per cent in September & October 1966 to 28.8 per cent twelve months later +. Since then there has been some recovery, the percentages being as follows:

Year	Percent via Singapore
1968	27.9
1969	29.3
1970 (1st 5 months)	29.4

However, it seems fairly clear that apart from rubber produced in the State of Johore very little other West Malaysian rubber is now being shipped through Singapore. It would be unwise to plan a port at Johore Bahru on any other assumption than this, although it must always be remembered that the natural hinterland of the port may be larger. The forecast production of rubber in Johore State in 1975 can be seen from Table 3.9 to be 400,000 tons and this will be the figure used as the potential combined traffic of Singapore and Johore Bahru, in the Report.

The way in which this 400,000 tons of cargo will be distributed between Johore Bahru and Singapore will depend very largely on government policy decisions (for example an export tax on rubber going across the causeway would divert considerable volumes to Johore Bahru) but for the purpose of this study it has been assumed that government policy is neutral in this respect.

A characteristic of the rubber export trade which is very important from the shipping point of view is the very wide variety of countries to which rubber is consigned. Table 3.10 shows the destinations of West Malaysian rubber shipped through Singapore in 1968. Only those countries receiving more than $500,000 worth of rubber through this channel in that year are listed.

This very wide geographical spread and the character of the rubber trade itself, dealing as it does with a vast number of individually small

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+ Malaysian Rubber Exchange.

Table 3.10

Major destinations of West Malaysian Rubber Exports through Singapore 1968

Country	$M
Argentina	6.1
Australia	9.1
Belgium	1.6
Brazil	3.1
Bulgaria	2.7
Canada	11.5
Chile	0.9
China (Mainland)	33.2
Colombia	2.0
Czechoslovakia	3.2
Egypt	1.0
Finland	1.7
Formosa	6.0
France	13.8
Germany, Federal Republic	18.1
Greece	0.6
Holland	3.6
Hong Kong	1.4
India	1.0
Iran	2.1
Israel	2.6
Italy	10.2
Japan	34.1
Korean Republic	2.0
Korea North	3.3
Mexico	4.1
Morocco	0.8
Mozambique	0.5
New Zealand	1.2
Pakistan	2.0
Peru	0.6
Poland	4.5
Portugal	1.8
Roumania	5.0
South Africa	12.0
Spain	7.3
Sweden	1.9
Turkey	2.1

Continued page 3.22.

Table 3.10 (Contd.)

Major destinations of West Malaysian Rubber Exports through Singapore 1968

Country	$M
U.K.	26.2
U.S.A.	61.0
U.S.S.R.	42.8
Uruguay	0.5
Venezuela	2.6
Vietnam	8.5
Yugoslavia	7.1
Other countries	7.0
TOTAL ($M in Millions)	374.4

consignments,
/ dictate the qualities required by any port handling rubber exports. It must have frequent and regular sailings of cargo liners to a very wide variety of destinations backed up by an extensive system of agencies, brokerage houses and other commercial services. This is exactly of course, the situation which exists in Singapore at the moment and the rubber industry is adamant that this trade is most unlikely to be diverted away from Singapore.

However, there are two countervailing factors which favour Johore Bahru. In the first place, according to the terms of reference of this study, port charges are likely to be lower than those prevailing in the Port of Singapore and in the second place, liner sailings are likely to be far more frequent from Johore Bahru because of the palm oil trade than many people in the rubber industry envisage.

The sector of the trade most sensitive to port charges and thus most likely to be attracted to Johore Bahru are those consignments sold under a forward contract, which can afford to wait for a while in a transit shed for a liner going to the appropriate port. It is difficult to tell with any accuracy what proportion of the total trade is genuinely sold under forward contract (as distinct from hedging) but one prominent figure in the rubber trade estimated that about 10 per cent is sold three months or more forward and a further 40 per cent between one and two months forward. If this is so, it suggests that a sizeable proportion of the trade may be open to competition by Johore Bahru, but against this it must be remembered that rubber is a commodity eminently suitable to containerisation. Container facilities would be completely uneconomic at Johore Bahru and any containerised rubber will

almost certainly be handled at Singapore where container facilities will be available from 1972. Analysis of Table 3.10 reveals that some 56 per cent of rubber exports through Singapore were being shipped to countries which have, or will have by 1975, container receiving facilities. If 80 per cent of the traffic on these routes were to travel in containers (as is anticipated by the rubber and shipping industries) this would leave about 55 per cent of the total trade still to be carried in conventional ships.

The proportion of this traffic which will be attracted to Johore Bahru will probably be in the range of 10 - 30 per cent giving a total throughput by 1975 of between 20,000 and 60,000 tons. This is an extremely wide range but as was explained at the beginning of this section forecasts of this sort are essentially subject to wide fluctuations. The most likely figure, and the one which has been adopted for planning purposes is the mean of these two extremes, that is 40,000 tons a year.

Canned Pineapples

Pineapple canning in West Malaysia is almost entirely confined to Johore, with the exception of one small cannery at Klang, and the whole of the output of the Johore canneries is exported through Singapore at the moment. This is a trade which has grown rapidly over the past decade as Table 3.11 illustrates.

Table 3.11

Total Malaysian Exports of Canned Pineapple

Year	Exports (tons)
1959	27,140
1960	32,831
1961	32,790
1962	35,556
1963	38,681
1964	42,884
1965	53,018
1966	58,032
1967	61,810
1968	66,066
1969	63,196

Source: Monthly Statistical Bulletin of West Malaysia (Department of Statistics, Kuala Lumpur).

This represents an average annual growth rate of some 8.5 per cent. The present capacity of the Johore canneries of about three million cases a year is now being fully utilised. This will be expanded to four million cases a year by 1975 with the addition of a new cannery at present being constructed by the Malaysian Pineapple Cannery. No difficulty is anticipated in disposing of the increased output as demand is already running ahead of productive capacity. The American market is expanding rapidly and, as yet, Japan has only been very partially exploited. Thus, by 1975 total exports of canned pineapple should be of the order of 90,000 tons a year.

At the moment the market consists largely of the United Kingdom, the United States, Germany and Canada as Table 3.12 illustrates.

Table 3.12

Destinations of Malaysian Canned Pineapple Exports 1968

Destination	Value $M	Tons	Per Cent
U.K.	15.0	20,511	31.0
U.S.A.	13.6	18,256	27.6
Canada	6.2	8,637	13.1
West Germany	5.0	7,220	10.9
New Zealand	2.1	2,874	4.4
Singapore	0.5	791	1.2
Japan	0.6	780	1.2
Italy	0.5	778	1.2
Saudi Arabia	0.4	713	1.1
Other countries	4.0	5,503	8.3
TOTAL	47.9	66,063	100.0

Source: West Malaysia Annual Statistics of External Trade (Department of Statistics, Kuala Lumpur.

Future expansion is expected to be far more by the exploitation of new markets than by the expansion of existing ones, although the American market is still growing rapidly and all of the established markets, with the exception of Canada, should show some development over the next five years.

The degree to which the trade may be channelled through Johore

Bahru is, as is the case with rubber, very much dependent upon the rate of containerisation of the trade. Canned pineapple is a natural commodity for containerisation as the cases will fit neatly and easily into a container with little or no wasted space. Furthermore, the major markets for Malaysian canned pineapples are all served by container ports at the moment. For this reason, it is hard to see more than a small proportion of the trade passing through Johore Bahru even though the industry itself is keen to make use of the new port and encourage its growth. Of the total forecast trade in 1975 of 90,000 tons, it is anticipated that at least half will be carried in containers. Of the other half, still being carried in conventional ships, a fairly high proportion consists of small consignments for quick delivery and these will almost certainly continue to use the port of Singapore. Thus, probably no more than 25 per cent of the total trade can be attracted to Johore Bahru. The resulting estimate of 22,500 tons a year is subject to variations of at least 20 per cent, giving maximum and minimum forecasts are 27,000 and 18,000 tons a year respectively.

Other General Exports

As may be seen from Table 3.13 the exports already dealt with individually constituted 86 per cent by value and about 90 per cent by volume in 1968.

Table 3.13

Total West Malaysian Exports through Singapore 1968+

Category	Commodity	Value $M	Approx. Volume Tons
Food	Canned pineapple	46.7	66,000
	Other food items	7.2	10,000
Beverages & tobacco		10.9	7,000
Crude Materials	Oil palm nuts & kernels	2.9	7,000
	Rubber	374.7	300,000
	Wood in the rough	4.8	60,000
	Wood squared & planks	4.3	34,000
	Other crude materials	2.8	3,000
Mineral fuel, lubricants etc.		-	-

Continued page 3.26

+ Note: this table was derived from a comparison of the West Malaysian export and Singapore import figures. It does not always agree exactly with figures appearing elsewhere in this report which were derived from other sources.

Table 3.13 (Contd.)

Total West Malaysian Exports through Singapore 1968

Category	Commodity	Value $M	Approx. Volume Tons
Animal & vegetable oils	Palm oil	36.0	87,000
	Coconut oil	11.4	13,000
	Other oils	0.3	1,000
Chemicals		9.4	7,000
Manufactures	Wood simply shaped	8.1	17,000
	Other manufactured goods	22.7	4,000
Machinery & transport equipment		7.7	1,000
Other miscellaneous items		10.5	2,000
		560.4	619,000

Of the remaining commodities, the only one likely to be of significance for Johore Bahru is 'wood simply shaped', which includes plywood, veneers and wooden mouldings. The likely port of export for these commodities is very closely linked with the development of the timber processing industry in South Johore and particularly the industrial estate to be associated with the new port. As such, it is discussed in Sub-section 4.3 below, the main conclusion of which is that exports in 1975 through Johore Bahru will be between 18,000 and 22,000 tons with a most probable figure of 20,000 tons.

Other commodities exported through Singapore at the moment include milled rice, biscuits, beer, cigarettes, soap, textiles and a wide range of other manufactured products. None of these is very important individually, and the total volume of trade probably amounted to little more than 35,000 tons in 1968. Individual studies have not been made of the prospects for the various constituents of this trade, but in total it appears to have been growing at an average rate of about 12 per cent a year in volumetric terms. Projected at this rate, there could be something of the order of 80,000 tons available to Singapore and Johore Bahru in 1975. Much of this trade is destined for East Malaysia and will therefore most probably be carried by the Straits Steamship Company who operate a frequent and efficient service from Singapore to the ports of Sabah and Sarawak. If they could be persuaded to operate out of Johore Bahru, then no doubt much of the trade could be attracted. However, most of the cargo which Straits Steamship carry to East Malaysia is transhipped from liners calling at Singapore and they will doubtless be extremely loath to

alter their existing arrangements. For this reason, it is not likely that more than 15 per cent of this traffic will be attracted to Johore Bahru unless some fairly radical change is made to the existing pattern of shipping movement. The forecast traffic through Johore Bahru of other miscellaneous exports is, thus, about 12,000 tons a year with a wide maximum-minimum variation of 6,000 to 18,000 tons.

3.3 Bulk imports

Bulk imports are not likely to be as important as bulk exports for a new port at Johore Bahru. This is both because the absolute volumes of bulk imports into West Malaysia through Singapore are relatively smaller than exports and because such trade as that tends to be well established at Jurong where comparatively extensive capital investment in specialised handling facilities has already taken place. The only two commodities for which there appear to be a realistic chance of significant volumes being imported in bulk through a port at Johore Bahru are fertilizers and animal feeding stuffs. They are examined individually below. Other bulk imports are treated more generally in a third section.

Fertilizers

West Malaysia is not a very large scale importer or consumer of fertilizer although oil palm in particular, but also rubber and padi are usually grown with the help of fertilizer applications. Domestic consumption has remained fairly static at about 300,000 tons a year. The principle imports since 1964 are given in tons in Table 3.14.

