CHAPTER 6 : PROJECT COST ESTIMATES

6.1   General

The construction cost is estimated based on the results of preliminary engineering design and the quantity take-off of construction work items.

The unit prices are computed in accordance with the following criteria:-

(i) It is assumed that major construction works will be contracted to general contractors by international tender;

(ii) The unit price of each work item is determined based on the economic conditions prevailing in June 1988; and

(iii) The cost is split into foreign currency and local currency portions, both indicated in Malaysian Ringgit.

The foreign currency component comprises the costs of:-

* wages of foreign personnel;
* overhead and profit of foreign firms;
* depreciation of construction equipment;
* steel products except reinforcing bar;
* bituminous materials;
* joint fillers; and
* materials for road supporting facilities.

The local currency component includes the costs of:-

* domestic materials and supplies such as fuel, cement, reinforcing bar, plywood, timber of which the country is a net exporter;
* wages of local personnel;
* overhead and profit of local firms;
* managing and maintenance costs of construction equipment;
* port handling and clearance charges of construction equipment; and
* taxes.

(iv) The Malaysian tax and duty on imported equipment and materials are included;

(v) Tax is imposed on overhead and profit even if it is a foreign currency component;

(vi) Land acquisition and compensation includes land acquisition, property compensation and compensation for the relocation of public utilities;

(vii) Physical contingency is assumed to be 10% of the total of construction cost;

(viii) The cost of consulting supervisory services is estimated to be 3% of construction cost;

(ix) Final engineering services are estimated to be 5% of construction cost;

(x) The rates of exchange used to convert the Malaysian Ringgit to Japanese Yen and US Dollar are M$2.60 = US$1.00 = Yen 125.

6.2  Unit Construction Cost

(1) General

The unit cost of each work item was obtained by accumulating the labour cost, equipment cost, royalty, material cost and miscellaneous cost for the item. The result was checked against actual figure for similar construction works in Malaysia.

(2) Unit Cost of Labour

The unit labour cost was based on "Kadar-kadar Harga Yang Ditawarkan Bagi Kerja Kejuruteraan Awam, JKR" and the actual cost prevailing in Malaysia. Table 6.2.1 shows the costs by major labour classifications.

Table 6.2.1 : Unit Cost of Labour

| Labour Classification | | Unit Cost per hour (M$) |
|---|---|---|
| Foreman, General | .. | 7.68 |
| Plant Operator | .. | 5.16 |
| Driver | .. | 4.00 |
| Mechanic | .. | 4.00 |
| Carpenter | .. | 3.50 |
| Skilled Labour | .. | 3.50 |
| Heavy Labour | .. | 2.30 |
| Common Labour | .. | 1.70 |
| Superintendant | .. | 12.00 |

Notes:
(1) The costs per hour have been increased by 20% to allow for social benefits, insurance, etc.
(2) The costs per day are based on seven (7) hours working time.


(3) Unit Cost of Materials

The unit cost of materials was based on "Data Book for Cost Estimates in Japan" and "Kadar-kadar Harga Yang Ditawarkan Bagi Kerja Kejuruteraan Awam, JKR".

Table 6.2.2 shows the unit cost of major materials. The costs of imported materials are based on the prevailing market prices in Malaysia.


Table 6.2.2 : Unit Cost of Major Materials

| Material | Unit | Unit Cost | Remarks |
|---|---|---|---|
| Gasoline | litre | 0.85 | |
| Diesel Fuel | litre | 0.47 | |
| Lubricant Oil | litre | 3.50 | |
| Asphalt Cement | t | 396.4 | |
| Portland Cement | bag | 9.10 | |
| Timber Plank | cu.m | 247.0 | |
| Reinforcing Steel | kg | 1.49 | SD 30 |
| Prestressing Steel | t | 3000 | |
| Reinforced Concrete Pile | m | 69 | 356mm x 356mm |
| Steel Pipe Pile | t | 1300 | |

(4) Equipment Unit Cost

An assessment of equipment hourly costs was
made for the plant that would probably be used
in the construction of the project. The
equipment unit costs are estimated by the
following elements.

* Capacity
* Prevailing CIF at Port Klang
* Port handling and clearance cost
* Economic life (Year)
* Hours used per year
* Scrap value
* Repair and maintenance cost
* Managing cost
* Fuel cost per hour
* Lubricant oil cost per hour


6.3   Land Acquisition and Compensation Costs

6.3.1 Land Acquisition Costs

(1) Basic Data

Land acquisition costs are calculated based on
the result of ROW Study and the unit cost data
obtained from Property Evaluation and Service
Offices of Federal Territory and Selangor
State respectively in September 1988. The
unit costs applied to the cost estimates for
each category of land are shown in Table
6.3.1.

(2) Assumption Used to Derive Total Land
Acquisition Cost

Existing streets and waterways within the
future ROW are excluded from the cost
estimates. Such private land as plantations,
fish ponds and access gates to buildings are
regarded as the land to be compensated
according to the relevant category in Table
6.3.1.

Table 6.3.1 : Unit Costs of Land Acquisition

| Category | Unit Cost (M$/sq.m) |
|---|---|
| **1. Built-up Area * i)** | |
| a) Residential | 320 |
| b) Industrial | 400 |
| c) Other Landuse | 150 |
| d) Malay Reserve * iii) | 120 |
| **2. Approved Development Area * ii)** | |
| a) Residential | 45 |
| b) Mixed Landuse | 100 |
| **3. Agricultural Land** | |
| a) Large Plantation | 25 |
| b) Small Holding | 65 |
| c) Malay Reserve * iii) | 35 |
| d) Potential for Housing Development | 50 |
| **4. Government Land (including road reserve, river reserve, transmission reserve, forest reserve and mining land)** | 0 *iv) |

* Notes:-
  i) Including building compensation cost
 ii) Refers to land already approved for development but not yet implemented
iii) Not taking into consideration special conditions attached to compensation for Malay Reserve Land under Schedule 1, Section 1 (2A), Land Acquisition Act.
 iv) In the estimation of economic cost, road reserve given up by developers are costed on the same basis as neighbouring approved development land. River and transmission reserve which have been acquired has no cost except that the amount required for relocating facilities or additional works to enable the study roads to pass through. Existing roadway also has no cost, but forest reserve and mining land are costed on the same basis of the potential market value.

6.3.2 Compensation Cost for Buildings and Other
Properties

(1) Basic Data

The costs for the compensation of buildings
and other properties are also calculated based
on the unit cost data which were obtained from
Property Evaluation and Service Offices of
Federal Territory and Selangor State
respectively in September 1988.

Table 6.3.2 shows the unit cost applied to the
cost estimates for each category of property.

Table 6.3.2 : Unit Cost of Compensation for Property

| Category | Unit Cost (M$'000/unit) |
|---|---|
| 1. Permanent (Ferro-concrete) House | 100.0 |
| 2. Temporary (Wooden) House | 50.0 |
| 3. Shophouses (2-Storey) | 150.0 |

6.3.3 Compensation Costs for Relocation of Public
Facilities

Only existing utilities are assumed to be
relocated at the time of construction of the Study
roads. The unit compensation costs for relocation
are established on the assumption that new cables
and pipes may be laid in the proposed utility
space underneath the side strips of arterial
street and no reuse of the existing materials is
taken into consideration.

6.4 Quantity Take-off of Each Work Item

Quantity take-off is prepared from the preliminary
engineering designs. In order to enable
complicated studies on alternative stage
construction plans to be carried out, the whole
project road length is divided into 43 segments.

Major structures, such as bridges, retaining
walls, boxes and sand drains are summarized
separately from others.

Factors such as bridge type, span length, width, depth of a bearing stratum surface, etc. regarding to structural characteristics are recorded on a Structural Data File which is referred to each pay item by a unit quantity computation programme to produce a Structural Quantity File.

Ordinary roadway quantities other than structural quantities are calculated and stored in Ordinary Item Data Files which are prepared for each segment. Extracted quantities are processed by computer and stored in an Ordinary Quantity File for each segment.

The Structural and Ordinary Quantity Files as described above are combined into a total cost quantity table and output for the combined segments, i.e. construction sections under study.

6.5     Summary of Estimated Construction Cost in 1988 Prices

(1) Total Construction Cost

Figures 6.5.1 and 6.5.2 show each construction section of Study roads and its estimated construction cost in 1988 prices.

The total construction cost is estimated as follows:-

(i) Shah Alam Highway/MRR II .. M$  673.5 million
(ii) North-South Link             .. M$  358.6 million

Total                           .. M$1,032.1 million

The breakdown of total construction cost is shown in Appendix Chapter 6.

