8.2 Financial Analysis

(1) Objectives and Assumptions

The objectives of financial analysis in this Study are two-fold. One is to establish a phasing plan to implement the Project Roads while the other is to find the conditions required for the privatization of these road projects.

The analysis for the first objective is made in two steps as follows:-

1st Step - Evaluation for determining the highest priority or Phase 1 project

2nd Step - Evaluation for determining the second phase project

The analysis for finding the privatization conditions is made for the following cases*

Case -a : Maximum Package
- Privatization of whole project

Case -b : Minimum Package
- Privatization of Highest Priority Project only

Case -c : Medium Package
- Privatization of the projects up to the second phase

The basic assumptions used in the financial analysis are derived from the existing Malaysian standards and the Government's recent experience in privatization projects as presented below.

(a) Construction schedule for establishing a phasing plan is assumed as follows:-

- The highest priority project is assumed to be implemented from 1991 to 1994 and open to traffic in 1995.

- The second phase project is to be implemented from 1994 to 1997 and open to traffic in 1998.

(b) Concession period for establishing a phasing plan is assumed to be 20 years for the highest priority project and 25 years for selecting the second phase project.

(c) The following toll rates for passenger car and buses similar to the toll scheme projected by PLUS will be applied. Medium and heavy lorries will be charged double.

Year	TOLL LEVY SYSTEM	
	Open (per Barrier)	Closed (per km)
1995	M$0.70	7 sen
1996-1999	M$1.00	10 sen
2000	M$1.30	13 sen

Beyond 2000, toll rates will be raised every five years with an annual growth rate of 6%.

(d) Equity share is assumed to be 10% of the total initial investment, unless denoted otherwise.

Dividend rate is assumed as 10% per year, distributed from the third year after opening to traffic.

(e) Government's Contribution

The Government's contribution in terms of initial investment is set up as follows:-

Case 1 .. Nothing
Case 2 .. Land Acquisition Only

(f) Long-term Loan Condition

The following two types of long-term loan are considered.

Loan Conditions	Loan Type Type 1	Type 2
Maximum Lending Period	15 years	15 years
Grace Period	5 years	5 years
Annual Interest Rate	8.5%	6.5%
Repayment	Uniform	Uniform

The following two alternative long-term loan allocation ratios are assumed:

	Loan Type Type 1	Type 2
Case 1	100%	0%
Case 2	60%	40%

In this analysis, Case 1 is applied, unless denoted otherwise.

(g) Short-term Loan Condition

The lending period of short-term loan is assumed to be one year and the interest rate is 10% per year.

(2) Analysis for Establishing a Phasing Plan

Based on the results of the economic evaluation, the following three sections are given higher priority.

- Section of N-S Link from NKVE to Shah Alam Highway;
- Section of Shah Alam Highway/MRR-II from KL-Seremban Expressway to HICOM; and
- Section of Shah Alam Highway from HICOM to Jalan Langat.

Accordingly, the seven (7) alternative cases shown in Table I-21 are examined in order to select the highest priority project.

Table I-21: Alternatives For Determining the Highest Priority Project

Alternative Case	N-S LINK	SHAH ALAM HIGHWAY/ MRR-II	
	NKVE to Shah Alam Highway	KL-Seremban Expressway to HICOM	HICOM to Jln. Langat
Alt.1	2 Lanes (Connecting Road Only)	4 Lanes	-
Alt.2	2 Lanes (Connecting Road Only)	4 Lanes	2 Lanes
Alt.3	2 Lanes (Connecting Road Only)	4 Lanes	4 Lanes
Alt.4	2 Lanes (Connecting Road Only)	6 Lanes	-
Alt.5	2 Lanes (Connecting Road Only)	6 Lanes	4 Lanes
Alt.6	4 Lanes (Connecting Road Only)	4 Lanes	-
Alt.7	4 Lanes (New Construction)	4 Lanes	-

In Alt.1 through Alt.6, on the short stretch of N-S Link from NKVE to Shah Alam H'way,only three interchanges and a connecting road from the upgraded Jalan TUDM-Shah Alam to Shah Alam Highway are to be constructed so as to minimize the initial capital outlay.

In Alt.7 however, a 4-lane throughway as well as the three interchanges are to be constructed.

Therefore, only in the case of Alt.7 will the short stretch of N-S Link be tolled under closed system while for the other cases, it is assumed to be toll free as it is difficult to do so from the engineering and social viewpoints.

Table I-22 shows the evaluation results for the seven alternative cases set up above with a concession period of 20 years.

Alt.1 and Alt.6 show more favourable indicators of financial feasibility than the other cases.

Although Alt.6 has the second highest FIRR, this case was selected as the highest priority project in view of the fact that Alt.6 would more likely effect a smoother traffic flow in anticipation of the rapid future traffic growth and the effective use of the existing upgraded road.

Table I-22: Financial Evaluation Indicators for Selecting Highest Priority Project (Concession Period 20 years)

Alternative Case	Land Cost	FIRR Nominal %	FIRR Real %	NPV Nominal (M$mil)	B/C Ratio Nominal	ROE Nominal %	ROE Real %
Alt.1	Including	13.9	9.5	67.5	1.34	27.2	22.3
	Excluding	15.3	10.9	82.4	1.46	33.7	28.6
Alt.2	Including	11.6	7.3	34.3	1.13	16.0	11.5
	Excluding	13.0	8.6	56.3	1.24	22.9	18.2
Alt.3	Including	11.1	6.9	26.6	1.09	14.3	9.9
	Excluding	12.9	8.5	58.0	1.22	24.3	19.5
Alt.4	Including	12.9	8.5	59.9	1.25	21.0	16.4
	Excluding	14.3	9.9	80.2	1.38	27.3	22.4
Alt.5	Including	11.3	7.0	35.5	1.11	14.6	10.2
	Excluding	13.1	8.7	72.2	1.25	24.0	19.3
Alt.6	Including	13.3	9.0	60.2	1.29	23.6	18.9
	Excluding	14.6	10.2	75.2	1.40	29.8	24.8
Alt.7	Including	12.9	8.6	61.0	1.24	22.0	17.3
	Excluding	13.9	9.5	76.0	1.33	27.4	22.5

Note: * For conditions of alternative cases, see Table I-21

Having determined the highest priority (or Phase 1) project, the second phase project is selected following a similar process.

The project which completes the section of Shah Alam Highway/MRR-II from KL-Seremban Expressway to SKSB as a 6-lane highway and SKSB to Jalan Langat as a 4-lane highway only is selected as the second phase project.

(2) Analysis for Privatization based on the Established Implementation Schedule

In order to clarify the conditions for privatization, financial analysis was carried out for the following project packages based on the implementation schedule described in Table I-29 of the next Chapter.

- Maximum Package .. Total Project
- Minimum Package .. Project in Phase 1 only
- Medium Package .. Project up to Phase 2

(a) Maximum Package

As a concession for undertaking the total project, the two (2) cases shown in Table I-23 are envisaged:-

Table I-23: Alternatives for the Maximum Package

Case	Shah Alam Highway/MRR-II	N-S Link	Disbursement Schedule
1	All the schemes except the section from Jalan Cheras to KL-Seremban Expressway	All	According to the implementation Schedule
2	As in Case 1 but excluding the section of Jalan Langat to NKSB	All	According to the implementation Schedule

If the total project (except the section on Jalan Cheras to KL-Seremban Expressway) is to be implemented as a privatization project, the FIRR will exceed 10% only if the concession period above 25 years and land acquisition cost is borne by the Government. Therefore, it can be said that the total project is financially viable to be privatized.

In practical sense, however, longer concession period, say 35 years or more and a larger equity share of around 50% are preferable in order to make the project sufficiently attractive to the private sector.

If the section from Jalan Langat to NKSB is further excluded from the package, then the project can become even more profitable, with a 30-year concession period. Under the conditions that land cost is borne by the Government and the equity share being 10%, the FIRR is found to be 14.5% and the maximum accumulated short-term loan is M$16.4 million which is only about 10% of that in Case 1. Accordingly, the debt service coverage ratio also becomes sufficiently high.

Table I-24: Financial Evaluation Indicators for the Maximum Package

Case	Concession Period (yrs)	Land Cost	FIRR (%)	NPV (M$mil)	B/C Ratio	ROE (%)
1	25	Including	9.8	-12.5	0.98	9.8
		Excluding	11.7	76.3	1.13	18.6
	30	Including	11.0	65.9	1.09	11.2
		Excluding	12.9	161.2	1.27	20.6
	35	Including	11.8	124.7	1.19	13.1
		Excluding	13.7	223.4	1.38	21.5
2	25	Including	11.4	66.0	1.12	15.3
		Excluding	13.4	137.9	1.29	21.4
	30	Including	12.5	146.2	1.25	17.5
		Excluding	14.5	223.2	1.46	26.3
	35	Including	13.2	206.1	1.36	18.6
		Excluding	15.2	285.0	1.57	26.7

Note: Figures are expressed in nominal value

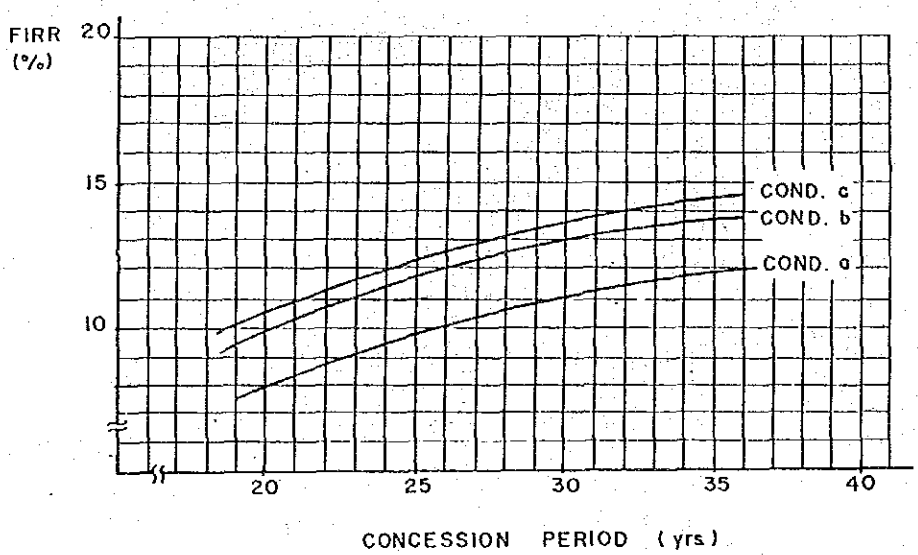
Table I-25: Financial Situation During the Concession Period for Maximum Package

Alternative Conditions		First Year of Operating Surplus	Maximum Short-Term Loan in Single Year		Maximum Accumulated Short-term Loan		Clearing-up Year of Short-term Loan
Case	Land Cost		M$mil	(Year)	M$mil	(Year)	
1	Including	11th	80.9	(10th)	574.5	(16th)	23rd
	Excluding	11th	32.9	(10th)	153.9	(15th)	18th
2	Including	11th	42.9	(10th)	241.6	(14th)	19th
	Excluding	8th	14.3	(10th)	16.4	(10th)	12th

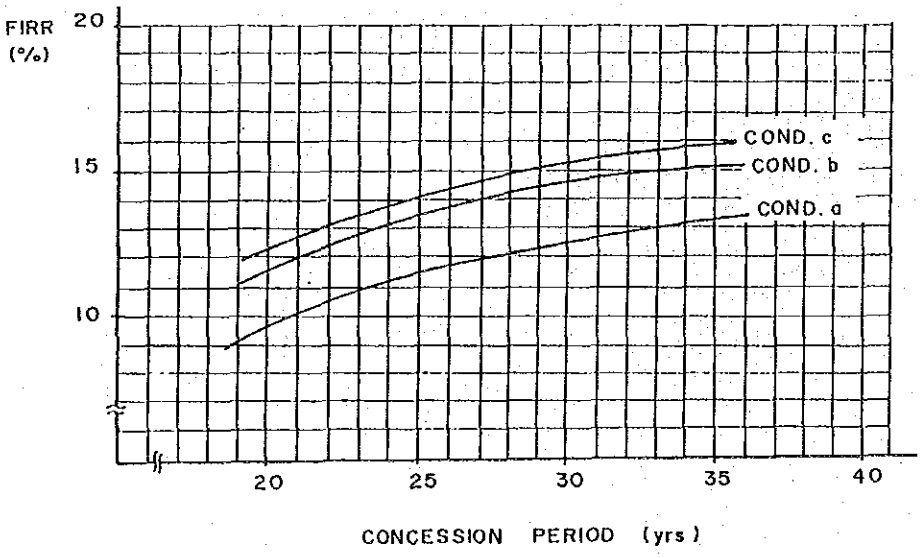
Figure I-17: Variation of FIRR for Total Project with Varying Concession Period

CONDITION	LAND COST	EQUITY SHARE	LONG TERM LOAN	
			LOCAL	FOREIGN
a	Including	10%	100%	0%
b	excluding	10%	100%	0%
c	excluding	50%	50%	50%

(a) Case 1



(b) Case 2



(b) Minimum Package

If only the project in Phase 1 (Total project cost: M$210.5 million) is envisaged for privatization, this project will be, financially speaking, highly viable under the following conditions:-

Land Acquisition	..	Cost to be borne by the Government
Concession Period	..	20 years or more
Equity Share	..	10% of the total initial investment
Long-term Loan	..	Local loan only

Even in case of a 20-year concession period, a FIRR of 14.6% will be expected and the first year of operation surplus comes comparatively early, i.e. 5th year from the opening which accordingly leads to sound financial performance during the concession period with the maximum accumulated short-term loan being only M$3.8 million.

(c) Medium Package

If the project up to Phase 2 (Total project cost: M$385.4 million) is taken up for privatization, the project will also be, financially speaking, highly feasible under the following conditions:-

Land Acquisition	..	Cost to be borne by the Government
Concession Period	..	25 years or more
Equity Share	..	10% of the total
Long-term Loan	..	Local loan only

Table I-26: FIRR for Minimum and Medium Packages (%)

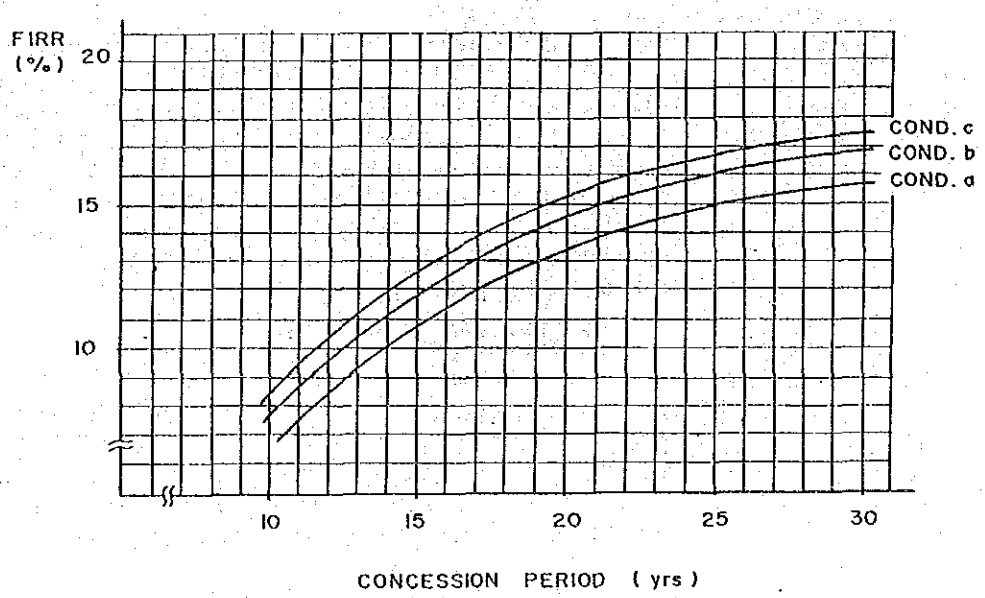
Concession Period	Minimum Package	Medium Package
15 Years	11.9	N.A.
20 Years	14.6	12.8
25 Years	16.0	14.4
30 Years	16.8	15.3
35 Years	N.A.	15.9

Notes: 1) Figures are expressed in nominal value
2) Calculated under conditions of:-
- Land acquisition cost is borne by the Government
- Equity share is 10%
- Local loan only

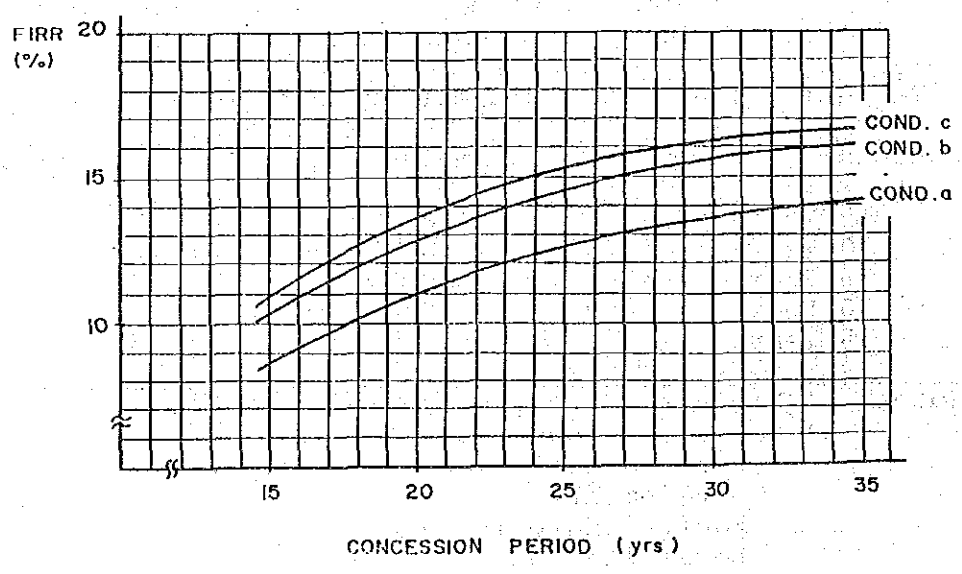
Figure I-18: Variation of FIRR for the Projects in Phase 1 and Up to Phase 2 by Different Concession Period

CONDITION	LAND COST	EQUITY SHARE	LONG TERM LOAN	
			LOCAL	FOREIGN
a	including	10 %	100 %	0 %
b	excluding	10 %	100 %	0 %
c	excluding	50 %	50 %	50 %

(A) The Projects in Phase 1



(B) The Projects up to Phase 2



(3) Sensitivity Analysis

Sensitivity analysis is carried out to examine the effects of the following factors on the financial feasibility of the projects.