Table 3.14

Fertilizer Imports West Malaysia

Item	1964	1965	1966	1967	1968
Crude fish fertilizer	278	616	3,089	3,565	1,248
Other natural animal fertilizer	5,080	2,090	1,115	21,880	21,810
Natural sodium nitrate	4	4	6	15	32
Natural phosphates	84,482	89,482	111,844	100,301	84,948
Crude potassium salts	2,094	1,911	851	201	156
Nitrogenous fertilizer (mfd)	137,423	139,514	152,867	120,678	56,860
Phosphatic fertilizer (mfd)	5,097	7,204	6,477	6,014	3,865
Potassic fertilizer (mfd)	21,958	30,751	44,947	55,434	53,239
Fertilizer m.e.s.	35,644	37,025	40,566	34,456	24,988
TOTAL TONS	296,060	~~308,326~~ 308,597	~~361,752~~ 361,762	~~342,381~~ 342,544	~~250,146~~ 247,146

The absolute level of imports in any year tends to depend fairly heavily upon the prices of rubber and palm oil in that particular year and thus be virtually unpredictable. However, the long term underlying movements of the market does seem to be in the direction of slow but steady growth. The Nathan Report adopted a figure of 8 per cent a year which seems rather high in general terms, but since the base year for this study, 1968, was one of low activity for the fertilizer industry, an annual rate of increase of 8 per cent does not seem unreasonable and has been adopted. Of the 250,000 tons imported into West Malaysia in 1968, about 91,000 tons came through Singapore. These imports were almost entirely in bagged form as, although bulk fertilizer is imported on quite a large scale into Singapore, it is normally bagged there for distribution throughout South East Asia, including West Malaysia. Several large importers, such as Astraco and the International Mineral Corporation have created bulk handling facilities at Jurong. It is extremely difficult to imagine that they will wish to transfer any part of their activities to a new port at Johore Bahru both because the economies of scale would make it uneconomic for them to have two separate plants and because their leases with the Jurong Port Authority dictate a minimum quantity of throughput on which they must pay wharfage. This minimum quantity tends to rise as time goes on and with the relatively static market for fertilizer, this virtually ensures that all their activity will take place at Jurong. The other large importer of fertilizer is I.C.I. through its Malaysia subsidiary Chemical Corporation of Malaysia. However, their major manufacturing plant is at Batu Tiga, Port Swettenahm and their imports through Singapore are comparatively small.

Thus, the scope for fertilizer imports through Johore Bahru appears to be comparatively limited within the period of study up to 1975. One possible trade for which there appears to be excellent prospects is the import of crude phosphates from Christmas Island. This is at present shipped in a specialised carrier of about 500 tons to Singapore for eventual distribution in the State of Johore. In 1968 the volume of Christmas Island phosphate landed in Singapore was 7,500 tons and it is quite reasonable to assume that all this trade could be attracted to Johore Bahru. It is also possible that some of the smaller importers through Singapore who distribute only in Johore would channel their imports through Johore Bahru. There is very little information as to what this trade would amount to in total, but trade sources indicated that it is unlikely to be more than 5,000 tons a year in the first instance.

Fertilizer imports through a new port at Johore Bahru are unlikely to total more than 12,500 a year by 1975 and a more likely figure is about 10,000 tons. All this, of course, assumes that government policy with regard to fertilizer imports is neutral.

Animal feedstuffs

A large volume of animal feedstuffs are imported into Malaysia particularly through Singapore. Total West Malaysian imports in tons in 1966, 1967 and 1968 is given in Table 3.15

Table 3.15

Total West Malaysia Animal Feedstuff Imports

Type	1966	1967	1968
Cereal straws and husk	11,974	2,650	2,662
Fodder, roots, hay etc.	2,925	2,564	3,069
Other vegetable products	4,255	4,724	7,315
Rice bran	22,996	20,986	28,721
Other brans	1,840	185	772
Copracake	10,862	17,331	15,453
Other oil cakes	15,007	14,851	21,028
Prawn dust	1,064	3,756	3,691
Fish meal	10,602	10,012	13,568
Meat meal	5,823	6,907	10,577
Tapioca refuse	14,961	19,578	12,990
Sago refuse	287	112	112
Rolled oats	21,570	15,840	4,558
Maize/animals	49,076	55,305	91,902
Other animal foods	34,496	32,764	37,000
TOTAL TONS	197,740	207,563	253,418

This represents an annual growth rate of over 14%. It is unlikely that this very high rate of growth will continue, although trade sources indicate that their projections are based on a growth of demand of between 7% and 15% a year. A study done by the South East Johore Master Plan Team based on projected livestock populations suggests as a long term growth ratio of about 9%. This figure has been adopted in the current study.

Total imports into West Malaysia during 1975 are thus estimated at 460,000 tons. In the short-term, this proportion may even rise, although it seems almost certain that in the longer term, import substitution will develop. In 1968, the proportion of imported animal

feedstuffs passing through Singapore represented 48 per cent of the total by weight of imports. It seems likely that this proportion will be maintained as the faster growing foodstuffs, such as maize, tend to be handled in greater quantities, through Singapore whereas those which are declining in importance such as tapioca refuse and rolled oats are predominantly handled elsewhere. If 48 per cent of the forecast total West Malaysian import requirement continues to be handled through Singapore and Johore Bahru port in 1975, their combined total traffic would be 220,000 tons.

As was mentioned above in connection with fertilizer, the major importers have already established bulk handling facilities at Jurong Port which imposes on them a minimum tonnage which they are committed to moving over the wharves, so that the potential for attracting this trade to Johore Bahru must be somewhat circumscribed. However, one of the major foodstuff importers is at present constructing a blending factory at Tampoi and it seems very likely that he could supply this plant from Johore Bahru, if the port dues were competitive with Jurong. He can meet his commitment at Jurong with his existing demand and this input for Tampoi would be free to seek the lowest cost inlet. The initial production of this factory is estimated at 5,000 tons a month of which 3,500 tons would be imported material. It is also conceivable that within the five year period covered by this study, this factory would be expanded to cater from the East Malaysian market at present supplied by the Jurong plant. If the output of the factory were doubled and the volume passing through Johore Bahru could rise to 7,500 tons a month for imports and 5,000 tons a month re-exported to East Malaysia and other destinations. Other animal feed importers could bring the potential traffic up to 10,000 tons a month as a maximum.

These imports come mainly from Indonesia, Thailand and Burma in 2,000 DWT carriers having between 14 and 20 feet draught. About 60 per cent of the supplies are imported in bulk, the remainder, largely originating in Australia and New Zealand is bagged and is transported in general freight liners. This latter trade is likely to continue to be handled largely through Singapore so that the maximum volume of imports likely to be handled through Johore Bahru is 7,500 tons a month or 90,000 tons a year. The minimum figure would be half this level, that is 45,000 tons a year. It would be predominantly bulk, handled by mobile discharge units.

Other bulk imports

Other commodities at present imported in bulk into West Malaysia are:-

Wheat
Sugar
Rice
Petroleum

West Malaysia wheat imports are almost entirely confined to these ports which have flour milling factories associated with them, namely Port Swettenham, Penang and Lumut. Bulk handling facilities exist in Singapore in association with a number of flour mills, but only about 11,000 tons a year of unmilled wheat passes over the Causeway into West Malaysia. Although it is possible that some of this traffic might be handled at Johore Bahru and in the longer term, the port area could be considered as an excellent site for flour mills, it is not considered likely that wheat imports through Johore Bahru will reach significant proportions during the 5 year study period.

Much of the same considerations apply to sugar. The two major sugar refineries in West Malaysia are the Malayan Sugar Manufacturing Company at Prai (Butterworth) and Central Sugars at Batu Tiga near Port Swettenham. A 20,000 acre scheme to grow sugar cane is at present under development in Johore and if this proves successful the current rate of sugar imports through Singapore of some 12,500 tons a year, will be reduced or even eliminated.

Rice is at present imported in rather more substantial quantities, nearly 40,000 tons entering Malaysia through Singapore in 1968. However, total Malaysian rice imports have been falling steadily for some years as Table 3.16.

Table 3.16

Net West Malaysia Rice Imports

Year	Tons
1959	359,569
1960	356,966
1961	315,709
1962	288,107
1963	389,263
1964	401,846
1965	257,351
1966	207,602
1967	285,941
1968	238,467
1969	220,832

Thus the total volume imported has fallen by 39 per cent in the past ten years. It is the official policy of the Government to achieve self-sufficiency in rice by 1975, by which time both the Muda Scheme in Kedah and Perlis and the Kemubu project in Kelantan should be operative.

Forecasts given in the Nathan Report estimate total rice imports in 1975 at 5,000 tons only, with a range of a maximum of 108,000 tons to an export of 93,000 tons. These figures suggest that although there could be small import of rice through Johore Bahru in the very short term, it will never feature in significant volumes, except conceivably in the coastal trade.

Crude petroleum is imported into West Malaysia only at Port Dickson where the Esso and Shell refineries are situated. Other major oil companies distributing in West Malaysia have their refinery capacity in Singapore and distribute products both by coastal tanker and by road and rail over the Causeway. It is expected that this pattern will continue very much as it is at the moment. Whilst the Johore Bahru port area would make a first-class site for a new oil refinery, no evidence has suggested that any of the major oil companies have team plans. Although such a development seems a desirable long firm objective, it is unlikely to materialise in the period of study up to 1975.

3.4 General Imports

The approximate value and tonnage of all commodities imported into West Malaysia through Singapore in 1968 is set out in Table 3.17.

Table 3.17

West Malaysian Imports through Singapore 1968

Category	Commodity	Value $M	Volume Tons
Food	Fresh meat	5.9	3,000
	Rice	22.9	38,000
	Other unmilled cereals	3.7	17,000
	Fresh fruit and vegetables	30.1	73,000
	Sugar	3.1	12,000
	Animal feeding stuffs	27.8	120,000
	Other food items	48.0	60,000
Beverages & tobacco		7.7	5,000

Continued page 3.33

Table 3.17 (Contd.)

West Malaysian Imports through Singapore 1968

Category	Commodity	Value $M	Volume Tons
Crude materials	Groundnuts & soya beans	8.8	21,000
	Cotton & artificial fibres	10.4	9,000
	Crude fertilizer	1.6	33,000
	Sulphur	0.6	4,000
	Salt	1.3	14,000
	Tin & manganese ore	15.8	4,000
	Other crude materials	25.1	55,000
Mineral fuels	Petroleum products	10.8	93,000
Animal & vegetable oils		4.3	3,000
Chemicals	Inorganic compounds	7.4	20,000
	Fertilizers, manufactured	10.7	58,000
	Other chemicals	36.0	39,000
Manufactures	Paper & paperboard	7.8	15,000
	Iron and steel	18.9	40,000
	Other manufactured goods	125.7	21,000
		127.7	21,000
Machinery and transport equipment		62.5	10,000
Other miscellaneous terms		624.6	788,000

It may be noted that whereas bulk commodities, which are far more easily attracted to a new port constituted a very large proportion of total export trade, in the case of imports only 13 per cent by bulk fall into this category. The remainder of the trade which at present is being carried in conventional cargo ships will be extremely difficult to attract into Johore Bahru. In the future, a large proportion of this general import trade may also be expected to be containerised and, thus be tied to Singapore with its container handling facilities.

It seems, therefore, unlikely that any substantial trade will develop in general imports. The only possible exception to this is the import of crated knock-down cars (CKD packs) for assembly in Johore Bahru. There are at present two assembly plants at Tampoi and the manager of one of these has indicated that he would very much prefer to import his CKD packs through a port at Johore Bahru. He would be prepared to organise his consignments such that they were all in excess of the 500 tons inducement probably required for general

cargo liners to call. This would amount to some 5,000 tons a year. Other general cargo will probably not exceed 10,000 tons a year with 3,000 tons limit on either side of this.

3.5 Coastal trade, with the exception of the distribution of petroleum from Singapore has fallen to a very low level in recent years as is illustrated by Table 3.18.

Table 3.18

Total coastal cargo handled at East Coast Ports
(in tons)

	1962	1963	1964	1965	1966
General cargo loaded	27,842	37,912	26,006	14,628	16,542
Logs and sawn timber loaded	6,837	11,012	13,384	21,685	19,047
General cargo discharged	63,387	62,324	51,275	27,155	16,583
Petroleum discharged	61,892	83,824	79,142	79,394	79,850

Source: Nathan Report (Tables EVII 1-4).

The interim report[+] on Kuantan and Kuala Trengganu previously referred to gives the following traffic forecasts as shown in Table 3.19 for these two ports.

Table 3.19

	Kuantan		Kuala Trengganu	
	1969 Actual	1975 Forecast	1969 Actual	1975 Forecast
EXPORTS (in tons)				
Palm oil	-	100,000	-	46,000
Rubber	-	18,000	-	22,000
Logs	33,000	-	21,000	-
Sawn timber	-	10,000	-	9,000
Miscellaneous Production	-	20,000	-	40,000
IMPORTS (in tons)				
Petrol	44,000	59,000	18,000	40,000
Fertilizer	-	16,000	-	9,000
General cargo	3,000	3,000	5,000	5,000

[+] Port Development: Kuantan and Kuala Trengganu - Preliminary Appreciation & Report 29/6/70 - Engineering Export Association of New Zealand Inc.