(2) Cost of Proposed Interchanges

Figures 6.5.3 through 6.5.5 show the estimated construction cost of each proposed interchange in 1988 prices. The estimated cost excludes the portion due to throughway construction.
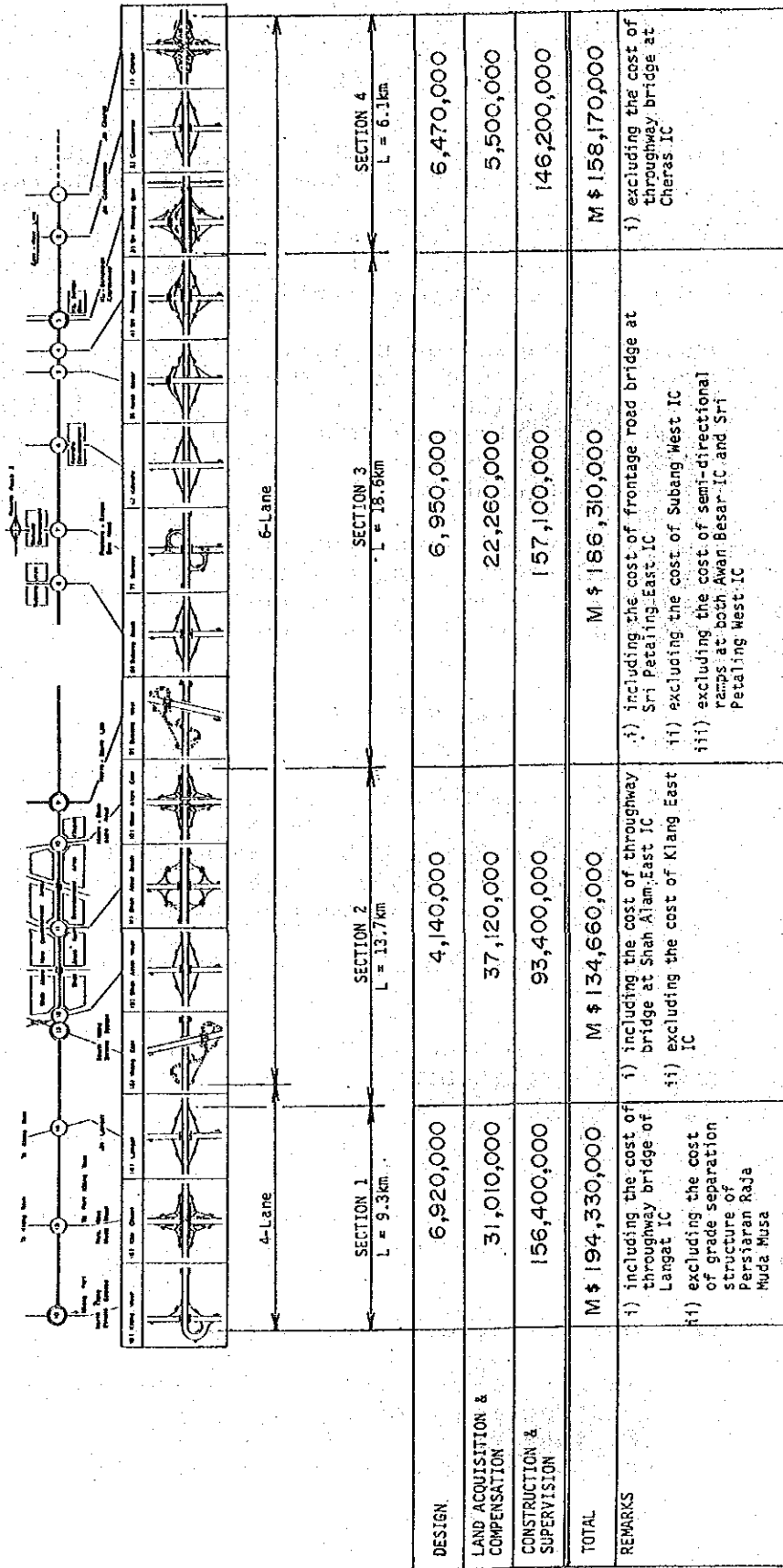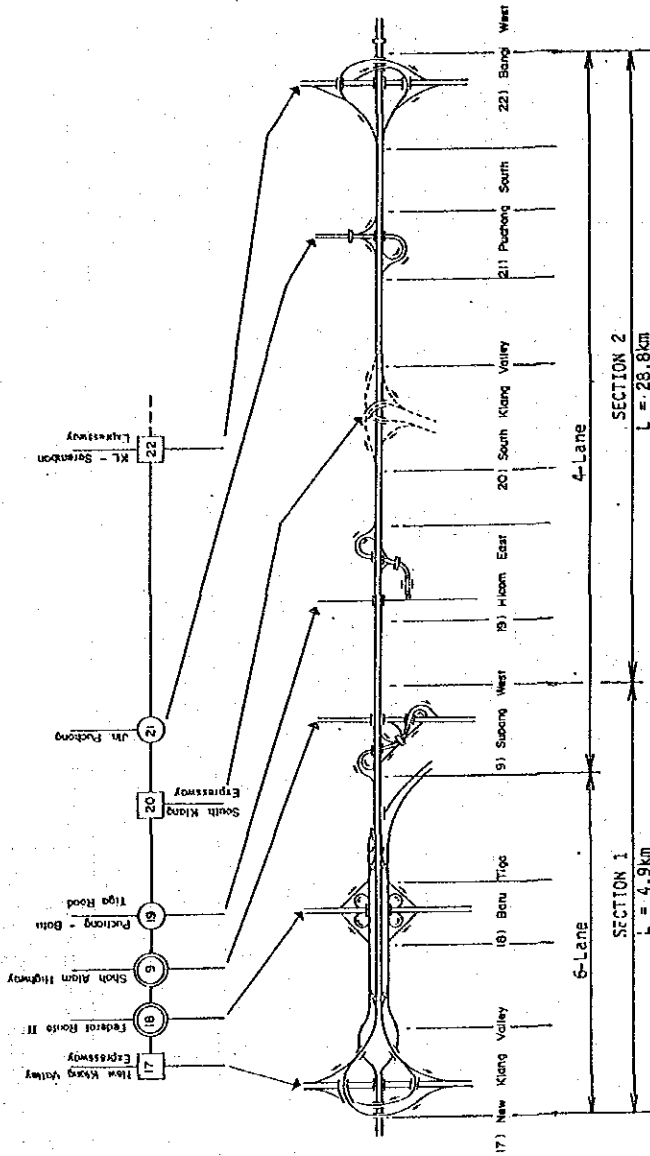
# SHAH ALAM HIGHWAY / MRR II



| | SECTION 1<br>L = 9.3km | SECTION 2<br>L = 13.7km | SECTION 3<br>L = 18.6km | SECTION 4<br>L = 6.1km |
|---|---|---|---|---|
| DESIGN | 6,920,000 | 4,140,000 | 6,950,000 | 6,470,000 |
| LAND ACQUISITION & COMPENSATION | 31,010,000 | 37,120,000 | 22,260,000 | 5,500,000 |
| CONSTRUCTION & SUPERVISION | 156,400,000 | 93,400,000 | 157,100,000 | 146,200,000 |
| TOTAL | M $ 194,330,000 | M $ 134,660,000 | M $ 186,310,000 | M $ 158,170,000 |
| REMARKS | i) including the cost of throughway bridge of Langat IC<br>ii) excluding the cost of grade separation structure of Persiaran Raja Muda Musa | i) including the cost of throughway bridge at Shah Alam East IC<br>ii) excluding the cost of Klang East IC | i) including the cost of frontage road bridge at Sri Petaling East IC<br>ii) excluding the cost of Subang West IC<br>iii) excluding the cost of semi-directional ramps at both Awan Besar IC and Sri Petaling West IC | i) excluding the cost of throughway bridge at Cheras IC |

Figure 6.5.1: Construction Cost of Shah Alam Highway/MRR-II

LEGEND:

SCALE:

THE FEASIBILITY STUDY ON TRANSPORTATION FACILITIES PROJECTS IN KLANG VALLEY

# N-S LINK



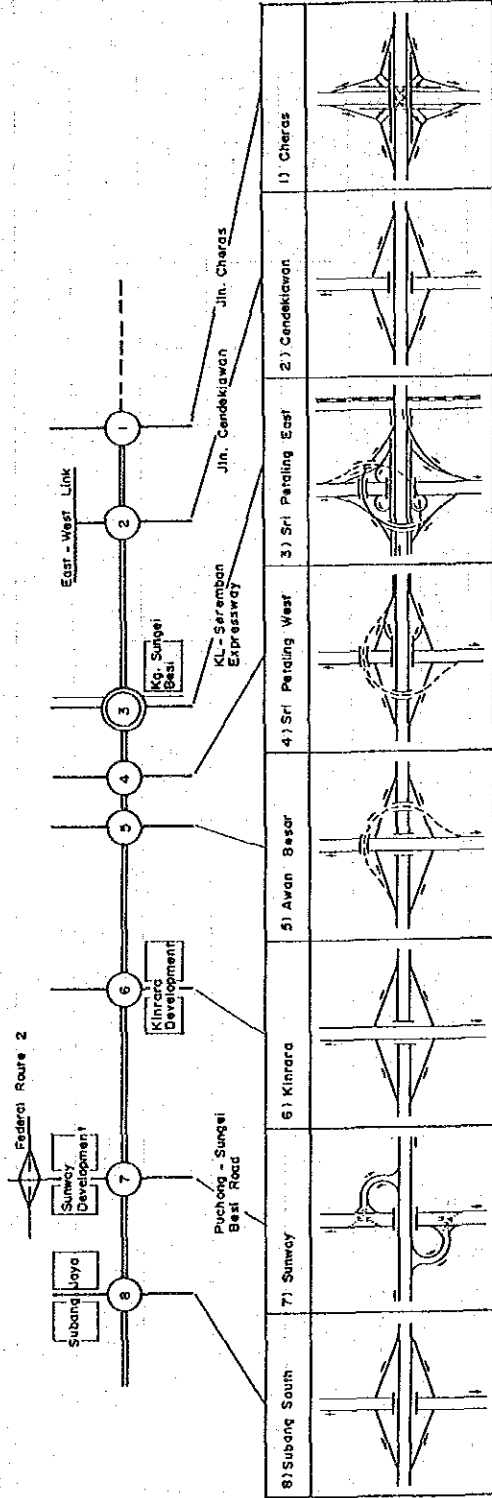| | SECTION 1<br>L = 4.9km | SECTION 2<br>L = 28.8km |
|---|---|---|
| | 6-Lane | 4-Lane |
| DESIGN | 4,400,000 | 8,640,000 |
| LAND ACQUISITION &<br>COMPENSATION | 4,060,000 | 47,430,000 |
| CONSTRUCTION &<br>SUPERVISION | 98,800,000 | 195,300,000 |
| TOTAL | M $ 107,260,000 | M $ 251,370,000 |
| REMARKS | i) excluding the cost of throughway bridge<br>at Subang West IC | i) including the cost of throughway bridge at Subang West IC<br>ii) including the cost of direct access to Bangi New Town<br>iii) excluding the cost of South Klang Valley IC |
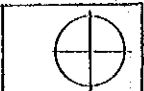
Figure 6.5.2: Construction Cost of N-S Link

LEGEND:

SCALE:

## THE FEASIBILITY STUDY ON TRANSPORTATION FACILITIES PROJECTS IN KLANG VALLEY

# SHAH ALAM HIGHWAY

IC CONSTRUCTION COST ( Excluding Throughway Construction Cost, Unit : Million Ringgit ).

| | 9) Subang West | 10) Shah Alam East | 11) Shah Alam South | 12) Shah Alam West | 13) Klang East | 14) Langat | 15) Kim Chuan | 16) Klang West |
|---|---|---|---|---|---|---|---|---|
| IC with Existing Road | 9.4 | 1.7 | — | — | — | 1.5 | — | 8.7 |
| IC with Planned Road | — | — | — | — | 6.0 | — | — | — |
| 2nd RANK | — | — | 3.8 | — | — | — | 0.8 | — |
| 3rd RANK | — | — | — | 1.1 | — | — | — | — |
| Beyond year 2005 | — | 7.8 | — | — | — | — | — | — |

LEGEND:

SYSTEM INTERCHANGE A (square)
SYSTEM INTERCHANGE B (circle)
SERVICE INTERCHANGE (small circle)
TOLL PLAZA

Figure 6.5.3 : Interchange Type (Shah Alam Highway)

THE FEASIBILITY STUDY ON TRANSPORTATION FACILITIES PROJECTS IN KLANG VALLEY

SCALE :

# SHAH ALAM HIGHWAY

East - West Link
Jln. Cerdas
Jln. Cendekiawan
KL - Seremban Expressway
Kg. Sungei Besi
Federal Route 2
Sunway Development
Subang Jaya
Kinrara Development
Puchong - Sungei Besi Road

| | 1) Cheras | 2) Cendekiawan | 3) Sri Petaling East | 4) Sri Petaling West | 5) Awan Besar | 6) Kinrara | 7) Sunway | 8) Subang South |
|---|---|---|---|---|---|---|---|---|

**IC CONSTRUCTION COST ( Excluding Throughway Construction Cost, Unit : Million Ringgit ).**

| | | 1) Cheras | 2) Cendekiawan | 3) Sri Petaling East | 4) Sri Petaling West | 5) Awan Besar | 6) Kinrara | 7) Sunway | 8) Subang South |
|---|---|---|---|---|---|---|---|---|---|
| 1st RANK | IC with Existing Road | 2.5 | — | 18.7 | — | — | — | — | — |
| | IC with Planned Road | — | 2.0 | — | — | — | — | — | — |
| 2nd RANK | | — | — | — | — | — | — | — | — |
| 3rd RANK | | — | — | — | 0.7 | 3.5 | 4.2 | 2.2 | 1.2 |
| Beyond year 2005 | | — | — | — | 4.0 | 4.0 | — | — | — |

LEGEND:
☐ SYSTEM INTERCHANGE A  ◯ SERVICE INTERCHANGE
◎ SYSTEM INTERCHANGE B  ⊏⊐ TOLL PLAZA
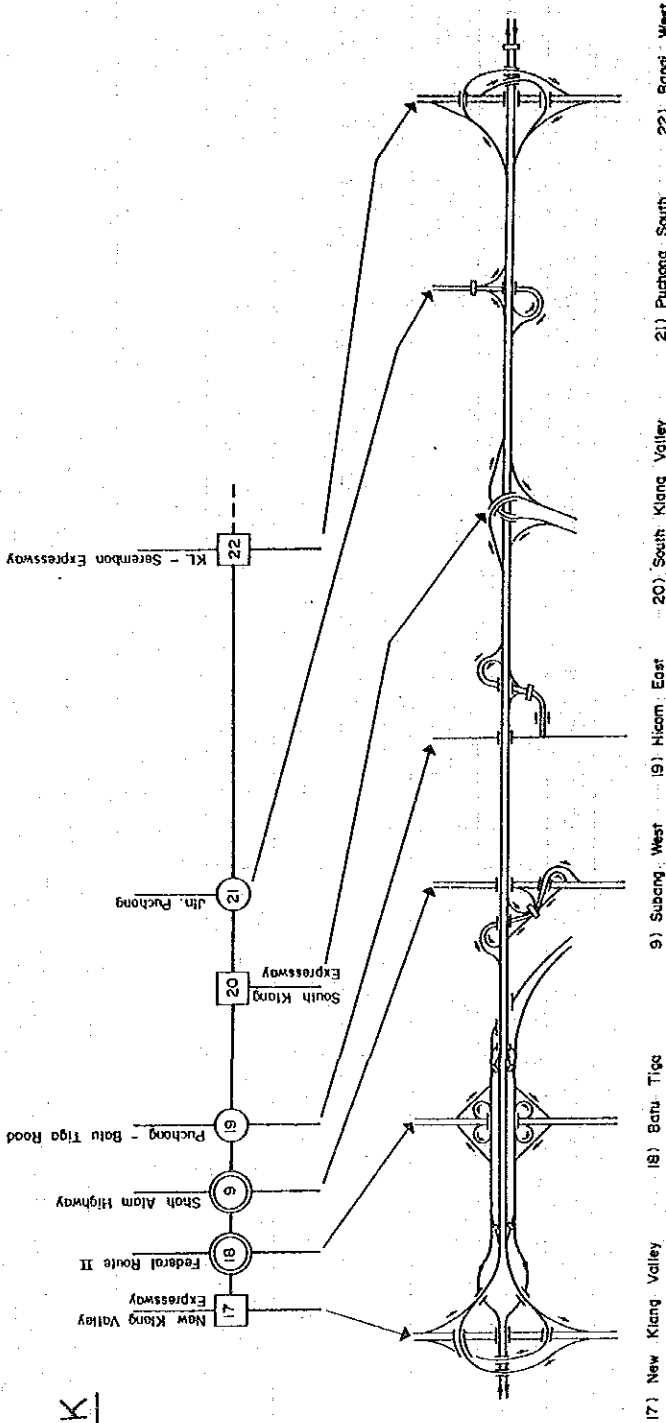
N

SCALE:

Figure 6.5.4 : Interchange Type (Shah Alam Highway/MRR II)

**THE FEASIBILITY STUDY ON TRANSPORTATION FACILITIES PROJECTS IN KLANG VALLEY**

# N - S LINK



## IC CONSTRUCTION COST ( Excluding Throughway Construction Cost, Unit : Million Ringgit).

| | 7) New Klang Valley | 8) Banu Tiga | 9) Subang West | 9) Nicom East | 20) South Klang Valley | 21) Puchong South | 22) Bangi West |
|---|---|---|---|---|---|---|---|
| 1st RANK — IC with Existing Road | 21.7 | 10.6 | 9.4 | — | — | — | 14.0 |
| IC with Planned Road | — | — | — | — | 6.1 | — | — |
| 2nd. RANK | — | — | — | — | — | — | — |
| 3rd. RANK | — | — | — | 5.6 | — | 5.5 | — |
| Beyond year 2005 | — | — | — | — | — | — | — |

LEGEND:

SYSTEM INTERCHANGE A
SYSTEM INTERCHANGE B
SERVICE INTERCHANGE
TOLL PLAZA

Figure 6.5.5 : Interchange Type (N-S Link)

THE FEASIBILITY STUDY ON TRANSPORTATION
FACILITIES PROJECTS IN KLANG VALLEY

SCALE :

N
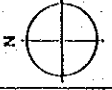
(3) Cost of Alternative Schemes for High Priority
Sections

Sections 2 and 3 of Shah Alam Highway/MRR-II
and Section 1 of N-S Link are considered as
high priority sections of the study roads.