- Additional toll levy on the short stretch of N-S Link from NKVE to Shah Alam Highway
- Changes in the estimated traffic volume

(a) Additional Toll Levy on the Short Stretch of N-S Link

In this Study, the short stretch of N-S Link from NKVE to Shah Alam H'way has been assumed to be toll free unless the throughway is constructed.

The following analysis examines the case where a toll barrier is additionally installed at the section between Federal Route 2 and Subang West IC during the period when the throughway is not constructed. It is also assumed that the toll barrier system of N-S Link will be replaced by a closed system when the expressway is completed.

The following toll rate is assumed for the short stretch of N-S Link.

1995	..	M$0.40/passenger car
1996-1999	..	M$0.60/passenger car
2000	..	M$0.80/passenger car

Beyond 2000, the toll rate will be revised every five years with an annual growth rate of 6%.

Table I-27 shows the FIRR changes due to the additional toll levy on the short stretch of N-S Link for the alternative packages.

In general, compared with the original case, the FIRRs are higher in all packages where additional toll is levied.

For the Maximum Package, "the improvement" of FIRR is small, only 0.2% or 0.3% points for Case 1 and 2 respectively. This is because the period that the additional toll is levied is only 6 years from 1995 to 2000 and beyond 2000, the closed toll system is applied as in the original case.

For the Minimum and Medium Packages however, FIRR increases as much as 1.2% or 1.3% points with additional toll.

As a conclusion, the additional toll levy is not effective in raising the project profitability if the Maximum Package is considered, but might be worthwhile to consider if either the Minimum or Medium Package is taken up.

Table I-27: FIRR Changes Due to Additional Toll

	Original Case	Additional Toll Case on N-S Link
Maximum Package		
Case 1	12.9%	13.1%
Case 2	14.5%	14.8%
Minimum Package	14.6%	15.8%
Medium Package	14.4%	15.7%

Notes: 1) Figures are expressed in nominal value
2) Land acqusition cost is excluded
3) Concession Period is as follows:-
Maximum Package .. 30 years
Minimum Package .. 20 years
Medium Package .. 25 years
4) Other conditions are unchanged from the basic assumptions

(b) Changes in the Estimated Traffic Volume

Generally, by levying a toll, some vehicles would not use the toll road and prefer to make a detour to bypass the toll gate.

This phenomenon is simulated in the computer model when the future traffic demand is assigned to future road network.

In this Study, the estimated traffic volume at the toll gate in the case of toll levy is approximately 63% of that in the case of toll free condition in the year 1995.

Accordingly, the sensitivity analysis here is to examine the influence of the changes in the traffic volume to be tolled on the financial viability.

The following two cases are examined:-

* 10% increase in the traffic volume to be tolled
* 10% decrease in the traffic volume to be tolled

Hence, these two cases correspond to having about 70% and 57% respectively of the traffic demand in the toll free case.

Table I-28 shows the FIRR changes due to the changes in the traffic volume to be tolled for the alternative packages.

Table I-28: Changes in FIRR due to Varying Traffic Volume

	Traffic Volume to be Tolled		
	-10%	Original	+10%
Maximum Package			
Case 1	11.6	12.9	14.1
Case 2	13.2	14.5	15.7
Minimum Package	13.2	14.6	15.9
Medium Package	13.1	14.4	15.7

Notes: 1) Figures are expressed in nominal value
2) Land acquisition cost is excluded
3) Concession period is as follows:-
Maximum Package .. 30 years
Minimum Package .. 20 years
Medium Package .. 25 years
4) Other conditions are unchanged from the basic assumptions

Generally, FIRR changes are proportional to the changes in the traffic volume to be tolled in any package.

It is also recognized that even in the case of 10% decrease of traffic volume, all the packages are still financially viable.

On the other hand, in the case of 10% increase of traffic volume, the FIRR becomes sufficiently high enough to consider a possibility to reduce the concession period, say by as much as 5 years.

9. PROJECT IMPLEMENTATION

9.1 Implementation Schedule

From the analyses for selecting project priority and evaluation of financial viability, the proposed implementation schedule of the Project Roads is established as follows. The details in each phase are expressed in Table I-29 and Figure I-18.

Phase 1: 1991-1994

(a) Shah Alam Highway/MRR-II
- Construction of the section from KL-Seremban Expressway to HICOM as a 4-lane highway. This section will be open to traffic in 1995.

(b) N-S Link
- Construction of three interchanges and a connecting road for the section from NKVE to Shah Alam Highway as a 4-lane road. This section will be open to traffic in 1995.

Phase 2: 1994-1997

(a) Shah Alam Highway/MRR-II
- Widening of the section between KL-Seremban Expressway and HICOM to a 6-lane highway.
- Construction of the section from HICOM to SKSB as a 6-lane highway. This section will be open to traffic in 1998.
- Construction of the section from SKSB to Jalan Langat as a 4-lane highway. This section will be open to traffic in 1998.

Phase 3: 1997-2000

(a) Shah Alam Highway/MRR-II
- Construction of the section from Jalan Cheras to KL-Seremban Expressway as a 6-lane highway.
- Construction of the section from Jalan Langat to NKSB as a 4-lane highway.

Both sections will be open to traffic in 2001.

(b) N-S Link
- Construction of the section between NKVE and Shah Alam Highway as a 6-lane expressway.
- Construction of the section from Shah Alam Highway to KL-Seremban Expressway as a 4-lane expressway.

Both sections will be open to traffic in 2001.

Table I-29: Proposed Implementation Schedule

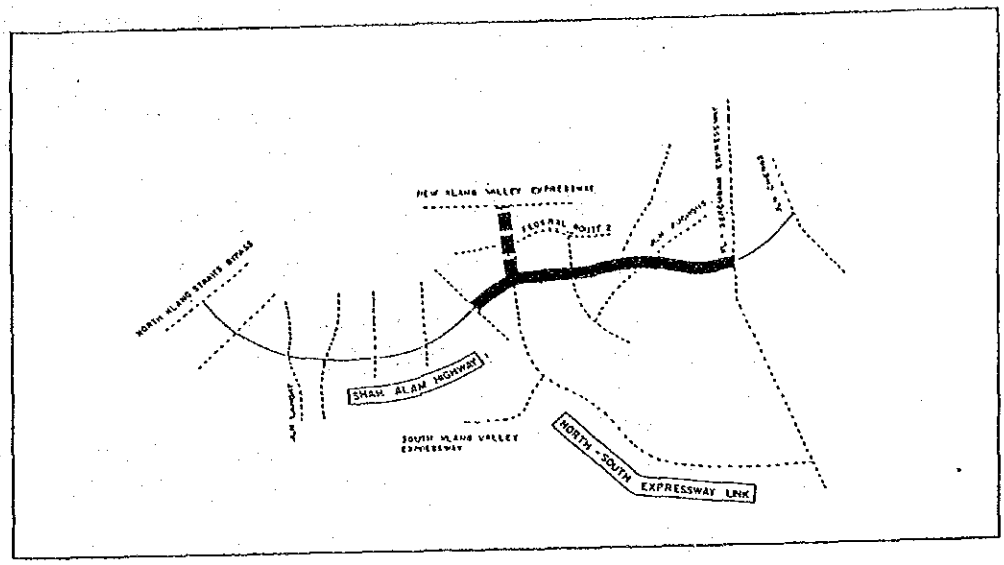
Project	Total Length (km)	No.of Lanes	Project Cost (M$mil)	Year 1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
1. SHAH ALAM HIGHWAY/MRR-II													
1-1(a) Construction of Section: KL-Seremban Expressway to HICOM	18.6	4	146.1	- - -									
1-1(b) Widening of Section: KL-Seremban Expressway to HICOM	18.6	6	40.2				- - -						
1-2 Construction of Section: HICOM to Jalan Langat*	13.7	6/4	134.7				- - -						
1-3 Construction of Section: Jln.Cheras to KL-Seremban Exp.	6.1	6	158.2							- - -			
1-4 Construction of Section: Jln.Langat to NKSB	9.3	4	194.3							- - -			
2. N-S LINK													
2-1(a) Construction of connecting road for Section: NKVE to Shah Alam Highway	4.9	4	64.4	- - -									
2-1(b) Construction of Section: NKVE to Shah Alam Highway	4.9	6	42.9							- - -			
2-2 Construction of Section: Shah Alam H'way to KL-Seremban Exp.	28.8	4	251.2							- - -			

Notes: * HICOM - SKSB .. 6 lanes
SKSB - Jalan Langat .. 4 lanes

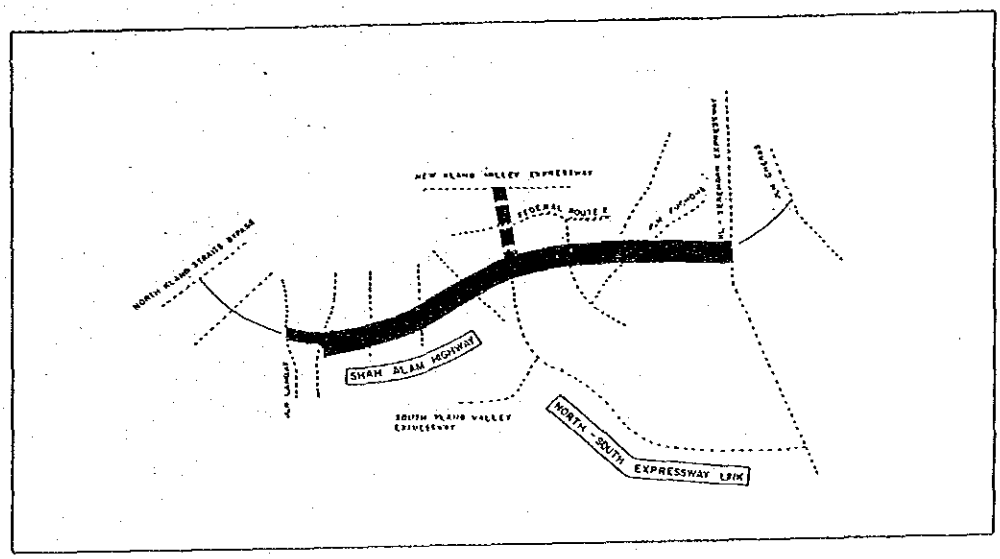
- - - Detailed Engineering
_____ Land Acquisition and Construction

Figure I-19: Proposed Implementation Schedule

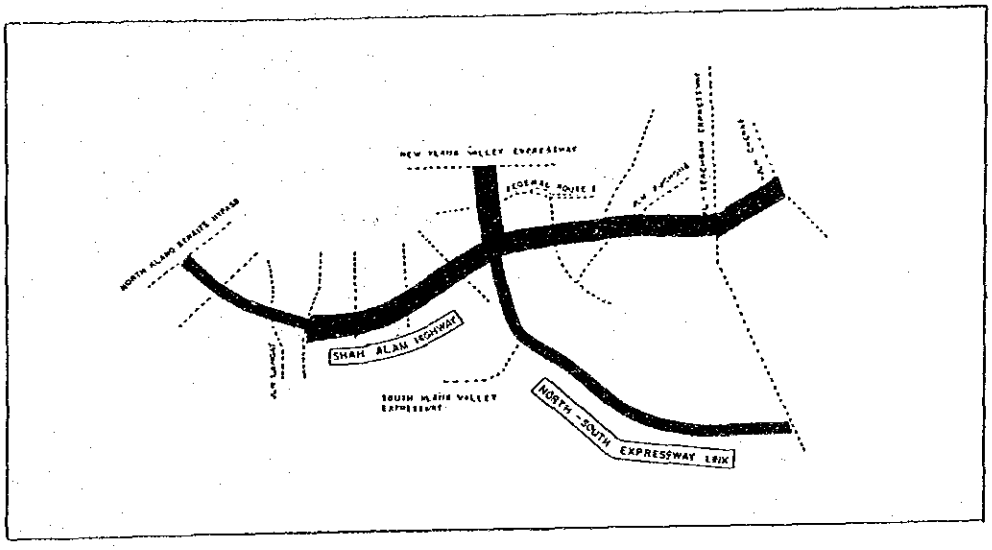
PHASE I
(1991 - 1994)



PHASE 2
(1994 - 1997)



PHASE 3
(1997 - 2000)



LEGEND

CONSTRUCTION OF THROUGH WAY
- 4 LANES
- 6 LANES

CONNECTING ROAD ONLY

9.2 Conditions for Privatization

The following alternatives of concession can be considered:-

* Concession for the Total Project (except for Jalan Cheras to KL-Seremban Expressway Section)
* Concession for the Project in Phase 1 only
* Concession for the Project up to Phase 2

(1) Concession for the Total Project

If the first alternative is taken, then there are two possible options:-

Option 1

Project : Shah Alam Highway/MRR-II (KL-Seremban Expressway to NKSB)
: N-S Link

Total Project Cost : M$873.8 million
Government Support : Land acquisition only
Concession Period : 35 years or more will be required

Option 2

Project : Shah Alam Highway/MRR-II (KL-Seremban Expressway to Jalan Langat)
: N-S Link

Total Project Cost : M$679.5 million
Government Support : Land acquisition only
Concession Period : About 30 years can be applied

In Option 1, except for the section of Jalan Cheras to KL-Seremban Expressway, the entire length of the Project Road is to be implemented by privatization. Option 2 implies that in addition to Option 1, the section from Jalan Langat to NKSB might also be implemented by the Government.

(2) Concession for the Project in Phase 1 only

Project : Shah Alam Highway/MRR-II
(KL-Seremban Expressway to HICOM as 4-lane highway)
: N-S Link
(NKVE to Shah Alam Highway as 4-lane road basically using the travelled way of Jalan TUDM-Shah Alam)

Total Project Cost : M$210.5 million
Government Support : Land acquisition only
Concession Period : About 20 years can be applied

(3) Concession for the Project up to Phase 2

Project : Shah Alam Highway/MRR-II
(KL-Seremban Expressway to SKSB as a 6-lane highway and SKSB to Jalan Langat as 4-lane highway)
: N-S Link
(NKVE-Shah Alam Highway as 4-lane road basically using the travelled way of Jalan TUDM-Shah Alam)

Total Project Cost : M$385.4 million
Government Support : Land acquisition only
Concession Period : About 25 years can be applied

In case of the concession given for Phase 1 only or up to Phase 2, subsequently scheduled projects might be carried out by the Government or by means of giving out additional concession.

10. CONCLUSION AND RECOMMENDATIONS

Based on the technical, economic and financial studies for the Project Roads mentioned above, the following conclusion and recommendations are made:-

(1) Scheme of the Project Roads

Through the Feasibility Study, the scheme of the Project Roads has been identified as follows:-

Design Element	Shah Alam Highway/ MRR-II	N-S Link
Design Standard	Arterial (U5)	Expressway (R-6)
Design Speed (km/h)	80	120
Number of Lanes	Divided 6-lane or 4-lane	Divided 6-lane or 4-lane
Right-of-Way (m)	40 - 80	60 - 80
Length of Project Road (km)	47.7	33.7

(2) Economic Evaluation

(a) Both the Project Roads, namely, Shah Alam Highway/MRR-II and N-S Link are found to be economically feasible if they are implemented from 1991 to 2000 according to the implementation schedule described in the forthcoming paragraph (4).

(b) Based on the results of the economic evaluation, the following sections of the Project Roads are identified as the highest priority sections:-

* Shah Alam Highway/MRR-II:
  KL-Seremban Expressway to *HICOM*

* N-S Link
  New Klang Valley Expressway to Shah Alam Highway

(3) Implementation Concept

The following three alternatives are identified as the possible implementation and operating body for the Projects Roads.

- Government or Related Agency
- Private Sector
- Third Sector (Joint-venture by Government and Private Sector)

In principle, when a toll is levied on a certain highway, there should be an alternative toll free road to the same destination.

The existing and committed highways running in parallel with Shah Alam Highway/MRR-II, namely NKVE and Federal Route 2 have already been determined as tollways. In order to provide an alternative choice to road users, therefore, Shah Alam Highway/MRR-II should ideally be toll free. In this case, the project should be implemented by the Government. If the Government however, prefers to privatize the project as a national policy, it should be implemented and operated by a private sector as a tollway. In this case, BOT (Build, Operate, Transfer) scheme should be applied as practiced in the other on-going privatization projects.