Palm oil has already been dealt with in Sub-section 3.1 above and it was also stated that petroleum is unlikely to be produced at Johore Bahru during the study period. However, even the elimination of these two commodities leaves 152,000 tons of cargo which the New Zealand Study Team have assumed will all pass through Singapore. This assumption was based on the current thinking that Johore Bahru would have facilities only for handling palm oil. If a general cargo berth were also provided it seems likely that a proportion, though probably only a relatively limited one, might be diverted to Johore Bahru. Sawn timber in particular and possibly some rubber and general cargo, amounting to 15,000 tons a year might be attracted away from Singapore. However, this is highly speculative, depending as it does so heavily upon the actions of a few individuals, and as a minimum forecast it would be safer to revert to the assumption made by the New Zealand team that in the short term only palm oil of the east coast traffic will be handled at Johore Bahru.

The trade with East Malaysia which is handled at the moment by Singapore is on a far larger scale. Singapore is used as a transhipment port for foreign cargo bound to and from East Malaysia and acts as a wholesaler and distributer of consumer goods. The volume of this traffic in 1968 is illustrated in Table 3.20.

Table 3.20

Volume of Cargo in tons between East Malaysia and Singapore

	General Cargoes	Transhipment Cargo	Petroleum
From Singapore to East Malaysia	340,000	75,500	158,200
From East Malaysia to Singapore	90,700	33,400	2,846,200

Source: Monthly Digest of Statistics. (Department of Statistics, Singapore).

It would be unwise to expect that more than a small proportion of this traffic would be likely to be attracted to Johore Bahru in the first instance, because of degree to which Singapore acts as a clearing house rather than simply a transhipment point for goods destined from East Malaysia. No firm evidence exists on the degree to which this traffic might be divertible from Singapore, but the general opinion in shipping and commercial circles is that it would be very small. Even if 10 per cent of this trade were to pass through Johore Bahru this would represent over 40,000 tons a year; a substantial addition to the traffic forecast for general export trades. However,

within the time available to this study it has not been possible to study the West Malaysia - East Malaysian trade in the detail required to give a firm estimate of volumes. For planning purposes it is assumed that a maximum of 40,000 tons of East Malaysian trade passes through Johore Bahru, but the minimum assumption is that no traffic is attracted away from Singapore at all.

3.6 Summary of Traffic Forecasts

A summary of the likely range of volumes of the various trades which could pass through a new port at Johore Bahru (assuming the port capacity were available) is given in Table 3.21. These figures are for the year 1975. The most likely tonnage figures are given and these have been adopted throughout the rest of the Report.

Table 3.21 : New Port at Johore Bahru
Forecasted Exports Imports and Inter-Coastal Traffic in tons.

		Minimum	Most Likely	Maximum
EXPORTS	Palm oil	250,000	275,000	300,000
	Sawn timber	40,000	70,000	100,000
	Palm kernels	-	-	55,000
	Rubber	20,000	40,000	60,000
	Canned pineapples	18,000	22,500	27,000
	Plywood	18,000	20,000	22,000
	General cargo	6,000	12,000	18,000
		352,000	439,500	582,000
IMPORTS	Fertilizer	7,500	10,000	12,500
	Animal feedstuffs	45,000	67,500	90,000
	General cargo	7,000	12,500	18,000
		59,500	90,000	120,500
EAST MALAYSIA	Animal feedstuffs	-	30,000	60,000
	General cargo	-	20,000	40,000
		-	50,000	100,000
COASTAL	Palm oil	126,000	146,000	166,000
	General cargo	-	7,500	15,000
		126,000	153,500	181,000
Total	Liquid cargo	376,000	421,000	466,000
Total	Dry cargo	161,500	312,000	517,500
TOTAL CARGO		537,500	733,000	983,500

SECTION 4 INDUSTRIAL DEVELOPMENT AT THE PORT & INDUSTRIAL ESTATE AREAS

4.1 General Industrial Growth

It is being increasingly realised that ports act not merely as a channel through which goods enter and leave the hinterland behind it but as modal points in the generation of industrial activity. As a source of raw materials for manufacturing industries and the point of evacuation for exported produce, a port area can become the point of lowest overall distribution cost for a wide range of activities. These activities include directly port orientated industries such as for example ship repairing and oil rig servicing, the processing of locally produced raw materials for export such as timber milling, and manufacturing of imported raw material both for the domestic market and for the export of finished or semi-finished goods.

It has not been possible within the time limits imposed on the present study to investigate the entire existing Malaysian industrial sector so as to identify those activities which could most advantageously be sited in the port area. Indeed, within the 5 year period of the study such an exercise would in any case have been of very limited use. What has been attempted is to seek out all these industrialists who were known to be actively seeking a site with access to port facilities and where plans were sufficiently advanced for them to be operating before 1975. Their proposals and requirements have been examined in the light of facilities likely to be available and from this and interviews with a wide range of other industrialists in the area a fairly clear picture has emerged of the likely pattern of activity in 1975.

As a starting point an analysis was made of all applications outstanding for industrial development in the State of Johore. This was only of indirect relevance to development in the port area as the applications involved were from developers who had already secured a site and were, in any case, often at locations far removed from the port area. However, the analysis is useful in highlighting those areas of industrialisation from which spontaneous development pressure is being generated and are thus those which are now likely to be making use of sites in the proposed port industrial estate areas.

The analysis involved 70 applications and the results are given below:

Applications for Industrial Development in Johore

Industry	No. of Applications	Rejected	Approved	Pending
Sawmills	14	6	1	7
Timber based	17	4	3	10
Rubber	1	1	-	-
Veg. oil	5	3	2	-
Chemicals	6	3	1	2
Metals and Engineering	4	1	-	3
Building Materials	7	1	2	4
Tyre retreading	2	-	-	2
Others	14	2	1	11
	70	21	10	39

It can be seen immediately from the above figures that, fairly predictably, by far the greatest number of applications are for sawmills and other timber based industries. It will almost certainly be from this sector that the greatest number of applications for sites in the port area can be expected. This industry is considered in greater detail below. The remaining industries shown up in the analysis are of three types: processing of locally produced raw materials (rubber and vegetable oil); industries based on imported raw materials (chemicals, metal and engineering, building materials); and those which are little more than service industries (tyre re-treading). Most of the applications are fairly small in size, but where they appeared ~~promosing~~ promising they were followed up and are described below. Also contained within this Section are examinations of other industries from whom no firm applications for development have been received because they as yet have no site, but who are known to be interested in a site within a port area.

4.2 Chip wood factories

This industry is by far the most advanced in its plans for development within the study area. One company has already acquired a site just outside the gazetted area and expects to start work on site preparation very shortly. Another company has acquired land within

the gazetted area, although here, of course, all further progress has been suspended pending a decision on the port and its land requirements. The intention of these two companies, who are operating quite independently of each other, is to purchase rubber tree logs from estates which are being cleared for replanting. This is done either by a direct contract with the estate whereby the estate does its own felling and clearing and sells the logs to the factory or, if necessary, the factory will engage their own contractors to clear the trees for the estate owner. The logs are brought to the factory which must be situated at or very near to the waterside and fed into a chipping machine, each of which can chip about 1,200 tons of logs a day. The chips are stored temporarily and then loaded directly into the holds of a specially designed bulk-carrier, the most modern of which are of 33,000 DWT. It is estimated that with modern blow-loading techniques, such a ship could be fully loaded within 4 days, given 24 hour operation of the loading equipment. The chips are then transported to Japan where they are mixed with chips from longer-fibred species and the resultant mixture used for pulping for paper manufacture.

The economic distance for transporting rubber tree logs is comparatively limited and the hinterland would be effectively confined to the State of Johore. The combined ultimate outputs of the two proposed factories amount to well over 1 million tons a year and serious doubts have been voiced in certain quarters of the ability of the rubber estates of Johore to supply anything like this volume of timber. There has not been time within the scope of this study to investigate these claims, nor those of the industrialists that ~~of~~ if the supply ~~of~~ if rubber logs should be insufficient then mixed jungle woods might be substituted. It has, however, been assumed in this study that ~~as~~ the first stages of the two developments would be reached during the plan period and that the total output will not exceed 500,000 tons a year before 1975.

The labour requirements of these two factories would ultimately be of the order of 500 persons in the factories alone, but it would be unwise to anticipate more than half this figure materialising with the plan period. The other important requirement as far as estate planning is concerned is that the blow loading equipment is most economical up to distances of 1000 ft. This dictates that the factory be sited on or very close to the water front and that the ship must be able to manoeuvre such that any one of its holds can be placed underneath the fixed end of the pipeline. One of the companies

concerned has already designed, although approval has not yet been obtained for, a jetty projecting 700 ft. out into the Straits of Johore. Including mooring posts it will occupy approximately 1350 feet of frontage.

It should be emphasised that the wood chipping industry is one with a good deal of experience of Malaysian conditions and the present enterprises are based on exhaustive research and investigation and backed up by substantial financial resources. One of the companies is intending to start production early in 1972 and if it were in possession of a site the other company would undoubtedly start operations fairly soon after that date. These are activities which would proceed independently of any port development but, given that a public port is being developed in the area, they must be sympathetically and economically integrated into the total design so as to provide the minimum of interference to port traffic. Equally well, although their planning was independent of the development of the port, they are nevertheless important to it in providing a stimulus to further industrial development as users a common port infrastructure and a source of port dues.

4.3 Other Timber Based Industries

Although there are only very limited timber resources within the immediate hinterland of the Johore Bahru port area, it is nevertheless, in many ways an ideal location for large scale timber processing industry. This being labour oriented, and the fall in bulk through the processing being fairly limited, access to the market is very nearly as important as access to the source of supply. This point is reinforced by the fact that as forest areas become logged out the supply tends to move, so that if a capitally intensive timber processing plant is sited within the forest area, the average length of haul of raw material to the factory increases over time.

Most of the remaining forest resources of West Malaysia are sited along or near the east coast where the development of a deepwater ocean port will probably be prohibitively expensive. If logs are moved out of this area for processing and export by a deep water port to foreign markets, the most accessible point in Malaysia (particularly if the logs are moved by coastal barge) is Johore Bahru. This line of reasoning has caused a number of industrialists in the timber business to consider actively setting up facilities in the port

area. Another factor which has to be considered is that if shortage of Malaysian logs developed, Johore Bahru would be ideally sited for the import of logs from Sumatra for processing in Malaysia and subsequent re-export either as sawn timber or timber products.

One enterprise which was contacted and which has already secured a loan of $2.6 million from the Malaysian Industrial Development Finance Corporation, is planning for initial throughput of 5-6000 tons a year, although this might be expended rapidly if the venture was successful. Raw materials would be purchased from freelance loggers in Pahang and other east coast states and the logs barged or trucked down to Johore Bahru (the method of transportation depending upon the relative costs of transport from the particular logging concession). Initially production would be confined entirely to plywood and veneers, but the eventual aim would be to diversify into a fully integrated timber processing complex producing mouldings, chip boards, louvre doors, etc. as well. This factory would require a site of 25 acres with a further 15 acres reserved for expansion and employ 325 initially of whom about 270 would be comparatively unskilled labour recruited locally. The products of this factory would be entirely for export and would almost certainly be shipped directly through the port at Johore Bahru.

It is extremely difficult, if not impossible, to predict the total likely output from this sector by 1975, as it is so dependent upon the decisions of a small number of entrepreneurs. However, the market potential can be indicated. The plywood export industry has grown extremely rapidly from a limited base in 1963 to a significant export industry today as Table 4.1 illustrates. Although initially virtually all trade was channelled through Singapore, other outlets have now developed and exports through Singapore amounted to only 60 per cent of the total in 1968.

Table 4.1: West Malaysian Plywood Exports 1963-69

	Total		To and via Singapore		Percentage to and via Singapore
	Value $ M	Volume tons of 40 cu.ft.	Value $ M	Volume tons of 40 cu.ft.	
1963	1.1	2,000	1.1	2,000	100
1964	2.2	5,600	2.2	5,600	100
1965	3.1	8,400	2.5	6,900	82
1966	4.8	11,900	3.9	9,800	83
1967	11.3	27,300	7.7	19,800	72
1968	19.6	53,700	12.5	32,400	60
1969			15.7	43,900	
Average Annual growth rate	78%	100%	58%	74%	

It would be unwise to plan on the basis of this phenomenal rate of growth continuing for very much longer. Even so, it does not seem unreasonable to assume that the volume exported from the Singapore hinterland will double by 1975 to, say, 88,000 tons. This represents an average growth rate of about 12½ per cent a year compared with the 74 per cent a year achieved over the past six years. Something of the order of half of this increase will probably be produced by expansion of existing plant and development at inland sites. The potential output which could be supplied from Johore Bahru is, thus, 22,000 tons a year. This is a maximum figure and a more likely forecast is 20,000 tons with 18,000 tons a year as a minimum. This could well provide employment for over a thousand men.