In addition, alternative schemes of each high
priority section can be formulated from the
stage-wise construction of interchanges and
the number of lanes.

The estimated construction and supervision
cost of each alternative scheme and the
applied conditions are shown in Figures 6.5.6
through 6.5.12.

The cost breakdown of alternative schemes is
shown in Appendix to Chapter 6.

# SHAH ALAM HIGHWAY / MRR - II SECTION 2
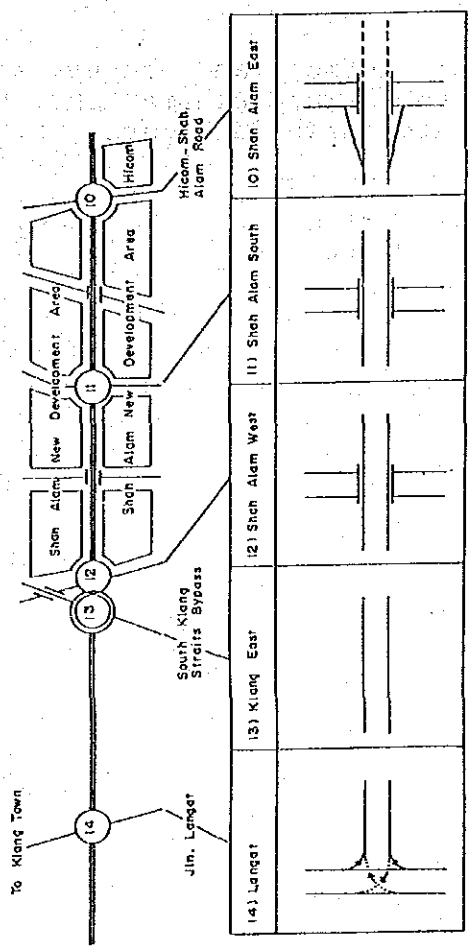


Conditions:
1) No. of Interchanges = 2
   - At-grade Langat intersection is constructed
   - Full-scheme of Shah Alam East IC is constructed
   - Klang East IC is not constructed
   - Shah Alam West and South ICs are not constructed but flyover bridges are constructed

2) Estimated construction and supervision costs:
   - For case of two-lane highway = M$46,281,000
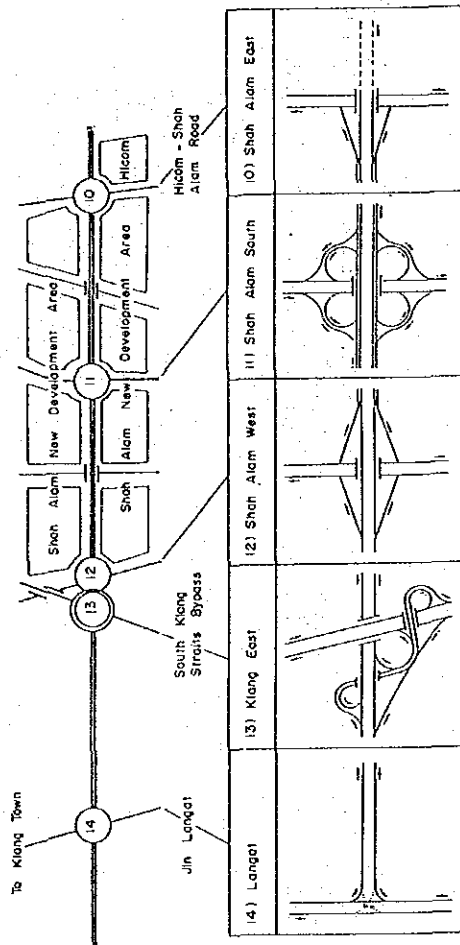   - For case of four-lane highway = M$65,116,000

Figure 6.5.6: Estimated Cost of Shah Alam Highway/
MRR-II Section 2 (Scheme A)

LEGEND:

THE FEASIBILITY STUDY ON TRANSPORTATION
FACILITIES PROJECTS IN KLANG VALLEY

SCALE:

# SHAH ALAM HIGHWAY / MRR - II SECTION · 2



Conditions:
1) No. of Interchanges = 5
   - At-grade Langat intersection is constructed
   - Full-scheme of Klang East IC and Shah Alam West, South and East ICs are constructed

2) Estimated construction and supervision costs:
   - For case of two-lane highway = M$58,598,000
   - For case of four-lane highway = M$79,379,000

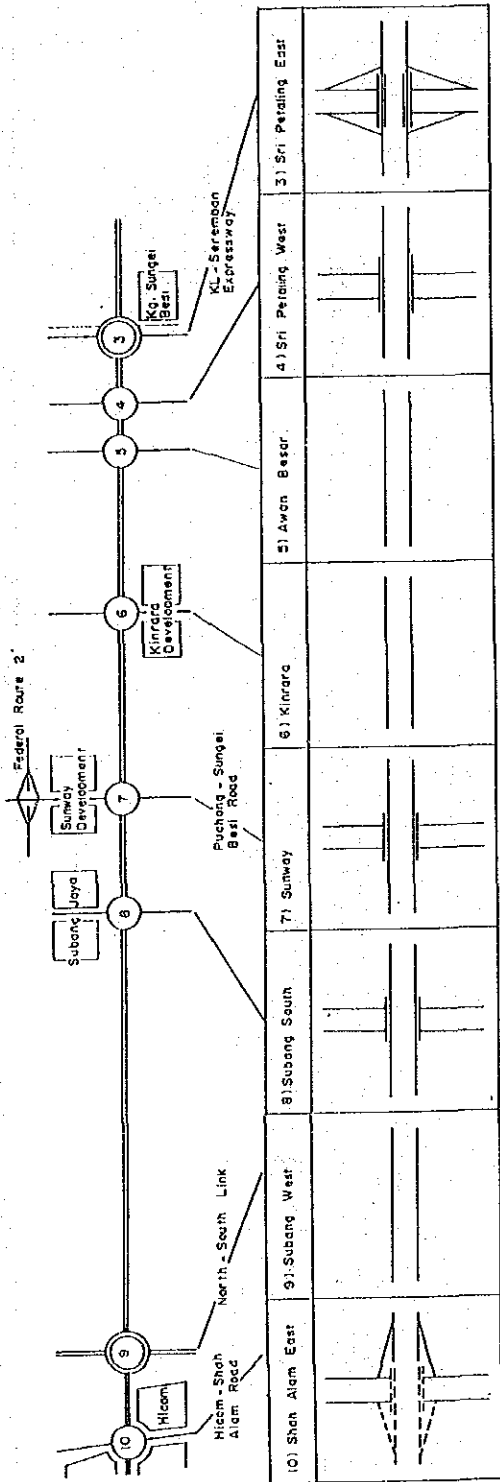| Figure 6.5.7: Estimated Cost of Shah Alam Highway/ MRR-II Section 2 (Scheme B) | LEGEND: | SCALE: |
|---|---|---|
| THE FEASIBILITY STUDY ON TRANSPORTATION FACILITIES PROJECTS IN KLANG VALLEY | | |

# SHAH ALAM HIGHWAY / MRR - II SECTION 3



Conditions:
1) No. of Interchanges = 2
   - Frontage road and a frontage road bridge of Sri Petaling East IC are constructed
   - At-grade Shah Alam East intersection is constructed
   - Other ICs are not constructed but flyover bridges at Subang South IC, Sunway IC and Sri Petaling West IC are constructed

2) Estimated construction and supervision cost:
   - For case of four-lane highway = M$111,907,000