(4) Toll System

If the Government decides to implement the Project Roads under the BOT Scheme, the following toll levy system is recommended:-

(a) For reason of uniformity, the toll levy system on N-S Link will be similar to that used on North-South Highway, i.e. a closed system by distance proportional tariff.

(b) In the case that only the short section of N-S Link between NKVE and Shah Alam Highway is constructed, it is recommended to be tentatively toll free.

(c) In the case of Shah Alam Highway/MRR-II, it is proposed that an open system by zone tariff be implemented with three (3) toll barriers; one located between Kuala Lumpur and Subang-Puchong area, the second located between Subang-Puchong area and Shah Alam while the third is located between Shah Alam and Klang, that is, only inter-urban traffic will be tolled.

(5) Government's Contribution

In order to implement the project smoothly and effectively, the following are recommended as Government's contribution.

(a) The proposed plan should be thoroughly scrutinized and promptly authorized to define and secure the right-of-way for the Project Roads;

(b) Land acquisition cost is preferably borne by the government even in the case of privatization;

(c) Land acquisition at an early stage is recommended. In case of stage construction from 4-lane to 6-lane road, sufficient right-of-way for 6 lanes should be obtained at the first stage;

Because of its characteristics as a social infrastructure for public use, the Government in general has to have a right of overseeing the due performance of the implementation/ operating body in any case.

(6) Concession and Other Conditions

If the implementation of the Project Roads is privatized, the following options can be considered:-

(a) Minimum Package Option

This option consists of privatizing the highest priority sections of the Project Roads as follows:-

* Shah Alam Highway/MRR-II
  Construction of the section from KL-Seremban Expressway to HICOM as a 4-lane highway.

* N-S Link
  Construction of the connecting road from Jalan TUDM-Shah Alam to Shah Alam Highway to form the section of N-S Link between NKVE to Shah Alam Highway as a 4-lane road.

If this option is implemented as a privatization project, a twenty (20) year concession period to the business entity is recommended. The total project cost under this option is about M$210 million.

(b) Medium Package Option

This option consists of privatizing the Minimum Package plus other higher priority sections of the Project Roads as follows:-

* Minimum Package as in (a)
* Widening of 4-lane section of Shah Alam Highway in Minimum Package into 6-lane highway
* Construction of Shah Alam Highway between HICOM and SKSB as 6-lane highway and between SKSB and Jalan Langat as a 4-lane highway

If this option is implemented as a privatization project, a twenty-five (25) year concession period to the business entity is recommended. The total project cost under this option is about M$385 million.

(c) Maximum Package Option

This option includes all the Project Roads excluding the section of MRR-II from Jalan Cheras to KL-Seremban Expressway.

If this option is implemented as a privatization project, a thirty-five (35) year concession period to the business entity is recommended. The total project cost under this option is about M$874 million.

(7) Implementation Programme

The technical, economic and financial studies reveal that the Project Roads should preferably be implemented according to the following schedule:-

Phase 1: 1991-1994

(a) Shah Alam Highway/MRR-II
- Construction of the section from KL-Seremban Expressway to HICOM as a 4-lane highway.

(b) N-S Link
- Construction of the connecting road from Jalan TUDM-Shah Alam to Shah Alam Highway to complete the section of N-S Link from NKVE to Shah Alam Highway as a 4-lane road.

Phase 2: 1994-1997

(a) Shah Alam Highway/MRR-II
- Widening of the section between KL-Seremban Expressway and HICOM to a 6-lane highway.
- Construction of the section from HICOM to SKSB as a 6-lane highway.
- Construction of the section from SKSB Jalan Langat as a 4-lane highway

Phase 3: 1997-2000

(a) Shah Alam Highway/MRR-II
- Construction of the section of MRR-II from Jalan Cheras to KL-Seremban Expressway as a 6-lane arterial.
- Construction of the section of Shah Alam Highway from Jalan Langat to NKSB as a 4-lane highway.

(b) N-S Link
- Construction of the section between NKVE and Shah Alam Highway as a 6-lane expressway.
- Construction of the section from Shah Alam Highway to KL-Seremban Expressway as a 4-lane expressway.

(8) Investment Requirement

The project costs for the recommended plans are given below:-

(a) The project cost for Phase 1 is M$210 million of which foreign currency component will amount to M$91 million and local currency component to M$119 million.

(b) The project cost for Phase 2 requires an additional M$175 million, of which the foreign currency portion will amount to M$58 million and local currency portion to M$117 million.

(c) The construction cost for Phase 3 is M$647 of which foreign currency portion will amount to M$261 million and local currency portion to M$386 million.

(9) Further Areas of Investigation

This Study has evaluated the feasibility of three of the projects identified by the Klang Valley Transportation Study in response to the request from the Government of Malaysia. Further areas which need to be investigated as they are not covered in this Study are on the public transport system and intra-urban road network in Kuala Lumpur. These are deemed to be necessary as simultaneous improvements of the private and public transport systems in Klang Valley are very important for promoting a balanced transport system and to ensure the achievement of the planned mode shares in future.

PART II

TRAFFIC CONTROL AND SURVEILLANCE SYSTEM PROJECT

CONTENTS

1. INTRODUCTION

In response to the need for an integrated and comprehensive transport policy in the most rapidly developing Klang Valley region in Malaysia, the Klang Valley Transportation Study completed in March 1987 has recommended a list of priority transportation development projects including that of public transportation system, road improvement and construction, traffic control and surveillance as well as freight terminal.

The Government of Malaysia has accepted the recommendations and subsequently by way of technical cooperation, Japan International Cooperation Agency was entrusted with the responsibility of conducting the Feasibility Study on the Transportation Facilities Projects in Klang Valley that includes the traffic control and surveillance system project.

This feasibility study strongly recommends that the Traffic Control and Surveillance System Project be implemented as soon as possible. Specifically, it covers two types of traffic control and surveillance system namely Area Traffic Control (ATC) System which aims to control traffic signals at intersections on urban street network in Kuala Lumpur and Petaling Jaya, and Highway Traffic Surveillance (HTS) System which aims at ensuring smooth and safe traffic flow along highways and initiating vital traffic management activities.

2. RATIONALE OF THE TRAFFIC CONTROL AND SURVEILLANCE (TCS) SYSTEM

The rationale for the KL ATC System which aims to improve and expand the existing KL ATC System are:-

(a) To introduce traffic responsive signal control, capable of responding to changing traffic conditions in real time so as to alleviate traffic congestions;

(b) To expand the coverage area of existing ATC System in order to ensure an effective control of all traffic in the conurbation area;

(c) To reinforce the traffic surveillance function of collecting updated traffic-related information;

(d) To enhance driver information function in conveying accurate and up-to-date traffic-related information to drivers;

(e) To introduce statistical data collection function to facilitate traffic management activities and traffic improvement programs.

The rationale to introduce an Area Traffic Control System in Petaling Jaya are:-

(a) To introduce an Area Traffic Control System in Petaling Jaya in order to ensure an effective coordination and control of all traffic in the area;

(b) To introduce traffic responsive signal control capable of responding to changing traffic conditions in real time so as to alleviate traffic congestion;

(c) To introduce traffic surveillance function of collecting updated traffic-related information.

The rationale for a highway traffic surveillance system in the Klang Valley are:-

(a) To introduce traffic surveillance function of collecting and processing traffic-related information collectively in a manner that traffic management officials can administer the necessary first aid countermeasures;

(b) To introduce driver information function of conveying up-to-date traffic-related information to drivers so that congestion can be mitigated to a minimum;

(c) To introduce traffic management activities through monitoring the traffic situation in a center and where traffic improvement programs can be initiated.

3. CONCEPT OF THE TRAFFIC CONTROL AND SURVEILLANCE (TCS) SYSTEM PROJECT

The system concept is based on the established concept adopted in the United States and Japan. In principle, it is an intelligence system that employs state-of-the-art technology with a control center to monitor all incoming information in the coordination of traffic management activities. In other words, it manages mounting traffic problems due to record volumes by optimizing the utilization of existing road facilities.

The Traffic Control and Surveillance System encompasses Area Traffic Control System and Highway Traffic Surveillance System which have various functions such as:-

(a) traffic responsive signal control
(b) traffic surveillance
(c) driver information
(d) statistical data collection
(e) information exchange

Traffic responsive signal control centralizes the operation of traffic signal controllers and seek an optimum control timing parameter based on the traffic responsive function. Traffic surveillance involves the collection of traffic information by various means, for instance, vehicle detectors, CCTV and emergency telephone whereas driver information function conveys traffic-related information to the drivers by changeable message sign and commercial radio. Statistical data collection system provides pertinent statistical data for adjustment of control parameters, formulation of future traffic control policy and traffic research while information exchange enables system linkage with other systems.

As the core of the system, a center is established where traffic management activities such as incident detection, detour implementation, special enforcement, etc. are activated through monitoring the traffic situations. Besides, it takes the initiative to prepare traffic improvement programs and administer first-aid countermeasures.

4. TRAFFIC CONTROL AND SURVEILLANCE SYSTEM PLAN

The TCS System involves two ATC Systems and one HTS System namely, KL ATC System, PJ ATC System and JKR HTS System. Main features of the TCS System are shown in Figure II-1 and Table II-1.

KL ATC System is an integrated system consisting of wide-area traffic responsive signal control system, traffic surveillance system and driver information system. The system is to cover the entire Kuala Lumpur and its surrounding areas of Kepong, Selayang and Ampang. The System is to be implemented and managed by KL City Hall from the existing control center in its building.

PJ ATC System whose coverage area is the entire Petaling Jaya Municipality is also a wide-area traffic responsive signal control system as well as traffic surveillance system and it must be compatible with the KL ATC System and ramp signal control of HTS System. It will be implemented and managed by the Municipal Council of Petaling Jaya from a proposed control center to be set up in Menara MPPJ.

In the case of JKR HTS System, it is an advanced form of real-time traffic surveillance and control system which is applicable to urban expressway. Traffic responsive signal control at the Federal Highway Interchanges in Petaling Jaya is included. In addition, the coverage route is Federal Highway (from the Kuala Lumpur boundary to the junction with North Klang Straits Bypass) and Airport Highway. The executing agency is Federal Public Works Department (JKR) which may delegate this management responsibility to Selangor JKR. As such, the control center is proposed to be located in Bangunan Sultan Salahuddin, Shah Alam.

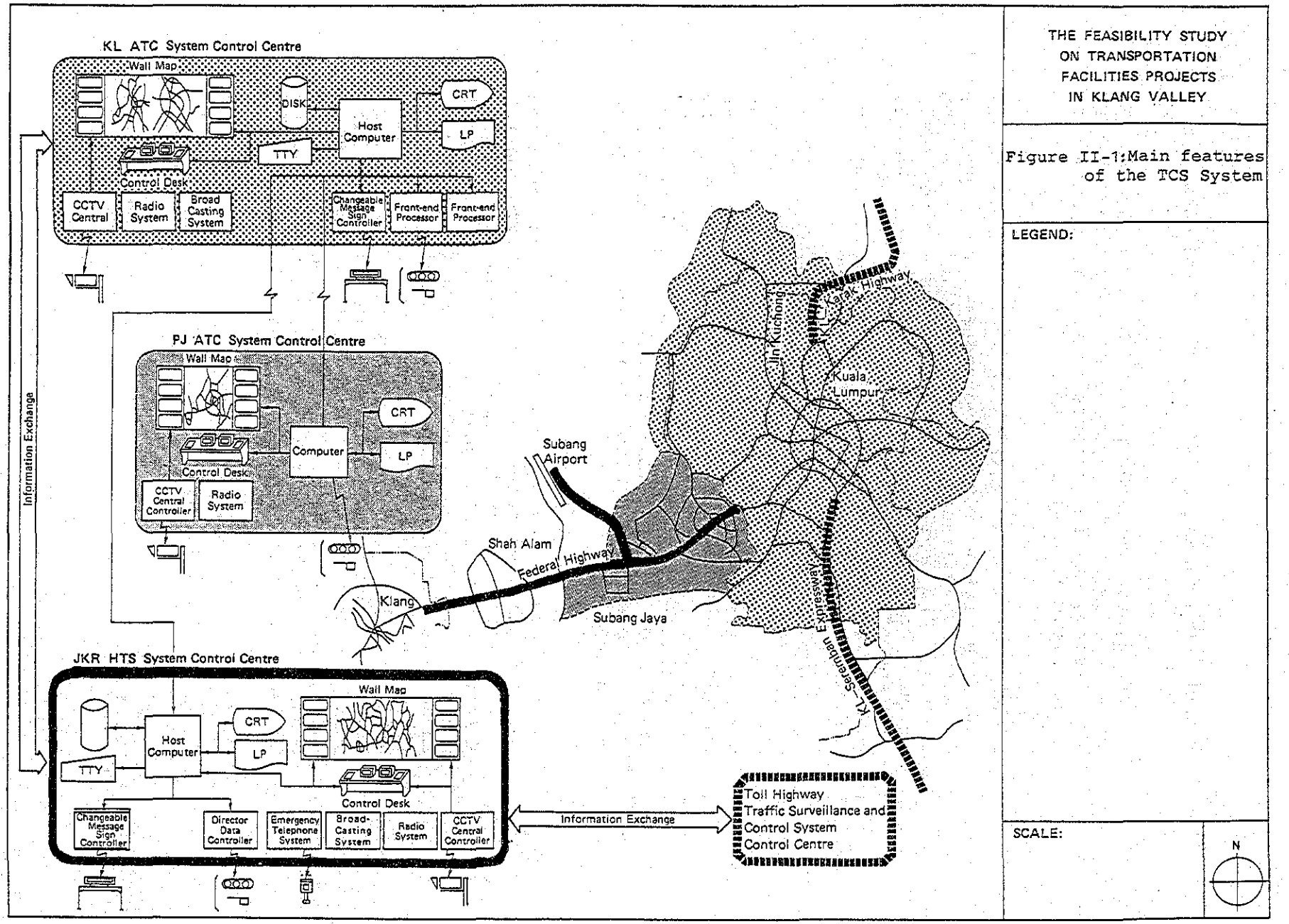
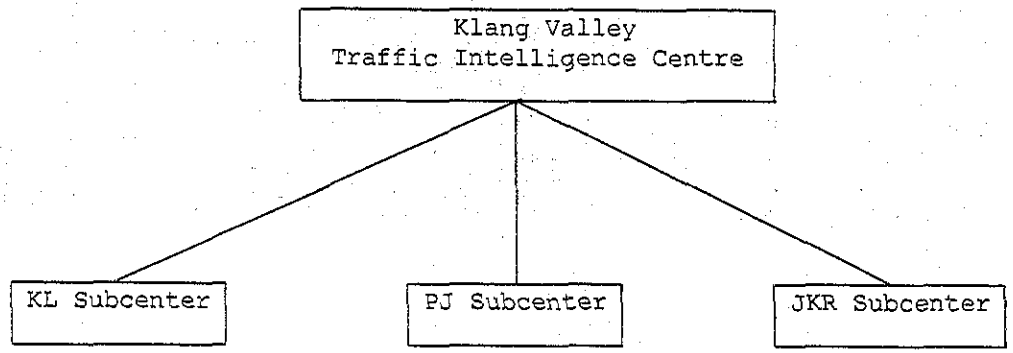

KL ATC System Control Centre
Wall Map
DISK
CRT
Host Computer
LP
TTY
Control Desk
CCTV Central
Radio System
Broad Casting System
Changeable Message Sign Controller
Front-end Processor
Front-end Processor
PJ ATC System Control Centre
Wall Map
CRT
Computer
LP
Control Desk
CCTV Central Controller
Radio System
Information Exchange
JKR HTS System Control Centre
Wall Map
CRT
Host Computer
LP
TTY
Control Desk
Changeable Message Sign Controller
Director Data Controller
Emergency Telephone System
Broad-Casting System
Radio System
CCTV Central Controller
Information Exchange
Toll Highway Traffic Surveillance and Control System Control Centre
Jln Kuching
Kerak Highway
Kuala Lumpur
Subang Airport
Shah Alam
Federal Highway
Klang
Subang Jaya
KL-Seremban Expressway
THE FEASIBILITY STUDY ON TRANSPORTATION FACILITIES PROJECTS IN KLANG VALLEY
Figure II-1:Main features of the TCS System
LEGEND:
SCALE:
N

Table II-1 : Main Features of TCS System

	Klang Valley TCS System	Kuala Lumpur ATC System	Petaling Jaya ATC System	JKR HTS System
Coverage Area/Route	* Entire Klang Valley	* All signalized intersections within Kuala Lumpur and surrounding areas of Kepong, Selayang and Ampang * Federal Route 1 and 2 within Kuala Lumpur	* All signalized intersections in Petaling Jaya	* Federal Highway * Airport Highway * Signalized Ramp along Federal Highway in PJ
Main Functions	* Coordination * Traffic Surveillance * Driver Information * Statistical Data Collection * Information Exchange	* Traffic Responsive Signal Control * Traffic Surveillance on the surface road and Federal Route 1 and 2 * Driver Information * Statistical Data Collection * Information Exchange	* Traffic Responsive Signal Control * Traffic Surveillance * Information Exchange	* Traffic Surveillance * Driver Information * Statistical Data Collection * Ramp Signal Control in Petaling Jaya * Information Exchange
System Configuration				

5. CONCEPT OF SYSTEM CENTER

Following the deliberations in the Steering and Technical Committee Meetings, it is proposed that a center-subcenter formation be established with one main center and a few subcenters.