4.4 Petrochemicals

An industry which almost always requires access to deepwater as one of its major locational factors is petrochemicals, and in the long run, the vicinity of the port site would seem to be an ideal situation for a petrochemicals complex. This could receive feed stocks from one of the refineries around Singapore or elsewhere and export products to the whole of South East Asia as well as supplying the domestic Malaysian market. It is impossible at this time to predict whether or not such a complex can be attracted to Johore Bahru but it would be prudent as a long term strategy to reserve

land along the water front for such an eventuality. In addition it would be advantageous to encourage those industries which would make use of the various petrochemical products such as plastics, artificial fibres, dye stuffs, fertilisers etc. as these will encourage the establishment of the basic petrochemical plant. One such company who has expressed interest in the site of the port area intends to establish there a factory to manufacture polyvinyl chloride from imported chemicals. They plan to start operations by early 1972, if a site can be acquired in time. There is a 15 to 18 month "lead" time between site acquisition and plant commissioning. In the first instance, a turn-over of 10,000 tons a year is planned and if successful output would be rapidly increased to 15,000 tons a year. A 15 acre site would be required in the first instance with a further 15 acres for expansion. The plant would employ some 120. The polyvinyl chloride resin would be destined almost entirely for the domestic Malaysian market for fabrication into plastic goods.

There is no indication at this time of what further industries of this type may be seeking facilities at a new Johore Bahru port. As mentioned previously, they should be strongly encouraged since the establishment of a petrochemical complex would act as a catalyst for even further industrialisation over a very wide field of activity.

It should be noted that to handle certain chemicals over the port facilities special precautions will have to be taken. In this respect it is preferable for the port to have at least two berths so that these precautions can be more easily implemented without disrupting general cargo operations.

4.5 Other Manufacturing and Processing Industries

No other specific industrial requirements were identified within the short period of investigation allowed for the study. However, this does not mean that no other industries are likely to require sites in the port and industrial estates areas with the study period. Quite the reverse. In fact all the investigations which were made tended to suggest that there will be considerable demand for sites. A good deal of this will be generated from Singapore where the demand for land and labour has risen so sharply as to create a considerable cost advantage for the Johore Bahru port site. This can only at the moment be described as a potential advantage,

for Singapore's relatively costly land and labour is more than counterbalanced by its efficient business and shipping facilities, its labour force, which although in short supply is highly skilled, and by the port's close proximity to industrial areas.

Most of these advantages can be created at a Johore Bahru port. Deep water berths can be created and as was shown in Section 3, sufficient traffic should be generated to provide a reasonable service with the major trading countries of the world. The port area is closer to the major road network of Malaysia and this area readily connected to it. Water and power can be made available within reasonable cost, as is shown in Section 5. But the importance of an easily accessible labour force should not be overlooked. Johore Bahru town is about 15 miles from the port area by road and this is a formidable distance to travel every day. If industrialisation is to proceed smoothly and rapidly and meet the potential demand which exists, labour must be readily available on the spot and this suggests very strongly that a residential area should be completed within the general area of the port as soon as possible. This is also discussed more fully in Section 5.

Another factor which would undoubtedly assist the development of the industrial area would be the establishment of a free trade zone. This would be an area outside the jurisdiction of the Malaysian customs where raw materials could be imported free of duty and formalities and finished goods not destined for West Malaysia exported in the same manner. Any manufactured goods for sale in Malaysia would of course have to cross the customs barrier. This would encourage industries which could supply not just the domestic market but the whole of South East Asia and possibly beyond. Such a free trade area close to deep water port facilities and offering reasonably cheap industrial sites and plentiful supplies of labour would undoubtedly be very attractive to international capital and provide a considerable volume of employment.

Even without the establishment of a free trade area, employment within the industrial estate should be between 2000 and 3000 by 1975 or soon after. With the added stimulus of being outside customs jurisdiction, employment could be twice this level. It must be added that these estimates are highly conjectural and dependent upon energetic promotion of the industrial area. The potential undoubtedly exists. Whether it will be realised depends

very much upon the vigour with which the opportunity is grasped.

4.6 Ship Repair & Construction

Apart from general industrial processes, a new port at Johore Bahru will be a natural site for a wide range of water-side activities. A ship repair yard could be attracted by the general shipping activity centred there, the ease of access from both the landward and the seaward side, the readymade infrastructure and the existence of a pool of labour. One major firm of ship-repairers has indicated its active interest in a site within the study area. They require a site of about 30 acres having 1200 ft. of waterside frontage. They would then start to develop a repair yard almost as soon as land could be made available and once this was established, after say three to five years, intend to extend their activities into the construction of small ships of up to 1000 tons. After about ten years, if the venture is successful, such a yard could be employing about 1200 directly and by their purchases from Malaysian suppliers indirectly contributing many more jobs. Naturally, the yard could not be expected to expand to this extent within the study period, but if a site could be made available at an early stage, employment would almost certainly reach 300 by 1975 and could be 500 if ship construction had been initiated by this date.

4.7 Contractors Plant Yard

One of the major international firms of civil engineering contractors, whose activities throughout South East Asia are at present based on Singapore, are looking for a site and have indicated that they would be extremely interested in the Johore Bahru port area. What they require is 40 acres of land which itself need not necessarily be on the waterfront but which must have unrestricted access to about 600 ft. of waterside frontage. This area would be used as a general contractors yard and workshop. Barges would be built and serviced there and it would act as a base for marine work throughout S.E. Asia.

4.8 Servicing of Oil Company Rigs and Platforms

Off-shore prospecting for oil has begun in the seas around Malaysia and if successful, the oil companies will require a base for the servicing of the well heads, pipelines etc. A new port at Johore Bahru could possibly be an ideal location for such a base.

The types of craft likely to be used are not large and the area of land required for stores, workshops etc., will also be small. The main requirements will be the provision of a series of small berths which could be easily provided for within the study area without making a large demand on the length of waterfront available.

4.9 Fishing

Besides general commercial traffic it should not be forgotten that there are two other classes of shipping which require port and harbour facilities; the fishing fleet and the Navy.

It has been established by the joint Thai-Malaysian survey of fish resources off the east coast of West Malaysia in 1967 that there are large quantities of commercially valuable fish along the entire coastline. This valuable asset could probably be most economically exploited by the use of ocean-going trawlers of about 100 DWT. A port at Johore Bahru would make an excellent base for vessels of the kind. Such trawlers could operate both along the east coast of West Malaysia and in the coastal waters off Sarawak & Sabah. Not only this, but when conditions were more favourable there, the trawlers could also operate out of Johore Bahru in the Malacca Straits and even in the Indian Ocean.

The development of such a base has not been investigated in detail during the limited time available for this study and its feasibility is unproved. The facilities required would comprise cleaning, sorting, refrigerated storage, processing, canning, freeze drying, fishmeal manufacture and others. The feasibility of establishing such a base at Johore Bahru should be investigated because clearly, the common use of general marine facilities with commercial shipping will result in a great lowering of cost compared with developing an equivalent fishing port in isolation elsewhere.

4.10 Naval Base Facilities

The Royal Malaysian Navy is currently based in Singapore using a section of the Royal Naval Dockyard at Sembawang. It is clearly an unsatisfactory state of affairs for a main naval base to be situated in a foreign country, albeit a friendly power, and the Malaysian Navy are understood to be actively considering transferring

the base to Lumut on the West Coast of West Malaysia. While this provides excellent command of the Straits of Malacca it is somewhat remote from the east coast of West Malaysia and East Malaysia itself. Johore Bahru would provide for more flexibility as a base for the Royal Malaysian Navy giving ready access to both the east and west coasts of West Malaysia and being the closest point in West Malaysia to Sarawak and Sabah.

It is recommended that Johore Bahru should be closely considered as a base for the Royal Malaysian Navy, both because of its locational advantages mentioned above and because of its proximity to the probable repair yard which will be able to render repair facilities for all craft except possibly the larger vessels such as frigates.

4.11 Bunkering of ships

Although not essential, it is quite likely that bunkering facilities for ships fuel oil will be desirable at the port with the build up of the number of vessels visiting the port.

This service is not likely to be provided immediately. There should be no difficulty however in providing an area for the necessary storage tanks and pipelines within the port when required.

SECTION 5 INFRASTRUCTURE REQUIREMENTS

5.1 Communications

Communications on the landward side of the port and the industrial estate can be listed as follows:-

Roads

Good fast road communications to the port area essential. At present, access to the site is from the road running out from Johore Bahru through Masai. For the majority of its length it is 20 feet wide, but there are stretches which are only 16 feet wide. The alignment of the road is also poor for a major highway which will be carrying larges volumes of heavy trucks. Initially this road should be substantially improved to a width of 24 feet, preferably on a new alignment for a design speed of 60 m.p.h. It would also be advantageous to consider a by-pass around the town of Masai.

Eventually, depending upon the rate of growth of the port and industrial estate, this road will require dualling.

Whilst it is not proposed to discuss in this Report the road development within the hinterland of the port, it is felt that some comments on this aspect may be of assistance.

(a) As this port will serve the east coast of West Malaysia, early attention should be given to ensuring that the east coast road is adequate and will provide a fast link to the port. This latter aspect can be greatly improved by the provision of a new road from Kota Tinggi linking directly with the port. This would reduce the distance to the north and east by 10 miles.

(b) Provision of a more direct link to the main Johore Bahru - Kuala Lumpur road which would avoid the town of Johore Bahru.

(c) Provision of a more direct route to the port from Johore Bahru which would open up the land between. This could cross the Sungei Tebrau be means of the proposed barrage, a scheme which at present is under consideration.

Within the industrial estate, the road pattern should be determined by taking both the port and estate requirements into account. Mention should be made however of the road which the Setia Jaya Wood Sdn. Bhd. are to build to their wood chip plant from the Masai Road. This could very well be incorporated as one of the main roads to the estate and port.

Rail.

The possibility of providing a rail link to the industrial estate and port area from the mainline somewhere north of Johore Bahru was discussed briefly with the Railway Authorities. Whilst there should be no technical difficulty in providing this link, it would require detailed study to prove the route, establish the volumes of traffic and its economic viability. The limited time available for the preparation of this Report precluded the possibility of making such a study and preferably it should be undertaken as a separate exercise.

Telephones

It would be expected that telephone and other such services would be provided automatically if the development proceeds, and these are not discussed further in this Report.

5.2 Utilities

To establish a new port and industrial estate certain essential public utilities have to be provided at an early stage. These are dealt with under this Section.

Water

The provision of water is the first requirement. It is understood a water supply of about 350,000 gallons per day is being made available to the estate area from a source at Kong Kong

of which 150,000 g.p.d. is intended for Setia Jaya Wood Sdn. Bhd. wood chip plant at Pasir Gudang.

At this stage, it is not possible to establish total water requirements for the estate and port. With regard to the port, however, a supply capable of about 100,000 gallons per hour will be required for fire fighting purposes. This demand will, of course, not be required at all times. It will be useful however for supplying fresh water to ships.

It is understood that future water supplies will have to be obtained from the Johore Bahru town area.

Electricity

Electrical power demands are not likely to be heavy within the port area when compared to a fully developed industrial estate. The provision of power supplies by means of overhead transmission lines is relatively simple as the generating station for the area is located in Johore Bahru town.

Foul Drainage

It will be necessary to provide foul drainage disposal. Initially it is recommended that small package plants are used and as the port and estate develop, consideration can be given to a sewerage system connecting to a single purification plant.

Surface Water Drainage

Surface water drainage within the port area should not present any undue difficulties. A similar statement can be made regarding the industrial estate area. The catchment areas are small and there are numerous water courses and streams to carry rainwater to the sea.

The main expenditure will be the straightening of the streams into water-courses when the mangrove swamp areas are reclaimed. In the case of the port area, these new channels will not be extensive as high ground as been generally selected for the port site.

5.3 Labour

Labour has been included in this Section because although clearly not one of the elements of infrastructure as such, it is important to emphasise that if a new industrial estate of 1500 acres is to be developed 14 miles from the nearest large town, large scale provision to accomodate workers will have to be made. Industrial densities vary considerably according to the type of industry and its capital intensity, but even at a fairly conservative figure of 10 workers to the acre, the industrial estate is likely to eventually provide some 15,000 jobs. Clearly this will not happen within the plan period but nevertheless long term planning must not be completely overlooked in an exercise of this sort. To transport 15,000 workers every day from the town of Johore Bahru to the industrial area and back again, a distance of between 10 and 15 miles, is impracticable. In the long term, it is essential to have a residential area within easy reach of the port and industrial estate areas. Even in the early years, if the industrial estate is to compete with Singapore for investment, it is essential that labour should not only be available in Johore Bahru town but also readily available close to the site itself.