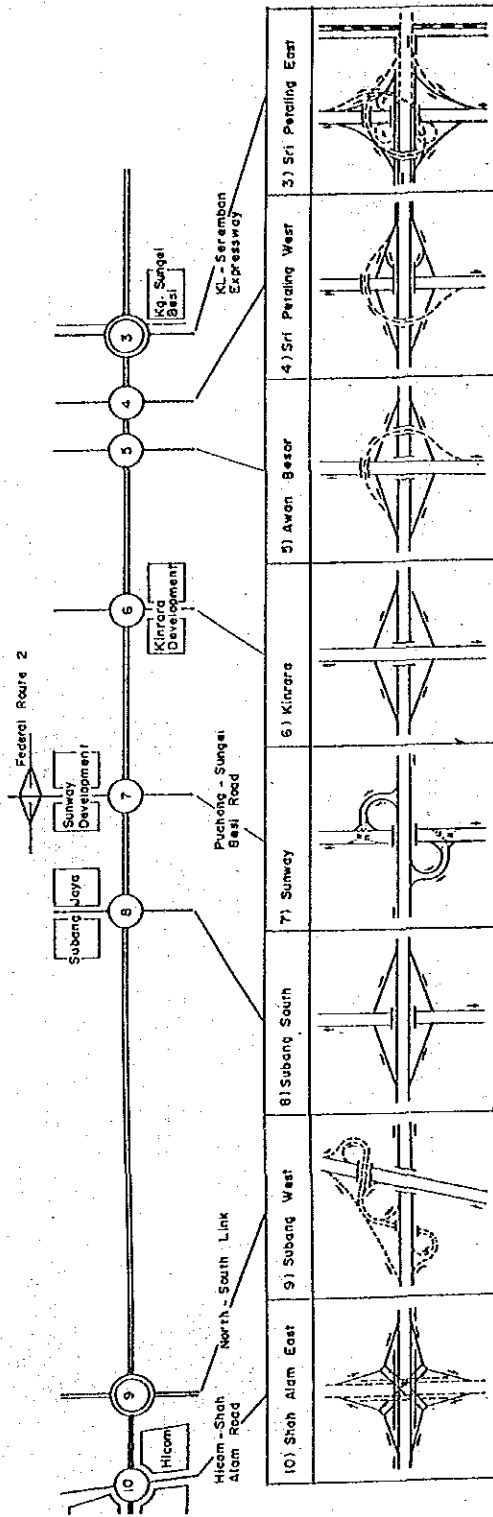Figure 6.5.8: Estimated Cost of Shah Alam Highway/ MRR-II Section 3 (Scheme A)

LEGEND:                                    SCALE:

THE FEASIBILITY STUDY ON TRANSPORTATION
FACILITIES PROJECTS IN KLANG VALLEY

# SHAH ALAM HIGHWAY/ MRR – II SECTION 3



Conditions:
1) No. of Interchanges - 7
   - Frontage road and the bridges of Sri Petaling East IC are constructed
   - Subang West IC is not constructed
   - At-grade Shah Alam East intersection is constructed
   - Full-scheme of other ICs except semi-directional ramps at Awan Besar IC and Sri Petaling West IC
     are constructed

2) Estimated construction and supervision costs:
   - For case of four-lane highway = M$125,241,000

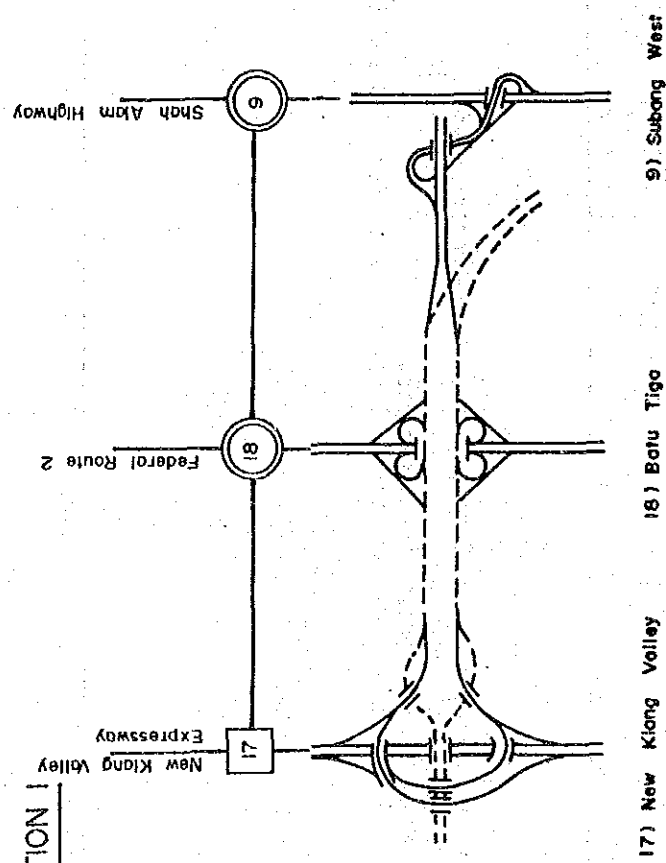Figure 6.5.9: Estimated Cost of Shah Alam Highway/
MRR-II Section 3 (Scheme B)

LEGEND:

**THE FEASIBILITY STUDY ON TRANSPORTATION
FACILITIES PROJECTS IN KLANG VALLEY**

SCALE:

## NORTH-SOUTH LINK SECTION 1



New Klang Valley Expressway — 17) New Klang Valley

Federal Route 2 — 18) Batu Tiga

Shah Alam Highway — 9) Subang West

Conditions:
1) No. of Interchanges = 3
   - Throughway along Jalan TUDM-Shah Alam is not constructed
   - Jalan TUDM-Shah Alam is constructed by others
   - Full scheme of three ICs are constructed
   - 2-lane connection road between Jalan TUDM-Shah Alam and
     Subang West IC is constructed

2) Estimated construction and supervision costs:
   - For case of three interchange and connection road
     only = M$47,100,000

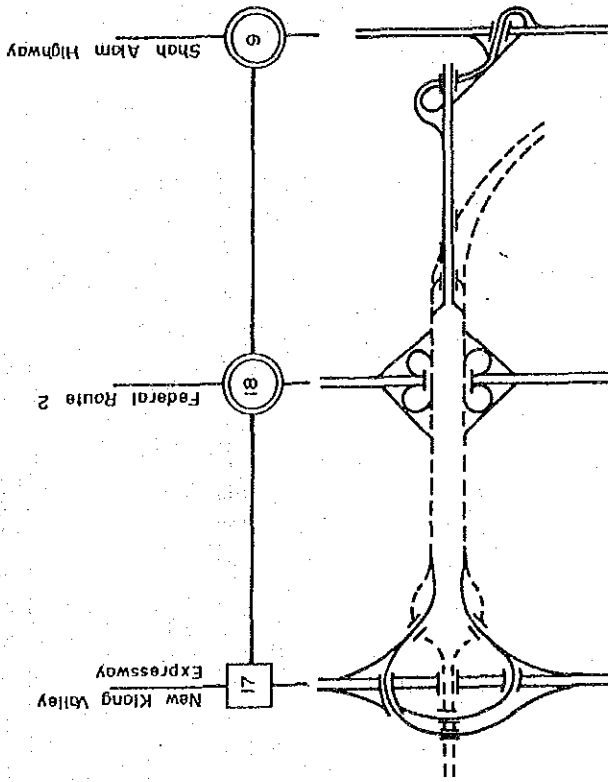Figure 6.5.10: Estimated Cost of N-S Link
              Section 1 (Scheme A)

LEGEND:

SCALE:

THE FEASIBILITY STUDY ON TRANSPORTATION
FACILITIES PROJECTS IN KLANG VALLEY

# NORTH - SOUTH LINK SECTION I



Shah Alam Highway ⑨

Federal Route 2 ⑱

New Klang Valley Expressway ⑰

17) New Klang Valley        18) Batu Tiga        9) Subang West

Conditions:

1) No. of Interchanges = 3
   - Throughway along Jalan TUDM-Shah Alam is not constructed
   - Jalan TUDM-Shah Alam is constructed by others
   - 4-lane throughway and the structures between Station 3+300 and 4+750, L=1450, is constructed
   - Full scheme of three ICs are constructed

2) Estimated construction and supervision costs:
   - For case of three interchanges and 1450m 4-lane throughway = M$57,800,000

| Figure 6.5.11 : Estimated Cost of N-S Link Section 1 (Scheme B) | LEGEND: |
|---|---|

**THE FEASIBILITY STUDY ON TRANSPORTATION FACILITIES PROJECTS IN KLANG VALLEY**

SCALE:

Shah Alam Highway

Federal Route 2

New Klang Valley
Expressway

17) New Klang Valley     18) Batu Tiga     9) Subang West

Conditions:

1) No. of Interchanges = 3
   - Full scheme of three ICs are constructed
   - Four-lane throughway and frontage roads are constructed

2) Estimated construction and supervision costs:
   - For case of four-lane highway = M$96,300,000

Figure 6.5.12 : Estimated Cost of N-S Link Section 1 (Scheme C)

LEGEND:

THE FEASIBILITY STUDY ON TRANSPORTATION
FACILITIES PROJECTS IN KLANG VALLEY

SCALE :

## 6.6 Road Maintenance and Toll Operation Cost

### 6.6.1 Road Maintenance

The term "road maintenance" is defined as the preserving and keeping of each type of roadway, roadside structure and facility as nearly as possible in its original condition as constructed or as subsequently improved and the operation of road facilities and services to provide satisfactory and safe transportation.

The road maintenance works required for the access controlled road facilities include the following items:-

(1) Road Maintenance Works

    (a) Maintenance

- Road cleaning by machine or by manpower;
- Traffic signs and guardrails;
- Drainage facilities cleaning (ditches, catch basins and culverts);
- Expansion joint and shoe;
- Mowing of slopes and median;
- Extra cleaning as required.