Under this proposed formation, the main center of the Traffic Control and Surveillance System shall be set up in Kuala Lumpur to be called the Klang Valley Traffic Intelligence Center. Linked to this main center are three (3) subcenters namely Kuala Lumpur Subcenter, Petaling Jaya Subcenter and Public Works Department (JKR) Subcenter.

Figure II-2 illustrates the proposed concept of system center.

Being the hub of national economy, Klang Valley Region will continue to experience rapid urbanization thereby inducing large increase in traffic volumes. Under the Klang Valley Perspective Plan, a dispersal strategy of a self-contained, medium growth six-town concept aimed at spatial allocation of urban growth and reconstitution of urban development in the Klang Valley Region has been adopted. The future urban structure of this region will consist of Kuala Lumpur, Shah Alam, Petaling Jaya, Klang, Bangi Newtown and Selayang Newtown. In pursuance with this perspective regional development strategy but faced with the inevitable fact that it is increasingly difficult to cope with the increasing demand for road development by the Government, it is envisaged that traffic control and surveillance system, capable of optimizing the utilization of road facilities, will be needed for better coordination of traffic in the region.

Another distinct area that needs traffic control and surveillance function is the fast developing Ampang area within and to the east of Kuala Lumpur Conurbation.

In addition, the Traffic Control and Surveillance System is capable of maintaining close rapport with the being planned Traffic Control and Management System of Malaysian Expressways and Toll Highway under the responsibility of Malaysian Highway Authority (LLM) in order to ensure effective and safe traffic flow in the Klang Valley Region.

As a result, the perspective concept of a system center in the Klang Valley is depicted in Figure II-3.

The requirement of the KL, PJ and JKR subcenter are depicted in Table II-2.

Table II-2 : Requirement of Control Center

Subcenter		KL ATC	JKR HTS	PJ ATC
Control Center Location		KL City Hall	Selangor State JKR, Bgn. Sultan Salahuddin, Shah Alam	Menara MPPJ
*1 Room Space	Control and Machine Room	184sq.m *2	184sq.m	54sq.m
	Room for Power Generator, etc.	55sq.m	55sq.m	-
	Total	239sq.m	239sq.m	54sq.m
Ceiling height in the control room		More than 3m	More than 3m	More than 2.5m
Control and Machine Room	Floor design	* Raised floor	* Raised floor	* Raised floor
	Services	* Air-conditioned	* Air-conditioned	* Air-conditioned

Note:
*1 : Office space for staff is excluded
*2 : Same size as the control and machine rooms in the existing KL control center

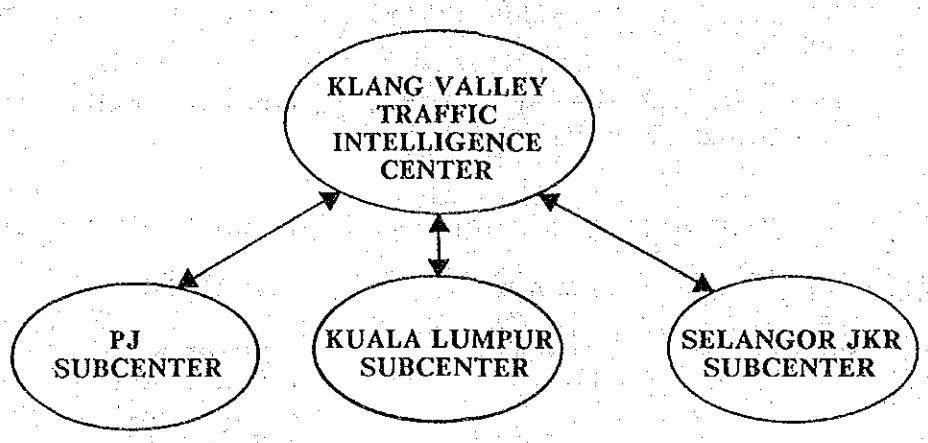


Figure II-2: Proposed Concept of Traffic Intelligence Center

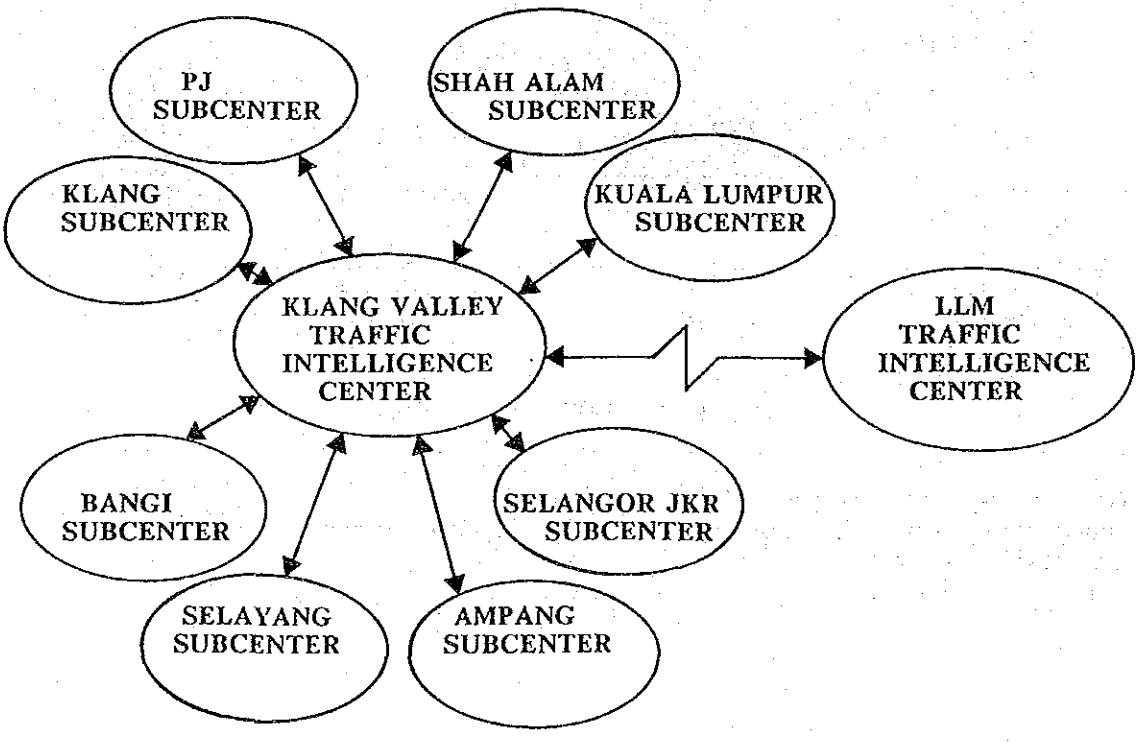


Figure II-3: Perspective Concept of Traffic Intelligence Center

6. STAGING PLAN

The staging plan that illustrates the timing of area/route covered and functional subsystems introduced is divided into two phases. Phase 1 includes Stages 1 and 2 of KL and PJ ATC Systems and JKR HTS System whereas Phase 2 involves Stage 3 of the three systems.

For the KL ATC System, Stage 1 involves upgrading the existing ATC System within the Central Planning Area (CPA) and its periphery as well as expanding the system on the heavily trafficked radial roads. For other intersections within the CPA and its periphery that are not covered under the existing ATC System, they will be brought under the new system in Stage 2. Finally, the expansion of ATC System to the outskirts of Kuala Lumpur will be materialized in Stage 3.

In the case of the PJ ATC System, it will be introduced in the vicinity area along Federal Highway and Jalan Kelang Lama in Stage 1. Subsequently, the system will cover other areas in Stage 2 and finally the whole PJ in Stage 3.

Under the JKR HTS System, Stage 1 involves ramp signal control at five (5) interchange ramps in Petaling Jaya. This system will cover the section of Federal Highway from Kuala Lumpur boundary to the junction with Airport Highway and the Airport Highway itself in Stage 2 and the section of Federal Highway from the junction with Airport Highway to that with North Klang Straits Bypass in Stage 3.

However, the installation in Stage 3 is recommended to be determined and coordinated with the being planned Traffic Control and Management System of Malaysian Expressway and Toll Highway.

Table II-3 : Staging Plan of the Traffic Control and Surveillance System Plan

	KL ATC System			PJ ATC System			Selangor JKR HTS System		
	Traffic Signal	CCTV Camera	CMS Board	Traffic Signal	CCTV Camera	CMS Board	Traffic Signal	CCTV Camera	CMS Board
PHASE 1									
Stage 1	116	6	0	16	52	0	5	4	0
Stage 2	30	11	2	16	47	3	0	0	0
PHASE 2									
Stage 3	24	0	10	11	23	1	0	8	10
Total	170	17	12	43	122	4	5	12	10

7. PROJECT COST ESTIMATES

The cost for the TCS System, calculated in 1988 prices, consists of construction and operation costs. The former includes detailed engineering, engineering supervision and installation costs.

Table II-4 shows the estimated construction cost in each stage for the TCS System.

The Traffic Control and Surveillance System will require a total construction cost of M$116.3 million, that is M$83.1 million in Phase 1 and M$33.2 million in Phase 2.

Table II-4 : Construction Cost (at 1988 Prices)

(Unit: M$ million)

	KL ATC System	PJ ATC System	Selangor JKR HTS System	Total
PHASE 1				
Stage 1	24.1	5.8	13.6	
Stage 2	15.7	5.5	-	-
Sub-total	39.8	11.3	13.6	64.7
PHASE 2				
Stage 3	20.3	2.5	28.8	51.6
TOTAL	60.1	13.8	42.4	116.3

The KL ATC System will require an annual operation cost of M$1.2 million, M$1.6 million and M$2.1 million after completion of Stages 1, 2 and 3 respectively.

For PJ ATC System, the annual operation cost after the completion of Stages 1, 2 and 3 is M$0.21 million, M$0.35 million and M$0.43 million respectively.

The JKR HTS System will incur an annual operation cost of M$0.3 million, M$0.8 million and M$1.1 million after the completion of Stages 1, 2 and 3 respectively.

8. ECONOMIC EVALUATION

8.1 Economic Effects of the System

With the implementation of the Traffic Control and Surveillance (TCS) System, the following six (6) beneficial effects can be expected:-

(a) Alleviation of traffic congestions;
(b) Ability to monitor malfunctioning equipment units;
(c) Ability to facilitate emergency vehicle users;
(d) Ability to control vehicular traffic volume;
(e) Ability to control vehicle speed; and
(f) Reduction of noise and air pollution.

In addition, incidents can be detected by the CCTV cameras and the information can be relayed to drivers via the driver information boards. Automatic recording of traffic volume and compilation of statistical reports can be facilitated by the statistical data collection system.

8.2 Economic Analysis

Among these beneficial effects of the TCS System, the reduction in delay time and fuel consumption resulted from a decrease in vehicle idling can be quantified using monetary benefits. Figures II-4 and II-5 show the benefit of the ATC System.

An economic analysis based on the estimated benefits and the total economic cost of ATC Systems is carried out. The economic indicators, as shown in Table II-5, show that both the ATC System Plans are economically highly feasible.

Furthermore, a sensitivity analysis performed on the economic evaluation indicates the feasibility of the plan even when benefit is reduced by 40% and the installation and operation costs are increased by 40%.

Table II-5: Economic Indicators of ATC System Plan

Plan	Indicator	
KL ATC SYSTEM	Internal Rate of Return, IRR (%) ..	69.1
	Benefit-Cost Ratio, B/C Ratio ..	3.0
	Net Present Value, NPV (M$'000) ..	73,229
PJ ATC SYSTEM	Internal Rate of Return, IRR (%) ..	84.6
	Benefit-Cost Ratio, B/C Ratio ..	5.6
	Net Present Value, NPV (M$'000) ..	40,198

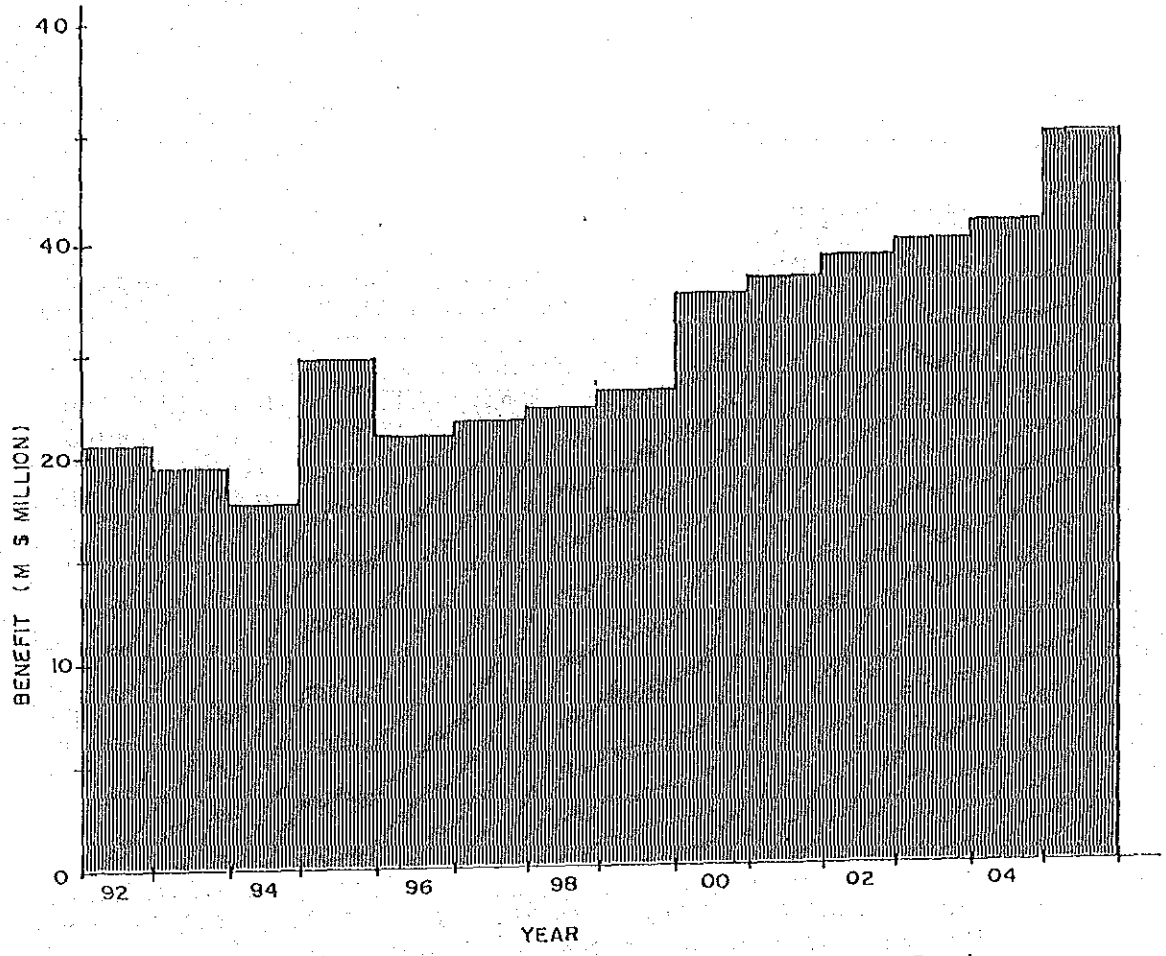


Figure II-4: Economic Benefit - KL ATC System

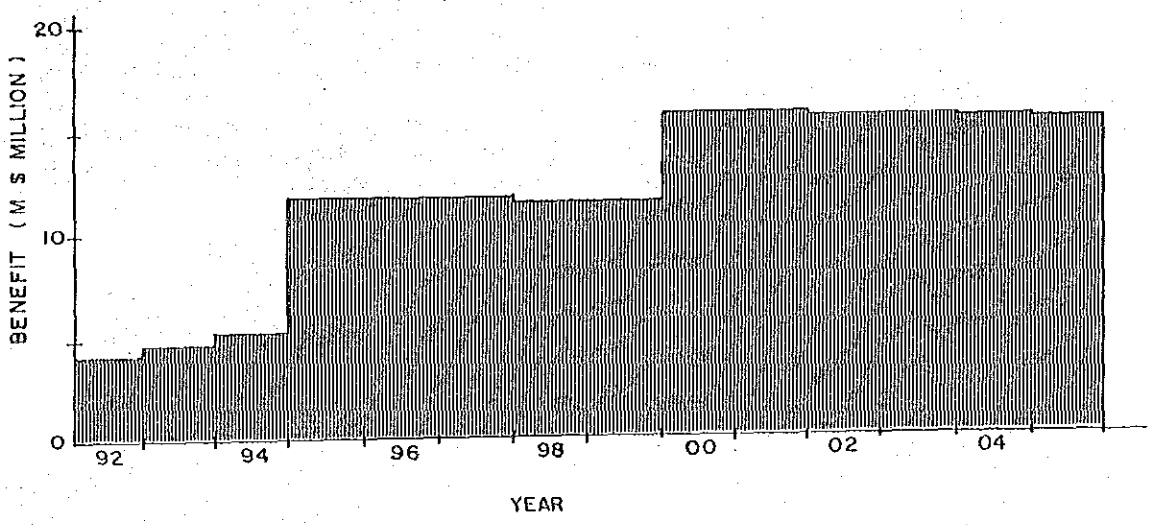


Figure II-5: Economic Benefit - PJ ATC System

9. IMPLEMENTATION PROGRAM

9.1 Task Force

In the Klang Valley Region, there are various government agencies concerned with traffic control. For instance, the ATC System which covers Kuala Lumpur and Petaling Jaya are under two different jurisdictions, Kuala Lumpur City Hall (DBKL) and Municipal Council of Petaling Jaya (MPPJ) respectively. The highway route covered by the HTS System (Federal Highway from the junction with North Klang Straits Bypass to the boundary of Kuala Lumpur and Airport Highway) is under the jurisdiction of Federal Public Works Department (JKR).