Thus, planning from the earliest stages should include the progressive development of a residential area which can expand at about the same rate as employment. This area should not be conceived simply as an area of housing but as virtually a new town - as it will almost certainly become in the course of time - having a full range of social amenities.

This study cannot attempt a full scale discussion of the detailed requirements of such a residential area. It must be stressed, however, that if a successful industrial area is to be developed so far away from a ready pool of labour, access to a port is unlikely to provide sufficient impetus in itself. The correct amount of infrastructural and labour requirements for industrial expansion must be provided as an inducement to the potential developer. He is unlikely to be impressed by the pledge that they can be provided later when other sites rivalling for his investment can show that they have already sufficient for his requirements.

SECTION 6 ALTERNATIVE PORT DESIGNS

Previous Sections of this Report have dealt with the possibility of siting a new port within the study area and the forecasting of the types and likely volumes of traffic that would use such a port, but before embarking upon consideration of the type of facilities required and their possible layouts, a review of the physical conditions of the study area affecting design has been made.

6.1 Site Conditions

Topographically the eastern arm of the Johore Straits is comparatively narrow being about 1 mile wide. The depth of water throughout the length of the main channel is never less than 40 feet at low water. Into this channel flow a number of short streams which act as collectors for surface water from a relatively small water-shed. The only major stream is the Sungei Tebrau entering the upper part of the channel. The smaller streams tend to be almost uniformly spaced along the coastline forming areas of mangrove swamp within the tidal reaches.

The surrounding land to the Straits, particularly the eastern arm, consists of gently undulating country rising to a maximum of about 200 feet. At various higher points such as Lunchu and Pulau Ubin, the island in the middle of the channel, there are outcrops of granite, but the principle surface material in the area is aluvium origin.

At first glance, the coastline does not appear to be indented. This is masked by the mangroves growing in the tidal waters of the small streams mentioned previously, but an examination of the study area on a map will show that within a belt of the coastline one mile wide, approximately half of the area consists of swamps and is below high water level. To fully develop the entire length of coastline of the study area these areas will have to be reclaimed by filling in, but this expense can be deferred by initially using those parts of firm ground for the location of the port.

6.2 Geological and Sub-soil Conditions

Beyond general geological surveys and soil studies made for agricultural purposes, no studies of the geological and sub-soil conditions have been made within the study area. Precise information on this aspect suitable to base engineering designs upon is therefore non-existent. Without this information, it is impossible to be positive regarding the practicability of any design and its likely cost, as these two factors will be dictated to a great extent by the underlying ground conditions upon which it is to be built.

Whilst there can be no doubt that a port can be built within the study area, it must be realised that without detailed knowledge of the ground conditions, it is quite impossible to state in definite terms what form the port should take or ~~what the~~ which type of construction ~~which~~ will be the most economical. To reach this stage, will require a detailed analysis of the information obtained from a sub-soil investigation. About four months will be required to carry out the investigations and analyse the results. As mentioned elsewhere, the time available is very limited and since some of the facilities must be in operation in 1972, approval of the locations of these is needed by December 1970, to meet this dateline. It is therefore essential that a site investigation together with the relevant surveys should be put in hand at the earliest possible moment.

For the purpose of this Report, it has been decided to study such other information on port structures built in similar ground conditions as is likely to be found in the study area and to base outline designs upon this information. Structures at the Royal Naval Dockyard, Port Swettenham and the Port of Singapore have been examined for this purpose. Subject to the proviso that there is no guarantee as to the sub-soil conditions at the study area being the same, the resulting designs proposed in this Report should give a reasonable guide to the likely layouts of the port and costs.

The general geology of the area is one of alluvial deposits of recent origin which are of considerable depth. On the coast they consist of fine silts and clays which could be difficult to use as fill material particularly where free draining material is required. The sea bed of the Straits is probably part of this

material and of more recently deposited silts and clays. The strengths of such recently deposited material are generally low. The experience gained from building ports in Port Swettenham and Singapore illustrate this. Underlying these deposits are varying degrees of weathered rocks of igneous or sedimentary origin with solid rock underneath.

Structures under these conditions are designed to be supported directly on the underlying rock strata. This foundation level is usually found with about 60 to 100 feet of solid cover above, that is, in coastal waters 40 feet deep at about 120 feet below mean sea level.. Experience of piling in Port Swettenham, the port of Singapore and the Royal Naval Dockyard indicate that this is the most likely depth at which it will be possible to found structures within the port area under study. Designs and costs have therefore been based on this.

The placing of fill on such weak subsoils as are likely to be found in the Johore Straits also presents a considerable problem. Under loading, these silts and clays will compress and could easily shear resulting in mud waves and collapse of the fill placed. The results of such a collapse could be very serious but given the information of the sub-soil characteristics, a safe design can be provided.

Any filling placed on soils behind a platform forming the berth has to be carefully controlled and placed with relatively flat slopes. This slope is a factor which can determine the width of the platform and thus the overall cost. Since the cost of a platform structure is probably the largest single item of expenditure, this factor is critical in establishing the estimated cost for the port. For the purpose of this Report, designs have been based on a minimum slope of 1 in 3¼, which although not as flat as used for the new container berths in Singapore will probably be satisfactory as it is thought that the sea bed conditions are more favourable in the Straits of Johore.

6.3 Siltation

Since the water courses and streams in the area are not large, the volume of silt carried down by rainwater is small and what does get carried down appears to dissipate easily. There are

no readily discernable signs of siltation along the coastline due to these streams, and what records there are show that the regime of the Straits is stable. With the exception of cleaning out deposits along some of the quay walls in the Royal Navy Dockyard by means of very infrequent dredging operations, no dredging has been carried out in the Straits.

The above remarks do not imply that if a certain area was deepened by dredging it might not fill up again over time, since one would be altering the regime of the channel. If acretion in a dredged area occurred, the likelihood would be that it would be a gradual process requiring periodic maintenance dredging to keep the depth of water. The cost of such maintenance dredging, however, would be likely to be low in comparison with other dredged channels associated with ports.

6.4 Tidal Conditions and Currents

Within the Johore Straits, a diurnal tide condition appertains, the maximum difference between High and Low Water Spring Tides being 8.1 feet in the region of the study area.

There will be no difficulty in accommodating this range of tide.

Arising from this tidal condition, the Straits are subject to tidal currents which have been measured in the centre of the channel opposite Ayer Biru. The Admiralty Chart for the area gives the maximum velocity of these currents as 1.6 knots and the general directions along the deep channel. In other words, currents are parallel to the coastline since the channel is so narrow.

Currents of this magnitude will present little or no difficulty to port operations as long as the ships are required to berth parallel to the main stream.

6.5 Weather and Sea Conditions

As discussed in Section 2, the area around Singapore is relatively free from adverse meteorological and sea conditions. In the Straits of Johore, the sea is always calm with the exception

of short-lived disturbances caused by thunderstorms at certain times of the year. When these storms are about, care is necessary when navigating large ships in Straits, but as these storms are so very infrequent and of short duration, they can be discounted when considering the general operating conditions likely to be met.

6.6 Materials for Site Levelling and Marine Filling

Considerable quantities of fill material will be required within the port and industrial estate areas to fill in the mangrove swamps. This can be readily obtainable within the study area.

However, if fill is required to fill in the sea, for example between the shore line and the berth out in deep water, it must be free draining, which means that it should be of granular nature. This type of material is unlikely to be found near the coast as explained earlier, and will have to be obtained inland. Suitable granular material has been seen along the Masai Road, a distance of about 4 miles away. For the purpose of calculating costs, this source has been used.

6.7 Depth of Water Required

In designing a port, the depth of water to be provided is critical to the design and ultimately to the probable life of the port since ships are tending to get larger and draw greater depths of water. At the same time, there is no point in providing depths of water more than economically desirable or greater than in the approach channels to the port if these are long and thus expensive to deepen.

Examination of this problem shows that at all stages of the tide, the maximum practical depth within the Johore Straits is about 40 feet. This is adequate for vessels up to about 40,000 DWT, a size which is not likely to be exceeded by general cargo and bulk carriers operating in the trades contemplated in this Report for many years to come.

Some recent port facilities are being designed with a minimum depth of 33 feet to take ships of 30 feet draught. In the case under consideration, bulk carriers of 33,000 DWT drawing 33 feet and requiring 36 feet depth of water are to be used for shipping

bulk cargoes from one of the private terminals. For the general cargo berths, this could be reduced to 33 feet but the likely increases in cost of providing 36 feet would not be great. In these circumstances, it is recommended that a minimum depth of 36 feet alongside all berths should be provided. Port layouts and costs have therefore been prepared on this basis.

6.8 Integration of Private and Public Facilities

In preparing this Report, a number of discussions were held with companies who desire to construct plants and private marine facilities within the study area. These include the following:-

Rubber Wood Chip Plants
Bulk oil palm storage and loading facility
Shipbuilding and repair yard
Civil engineering contractors plant yard.

One company who intends to produce wood chips for export already has purchased land at the western end of the study area and has authority to proceed with the construction of the access road and plant, and outline approval for their loading terminal has also been given. As this development will definitely proceed, it has to be taken into account in planning port layouts. The second company intending to produce wood chips had not proceeded so far with their plans at the time of the Government freezing the study area. It can therefore be located anywhere with the study area. In the case of the other possible developments mentioned above, no approved plans exist and these can be similarly located to suit overall planning considerations.

The length of coastline within the study area is about 3 miles and obviously as the proposed public port and private facilities will only occupy a portion of this, a long length will be left for future development. This remaining portion should preferebly be left as one or two lengths in order to preserve the maximum number of options available for the future. This has been kept very much in mind when preparing the outline designs presented in this Section.

In adopting this policy, it will be necessary to try and group the various units into a group located around the proposed public berths. Besides achieving the object of keeping the unused coastline as a single length, the concentration of the initial development into one area will simplify the preliminary infrastructure costs, an element of the total cost which is not insignificant.

With regard to the shipping of palm oil, two classes of ships are likely to be used during the study period, i.e. up to 1975. During this period, the conventional cargo liner will still be carrying large quantities of oil, in various lots totalling up to 2,500 tons in one shipment. In addition, there will be the packet tankers shipping oil in large consignments of up to 15,000 tons. Whilst both of these two types can use a separate and purpose built terminal, the cargo liner could also be carrying cargoes which cannot be handled over such a terminal due to its likely layout and for other reasons such as customs etc. This would mean that the ship would have to move berths - a factor which creates delays and increases costs. It would be preferable if the loading of palm oil and the handling of other cargo can proceed at the same time. This could be arranged if oil lines are provided to the general cargo or public berth and for this reason the palm oil terminal has been located next to a general cargo berth in the outline designs. If the two berths are built apart, it will not be possible to install pipelines economically and also there could very well be operational conditions regarding the practical lengths of lines which would not allow widely separated berths.

There does not appear to be any feature controlling the inter-relationship of the port and the ship building yard or the contractors plant yard, but as mentioned above, grouping of all these installations would be preferable.

6.9 Proposed Alternative Designs for the Port

The terms of reference for the current study call for a set of alternative designs ranging from a minimum up to "the most advanced conceivable in the light of the expected demand". From an examination of the forecasts given in Section 3, the minimum facilities which it seems worth considering are a single berth plus a special purpose berth for handling palm oil. The maximum requirement by 1975 would be for three berths plus the special purpose oil berth. These figures however do not include the private

facilities proposed to handle wood chips. This broad assessment is based on a berth handling general cargo being able to load and unload in total between 100,000 to 150,000 tons per year. Special purpose berths handling such bulk commodities as timber, animal feeding stuffs and fertilizers should be able to handle considerably larger volumes than this range, and for berths designed to handle liquids such as palm oil, even higher throughputs would be possible.

To cater for possible future developments, an additional berth should be allowed for. The total berthing length required, including the special palm oil facility is therefore about 4,000 feet and in considering possible locations for the port, this figure has been used.