    (b) Repair and Painting

- Pavement and shoulders - repair of pot holes, cracks and rutting and partial overlay;
- Bridge - repair and painting of joints and shoe;
- Guardrail and handrail - repair and painting;
- Slope and green areas - repair of landslide areas and washed out areas;
- Drainage facilities - repair of catch basins, drainage pipes, box culverts and side ditches; and
- Traffic signs and road markings - repainting or replacing of signs and repainting of markings.

(2) Equipment Maintenance Works

    (a) Maintenance

- Lighting facilities (cleaning);
- Electrical information facilities (cleaning);
- Electricity transformer substations (maintenance);
- Telecommunication facilities (maintenance); and
- Traffic control system (maintenance).

    (b) Repair

- Lighting facilities and electrical information facilities - replacement of bulbs and wiring and painting of poles, etc.;
- Electricity transformer substations - repair of electricity receiving and transforming devices, electricity generators, indicators, wiring, etc.;
- Telecommunication facilities - repair of emergency telephones, fire alarm devices, radio facilities, etc.;
- Traffic volume detectors, closed circuit television camera, wiring, etc.

The types of vehicles that will be used for maintenance and repair works are as follows:-

- Patrol car;
- Multi-purpose car;
- Warning car;
- Towing vehicle;
- Sprinklers;
- Sweeper;
- Dump truck;
- Line marker;
- Mobile hydraulic platform; and
- Other construction equipment.

The road maintenance cost is estimated for
the following items:-

```
                        ┌── Electricity cost
      ┌─ Maintenance Cost ──┼── Cleaning Cost
      │                 └── Repair cost
      │
      │                    ┌── Overlay cost
Road Maintenance ──┼─ Improvement Cost ──┼── Bridge rehabilitation cost
     Cost          │                 └── Environmental protection measures
      │
      │                    ┌── Inspection and patrol
      └─ Indirect Cost ──────┴── Others
```
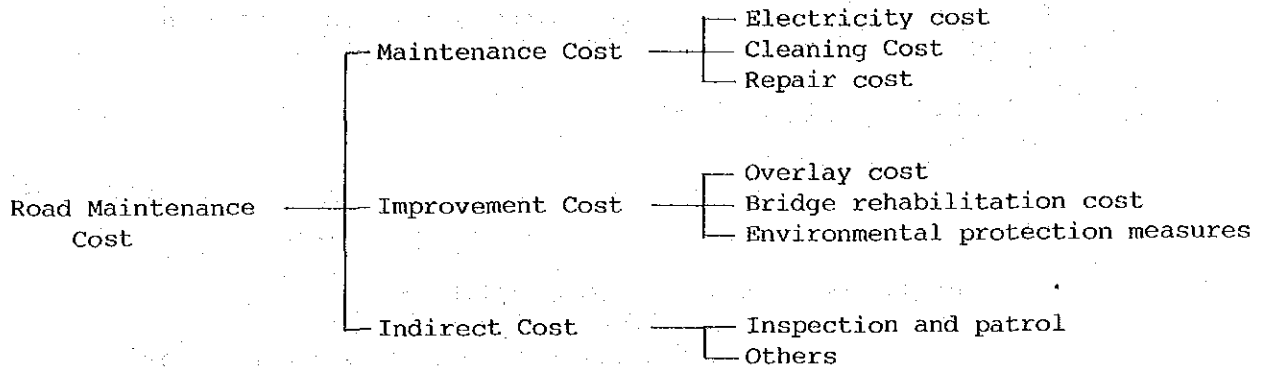
The annual unit cost of road maintenance
is estimated in 1988 prices referring to
the actual expenditure of Malaysia Highway
Authority and certain practice in Japan.

6-lane with road lighting
- M$133,100 per 1km of road length, plus
- M$125,300 per 1km of bridge length.

4c-lane with road lighting
- M$111,000 per 1km of road length, plus
- M$92,900 per 1km of bridge length.

4-lane without road lighting
- M$101,800 per 1km of road length.

The annual maintenance cost thus obtained
by each section is applied to the first
year and up to the fifth year after
opening. From the sixth year the annual ,
cost is increased 7% per annum.

## 6.6.2 Toll Operation

The toll operation works mainly consist of the following items:-

(a) Toll Management and
(b) Toll Levy

### (1) Tollway Management Office Organization

The tollway management includes:-
- Supervision of tollway operations;
- Maintenance and repair of tollway facilities and equipment;
- Traffic control and provision of information and
- Administration.

Each of the future tollway is planned to have its own operation centre at barrier type gate for supervision of operation, maintenance and control services. An executing body will carry out supervision and coordination of the tollway operation centres and administration for the whole tollway network.

### Traffic Control and Information

A traffic control and information system is required to maintain safe and smooth traffic flow on the access controlled road to avoid traffic accidents or congestion and to resume normal conditions as soon as possible in the event of trouble.

The functions of the system will include:-
- Detecting accidents, congestion, damage to road facilities, etc.;
- Collecting and providing information;
- Regulating the road traffic; and
- Maintaining of security services.

(2) Toll Levy

The present toll levy system managed by Malaysian Highway Authority is presented in Table 6.5.1.


Table 6.5.1 : Toll Levy System

| Name of IC (Toll Plaza) | No. of Booths (No. of Lanes) | | No. of Personnel |
|---|---|---|---|
| Sungei Besi | 12 | (13) | 57 |
| UPM | 3 | ( 4) | 22 |
| Kajang | 13 | (11) | 31 |
| Bangi | 11 | ( 9) | 26 |
| Nilai | 6 | ( 4) | 29 |
| Seremban | 8 | ( 9) | 44 |
| Port Dickson (N) | 7 | ( 6) | 21 |
| Port Dickson (S) | 6 | ( 6) | 24 |
| Senawang | 7 | ( 8) | 26 |
| Padat Linggi | 4 | ( 4) | 18 |
| Simpang Ampat | 7 | ( 6) | 26 |
| Ayer Keroh | 5 | ( 5) | 28 |


Normally, four shift staffing is adopted to each operating booth.


The toll operation cost is estimated in 1988 prices for tollway management and toll levy respectively.

(i) Toll Management Cost
    Shah Alam Highway/MRR-II    ... M&533,500/year
    North-South Link            ... M$379,100/year

(ii) Toll Levy Cost              ... M$38,000/booth/year


The summary of costs for road maintenance and toll operation is presented in Table 6.5.2.

Table 6.5.2: Summary of Road Maintenance and Toll Operation Costs
(Unit: M$'000 in 1988 prices)

| Project Road | | Road Maintenance | | | Toll Operation | | | Total |
|---|---|---|---|---|---|---|---|---|
| Name | Section | Road | Bridge | Sub-total | Toll Levy | Management | Sub-total | |
| SHAH ALAM HIGHWAY/ MRR II | SECTION-1: NKSB - Jalan Langat  L = 9.3 km | 1,032.3 | 174.7 | 1,207.0 | 0 | | | |
| | SECTION-2: Jalan Langat - HICOM  L = 13.7 km | 1,823.5 | 102.7 | 1,926.2 | 380.0 | 533.5 | | |
| | SECTION 3: HICOM - KL-Seremban Expressway  L = 18.6 km | 2,475.7 | 100.2 | 2,575.9 | 950.0 | | | |
| | SECTION-4: KL-Seremban Expressway - Jalan Cheras  L = 6.1 km | 811.9 | 347.1 | 1,159.0 | 0 | | | |
| | Sub-total | | | 6,868.1 | | | 1,863.5 | 8,731.6 |
| NORTH-SOUTH LINK | SECTION-1: NKVE - Shah Alam Highway  L = 4.9 km | 652.2 | 157.9 | 810.1 | 950.0 | 379.1 | | |
| | SECTION-2: Shah Alam Highway - KL-Seremban Expressway  L = 28.2 km | 2,931.8 | 135.6 | 3,067.4 | 684.0 | | | |
| | Sub-total | | | 3,877.5 | | | 2,013.1 | 5,890.6 |
| TOTAL | | | | 10,745.6 | | | 3,876.6 | 14,622.2 |

Note: The annual road maintenance cost is constant up to the fifth year after opening. From the sixth year the annual cost is increased 7% per annum.

# CHAPTER 7 : EVALUATION OF PROJECT ROADS

## 7.1 General

As elaborated in the preceeding chapters, the scheme of the Project Roads, Shah Alam Highway/ MRR-II and N-S Link has been formulated and found to be technically feasible.

There is no alternative plan with regard to the main features such as road alignment, cross section, etc. Therefore, an evaluation of the Project Roads is undertaken to examine the economic and financial viability of the formulated scheme.

The evaluation procedure is shown in Figure 7.1.1. Firstly, the projects to be evaluated are identified. As a tentative schedule, it is assumed that the projects will be implemented within the shortest possible period. Based on this tentative schedule, a preliminary economic evaluation is carried out under the condition of being a toll free highway.

As a result of the economic evaluation, the high priority project sections will be identified.

Then, a financial analysis is also undertaken for the high priority project sections assuming the projects as tollways.