With Klang Valley Region evolving into a metropolitan region, it is desirable and necessary that the traffic control and surveillance system be unified under a single task force. Being the authority formed to oversee the overall development of the Klang Valley Region, it is most appropriate that the task force be established under the Klang Valley Planning Secretariat. Members of the task force would be DBKL, MPPJ, JKR, HPU, Royal Police Department and other relevant agencies.

9.2 Detailed Engineering Design Work Package

Since the traffic control and surveillance system in the Klang Valley Region is recommended as an integrated system, it is necessary to implement the detailed engineering work as one package. This involves the detailed engineering design of the central and terminal equipment together with the communication cable network as well as the set up of the control center. This detailed engineering work is recommended to be implemented and coordinated by the proposed task force.

9.3 Implementation Program

Hitherto, the Klang Valley Traffic Control and Surveillance System is classified into three systems:-

(a) KL ATC System
(b) PJ ATC System
(c) JKR HTS System

Each system is equipped with individual subcenter and linked to the main Klang Valley Traffic Intelligence Center in Kuala Lumpur.

The recommended implementation program is only applied for Phase 1 of the Traffic Control and Surveillance System and in view of its urgency, it is recommended to be completed by year 1992. Besides, it is formulated with consideration of the allocation of federal funds under the coming Malaysian Development Plans, that is, Sixth Malaysia Plan (1991-1995) and Seventh Malaysia Plan (1996-2000).

Table II-6 shows the implementation program and construction costs. The Traffic Control and Surveillance System will require a construction cost of M$116.30 million, that is M$8.60 million for detailed engineering design and engineering supervision and M$107.70 million for system installation. For the installation cost, KL ATC System will require M$55.65 million, PJ ATC System M$12.76 million and JKR HTS System M$39.29 million.

Table II-6 : Implementation Program

	1991	1992	1993	1994	1995	Sub-Total	1996	1997	1998	1999	Sub-Total	TOTAL
Detailed Engineering	2.40					2.40	1.90				1.90	4.30
Engineering Supervision		0.48	0.96	0.96		2.40		0.64	0.63	0.63	1.90	4.30
Sub-total	2.40	0.48	0.96	0.96		4.80	1.90	0.64	0.63	0.63	3.80	8.60
Installation												
KL ATC System		7.45	14.70	14.70		36.85		6.30	6.30	6.20	18.80	55.65
PJ ATC System		2.12	4.17	4.17		10.46		0.80	0.80	0.70	2.30	12.76
JKR HTS System		2.55	5.02	5.02		12.59		8.90	8.90	8.90	26.70	39.29
Sub-total		12.12	23.89	23.89		59.90		16.00	16.00	15.80	47.80	107.70
TOTAL	2.40	12.60	24.85	24.85		64.70	1.90	16.64	16.63	16.43	51.60	116.30

Unit: M$million

In line with the Malaysian Development Plans, the construction cost of the traffic control and surveillance system will be M$64.70 million under the Sixth Malaysian Plan and M$51.60 million under the Seventh Malaysia Plan.

Table II-7 presents the requirement of federal fund.

Table II-7 : Requirement of Federal Fund

Plan	Fund
Sixth Malaysia Plan	M$64.70 million
Seventh Malaysia Plan	M$51.60 million
Total	M$116.30 million

10. CONCLUSION AND RECOMMENDATIONS

From all the analyses carried out for the Traffic Control and Surveillance (TCS) System Project, the Study Team has arrived at the following conclusion and recommendations:-

(a) In order to achieve the objectives of alleviating traffic congestion, ensuring an effective control of all traffic in the Kuala Lumpur Conurbation Area, to reinforce the traffic surveillance function, to enhance driver information function and to introduce statistical data collection function, the TCS System should be introduced and/or upgraded in the areas of Kuala Lumpur, Petaling Jaya and on major highways under JKR.

(b) Discerning from the results of economic and technical studies, the following three (3) TCS Systems should be implemented as soon as possible.

  (i) Kuala Lumpur Area Traffic Control (ATC) System
  (ii) Petaling Jaya Area Traffic Control (ATC) System
  (iii) JKR Highway Traffic Surveillance (HTS) System

(c) It is concluded from the technical analysis that:-

  (i) KL ATC System should be an integrated system consisting of area-wide traffic responsive signal control system, traffic surveillance system and driver information system.

  (ii) PJ ATC System whose coverage area is the entire Petaling Jaya should also comprise an area-wide traffic responsive signal control system as well as a traffic surveillance system.

  (iii) JKR System whose coverage route is the Federal Route 2 (from Kuala Lumpur boundary to the junction with NKSB) and Airport Highway should be an advanced form of real-time traffic surveillance and control system including traffic responsive signal control at the interchanges on the Federal Route 2 in Petaling Jaya.

(d) As for the System Center, it is proposed that a center-subcenter formation is the most preferable. Under this proposed formation, the main center of the TCS System should be set up in Kuala Lumpur, namely the Klang Valley Traffic Intelligence Centre. Linked to this main centre are three (3) subcentres namely Kuala Lumpur Subcentre, Petaling Jaya Subcentre and JKR Subcentre.

(e) The project costs for the TCS System are as follows:-

	Project Costs (M$mil at 1988 Constant Prices)		
	Phase 1	Phase 2	Total
KL ATC System	39.8	20.3	60.1
PJ ATC System	11.3	2.5	13.8
JKR HTS System	13.6	28.8	42.4
TOTAL	64.7	51.6	116.3

(f) As for the implementation of the TCS System, it is most appropriate that the task force be established under the Klang Valley Planning Secretariat. Members of the task force would include DBKL, MPPJ, JKR, HPU, Royal Police Department and other relevant agencies.

Since the TCS System in the Klang Valley Region is recommended as an integrated system, it is necessary to implement the detailed engineering work as one package.

(g) Implementation Program

The TCS System should preferably be implemented according to the following schedule:-

Phase	Installation Period	Start of Operation
Phase 1 ..	1991 - 1994	1995
Phase 2 ..	1996 - 1999	2005

In line with the Malaysian Development Plans, the construction cost of the TCS System will be required as follows:-

Plan	Federal Fund Requirement (M$ at 1988 Constant Prices)
Sixth Malaysia Plan	M$ 64.70 million
Seventh Malaysia Plan	M$ 51.60 million
TOTAL	M$116.30 million

PART III

FREIGHT TERMINAL PROJECT

CONTENTS

1. INTRODUCTION

Rapid economic growth in the Klang Valley Region has brought about a concentration of population creating a vast increase in urbanized areas. Klang Valley has been the leading manufacturing region in the country. In proportion to increases in industrial activities and consumer demand caused by population concentration, the volume of freight transported in Klang Valley has expanded correspondingly. The growth of lorry traffic on the roads in Klang Valley has created further traffic congestion as well as air and noise pollution. Wholesalers and warehouses remained unorganized in the CBD areas where the need to load and unload goods has produced adverse traffic disturbances in the city center. Without a proper designated place to park their vehicles, lorry operators have resorted to parking them along the curbs or street shoulders and even in residential districts. Such uncontrolled lorry transport operations are both uneconomical and detrimental to the urban living environment.

Three Freight Terminals have been identified by the Klang Valley Transportation Study in 1987 for implementation to reorganize the freight transport industry in Klang Valley. These terminals are to provide modern goods handling facilities, parking and warehouses to overcome the existing freight transport problems.

2. RATIONALE OF THE FREIGHT TERMINALS

The planning and development of freight transport terminals is to seek improved economics of freight transport through increased efficiency and hence the volume of goods handled, modernizing handling procedure, rationalizing distribution and collection.

(a) Rationalization in Freight Transport System

Freight terminals enable inter-city line-haulers and intra-city distributors to rationalize their collection, transfer and distribution activities. With this, the total freight transport industry is made more efficient which in turns, shall contribute vastly towards the stablisation of consumer prices. In addition, handling of goods will speed up thus increasing volume of goods transport capability. Line-haul and distribution lorries can keep to better time schedule thereby upgrading the reliability and speed in freight transport.

(b) Modernization of Freight Transport Industry

Swift and safe handling of goods can be made possible by the use of modern goods handling equipment. Damages to goods can also be minimized. Aggregation of transporters would make possible the economic use of these equipment.

(c) Reduction in Freight Transport Cost

With the rationalization of goods consolidation and distribution, the average lorry load factor will consequently increase. This would in turn result in the possible use of larger lorries, route simplification and shorter storage time required. All these outcomes would contribute to the saving of transport cost.

(d) Promotion of Better Landuse in the Urban Areas

By reorganizing the existing scattered and small-scale transporters in the city center to the terminals located in the outskirts, their vacated land in the city can be utilized for the provision of other urban facilities.

(e) Improvement of Living Environment

Removing the need to load and unload goods in the city center invariably helps to reduce traffic congestion and consequently pollution. Encroachment of trucks in residential districts can also be solved. Without large line-haul lorries in the city, a better environmental quality and a higher traffic safety level can be maintained.

(f) Fostering Small-scale Transporters

It can be said that based on the experiences made in Japan, the freight terminals can positively contribute to fostering the growth of small-scale transporters.

3. FUNCTIONS AT THE FREIGHT TERMINALS

Figure III-1 below depicts the general functions of a Freight Terminal involving goods collection, processing (loading/unloading, sorting, consolidating, etc), storage and distribution.

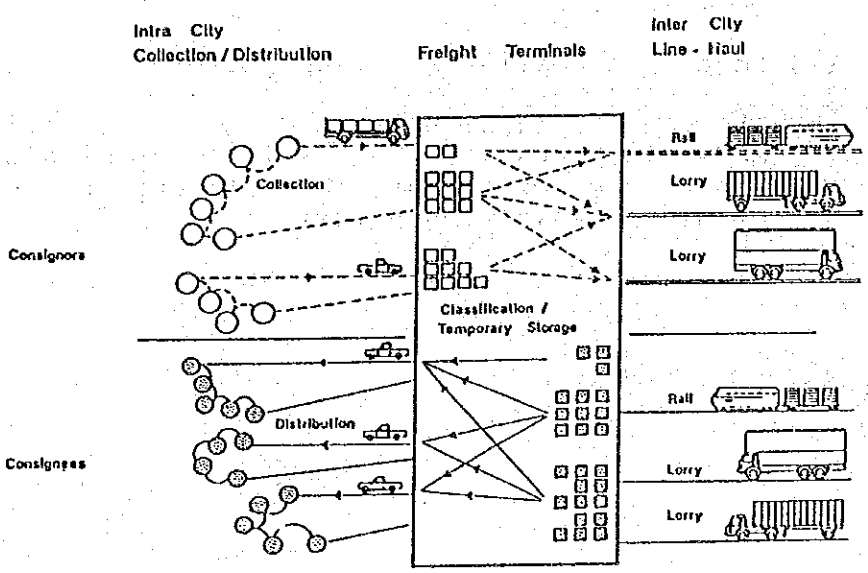


Figure III-1 : Functions of a Freight Terminal

The terminal provides a place where line-haul transport operation can be linked up with collection and distribution operation. Collection and distribution lorries can carry out activities in loops, thus saving time and transport costs. Line-haul lorries can expect to increase their load factor by consolidating the collected consignments at the terminal.

4. LOCATION OF THE FREIGHT TERMINAL SITES

The following locations of the terminal sites are selected as the result of an examination of alternative sites for each of the proposed terminals.

4.1 North Terminal

The site selected for locating North Terminal is a piece of land (Lot No.10903) belonging to Selangor State JKR, located in the district of Gombak just north of Kuala Lumpur City Limit. It is about 2km east of the intersection of Jalan Batu Caves and Jalan Ipoh (Federal Route 1) and fronting Jalan Batu Caves (see Figure III-2). Jalan Batu Caves will eventually be improved to be part of Middle Ring Road II as a divided urban arterial from which Karak Highway and Federal Route 1 radiates out to the east and north respectively.

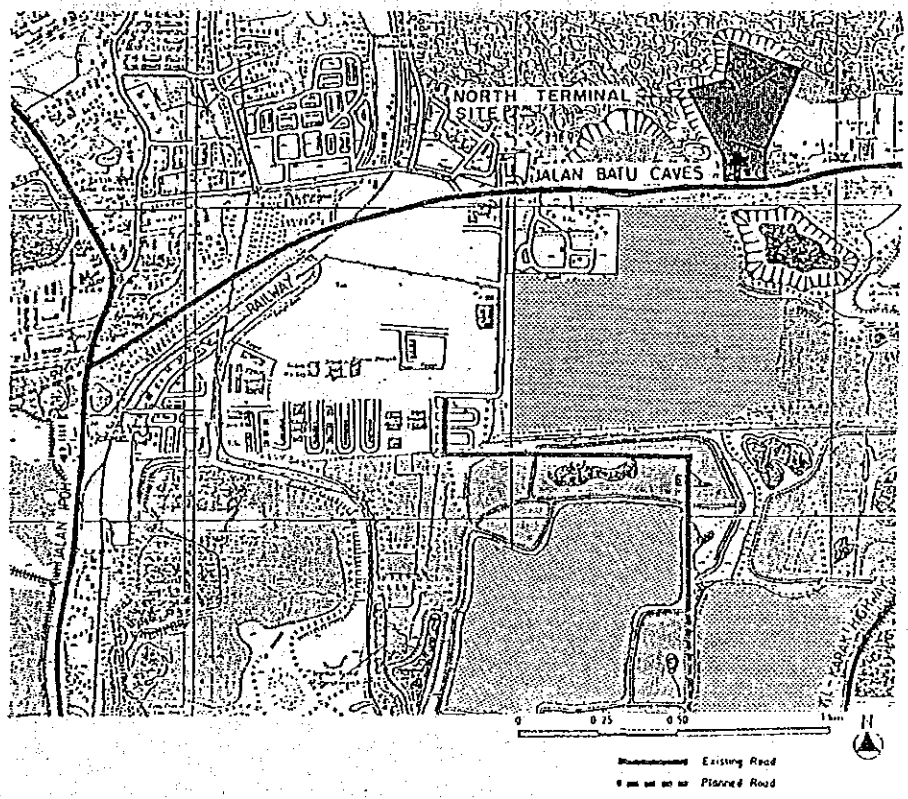


Figure III-2 : Location of North Terminal

4.2 South Terminal

The selected site for South Terminal is located some 13km to the south of Kuala Lumpur beside KL-Seremban Expressway. The site which consist of Lot 3050 and portion of Lot 3051 belongs to Selangor State Government. Although the site is on former tin mining area, geological survey has indicated that the ground is firm and suitable for construction (see Figure III-3).

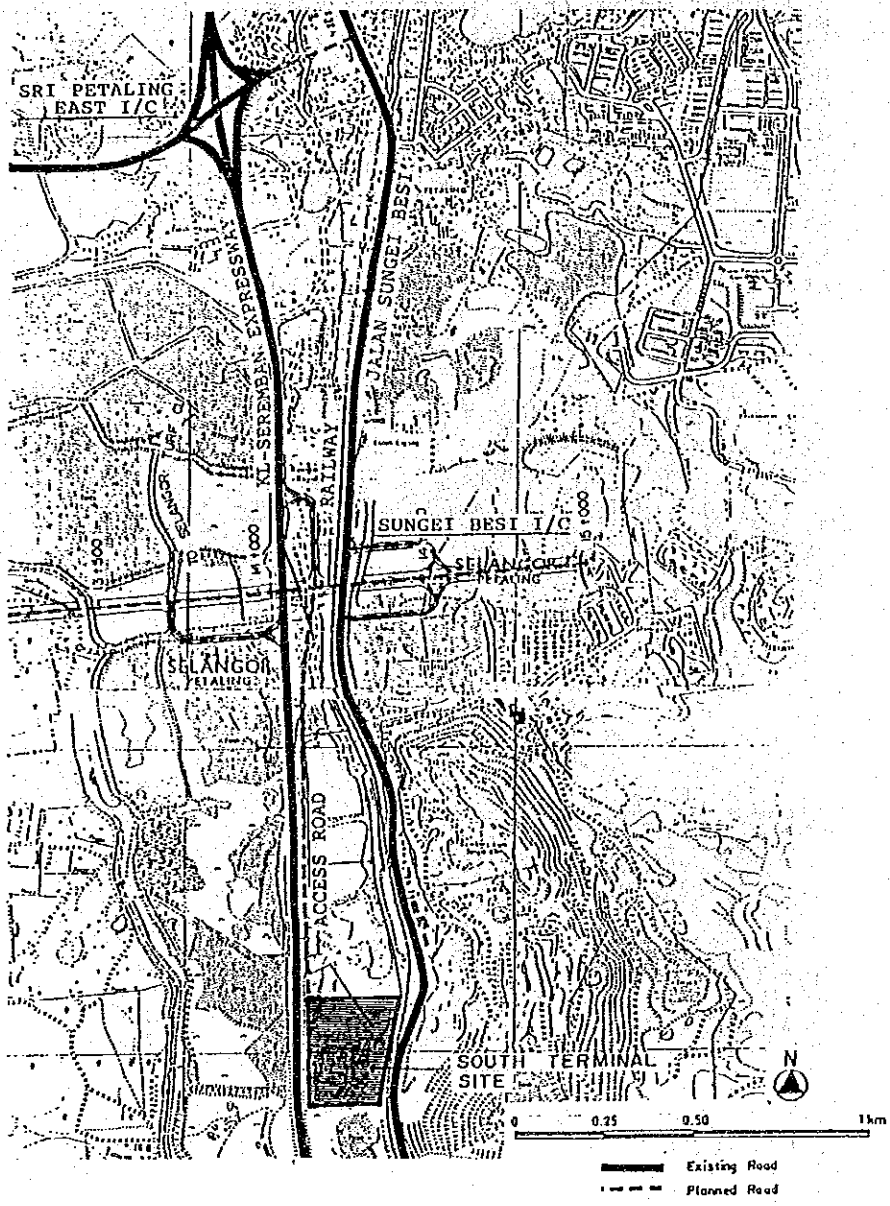


Figure III-3 : Location of South Terminal

4.3 Multi-modal Freight Terminal (a.k.a. West Terminal)

This terminal is planned to be located within the North Port Territory in Port Klang, some 45km west of Kuala Lumpur. The site is a reclaimed area from swamp land but geological survey has indicated that the ground is well settled and suitable for construction. The land belongs to Port Klang Authority (LPK) and is available for constructing the west terminal (Figure III-4). The site is served by Jalan Parang which connects to North Klang Straits Bypass.