Examination of the study area conditions suggests these berths will have to be provided in one single line parallel with the coast, the berthing face being located on the 6 fathom line to provide 36 feet depth of water. It is not practical to dredge close inshore because of the likely low stability characteristics of the sea bed discussed in the previous Sub-section. This not only rules out marginal wharfs close inshore but also finger piers. The general type of port arrangement is thus limited to a line of berths built as described above. (Perhaps it should mentioned at this point that monolith quay walls close inshore such as used in the Royal Navy Dockyard might be a possibility but the cost of this type of construction would be prohibitive).

Having described the likely type of layout for the port and its extent, examination of the coastline of the study area suggests that there are two possible locations which meet all the previously discussed desirable objectives. One site is at the western end of the study area on the eastern side of the Sungei Perembi and a possible layout for this location is shown in Drawing No. 2. The other is at the eastern end in the vicinity of Ayer Biru as shown in Drawing No. 3.

In terms of initial investment, there would not be a great deal to differentiate between the two but obviously there are other differences which make one site more advantageous than the other.

The site which appears to have most advantages is the one at Ayer Biru for the following reasons:-

a) There is a greater area of firm land available.

b) The cost of reclamation of adjacent swamp areas should be lower as fill can be obtained directly from the port area.

c) Berths will be further away from the main navigation channel and ship maneouvres will be easier to execute.

d) Close proximity to the proposed ship repair yard, the preferred site for which is at the eastern end of the study area.

e) Future extensions of the berthing face are nearer to the shoreline and therefore less fill will be required behind the berth.

f) The possibility of developing the rear face of the berthing platform as a berth for smaller vessels. The depths of water available in the area for ship movements are greater than at the other location.

The Admiralty Chart shows an area of prohibited anchorage at Ayer Biru. It is understood that this was due to the siting of a boom defence by the Royal Navy in this area, but this restriction will not apply after December 1971.

Assuming ground conditions and other factors are favourable, it is therefore recommended that the Ayer Biru site should be the preferred location and on this basis, the port layout designs for this Report have been prepared and costed.

Single Berth

A layout for a single public general cargo berth and the specialised palm oil terminal is shown on Drawing No. 4.

Before proceeding to briefly discuss this design, it would be as well to discuss the palm oil terminal as this will be common to all layouts. The anticipated export of up to 300,000 tons p.a. of palm oil by 1975 and the unloading of 150,000 tons p.a. from small tankers carrying it down from East Coast ports will

warrant a separate facility. The layout of this terminal as shown will achieve this with considerable spare capacity available for future development of the trade. However, berth occupancy will be high initially due to the relatively small quantities cargo liners can carry and the provision of additional loading facilities on the public berth would be advantageous in this respect if only to provide flexibility of loading. The small coastal tanker berth is located behind the main export berth of the terminal.

Referring back to the single berth layout, the design incorporates a transit shed to handle general cargo, This feature is essential if the port is develop, although this will hinder the handling of some bulk cargoes for which it is felt the port has the greatest potential. For example, the layout with a single berth does not permit fast over the berth loading of timber when this is handled in large quantities of 5,000 tons upwards. The reason for this is that the timber will have to be stored in a yard on the shore, probably entailing a haul of over a quarter of a mile. Timber cannot be stacked on the berth due to the space occupied by the transit shed. (Although not intended as a criticism, as time did not permit a proper examination of the problem, it is felt that the layout at Port Swettenham is, for similar reasons, not suitable for bulk timber exports. Timber in this particular port is handled by lighters and loaded over the side). It should be possible to provide berths for small coastal ships on the rear face of the platform. The 750 feet length of the front berthing face will allow for one large vessel or a number of smaller ships depending on their size.

The total capacity of this layout to handle cargo is obviously dependent upon the type of cargo and ship frequencies but the likely range would be between 60,000 tons - 100,000 tons per year. These figures should not be taken too literally because of the possible variations in the types of cargo to be handled, and due to the difficulties of organising a smooth flow of cargo over a single berth. Timber exports could probably be loaded into lighters over the rear face of the berthing platform if required and timber loaded in a similar manner as at Port Swettenham. This is a far from efficient method of loading.

Two Berth Design

A two berth design is shown on Drawing No. 5. This is a natural development from the single berth design and shows how the area behind the second berth is filled in to provide a large open storage area. If timber exports develop as expected, such a design will allow for storage of timber directly behind the second berth permitting fast loading techniques to be used. Packaging of hard woods into standard bundle sizes is likely to follow the introduction of this method into the softwood trades, particularly if the production end of the sawn timber trade is rationalised into larger units. If this is done, the volume of timber that can be handled across a single berth increases many times over the more traditional method of handling timber. (A new timber berth in the U.K. now off-loads something in the order of 30,000 tons of timber in five days).

This berth can be utilised as well for the loading and off-loading of bulk cargoes not requiring to be temporarily stored in the transit shed with greater all round efficiency than a berth with a transit shed. It would also assist in making arrangements easier for the handling of dangerous cargoes. On the single berth as shown in Drawing No. 4., cargoes of this type would be extremely difficult to handle.

A second berth also provides greater flexibility in the timing of shipping movements. This will increase the attraction of the port to ship owners who would obviously welcome the possibility of an alternative berth, to cater for the random arrival of ships.

Whilst no attempt has been made to investigate the question of specialised handling equipment for bulk cargoes in this Report, due to the shortness of the study, this open berth can be readily developed to accommodate such equipment. (The cost of this may be provided by private interests and has therefore not been included in the estimate.)

If a roll on/roll off facility was ever required for smaller ships, this could be constructed at the rear of the first berth at any time in the future. Loading and unloading operations would be conducted from the filled area.

The likely capacity of this design is again difficult to determine but it is considered that it is capable of handling the volumes of imports and exports projected as being the most probable by 1975, this is, about 300,000 tons per annum.

Three Berth Design

Drawing No. 6 shows how the basic layout can be extended for a third berth. This could be provided with a transit shed or the ground to the rear reclaimed by filling as desired. Further berths can be added in this manner as trade warrants them.

If the maximum demand for port facilities as forecast is reached, a three berth layout as shown in Drawing No. 6 will be required, with the possibility of a further berth being needed.

It should be noted that some dredging is required in all layouts. However, the quantities involved are small and it is thought that maintenance dredging will be insignificant.

With regard to the provision of a berth for smaller craft likely to be used by customs, police and the port authority, this can easily be accommodated within the stretch of water at the rear of the first berth.

No attempt is made in these designs to assess the extent of the inland area required for the port as it is felt that guidance and further study on this point is required. The area shown on the Drawings is purely diagrammatic. Its size as shown, however, is about 165 acres.

SECTION 7 COSTS AND BENEFITS

7.1 Construction Costs

In assessing capital costs for the new port the following items have not been included:-

a) Land purchase
b) Access roads through the industrial estate to the port area
c) Improvements to existing public roads such as the Johore Bahru - Masai Road
d) The provision of water and electricity supplies up to the boundary of the port area
e) Housing and social infrastructure

The reason for not including these items is that they are common to both the port area and industrial estate. The latter should absorb the largest proportion of these costs in any case.

With regard to construction costs within the port area itself, the following items have not been included:-

a) Distributor roads
b) Distribution of services such as water, electricity within the boundary as these will be chargeable to industrial plants built within the area
c) Any purpose built installations such as the palm oil terminal

Nominal amounts have been included in the estimates for -

i) Levelling of site and swamp reclamation
ii) Necessary alterations to navigation beacons
iii) Administration and workshop buildings
iv) Provision of mobile mechanical equipment
v) Water supply and fire fighting equipment to berth
vi) Provision of hardstandings on reclaimed land behind the berths and onshore
vii) Surface water drainage
viii) Sewerage and sewage purification
ix) Security
x) Lighting
xi) Site investigations and test piling

The capital costs for the three designs are calculated as follows:-

Single Berth Design

		M$
Shore based works	-	1,850,000
Marine works	-	10,130,000
Total Cost	-	11,980,000
if filling under approach structure is excluded, deduct	-	1,180,000
Total Cost	-	10,800,000

Two Berth Design

		M$
Shore based works	-	2,200,000
Marine works	-	19,100,000
Total Cost	-	21,300,000
if filling to land reclaimed from the sea is excluded but additional approach structure is added		3,410,000
Total Cost	-	17,890,000

Three Berth Design

		M$
Shore based works	-	2,460,000
Marine works	-	27,750,000
Total Cost including land reclaimed behind 2 berths plus one additional transit shed		30,210,000
if filling to reclaimed land from sea is not included deduct		6,900,000
if second transit shed is not included deduct		510,000

The above estimates include 10% for contingencies and 7% for the design and supervision costs. They do not include any financial charges.

With respect to the accuracy of these estimates, the likely range is probably ± 20%. The costs will obviously be dependent upon design standards such as length of berth, desired working space, etc. and the specification of construction adopted. The estimates have been based on fairly high design and construction standards and it should possible to make economies.

With regard to maintenance costs, these are difficult to assess without detailed examination but it is suggested that a figure of 1% per annum on the total cost is adopted at this stage. This would cover costs incurred maintaining structures and the mobile mechanical equipment.

Although considered as a special facility which will probably be financed by other sources than those of the port authority and is therefore not included in the above estimates, the likely cost for the provision of the palm oil terminal is in the region of M. $1,250,000. This price is purely for the marine structures and does not include such items as tankage, pumps, etc.

7.2 Summary of Traffic Forecasts over the Alternative Designs

The total potential tonnage identified in Section 3 is summarised in the following Table 7.1.

TABLE 7.1

TRAFFIC FORECASTS FOR NEW JOHORE BAHRU PORT 1975

		Minimum	Most Likely	Maximum
EXPORTS	Palm oil	250,000	275,000	300,000
	Sawn timber	40,000	70,000	100,000
	Palm kernels	-	-	55,000
	Rubber	20,000	40,000	60,000
	Canned pineapples	18,000	22,500	27,000
	Plywood	18,000	20,000	22,000
	General cargo	6,000	12,000	18,000
		352,000	~~429,500~~ 439,500	582,000
IMPORTS	Fertilizer	7,500	10,000	12,500
	Animal feedstuffs	45,000	67,500	90,000
	General cargo	7,000	12,500	18,000
		59,500	90,000	120,500
EAST MALAYSIA	Animal feedstuffs	-	30,000	60,000
	General cargo	-	20,000	40,000
		-	50,000	100,000
COASTAL	Palm oil	126,000	146,000	166,000
	General cargo	-	7,500	15,000
		126,000	153,500	181,000

It must be emphasised that this is a potential cargo only and that it will only materialise if the requisite facilities are available to deal with it. The most likely forecast comprises 421,000 tons of palm oil and 312,000 tons of dry cargo. The one berth design is almost certainly incapable of handling the forecast volumes, as the capacity of a single berth is very low, with a maximum of 100,000 tons a year. Even at this level one berth gives rise to considerable congestion because the random arrival of ship creates 'bunching' problems which diminish with a greater number of berths. Timber would probably be the cargo most heavily hit because, as was mentioned in Section 6, it is extremely uneconomic to handle timber over the type of berth

proposed where a transit shed provides a physical barrier to rapid handling.

The two berth design would be used fully to capacity in 1975 by the volumes of traffic forecast as being most likely. However, the flexibility implied by having one berth with a transit shed and one with a back-up area over which timber could be rapidly handled, would probably allow the volumes to be handled without too much congestion.

The three berth design could cope easily with even the maximum volumes forecast by 1975 and would provide sufficient capacity for some years thereafter. With three berths congestion and quequing would be a very rare phenomenon in the early years and, indeed, the opposite problem, under utilisation, is more likely to occur.

The most likely volumes of traffic flowing over the three alternative designs is given in the Table 7.2. These have been derived by scaling down the total potential dry cargo traffic to the maximum capacities of the designs : 100,000 tons for the single berth and 300,000 tons for the 2 berth design. Timber has been reduced more than proportionately in the single berth case for the reasons given above.

TABLE 7.2

FORECAST TRAFFIC OVER THE ALTERNATIVE DESIGNS 1975

		1 berth design	2 berth design	3 berth design
Exports	Palm oil	275,000	275,000	275,000
	Sawn timber	25,000	70,000	70,000
	Rubber	10,000	40,000	40,000
	Canned pineapple	10,000	20,000	22,500
	Plywood	10,000	20,000	20,000
	General cargo	5,000	10,000	12,000
		335,000	435,000	439,500
Imports	Fertilizer	5,000	10,000	10,000
	Animal feedstuff	20,000	60,000	67,500
	General cargo	5,000	12,500	12,500
		30,000	~~82,000~~ 82,500	90,000

Table 7.2 (contd.)