After determining the first phase (or highest priority) project based on this analysis, similarly further analysis is made to find the second phase (or higher priority project. Consequently the Implementation Schedule for the whole project is established.

Finally, on the basis of this schedule, the projects are evaluated again economically as well as financially.
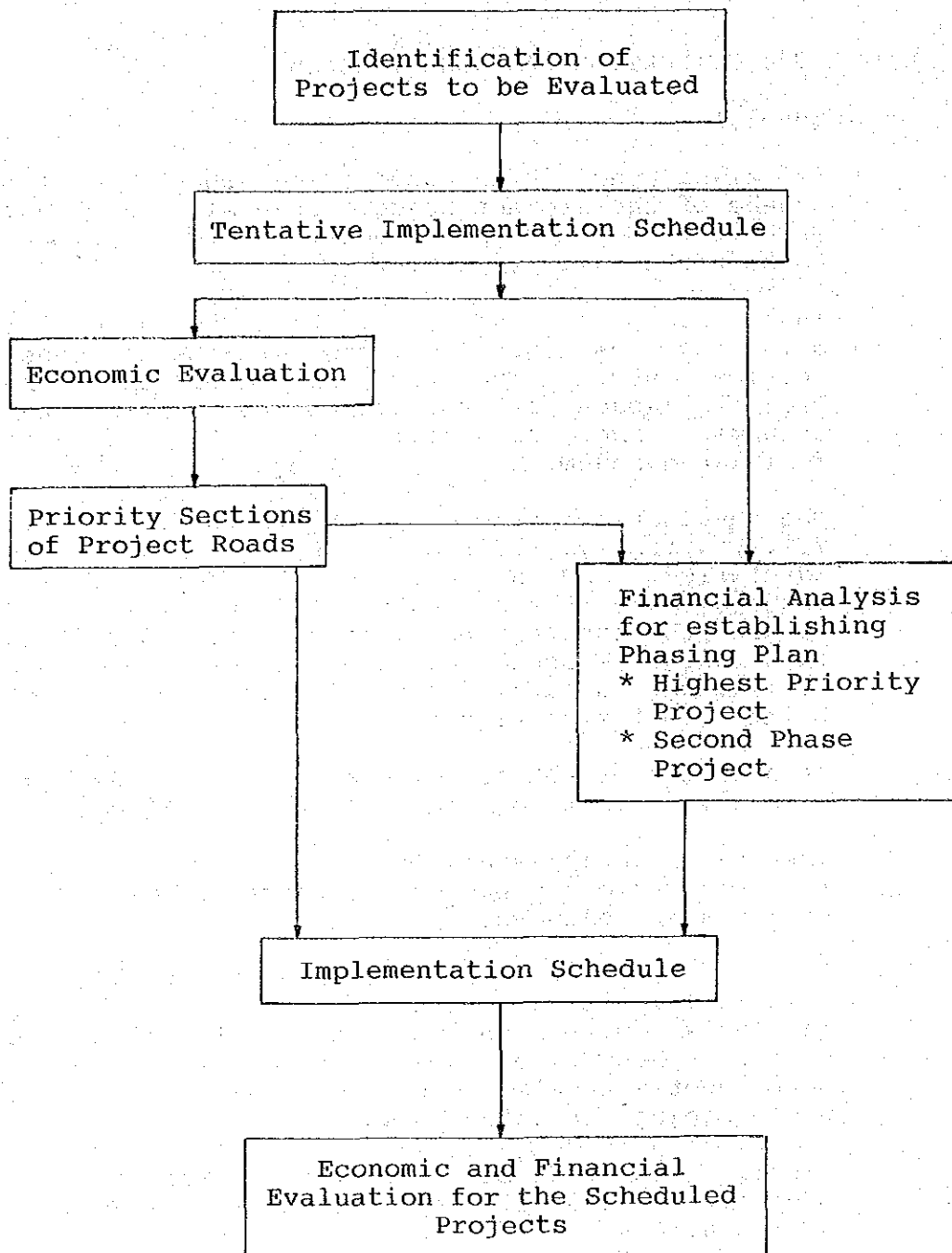
```
          ┌─────────────────────────────┐
          │    Identification of         │
          │  Projects to be Evaluated    │
          └─────────────────────────────┘
                         │
                         ▼
        ┌─────────────────────────────────┐
        │ Tentative Implementation Schedule │
        └─────────────────────────────────┘
                         │
        ┌────────────────┴──────────────────────┐
        ▼                                        │
  ┌──────────────────────┐                       │
  │ Economic Evaluation  │                       │
  └──────────────────────┘                       │
        │                                         │
        ▼                                         │
  ┌──────────────────┐                            │
  │ Priority Sections │─────────────┐             │
  │ of Project Roads  │             │             │
  └──────────────────┘             ▼             ▼
        │              ┌──────────────────────────┐
        │              │ Financial Analysis        │
        │              │ for establishing          │
        │              │ Phasing Plan              │
        │              │ * Highest Priority        │
        │              │   Project                 │
        │              │ * Second Phase            │
        │              │   Project                 │
        │              └──────────────────────────┘
        │                         │
        ▼                         ▼
    ┌─────────────────────────────┐
    │   Implementation Schedule    │
    └─────────────────────────────┘
                 │
                 ▼
    ┌─────────────────────────────┐
    │  Economic and Financial      │
    │ Evaluation for the Scheduled │
    │          Projects            │
    └─────────────────────────────┘
```

Figure 7.1.1 : Evaluation Procedure

## 7.2    Economic Evaluation

### 7.2.1   General

Economic evaluation is to find the economic
feasibility by examining whether the project will
bring about sufficient contribution to the
overall economy of Malaysia based on the
comparison of the costs and benefits.

The procedure for the economic evaluation is as
follows:-

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                    ┌─────────────────────┐
                    │  Proposed Projects  │
                    │   to be Evaluated   │
                    └─────────────────────┘
         ┌───────────────────┴──────────────────┐
         ▼                                       ▼
┌──────────────────┐              ┌────────────────────────┐
│  Estimation of   │              │  Traffic Assignment    │
│  Economic Cost   │              │  for the Cases With     │
│   by Project     │              │  and Without Project   │
└──────────────────┘              └────────────────────────┘
         │                                       │
         │                                       ▼
         │                        ┌────────────────────────┐
         │                        │  Estimation of Benefit │
         │                        └────────────────────────┘
         │                                       │
         └──────────────────┬────────────────────┘
                            ▼
                 ┌────────────────────────┐
                 │  Economic Evaluation   │
                 └────────────────────────┘
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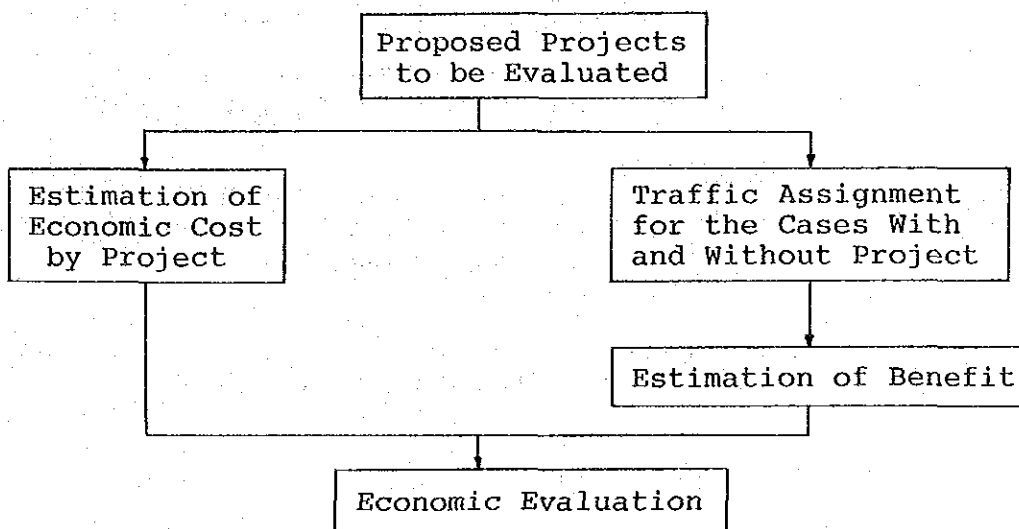
Figure 7.2.1 : Procedure of Economic Evaluation

(1) Projects to be Evaluated

Firstly, the proposed scheme as a whole is
evaluated to examine whether the project is
economically viable or not on condition that
the project is implemented during the years
from 1991 to 1994, which is shown in the
basic assumptions below.

As the second step, the scheme is evaluated
by section to find which section has a higher
priority under the same schedule assumed
above.

Finally, evaluation is made again on the
whole project when it is implemented
according to the Implementation Schedule
established by the priority analysis.