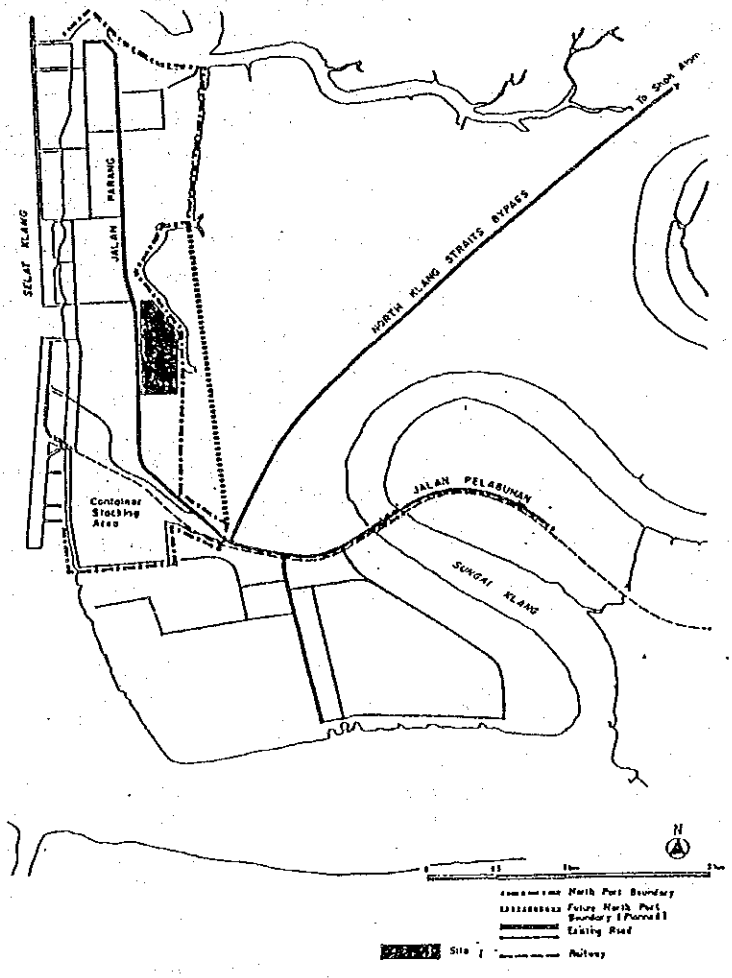


Figure III-4 : Location of Multi-modal (West) Terminal

5. PRELIMINARY DESIGN OF THE TERMINALS

5.1 Forecasted Freight Volume at the Terminals

To forecast the future freight volume, the existing OD pattern of goods movement and their consignment pattern were first analyzed. Using the 1985 data as base year information, future freight demand to 1995 and 2005 were then estimated based on the expected growth rates of GRP. The total volumes were subsequently split into intra-city, line haul and transit freight volumes. Lastly, these freight volumes were divided into shares for the South and North Terminals. The West Terminal is expected to handle mostly LCL container cargo. The future freight volume demand at this terminal is estimated based on the expected growth of LCL cargo less that can be absorbed by the existing container depots in the Klang Valley.

To handle the forecasted freight volume at the terminals, the space requirements in terms of the total area and each facility are computed and summarized in Table III-1.

Table III-1: Basic Space Requirements at the Freight Terminals

		North Terminal	South Terminal	Multi-modal (West) Terminal
1.	Freight Terminal Capacity	2,600 ton/day	2,000 ton/day	1,700 TEU/mth or 1,200 ton/day
2	Site Area			
2.1	Platform	20,900 sq.m	15,400 sq.m	21,700 sq.m
2.2	Admin.Bldg	4,900	3,000	2,300
2.3	Warehouse	7,280	7,600	8,300
2.4	Service Sta.*1	7,380	7,400	9,300
2.5	Parking *2	13,800	8,300	6,200
2.6	Container Yard	-	-	17,400
2.7	Road Space	21,500	19,500	9,900
2.8	Others	25,240	17,800	25,400
	Total	101,000 sq.m	79,000 sq.m	100,500 sq.m
3.	No. of Vehicles			
3.1	Line-haul	71 veh	54 veh	20 veh
3.2	Pick-up/delivery	412	316	62
3.3	Forklift	16	12	18
Total		499 veh	382 veh	112 veh

Note: (1) Including Petrol Station Area
(2) Including Vehicle Washing Area

5.2 Preliminary Design of the Terminals

Preliminary design of the terminals were performed with due consideration given to the following conditions:-

* Site Planning
  - land form, ground level, site configuration

* Functional Zoning
  - zoning of vehicle movement from human movement

* Vehicle Circulation System
  - one-way circulation by lorries in the terminal compound

* Terminal Facility Design

* Utility Provisions (roads, water tank, parking, power sub-station, drainage, etc.)

The layout plans of the various terminal facilities at North, South and Multi-modal (West) Terminals are respectively shown in Figures III-5 to III-7.

They are designed in such a way that the provision for introducing rail-mode facilities in both South and Multi-modal (West) Terminals is possible in future.

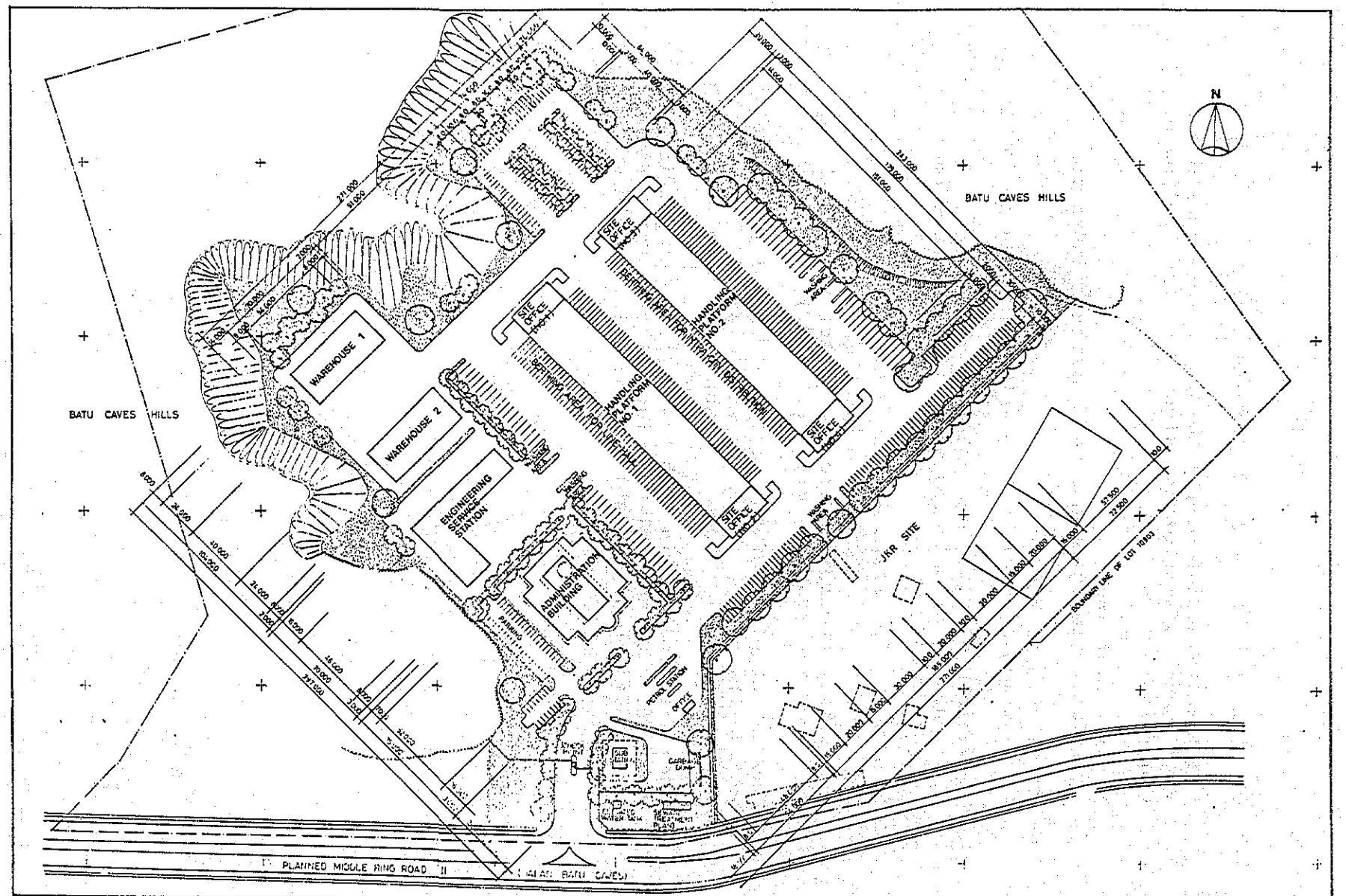


Figure III-5 : Layout Plan of North Terminal

NORTH TERMINAL	SITE PLAN	SCALE 1:2000	DRAWING NO N-1	DATE JULY 1988

THE FEASIBILITY STUDY ON TRANSPORTATION FACILITIES PROJECTS IN KLANG VALLEY

JAPAN INTERNATIONAL COOPERATION AGENCY

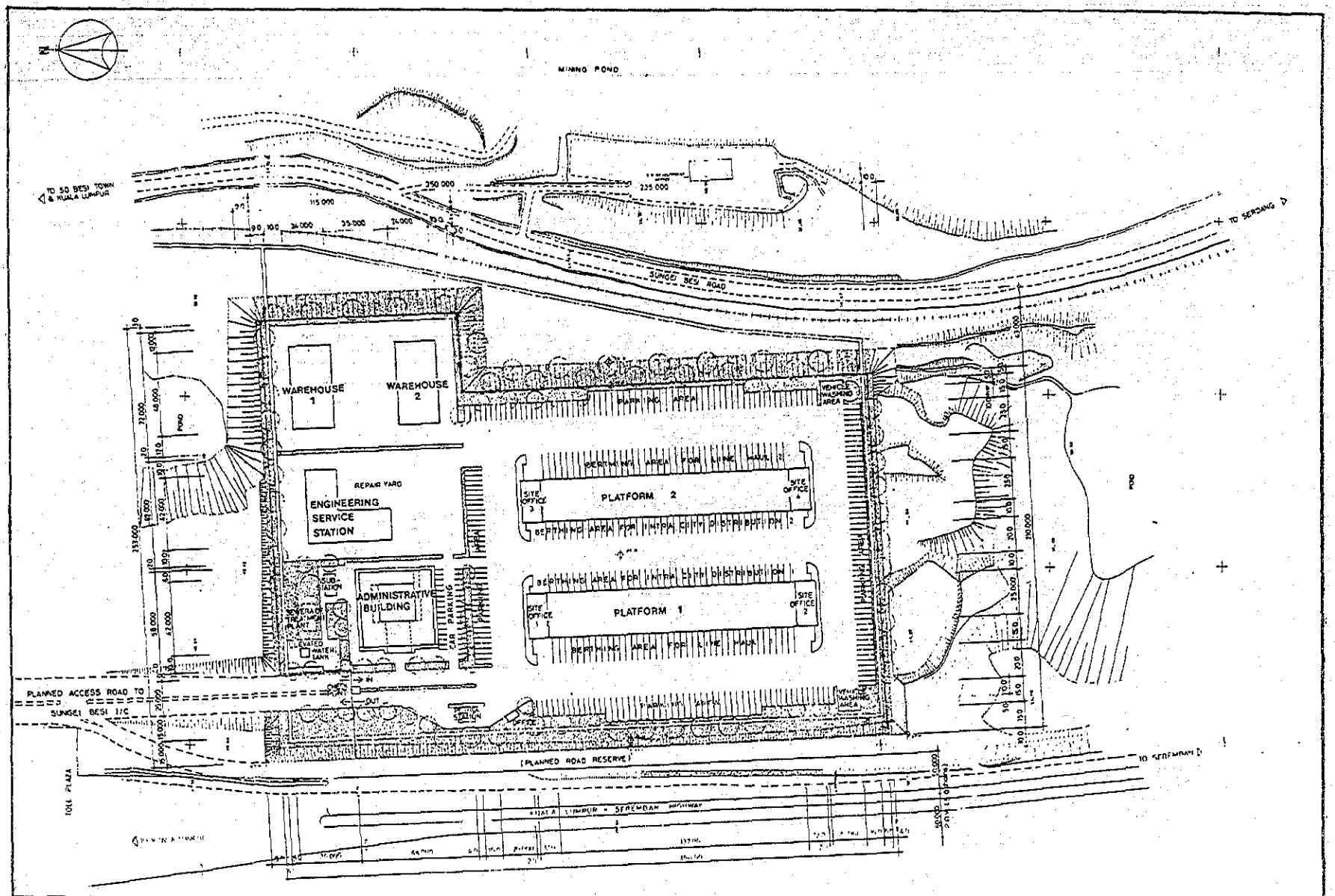


Figure III-6 : Layout Plan of South Terminal	SCALE 1:2000		THE FEASIBILITY STUDY ON TRANSPORTATION FACILITIES PROJECTS IN KLANG VALLEY
	DRAWING NO S-1	DATE JULY 1988	
SOUTH TERMINAL | SITE PLAN			JAPAN INTERNATIONAL COOPERATION AGENCY

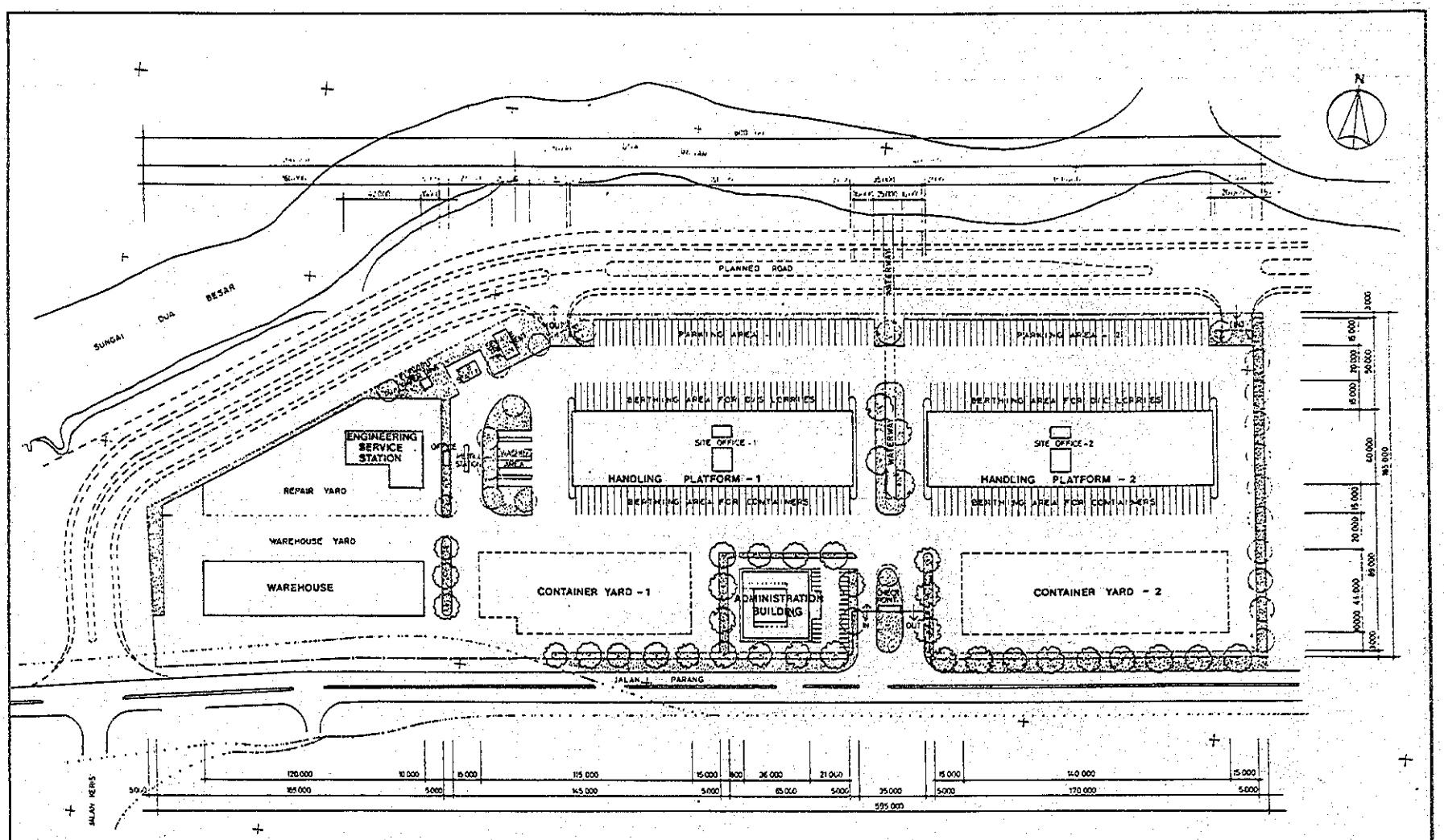


Figure III-7 : Layout Plan of Multi-modal (West) Terminal

MULTI-MODAL FREIGHT TERMINAL	SITE PLAN	SCALE : 1:2000	THE FEASIBILITY STUDY ON TRANSPORTATION FACILITIES PROJECTS IN KLANG VALLEY
		DRAWING NO : M - 1 / DATE : JULY 1988	JAPAN INTERNATIONAL COOPERATION AGENCY

6. PROJECT COST ESTIMATES

The implementation costs of each Freight Terminal which were estimated at the Interim Stage were found to be generally higher than normal practice in Malaysia for nearly similar structures. Therefore, the Study Team reviewed its cost estimates and the proposed implementation costs are shown in Table III-2. The proposed estimates are approximately 30% less than the interim ones.