		1 berth design	2 berth design	3 berth design
Malaysia	Animal feedstuff	-	30,000	30,000
	General cargo	10,000	20,000	20,000
		10,000	50,000	50,000
Coastal	Palm oil	146,000	146,000	146,000
	General cargo	-	7,500	7,500
		146,000	153,500	153,500
Total liquid cargo		421,000	421,000	421,000
Total dry cargo		100,000	300,000	312,000
TOTAL CARGO		521,000	721,000	733,000

7.3 Benefit from Port Dues

The benefit to Malaysia of a new port at Johore Bahru may be measured by the port charges which would otherwise have been levied on West Malaysian cargoes by the Port of Singapore. This is on the assumption that transport costs are equal to the two ports. In fact, on average Johore Bahru is situated between 5 and 10 miles closer to the hinterland than is the Port of Singapore. At a transport cost of, say, 10 cents per ton mile[+], this represents between 50 cents and one dollar per ton.

The total charges levied by the Port of Singapore are set out in greater detail in Section 8, but in summary form they are as follows:-

	M $ per ton
Dry Imports	6.45
Dry Exports	5.80
Coastal trade	4.50
Palm oil	1.08

On this basis the estimated 1975 traffic flows over the three alternative designs would generate the gross revenues set out Table 7.3 for the Port of Singapore, if it were handled there. This may be regarded as the saving to Malaysia from building the new port.

TABLE 7.3: Port Dues Saved by New Port at Johore Bahru

	1 berth design	2 berth design	3 berth design
Liquid cargo (@ $1.08 per ton)	455,000	455,000	455,000
Dry exports (@ $5.80 per ton)	348,000	928,000	954,000
Dry imports (@ $6.45 per ton)	194,000	529,000	580,000
Coastal trade (@ $4.50 per ton)	45,000	259,000	259,000
	M$1,042,000	M$2,171,000	M$2,248,000

[+] Nathan Report, page B 70.

This is, of course, only the basic cost, and any extra services which were provided such as warehouse storage or the provision of water would have to be paid for accordingly. At Port Swettenham these additional charges amounted to 26.5 per cent of total operational income in the first six months of 1970. Such a high proportion is not likely to occur in a small new port struggling to establish itself. For the purposes of this exercise 10 per cent has been added to the above figures to represent additional services. Thus, total costs saved on port operations, are as Table 7.4.

TABLE 7.4

TOTAL COST SAVINGS FROM PORT OPERATIONS

	1 berth design	2 berth design	3 berth design
Direct port charges	1,042,000	2,171,000	2,248,000
Other port services	104,000	217,000	225,000
Transport savings	172,000	322,000	331,000
M$	1,318,000	2,710,000	2,804,000

7.4 Operating Costs

It has not been possible within the limits of such a brief study as the current one to make detailed estimates of the operating costs of the various alternative designs. However, a brief study was made of the operating costs at Port Swettenham and Singapore and sufficient agreement between them was found to suggest at least the orders of magnitude which are likely to be encountered at a new port at Johore Bahru. The costs are quoted in Malaysian Dollars.

The overall operating costs at Port Swettenham are probably in excess of $8.00 per ton. This very high figure is not attributable to bad management but to a series of factors beyond management control such as the inefficient layout to meet modern conditions particularly of the South Port, the system of lighterage imposed by capacity limitations and so on. In the first six months of 1970 the North Port which was operating at the very high berth occupancy ratio of 75 per cent achieved a wharf working cost including overheads of $2.38 per ton. Nearly half of this cargo was handled through the transit sheds which had a working cost of $3.53 per ton. The overall cost per ton handled, regardless of whether it was handled directly or through a transit shed worked out at $4.05 per ton per dry cargo or $3.58 if depreciation is excluded. This is very close to the $3.22 per ton which it is estimated is the equivalent figure for Singapore.

It is felt that the port at Johore Bahru which would be designed to the most modern and efficient specifications should be capable of operating at rather less than either of these figures, but this would be counterbalanced by the almost inevitably lower berth occupancy which would be achieved at the smaller port. Thus, an operating cost of $3.50 per ton excluding depreciation has been adopted for planning purposes for general dry cargo. Palm oil shipments would impose little or no operating costs on the port as loading and dischanging would be handled by the owners of the bulking facility.

Thus, if all the potential cargo shown in summary form in Table 7.2 were to materialise and a 3 berth layout constructed, the operating costs to the port authority would be about M$1.09 million excluding depreciation. The reduced volumes of cargo which could be handled by the single berth design would have an operating cost, on the same basis of M$350,000 and the two berth design at M$1,050,000.

If labour were costed at the shadow price suggested in Section 2, these costs would be substantially reduced probably by as much as 50 per cent. However, within the time available an accurate costing has not been possible.

7.5 Employment Generation

The amount of employment likely to be generated by the port is extremely difficult to estimate both because of the inherent uncertainty of industrial development and because the labour intensity of such industry as might be attracted is almost impossible to predict.

The port operations themselves should employ about 510 persons with the three berth design on an analogy with the Port of Singapore Authority which employs 10,500 and handled 6.45 million tons of cargo in 1969. The two berth design would require a labour force of about 490 and the one berth design only 160. These figures are based on the traffic volumes given in Table 7.2.

It was suggested in Section 3 that manufacturing industry might provide some 2-3,000 jobs by 1975 and the service sectors, e.g. ship repairing, a further 500. On this basis a total number of about 4,000 jobs might be created by 1975. This is extremely conjectural, but it should be emphasised that the conjecture relates mainly to the date at which these jobs appear. It seems almost certain that in the long run, the industrial estate associated with a deep water port, strategically situated as Johore Bahru is, must be a success and employment will build up.

On the basis of 3,000 manufacturing jobs, the total value added by 1975 should be about $30 million, as the value added per worker in the larger manufacturing industries is about $10,000 a year.+

7.6 Comparison of Costs & Benefits

Single berth design

The capital cost of constructing this design has been shown to be M$12,000,000. It would save port dues of some M$1,146,000 per year at an annual operating cost of M$350,000. Thus, the net annual benefit is M$796,000 which represents are return of 6.6 per cent a year on the capital invested. The savings in transport costs per cargo delivered from the landward side would represent a further M$172,000, giving a total rate of return on port operations alone of 8.1 per cent by 1975. The benefits from the stimulation of industrial development are additional to this but it has not been possible to quantify them within the time limits set for this study.

2 berth design

The capital cost of this design is estimated as M$21,000,000. The port dues which it would save amount to some M$2,388,000 a year by 1975. The operating cost is estimated at M$1,050,000 a year giving rise to a net saving of M$1,338,000 a year. The savings in transport cost would represent a further M$322,000 a year giving a total return on capital invested of 7.9 per cent by 1975. This rate of return is very similar to that obtaining on the one berth design but in this case the greater volume of trade passing through the port is almost certain to stimulate a greater rate of industrial development so that the true rate of return on the two berth design would be the higher.

3 berth design

The capital cost of this design is estimated at $30,000,000. The port dues which it would save amount to some M$2,473,000 a year in 1975. The operating cost is estimated at M$1,090,000 giving rise to a net saving of M$1,383,000. The savings in transport costs would represent a further M$331,000 a year giving a total return on capital invested by 1975 of 5.7 per cent a year. It should be emphasised that the three berth design would not be operating at full capacity by 1975. The rate of return would rise to a figure equivalent to that given by the smaller designs as the capacity of the port was reached, probably in the later 70s.

+ Survey of Manufacturing Industries in West Malaysia 1967 Table 1.4 Dep.

Comparison of the Three Designs

On the calculations given above the highest rate of return appears to be given by the single berth design. To some extent this is misleading in that it would be very difficult to operate a one-berth port at the capacity implied in the benefit calculations. The two-berth port would also have a far more profound influence on industrial development and provide a far sounder base for future expansion. The three berth port would have great operational advantages and the inbuilt flexibility provided by the spare capacity in the early days would give users a far greater incentive. However, the very much lower return in the early years is a heavy price to pay for this flexibility and the two berth design is the recommended for initial development. Extensions can, of course, take place as traffic builds up.

The further question remains as to whether the rate of return of a little under 8 per cent is adequate. It must be realised that this figure does not take into account all the benefits which will be generated by the port but looks only at port operations. The figure is of most use for ranking the alternative designs. If labour were costed at a shadow price and if account was taken of the benefits of the stimulus to industrialisation the rate of return would be far higher. Similarly it must be acknowledged that not all the costs are included. Infrastructural improvements outside the port area will be required, although these may be largely attributed to the industrial estate. It is generally accepted that a rate of return on port works of between 6 per cent and 6.5 per cent on port operations alone is sufficient to justify a port. The 8 per cent return which will be earned by the recommended two berth design at Johore Bahru comfortably exceeds this.

7.7 The longer term perspective

The present study is restricted in its terms of reference to consideration of the period up to 1975. This is an artificial time horizon when considering investment in a physical facility having a life of anything between 40 and 100 years. This Sub-section attempts in the broadest outline to estimate the potential export commodities which might be produced within the Johore Bahru port hinterland by 1985. Account has been taken of the studies currently being undertaken of land development in Johore and Pahang Trenggara.

The current rate of land development in West Malaysia is about 75,000 acres a year. This is expected to increase rapidly to average 120,000 acres a year between 1970 and 1975, 150,000 acres a year between 1975 and 1980 and may reach 200,000 acres a year in 1980-1985. It is estimated by 1985 that 2,350,000 acres of productive

land will be added to West Malaysia's total. Of this a large proportion, probably at least 60 per cent will be in Johore and Pahang. No very clear indications yet exist as to what crops will be established on these newly won lands, but for this study the assumption is made that one third will be placed under rubber, one third under oil palm and one third will be developed for diversification crops which will be import substituting but which will not generate any export flows.

Thus, of the 2,350,000 acres, 1,410,000 would be in Pahang and Johore and about 470,000 would be devoted to each of the crops mentioned above. Even if only 50 per cent of these areas were within the hinterland of Johore Bahru, they would produce potential exports flows through the port of 470,000 tons of palm oil and over 150,000 tons of rubber on the basis of average yields now ruling. These flows are additional to these forecast for 1975 which arise from land already under cultivation.

Furthermore, the forest clearance programme would be covering 200,000 acres a year by 1985. Assuming as above that 60 per cent of this was in Pahang and Johore and that an average extraction rate of only 15 tons per acre were achieved (compared with over 20 in Jengka), there would be a timber production of some 1,800,000 tons a year. If only 50 per cent of this were processed in Malaysia for export and of this only 50 per cent were exported through Johore Bahru, the potential traffic for the port would be 450,000 tons.

Other dry cargoes will continue to rise and even at a conservative estimate of growth of 5 per cent annum would result in a total traffic of 400,000 tons by 1985.

It should be emphasised that these estimates are of the very broadest kind and simply intended to give an idea of the orders of magnitude of the traffic which a Johore Bahru port might be handling in 1985, if it were built by 1972. If it is not, then the opportunity may have been lost forever and cargo would be handled through Singapore as at present. A full scale study would be required to give a realistic estimate of volumes in 1985.

The broad outline calculations given above are summarised in the following table :

	1985 (tons)	
Palm oil	745,000	+ 200,000 coastal trade
Rubber	190,000	
Timber	450,000	
Other dry cargo	400,000	
	1,785,000	+ 200,000 coastal trade

This would require a very much larger port than the two berth design recommended in the current study. Whilst the volume of palm oil could still be handled over the special purpose terminal, a total of probably six general cargo berths will be needed. However, the potential undoubtedly exist at the port site to extend the facilities and the traffic built up to a level sufficient to justify it. The recommended two berth port will provide a valuable nucleus on which to build.

SECTION 8 PORT AND INDUSTRIAL ADMINISTRATION AND OTHER RELEVANT MATTERS

In this Section, a brief account is given of certain aspects of port operation which it is felt should be given consideration at an early stage when proceeding with the development. It is not intended to be an exhaustive statement.

8.1 Administration of Port and Industrial Estate

As the areas of the port and industrial estates are adjoining and will be provided with a common infrastructure such as roads, drainage, water and power supplies, it would appear advisable for the two sections to be administered by one overall authority. There are certain obvious advantages in doing this, such as :-

a) The allocation of land between the port area and the industrial estate can be controlled and adjusted as necessary to meet needs as they arise. In many respects, it is difficult to decide at this stage what industries should be best located within the port or estate areas.

b) The policy for land sales, leases and other conditions can be effected with greater consistency and the long term planning of the combined area could be made simpler.

c) The substantial investment required to provide the necessary infrastructure services, and the maintenance of such items would be more economically controlled.

The administrative machinery required to administer the port and industrial estate should have considerable powers in order to come to quick decisions. This is particularly true of the port where there will be a number of berths requiring day to day administration.