Table III-2 : Implementation Cost Estimates

(Unit: in M$'000)

Item	North Terminal	South Terminal	Multi-modal (West) Terminal
1) Construction Cost	9,264	7,681	8,741
* Building Cost	6,714	5,322	6,342
* Site Facilities	2,550	2,359	2,399
2) Detailed Design & Supervision Fee	926	768	874
3) Contingencies	926	768	874
Total	11,116	9,217	10,489

Notes: (i) Construction cost includes preparation work cost
(ii) Detailed design and supervision fee is assumed as 10% of the construction cost
(iii) Contingency cost is assumed as 10% of the construction cost
(iv) Land is assumed to be provided by the Government

7. ECONOMIC EVALUATION OF THE TERMINALS

7.1 Economic Effects of the Freight Terminals

The economic evaluation is performed to determine the economic feasibility of the terminals. The effects accruing from the construction and operation of freight terminals are measured both qualitatively and quantitatively.

(a) Economic Effects of Freight Terminals

The apparent benefits of the terminal can be enumerated as shown in Table III-3.

Among these benefits, there are also indirect benefits which are generally difficult to quantify and may sometimes lead to a double counting of benefits. Accordingly, they are excluded from the analysis and the quantifiable economic benefits are defined as follows:-

(i) Benefits on Line-haul Operation
- Saving in vehicle operating cost
- Saving in fixed cost

(ii) Benefits on Cargo Handling System
- Saving in cargo handling cost

(iii) Benefits on Collection and Delivery Operation
- Saving in vehicle operating cost
- Saving in fixed cost

Table III-3 : Effects of Freight Terminal

Item	Effects on Freight Terminal
Line-haul Operation	- Loading factor in line-haul operation becomes better "with terminal" than "without terminal". As a result, productivity of the lorry industry is expected to increase - Turn around time in line-haul operation can be reduced due to reduced idling time - A scheduled and punctual operation of vehicles become possible - A proper management concerning the cargo transport supply and demand and quick response to customers' orders become possible
Cargo Handling	- The freight terminal will effect reduction of line-haul vehicles entering into the city thereby alleviating traffic congestion in the town area - The use of freight terminal will lead to reduction in damage to cargoes - The use of modern handling equipment and sufficient handling space at the freight terminal will increase the efficiency of cargo handling - Improvement of living environment is expected due to removing line-haul vehicles from residential areas
Collection and Delivery Operation	- To consolidate small scale forwarders so as to increase the efficiency of lorry operation - To reduce idling time of the collection and delivery lorries - This enables pick-up and delivery lorries to operate efficiently

7.2 Economic Evaluation

Table III-4 shows the results of economic evaluation for the terminals. Based on an evaluation period of 20 years and a discount rate of 12%, a benefit-cost (B/C) ratio of 1.55 to 1.79 can be achieved for North Terminal while that for South Terminal is 1.23 to 1.41 if the transporters can increase their transport efficiency by 20 to 25%. Therefore both North and South Terminals are economically viable.

North Terminal also shows a better economic viability compared to South Terminal in terms of NPV and IRR.

In the case of Multi-modal (West) Terminal, a B/C ratio of 1.29 to 1.40 can be achieved. In addition, the NPV and IRR indicate that it is economically viable to construct the Multi-modal (West) Terminal.

Table III-4 : Economic Indicators for the Projects

	B/C Ratio	NPV (M$'000)	IRR %
North Terminal			
Case 1: 20% Increase	1.55	29,159	26
Case 2: 25% Increase	1.79	33,719	32
South Terminal			
Case 1: 20% Increase	1.23	19,707	18
Case 2: 25% Increase	1.41	22,616	22
Multi-modal (West) Terminal			
Case 1: 20% Increase	1.29	21,704	19
Case 2: 25% Increase	1.40	23,661	22

Note: (a) Project life is assumed to be 20 years
(b) Discount rate is 12% per annum

8. FINANCIAL ANALYSIS

The financial analysis of the projects is carried out to obtain the following information:-

(a) What is the minimum condition for keeping the financial self-supporting system of the business entity?

(b) Are terminal usage charges acceptable/ affordable to the transporters?

(c) Are the profitability and financial situation satisfactory to induce investors and bankers into the Project?

8.1 Financial Analysis

As a result of the financial analysis, the financial indicators of the projects are obtained as shown in Table III-5.

The basic assumptions made for this analysis are based on existing Malaysian standards and the Government's recent experience in privatization projects.

It is found that all three (3) projects are financially viable under the following conditions:-

(a) Annual berth rental for three (3) terminals is as follows:-

Terminal		Annual Rental
North Terminal	..	M$20,000/berth/year
South Terminal	..	M$18,000/berth/year
Multi-modal (West) Terminal	..	M$20,000/berth/year

(b) Project life is assumed to be 20 years.

(c) Number of berths will be utilized as follows:-

Year	North Terminal	South Terminal	Multi-modal (West)Terminal
1995	57 (65%)	51 (64%)	-
2000	71 (81%)	64 (80%)	-
2005	88 (100%)	80 (100%)	84 (100%)

Note: Figures in parenthesis are utilization rate to the total with capacity

(d) Annual inflation rate is assumed to be 4% per annum.

Table III-5 : Financial Indices of the Projects

		North Terminal	South Terminal	Multi-modal (West) Terminal
FIRR (%)	Nominal	14.5	13.7	14.9
	Real	10.1	9.4	10.5
FNPV (M$'000)	Nominal	5,056	3,462	3,564
B/C Ratio	Nominal	1.26	1.21	1.31
ROE	Nominal	18.8	17.0	22.3
	Real	14.2	12.5	17.7

Notes: (1) All calculations are made based on the revised cost estimates
(2) In the nominal case, FIRR as well as ROE is calculated based on the values at current prices and in the real case, based on the discounted values at current prices with a discount rate of 4%
(3) The FNPV and B/C ratio are calculated based on the discounted values at current prices with a discount rate of 10%

In order to answer the third question, the financial conditions of the business entity are analyzed in this Study on the basis of the following conditions:-

* Equity Share Ratio
  Paid-up Equity .. 20%
  Long-term Loan .. 80%

* Paid-up Equity Allocation Ratio
  Public Sector .. 20%
  Private Sector .. 80%

* Long-term Loan Conditions

	Maximum Lending Period (yrs)	Grace Period (yrs)	Annual Interest Rate (%)	Annual Amount of Re-payment	Long-term Loan Allocation Ratio
1. Bank Pembangunan Malaysia (BPM)	15	5	85	Uniform	80
2. Two Step Loan	15	5	7.75	Uniform	20
3. Commercial Bank	15	5	9.5	Uniform	0
4. Direct Foreign Loan	15	7	4.0	Uniform	0

* Tax
  - Corporate income tax is 40% on net profit

* Dividend
  - 10% dividend for investors is assumed to be distributed in the 5th year after investment is made

The results of the financial analysis is shown in Tables III-6 and III-7. According to these tables, it is concluded that the investors would invest in the Freight Terminal Projects.

Table III-6 : Recovering Years of the Investment

	North Terminal	South Terminal	Multi-modal (West) Terminal
Recovering Years after Operation	9 years	10 years	6 years
Recovering Year	2000	2001	2005

Table III-7 : Financial Condition of the Business Entity

	North Terminal	South Terminal	Multi-modal (West)Terminal
First-year of Operating Surplus	4th year	6th year	4th year
Maximum Short-term Loan in Single Year (M$'000)	609	476	534
Maximum Accumulated Short-term Loan (M$'000)	1,169	914	1,025
Clearing-up Year of Short-term Loan	5th year	11th year	4th year
Debt Service Coverage Ratio	2.13	2.00	2.25

8.2 Acceptability/Affordability of Transporters

An examination on the acceptability/affordability of transporters towards the terminal usage charges is made in the Study.

Table III-8 shows comparison of freight transport operation between existing shophouses and the Freight Terminal. Although the terminal seems to be more expensive than the existing shophouse, the terminal is providing berthing areas for incoming and outgoing cargoes and other spatial allowances.

Table III-9 shows the modal calculation for acceptability/affordability of transporters. If the transporters are able to achieve 4% increase of transport efficiency, they can expect to gain net benefits. Since the Study has shown that an increase of about 20% in transport efficiency can be expected when the transporters are relocated from the existing shophouses to the terminals, it is concluded that the transporters will accept a relocation to the terminals.

Table III-8 : Comparison of Existing Shophouses and Freight Terminal

		Existing Shophouse	Freight Terminal (North Terminal)
Functions		- Handling cargo - Warehousing - Office	- Handling cargo - Office - Berthing (- Warehousing)
Total Working Space		136.4 sq.m/shophouse (1,500 sq.ft)	124.1 sq.m/berth (1,370 sq.ft) Platform .. 105.0 sq.m/berth Site Office .. 19.1 sq.m/berth
Handling Cargo Capacity		20 tons/day	20 tons/day
Annual Rental	Rental	M$18,000/shophouse	M$20,000/berth
	Difference	-	M$2,000
	Per sq.m	M$132/sq.m	M$162/sq.m (23% up)
(Remarks) Berthing Area		- No own space. Public roads are occupied for berthing lorries (this cost is indirectly borne by the public)	- The terminal has its own berthing area of 87.5 sq.m/berth - The using cost of the berthing area is already included in the above annual rental
Other Spatial Allowance		- No own space	- The terminal is planned to automatically have the following spatial allowances other than the above total working space:- TOTAL .. 234.9 sq.m/berth - Other space allowance/Total working space .. 1.89 - Their costs (construction, operating and financial cost) are already reflected in the above annual rental

Table III-9: Acceptability/Affordability *1 of Transporter of the Proposed Terminal Usage Costs in 1994

(Unit M$ at current prices)

Case	Without Freight Terminal	With Freight Terminal (Transportation Efficiency)					
		No Increase		20% Increase		25% Increase	
Financial Items	(A)	(B)	(B)-(A)	(C)	(C)-(A)	(D)	(D)-(A)
Total Revenue	2,138,640	2,138,640		2,138,640		2,138,640	
Chartered Truckage	606,480	606,480		606,480		606,480	
Net Revenue	1,532,160	1,532,160		1,532,160		1,532,160	
Total Expenses	1,323,220	1,382,930		1,100,330		1,054,700	
Terminal Costs	93,630	153,340		153,340		153,340	
Net Profit Before Tax	208,940	149,230		431,830		477,460	
Net Profit After Tax	135,810	97,000	-38,810	280,690	144,880	310,350	174,540

Note: *1 - Medium scale transporter who can deal with 30,000 tonnes cargoes per year is supposed

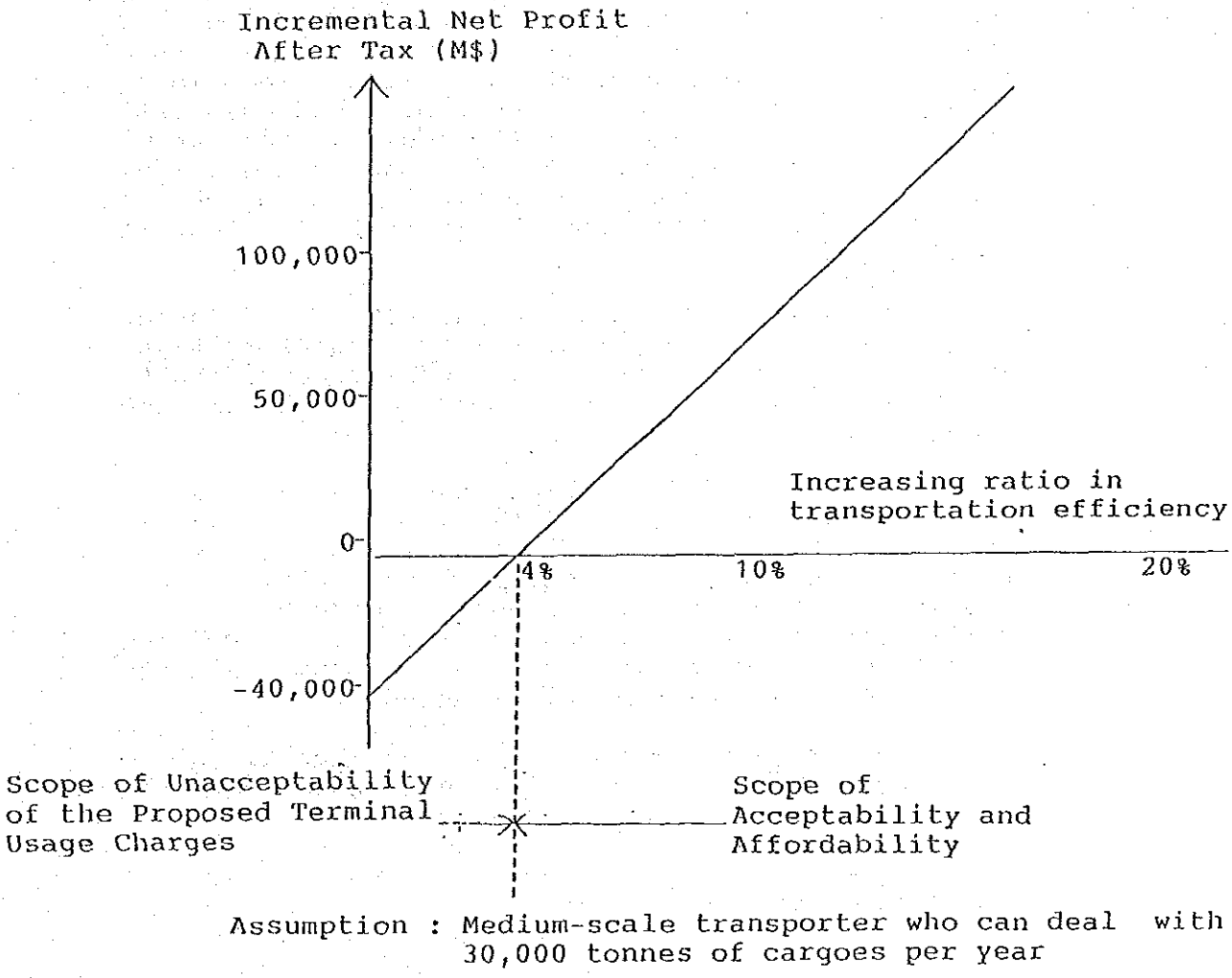


Figure III-8: Scope of Acceptability/Affordability of Transporter of the Proposed Terminal Usage Charges

9. OPERATION, ADMINISTRATION AND LEGAL ASPECTS

9.1 Ownership

The three terminals are recommended to be implemented by the private sector. However, due to the recognition that the Freight Terminals are but one of the public facilities for improving lorry transportation efficiency, the public bodies should contribute a small part of the equity, say about 20%. In addition, from the national context, the proposed terminals are to become the major bases for physical distribution by lorries located in Klang Valley.

Selangor State Investment Company (SSI), Selangor State Development Corporation (PKNS) and Port Klang Authority (LPK) are the public bodies identified to contribute equity to the implementation of the terminals.

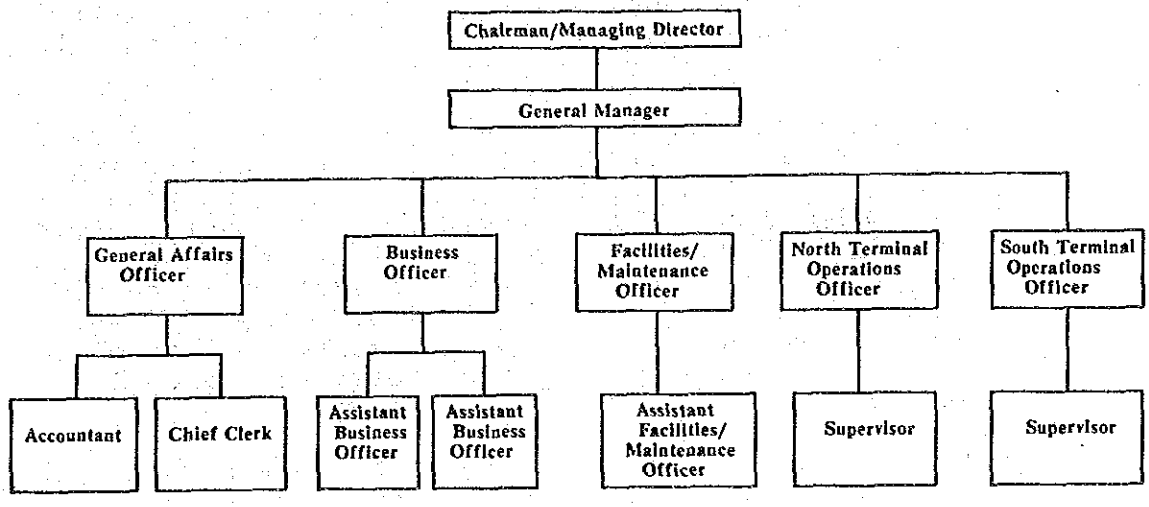
The participation of a public body in equity share would also ensure the realization of a desirable policy on the establishment of nation wide freight terminal network, to monitor and control unit freight cost by the Government, to enhance the qualification of business entity for receiving long-term loan from development banks and to achieve a financially stable management.

The Ministry of Transport has been identified to contribute an active role in regulating the planning, construction and operation of the terminals.

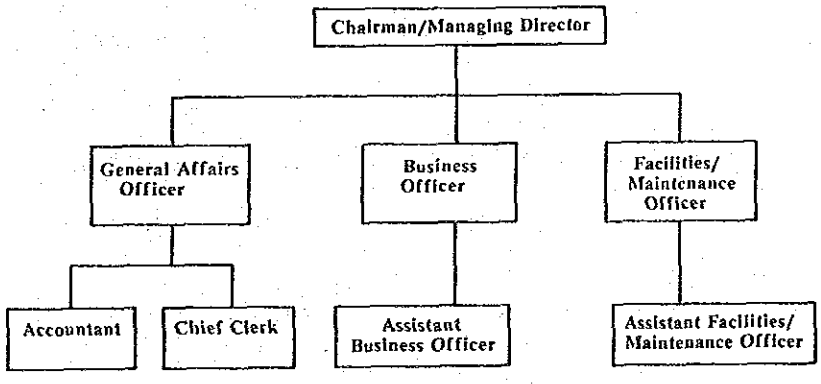
9.2 Management

North and South Terminals are recommended to be managed by a single management entity while Multi-modal Freight Terminal by a separate entity. This proposal is based on the need to manage both North and South Terminals in a closely related manner for the transport of general cargoes while Multi-modal (West) Terminal is to be managed for the handling of container cargoes.

The proposed organization setup for these two management companies are shown in Figure III-9.



(a) Organization Setup for North and South Terminals



(b) Organization Setup for the Multi-modal Freight Terminal

Figure III-9: Organization Set-ups for the Proposed Freight Terminal Management Companies

The management companies are to lease out the terminal berth space to lorry transporters and collect annual rental by a tariff rate to be set by the management but agreed to by the transporters. The auxiliary facilities like warehouse, petrol station, canteen, etc. are to be leased out to sub-contractors for their operation.

The leasing should ensure a good mix of large, medium and small transporters. This is to prevent any monopoly or oligopoly in transport operation and to help small enterpreneurs. Moreover, it is essential that a good mix of transporters be maintained for promoting rationalization in cargoes consolidation. The management company shall oversee the performances of the leasee of terminal berths to ensure that the terminals are fully utilized.

The management companies shall be responsible for the general maintenance of all building structures, roadways and apron utilities. The companies must also oversee the general security by checking and recording incoming and outgoing lorries at the entrance/exit points.

9.3 Legal Aspects for Terminal Construction

The licencing and control of goods transport vehicles and operation are now governed by the following:-

(i) Road Transport Act, 1987 (Act 333)
(ii) Commercial Vehicles Licencing Board Act, 1987 (Act 334)
(iii) Statutory Rules under the Road Traffic Ordinance, 1958

The construction and operation of warehouses are governed by the following Acts depending on the type of warehouses.

(iv) Local Government Act, 1976
(v) Custom Act, 1967

The Road Transport Act of 1987 generally regulates the operation of lorry vehicles. The Commercial Vehicles Licencing Board Act, 1987 on the other hand governs the licencing of transporters according to types of goods handled, either for reward/hire or the licence holders own goods. The statutory rules provided the various operating rules for goods transport.

Legal provision for the construction of the proposed terminals is contained in Section 72 of the Road Transport Act of 1987. The provision is not specifically for lorry terminals only but for the general construction and operation of public parking space and stands.

Salient points under this section of the Act are:-

* Any appropriate public body is allowed to construct Freight Terminals as long as it does not contravene other laws and its proposal to construct is approved by the Minister of Transport. Although the Act does not specify what are the public bodies concerned, reference to the existing bus terminals implementation within Klang Valley indicates that public body includes at least public organizations like City Hall, Municipal Councils, UDA and State Development Corporations like PKNS.

* Approval from the Ministry of Transport is required since the terminals are located near the Federal Road and involves goods vehicles.

* The terminals have among their facilities, parking spaces for hire. This therefore requires the Government to gazzette such provision and thus specify the location, type of parking, number of parking spaces, period of usage, charge or rate, manner of collection, etc. as required by the Act.

Operation of the warehouse facility in the Freight Terminals are governed by the Local Government Act, 1976 and the Custom Act, 1967. The former governs the construction and operation of public warehouse where a licence to operate has to be obtained from the local authority concerned. The Customs Act, 1967 governs and controls the operation of bonded warehouses where a licence from the Custom and Excise Department of the Ministry of Finance is necessary.

10. CONCLUSION AND RECOMMENDATIONS

From all the analyses carried out on the Freight Terminals, the Study Team arrives at the following conclusion and recommendations:-

(a) In order to achieve the objectives of rationalizing freight transport system, modernizing freight transport industry and reducing the freight transport cost through increase in transportation efficiency, Freight Terminals should be established not only in Klang Valley but also in Peninsular Malaysia as soon as possible;

(b) As the results of the economic and financial studies show, North and South Terminals should be constructed at the earliest possible time. However, construction of Multi-modal (West) Terminal should be delayed until such time as when the existing Inland Clearance Depot of Kontena Nasional and Container Depot of Shapadu will have reached their full capacity at around the year 1997 or earlier.

In this connection, works on the detailed engineering design for North and South Terminals should be started immediately.

(c) The financial analysis results reveal the following observations:-

(i) the Freight Terminals are financially viable for a business entity to implement and operate;

(ii) the business entity which will implement and operate the Freight Terminals can expect to receive appropriate level of profits;

(iii) investors in the Freight Terminals can also expect to receive appropriate levels of Return on Investment (ROI), but not a high return on the investment due to the project being a non-risky project and one of the semi-public infrastructures for the transport industry;

(iv) transporters who are willing to relocate to the Freight Terminals can expect to receive sufficient net financial benefit even though the berth rental charges of the proposed Terminals are higher than the cost of existing facilities borne by them.

(d) Nevertheless, the abovementioned financial viability is based on the following conditions:-

(i) The project costs for the Freight Terminals are as follows:-

(Unit: M$'000)

	Project Cost (at 1988 constant prices)
North Terminal	11,116
South Terminal	9,217
Multi-modal (West) Terminal	10,489
Total	30,822

Note: This is based on the revised cost estimates

(ii) The equity share of the capital costs shall be at least 20%.

(iii) Taking into consideration the Freight Terminal as one of the public infrastructures for lorry transportation system, it is recommended for the Government:-

* to contribute up to 20% of the total equity share to invest in the Freight Terminals

* to arrange for utilization of lower interest rate of long-term loan from Bank Pembangunan Malaysia (BPM) or two-step loan from World Bank or OECF (Japan).

(iv) The berth rental at the terminals would be as follows:-

Terminal	Annual Berth Rental (At 1988 constant prices)
North Terminal	M$20,000
South Terminal	M$18,000
Multi-modal (West) Terminal	M$20,000

(v) Number of berths will be utilized as follows:-

Year	North Terminal	South Terminal	Multi-modal (West) Terminal
1995	57 (65%)	51 (64%)	-
2000	71 (81%)	64 (80%)	-
2005	88 (100%)	80 (100%)	84 (100%)

Note: Figures in parenthesis are utilized in rate to the total berth capacity

(e) In order to implement the Freight Terminal Projects successfully, the Study Team recommends that the organization identified as the promoters of the Projects and related agencies should earnestly carry out the following main activities at each stage:-

Stage	Promoters/Related Agencies	Main Objectives and Activities
Preparatory Stage of the Projects	* Selangor State Government * Kuala Lumpur City Hall * Ministry of Transport	* To induce the candidate promoters to sit at the same table after arrangement of interest among the members
Establishment of the Business Entity	* Selangor State Government * Kuala Lumpur City Hall * Ministry of Transport * Representatives of Lorry Transport Industry * Loan-Supplier/s * Entrepreneur/s	* To establish the business entity * Clarification and getting concensus on the conditions to determine the responsibility and role of each member * To arrange for sources of implementation fund * Preparation of Project Proposal

(f) Considering that the Freight Terminals are one of the public infrastructures for the lorry transportation system, a public body should jointly invest with the business entity to be set up for the Freight Terminals and contribute at least 20% of the total equity share in order to realize a desirable policy on establishment of nation-wide freight terminal network, to monitor and control the freight cost by the Government, to enhance the qualification of business entity for receiving the long-term

loan from development banks and to achieve a financially stable management.

(g) The technical, economic and financial studies suggest that the Freight Terminals should preferably be implemented according to the following schedules:-

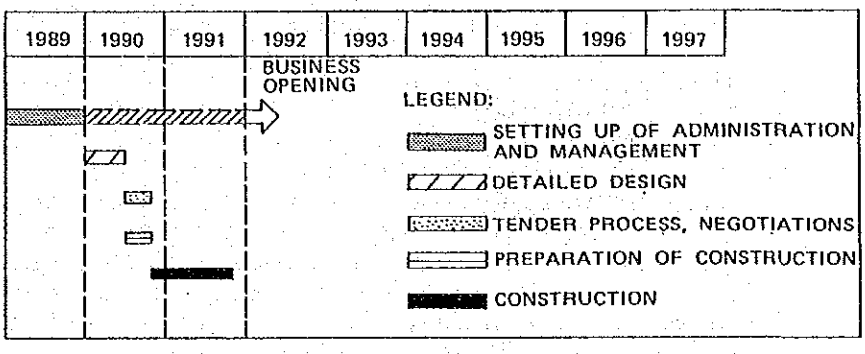


Figure III-10: Recommended Implementation Schedule for North and South Terminals

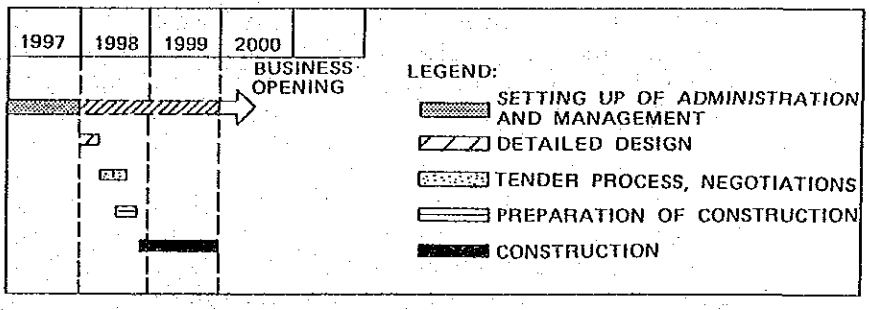


Figure III-11: Recommended Implementation Schedule for Multi-modal (West) Terminal

(h) Based on the result of the location study for the Freight Terminals, the following locations are recommended:-

(i) North Terminal on Lot No. 10903 (near Batu Caves)
(ii) South Terminal on Lot Nos. 3050 and 3051 (part of former Sungei Besi Tin Mines)
(iii) Multi-modal (West) Terminal on vacant reclaimed land in North Port area.

(i) The required area for the Freight Terminals are:-

Terminal		Area
North Terminal	..	10.1 ha
South Terminal	..	7.9 ha
Multi-modal (West) Terminal	..	10.1 ha

(j) The Freight Terminal management companies shall lease the terminal berth spaces to lorry transporters or forwarders at a tariff rate agreeable to all parties. Auxiliary facilities such as warehouses, petrol station are also to be contracted out to private operators. Parking facility is provided for all the line-haul and distribution lorries to avoid the present haphazard parking by lorries along street shoulders.

(k) Regulations on a restructuring and control of freight charges (between line-haul operators and distribution transporters); leasing procedure of berth spaces to transporters; terminal operations and usage need to be enacted. The Land and Marine Transport Divisions in the Ministry of Transport are recommended to play an active role in regulating the planning, construction and operation of all terminals in the country.

(l) A "National Freight Terminal Study" to undertake a feasibility study on the establishment of Freight Terminals at each regional center in Peninsular Malaysia is recommended in order to increase the overall efficiency of the lorry transport industry.

GLOSSARY

(A) ABBREVIATION

ATC	:	Area Traffic Control
B/C Ratio	:	Benefit-Cost Ratio
Bkt.	:	Bukit (hill)
CBD	:	Central Business District
CPA	:	Central Planning Area
CCTV	:	Close Circuit Television
CLS	:	Cordon Line Interview Survey
EPU	:	Economic Planning Unit
FCL	:	Full Carload
FIRR	:	Financial Internal Rate of Return
GDP	:	Gross Domestic Product
GRP	:	Gross Regional Product
HTS	:	Highway Traffic Surveillance
IC	:	Interchange
IRR	:	Inner Ring Road
JICA	:	Japan International Cooperation Agency
JKR	:	Jabatan Kerja Raya (Public Works Department)
Jln.	:	Jalan (Road, Street)
Kg.	:	Kampung (Village)
KL	:	Kuala Lumpur
KVTS	:	Klang Valley Transportation Study, 1987
KVPP	:	Klang Valley Perspective Plan, 1984
LCL	:	Less than Carload
LLM	:	Lembaga Lebuhraya Malaysia (Malaysian Highway Authority)
LLN	:	Lembaga Letrik Negara (National Electricity Board (NEB)
Modem	:	Modulator Demodulator
MPPJ	:	Majlis Perbandaran Petaling Jaya (PJ Municipal Council)
MRR	:	Middle Ring Road
MRR-II	:	Middle Ring Road II
NKSB	:	North Klang Straits Bypass
NKVE	:	New Klang Valley Expressway
NPV	:	Net Present Value
N-S Link	:	North-South Link
O-D Table	:	Origin-Destination Table
OECF	:	Overseas Economic Corporation Fund (Japan)
OIS	:	Lorry Owner Interview Survey, 1985
PCU	:	Passenger Car Unit
PJ	:	Petaling Jaya
PLUS	:	Projek Lebuhraya Utara Selatan Sdn. Bhd. (Private Company which is given the concession for the North -South Expressway)
Rd.	:	Road
ROE	:	Return on Equity
ROI	:	Return on Investment
ROW	:	Right-of-way
Sg.	:	Sungai (River)
TEU	:	Twenty foot equivalent unit for containers

(B) TERMINOLOGY

Bulk Commodities	:	Cargoes in loose form, i.e. not in packages/ containers/sacks, such as cereals, charcoal, iron ore, liquid form products
Freight Terminals	:	A single term to define the three proposed terminals, namely North Terminal, South Terminal and Multi-modal (West) Terminal
Full Carload Cargoes (FCL) Cargoes	:	Cargoes that are transported in units of container/ lorry, they are handled only by the consignor and consignee
Government	:	Refers to the Government of Malaysia unless specified otherwise
Interchange	:	Refers to grade separated intersection
Intersection	:	(or at-grade intersection) Refers to the intersecting of two roads at-grade, either signalized or non-signalized
Junction	:	Refers to interchange between two expressway only
Less than Carload (LCL) Cargoes	:	Cargoes that are not large enough to fill up a container/lorry, they are therefore collected and "consolidated" into units of container/lorry before they are transported
Non-bulk Commodities	:	Also called general cargoes, i.e. cargoes that are packed into boxes/containers/sacks, etc.
Physical Distribution	:	The act of transferring goods into the hands of the consumers which may involve packaging, transporting, distribution, etc.
Project Roads	:	A single term used to define the three proposed roads in this Study namely, the Southern part of Middle Ring Road II, Shah Alam Highway and North-South Expressway Link

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