With regard to land use, it should be remembered that the most valuable land within the study area will undoubtedly be that adjoining water. This should be reserved for those industries requiring it. Waterfront land should not be sold by the Authority but strictly controlled by stringent leases to prevent its misuse or being made sterile by the closing down of an enterprise. This is particularly true of land bordering or associated with the publicly owned port facilities, as it will inevitably mean an under-employment of the public investment made in the port.

8.2 Control and Maintenance of Navigational Waters, Navigation Aids, Pilotage, Policing, Health and Customs

The Straits of Johore is a narrow waterway partly under the jurisdiction of Malaysia and Singapore. In fact to reach the site of the new port from the open sea, ships using the normal navigation channel have to pass in certain parts through water entirely within the international boundaries of Singapore.

At present, the actual control of these waters in all respects is the responsibility of the Royal Navy who, it is understood, has commenced negotiations with the two Governments to enable them to relinquish their duties to these Governments by December 1971.

It is not possible to divide responsibility for the maintenance of navigation channels between two entirely separate organisations simply because of the geography of the Straits. The establishment of a new joint authority would be the best solution to this problem. Such a joint authority in addition to taking over the maintenance of the navigation channel and navigation aids, could either control or coordinate all common activities within the Straits such as pilotage, allocate anchorages, dredging, health and other services such as the provision of tugs. All these activities are essential to the operation of a new port for Johore Bahru and the new arrangements to control the use of the Straits should be preferably completed in plenty of time before the port becomes operational. It should be remembered that certain privately owned berths are proposed to be operational by early 1972 and if an early decision was made regarding the provision of publicly owned berths, these could be functioning later that year.

With regard to customs and policing, it will be necessary to provide certain facilities in the port area including berths for small craft.

8.3 Tariff of Charges

There is no scope within a study of this limited nature for the drafting of a comprehensive tariff of port charges. However, the Terms of Reference in Paragraph 6 states "It may be assumed that only very low tolls are to be charged during the early years of operation". Since this sentence occurs in the context of competition with Singapore, it was felt that this Report ought at least to state the charges levied in Singapore and suggest, in very broad terms, what level the rates levied at Johore Bahru would have to be in order to attract demand.

The Port of Singapore Authority levies the following three basic rates on general dry cargo passing over its wharfs in dollars per ton:

		Imports	Exports
Charged to vessel:	Wharfage	$1.20	$1.20
	Stevedorage	$2.90	$2.90
Charged to shipper and consignee:			
	Wharf handling charges	$2.35	$1.70
Total Revenue to P.S.A.		$6.45	$5.80

For loading or discharging vegetable oil only, wharfage of $1.08 per ton is charged. At Jurong a very similar set of charges was adopted. The charges to the vessel are identical but the wharf handling charge is only $1.70 a ton for imports and $1.30 a ton for export. If the cargo is handled directly by the consignee, a service charge of $1.00 a ton is imposed.

If Johore Bahru is to be attractive to shippers and ship owners, it will have to develop a scale of charges which is somewhat lower than these, at least in the early years while it is still struggling to establish itself. A tariff based on the following orders of magnitude seems indicated:

Wharfage	$1.00 a ton
Stevedorage	$2.50 a ton
	$1.10 a ton for export
	$1.50 a ton for import

It is only fair to note that this will almost certainly involve the Port Authority at Johore Bahru in financial losses during the initial period before it becomes established. There has not been time to carry out a full financial appraisal of the port, but for comparison, the rates charged at Port Swettenham at the moment are:

Wharfage	- Liquid cargoes	- $1.20 a ton
	- Dry cargoes	- $1.50 a ton
Stevedoring	-	- $4.00 a ton (basic)
Wharf handling	- Direct delivery	- $4.30 a ton
	- Transit shed	- $6.30 a ton
	- Warehouse	- $8.30 a ton

SECTION 9 SUMMARY AND RECOMMENDATIONS

9.1 Summary

In this summary, a review of the points raised in the Draft Terms of Reference (Appendix A) is made.

1. Development planning in Johore and Pahang Tenggara has been surveyed with the following results :-

   The port requirements from the areas under study as listed in the Terms of Reference will not materialise before 1975. In Sub-section 7.7 an assessment of long term potential indicates a port requirement for these areas of about 1,000,000 tons capacity by 1985. The best time for a study of the transportation requirements in and to these study areas would be now, in order that a properly coordinated transportation system is developed to meet all future needs.

2. In analysing the demand of potential industries and hinterland activities requiring a port facilities, it has been found that there is an immediate need for the port.

   To handle adequately this movement of cargoes up to 1975, the port should consist of the following :

   1. Two deep water cargo berths, one with a transit shed.
   2. A special purpose palm oil jetty capable of receiving oil from East Coast shipping movements and exporting in cargo liners and packet tankers.
   3. Auxillary berths for smaller ships.
   4. Special purpose privately owned terminals for shipment of wood chips.

   These would be the minimum required to meet the present trade figures, and possibly an additional public berth may be an advantage.

3. A rail link into the port area will not be required within the plan period. Road access to the site from Johore Bahru can be provided by improving the existing Masai road, with a new road down to the port area. It would be a considerable advantage to provide a new road link from Kota Tinggi to the port. The east coast highway should also be improved.

4. The control of private jetties together with the general planning of the port and industrial estates should be undertaken by an authority set up for this purpose and administrating the whole development.

5. The Report includes recommendations regarding the siting of the port and other water front facilities but these plans are subject to detailed knowledge of the sea bed which was unfortunately not available. To meet the time requirement likely to be imposed by considerations of land purchase and the availability of new facilities needed by certain interests the necessary surveys and site investigations should be put in hand immediately.

6. With regard to projection of demand, cost and benefits details of these are given in Section 7. It would appear that the port can be justified on economic grounds.

9.2 Recommendations

It is recommended that the necessary site investigations to enable a detailed design study to be made be put in hand immediately. Preferably these should be associated with the design study in order to control site investigation and thus minimise cost, and to save time which is critical both due to land purchase and the timing of certain installations.

Consideration should be given at an early stage to setting up a controlling authority.

APPENDIX A

DRAFT TERMS OF REFERENCE

Background

The Johore State Government has already frozen an area of about 5,000 acres along a three-mile stretch in the Pasir Gudang area. Initially, the State Government will purchase an area of about 2,100 acres in the immediate vicinity of Kampong Pasir Gudang for an industrial development area (1,500 acres) and a site for a possible long term development of a port (300 acres). A rough zoning plan for the area has been prepared by the State Town and Country Planning Office, Johore Bahru. The State has received numerous applications from potential industrialists and manufacturers for factory sites and it is the intention of the State Government to locate them in the area mentioned above. As an incentive some form of common user port/jetty is to be provided. Furthermore the potential demand for loading and bulking facilities in the area is considerable with the rising trend in the production of oil palm and logs in Johore and Southern Pahang.

Study Objectives and Scope of Work

The main objective of the study is to assess the need (up to 1975) in Johore, for a common user port/jetty equipped with storage and loading facilities for oil palm, logs, sawn timber and other bulk items for coastal trade. In order to meet the short term requirements for industrial development and export bulking/loading facilities, and to assure a rational physical development of the area, the study should be directed to the following :-

(1) To survey the development planning in Johore and Pahang Tenggara for the expected completion time as well as the earliest time, at which port requirements from these areas shall materialise. This information should be sufficiently detailed to indicate the best time for a feasibility study of the longrun requirements for transport facilities (port and access by road and rail) in Johore Bahru. In light of this the plan period of the present study should be adjusted to cover the intermediate period. Such a decision must obviously be taken as early as possible and only after consultation with the Economic Planning Unit.

(2) To analyse the demand within the plan period from

(2.1) potential industries that can be advantageously sited in the Ayer Biru area,

(2.2) hinterland activities which already exist or are firmly planned

to assess which are the facilities preferred by the customers of a public port/jetty and the minimum requirements on which the demand is conditioned.

(3) To recommend, in the light of the location of existing transport facilities, the most suitable access road and rail alignment into the industrial and port area.

(4) To recommend measures to co-ordinate an orderly development of private jetties in the area so as not to hamper the possible development of a future port in the area.

(5) To carry out the necessary engineering investigations and surveys in order to define a set of alternatives specifying for each the location, type and timing of the public port facilities to be provided. The alternatives should range from a simple jetty to the most advanced facilities conceivable in light of the expected demand found under (2). For the bulking and storage facilities consideration should be given to the proposals made by FLDA and to possible future methods of loading and shipping palm oil. Only layouts flexible enough to be incorporated in possible future extensions are to be considered. Each proposal should be accompanied by an estimate of construction cost.

(6) To assess the annual demand corresponding to each alternative bearing in mind the possibility of diverting the present traffic going through Singapore. It may be assumed that only very low tolls are to be charged during the early years of operation. To evaluate the benefits foregone by cutting short the possible investments, estimates should be made of the value added by the production expected to be conditioned upon the more costly alternative.

(7) To present in a draft final report of the above mentioned information for the final choice of alternative by the State and Federal Authorities.

APPENDIX B

LIST OF PERSONS INTERVIEWED

It is impossible to mention all those individuals and organisations whose invaluable assistance has contributed to this Report. However among them were.

Ahmad bin Sidek	)	
W. Panton	)	Economic Planning Unit
A. Selvanathan	)	
Bashah bin Nordin	-	Ministry of Transport
Saad bin Marzuki	-	Ministry of Transport
Nordin Kidam	-	Head of Highway Planning Unit, Public Works Department
Dr. Ting	-	Head of Soils Laboratory, Public Works Department
Waad bin Jamaluddin	-	General Manager, Malaysian Railways
S. Hayama	-	Managing Director, Diashowa
N. Sadasivam	-	Federal Industrial Development Authority
Dato Ibrahim Majid	-	State Secretary Johore
Hamid bin Ahmad	-	State Engineer, Johore
Radin Soenarno Alhaj	-	Formerly State Development Office, Johore
Suntharalingam	-	State Geologist Johore
J.C. Harrison	-	United Molasses, London
J. Maltby	-	Panocean, London
Jamil Mohd.	-	Federal Land Development Authority
Lt. Comdr. Barford	-	Royal Malaysian Navy
Capt. R.L. Garmons-Williams R.N.	-	Queen's Harbour Master Singapore
P. Hatnell	-	Hydrological Department, Royal Navy
M. Harrison	-	Ministry of Public Building & Works R.N. Yard, Singapore
M. Watson	-	Assistant Managing Director of Sembawang Ship Yard
L. Eu	-	General Manager Malaysian International Shipping Line

G.H. Postlethwaite	-	Straits Steamship Co. Ltd.
D.J. Cranna	-	Ben Line Steamers Ltd.
R.C. Wurtzburg	-	Mansfield & Co. Ltd.
Choo Weng Chuk	-	Blue Funnel
R.H.D. Lewis Bryan	-	Guthrie Waugh
J.D. Menneer	-	Harrison & Crossfield (Malaysia) Sdn. Bhd.
J. Grovenor	-	I.C.I. (Singapore) Private Ltd.
S, Umezawa	-	Yamamoto Sangyo Co. Ltd.
Chua Huck Chong	-	Setia Jaya Wood Sdn. Bhd.
P.J.C. Moccand	-	Zuelling Feedmills Sdn. Bhd.
D.W. Sitwell A. Colville	-	Vosper Thorneycroft Uniteers Private L
Chua Peng Len	-	Sharikat Chua
R.L. Laude	-	Kelang Pembena Kereta Sdn. Bhd.
E.C. Guyatt	-	Eastern Plantation Agency Sdn. Bhd.
Khoo Boon Giok	-	Lian Cheong Sawmill Co. Ltd.
F.H.C. Soon	-	Malaysian Timber Export Industry Board
A. Keoun J. Preston	-	I.C.I. Holdings (Malaysia) Bhd.
A. Vijayaratnam	-	Port of Singapore Authority
W. Fletcher	-	Secretary, Oil Palm Growers Council
M. Gent	-	Chairman, Oil Palm Growers Council
Members of the	-	Malaysian Rubber Exchange
L. Davidson	-	Pamol Plantations
A. Aziz Yassin	-	Pineapple Cannery of Malaya Sdn. Bhd.
Rodmay Seow	-	Capital Motors Assembly
Law Ho Hin	-	Bian Heng
Gan Chang Kiat	-	Accountant, Port Swettenham Authority
J. Bates	-	General Manager, Gammon South East Asia Bhd.
Lim Ho Hup	-	Singapore Polymer Corporation
Lim Ho Yin	-	Camel Wood Industries