Accordingly, the evaluation cases are as follows:-

(a) Evaluation as a Whole
   a-1  Whole Proposed Project
   a-2  Shah Alam Highway/MRR-II
   a-3  N-S Link

(b) Evaluation by Section

   Shah Alam Highway/MRR-II
   b-1  Section from Jalan Cheras to KL-Seremban Expressway
   b-2  Section from KL-Seremban Expressway to HICOM
   b-3  Section from HICOM to Jalan Langat
   b-4  Section from Jalan Langat to NKSB

   N-S Link
   b-5  Section from NKVE to Shah Alam Highway
   b-6  Section from Shah Alam Highway to KL-Seremban Expressway

(c) Evaluation as a Whole according to the established Implementation Schedule.

(2) Basic Assumptions

The projects are economically evaluated on the basis of the following assumptions:-

(a) The life of Project Roads is assumed to be twenty (20) years;

(b) The discount rate is 12% per annum;

(c) Except for the evaluation case according to the established Implementation Schedule, the construction schedule is tentatively assumed as follows so as to implement the project within the shortest possible period.

| | 1991 | 1992 | 1993 | 1994 | 1995 |
|---|---|---|---|---|---|
| Detailed Engineering ==== | | | | | |
| Land Acquisition | | ====== | | | |
| Construction | | | ============ | | |

Figure 7.2.2 : Tentative Construction Schedule

Accordingly, the project road is assumed to be open to traffic in the year 1995.


7.2.2   Estimation of Economic Cost

In Chapter 6, the total project cost was estimated in terms of financial cost.

For the purpose of economic evaluation, all costs should be converted to economic costs.

In estimating the project cost, the market prices of each cost item are normally used. Market prices usually do not represent adequately scarcities of certain resources or surpluses of other resources and in addition, are including of indirect taxes or hidden subsidies which are transfer payments and not resource costs.

In order to convert from the market price to economic price or shadow prices, the national parameters (*1), i.e. a set of conversion factors, have been prepared by the Government of Malaysia.

The national parameters cover a comprehensive range of tradeable and non-tradeable goods. Accordingly, the national parameters are basically employed in this Study after scrutinizing the appropriateness for their application.

---

(*1) National Parameters for Project Appraisal in Malaysia January 1986

(1) Economic Prices

(a) Skilled Labour

Although the unemployment rate is about 9.0% at present, the market for skilled labour in Malaysia still shows a scarcity rather than the surplus of skilled labour.

Hence, the opportunity cost might be adequately reflected in the market wage. Accordingly, the market wage is applied as the economic price.

(b) Unskilled Labour

In the case of unskilled labour, the market situation is quite different from that of the skilled labour.

Most of the unemployed are regarded as unskilled labour.

This seems to be well reflected in the national parameters mentioned above. Accordingly, the conversion factor for unskilled labour in Kuala Lumpur region is 0.78, which is almost equivalent to the shadow wage rate estimated by using Haveman's Formula.

Accordingly, the conversion factor of 0.78 is applied.

(c) Land

The area along Shah Alam Highway/MRR-II and N-S Link are presently urbanized or will be almost developed in the near future.

For urban area, the opportunity cost of land is envisaged to be well reflected in its market price. Even for the agricultural or reserve land, if it is located sufficiently adjacent to the urbanized area, the development potential might be reflected in the market price.

Accordingly, the market price will be applied as the economic price of land.

The land owned by the government and the land to be donated by the housing developers are not counted as the land acquisition cost in terms of financial cost. However, these costs are to be included in the economic cost.

(d) Other Cost Items

Project cost is disaggregated into various costs of tradeable and non-tradeable goods such as construction materials, equipment and labour, etc.

Construction material is further broken down into detail cost items such as cement, steel, asphalt, etc.

As for these material and equipment costs, the national parameters will be applied.

The conversion factors of the major items are as follows:-

- Cement .. 0.92
- Steel .. 0.78
- Asphalt .. 0.92
- Plywood .. 1.03
- Diesel Fuel .. 0.88
- Construction Equipment .. 0.94
- Transport .. 0.79

(2) Construction Cost

In order to estimate the economic construction cost, the financial cost estimated in the previous Chapter is broken down into basic cost items such as labour cost, material cost, equipment cost and others. By using the conversion factors for such cost items, the economic cost is obtained as shown in Table 7.2.1.

As a whole, the economic cost for the construction ranges about 85% to 88% of the financial cost in this Study.

Table 7.2.1 : Financial Cost and Economic Cost

(Unit: M$'000)

| | | Shah Alam Highway/MRR-II | | | | N-S Link | |
| | | Section 1 NKSB to Jln.Langat | Section 2 Jln.Langat to HICOM | Section 3 HICOM to KL-Seremban Expressway | Section 4 KL-Seremban Expressway to Jln. Cheras | Section 1 NKVE to Shah Alam Highway | Section 2 Shah Alam H'way to KL - Seremban Expressway |
|---|---|---|---|---|---|---|---|
| Financial Cost | Design | 6,920 | 4,140 | 6,950 | 6,470 | 4,400 | 8,640 |
| | Land Acquisition | 31,010 | 37,120 | 22,260 | 5,500 | 4,060 | 47,430 |
| | Construction | 156,400 | 93,400 | 157,100 | 146,200 | 98,800 | 195,300 |
| | Total | 194,330 | 134,660 | 186,310 | 158,170 | 107,260 | 251,370 |
| | Grand Total | 673,470 | | | | 358,630 | |
| Economic Cost | Design | 6,100 | 3,600 | 6,100 | 5,700 | 3,900 | 7,600 |
| | Land Acquisition | 32,100 | 74,200 | 70,900 | 23,100 | 4,100 | 53,000 |
| | Construction | 133,800 | 80,900 | 137,600 | 124,500 | 85,500 | 170,200 |
| | Total | 172,000 | 158,700 | 214,600 | 153,300 | 93,500 | 230,800 |
| | Grand Total | 698,600 | | | | 324,300 | |

7-8

(3) Maintenance Cost

Maintenance cost is also converted to the
economic cost by employing the national
parameter for road maintenance work. The
result is shown in Table 7.2.2.

Table 7.2.2 : Maintenance Cost
(Unit: M$'000)

| | Maintenance | |
| --- | --- | --- |
| | Financial Cost | Economic Cost |
| SHAH ALAM HIGHWAY/MRR-II | | |
| NKSB to Jalan Langat | 1,207.0 | 1,038.0 |
| Jalan Langat to HICOM | 1,926.2 | 1,656.5 |
| HICOM to KL-Seremban Expressway | 2,575.9 | 2,215.3 |
| KL-Seremban Expressway to Jalan Cheras | 1,159.0 | 996.7 |
| Total | 6,868.1 | 5,906.5 |
| N-S LINK | | |
| NKVE to Shah Alam Highway | 810.1 | 696.7 |
| Shah Alam Highway to KL-Seremban Expressway | 3,067.4 | 2,638.0 |
| Total | 3,877.5 | 3,334.7 |

7.2.3  Estimation of Economic Benefit

   (1) General

        Among the various benefits derived from the
        construction of roads, the following factors
        are counted as the economic benefit:-

        (a) Savings in Vehicle Operating Cost
        (b) Savings in Travel Time Cost

        Besides these direct benefits, there are
        numerous indirect benefits, eg. promotion
        effect of regional development, market
        development, etc. However, these are not
        counted, since they are likely to reduce the
        accuracy of estimation and sometimes may
        cause a double-counting of the direct
        benefits above.

   (2) Vehicle Operating Cost

        The vehicle operating cost is calculated for
        representative vehicles in Kuala Lumpur
        region by updating the VOC data prepared in
        the KVTS by JICA in 1987.

        The cost is represented in terms of economic
        cost by applying the national parameters
        carefully to the corresponding cost items,
        taking into account tax and other duties.

        Vehicle operating cost consists of running
        cost and fixed cost.

        (a) Running Cost

            Running cost consists of the following
            components:-

            - Vehicle depreciation cost
            - Fuel consumption
            - Engine oil consumption
            - Tyre wear
            - Maintenance cost


            (i) Vehicle Depreciation Cost

                Vehicle depreciation cost is updated
                by investigating the current market
                prices of representative vehicles
                through interviews with dealers in
                Kuala Lumpur.

The vehicle depreciation cost is calculated by taking into account the vehicle life and annual running mileage. The distance determined depreciation is obtained by setting up the percentage to the total depreciation cost.

(ii) Fuel and Oil Cost

The market price of gasoline is M$0.95/litre for premium and M$0.88/litre for regular. This price varies according to the international market price of crude oil which is unstable from year to year.

Accordingly the target price determined by OPEC in December 1986 i.e. US$18/barrel is taken in as the international crude oil price. The economic price of gasoline is estimated by adding the refinery cost to this price.

The diesel cost is also estimated in the same way.

(iii) Tyre Cost

Tyre cost obtained in the KVTS is renewed by using the current price and the annual mileage by vehicle type.

(iv) Maintenance Cost

Maintenance cost consists of parts cost and labour cost. Parts cost is calculated by setting the parts cost ratio to vehicle price. Labour cost is calculated by using labour hour and updated unit labour cost.

As a result, the total running cost is calculated as shown in Table 7.2.3.

Vehicle operating cost varies by vehicle operating speed. This relationship is shown in Figure 7.2.3.
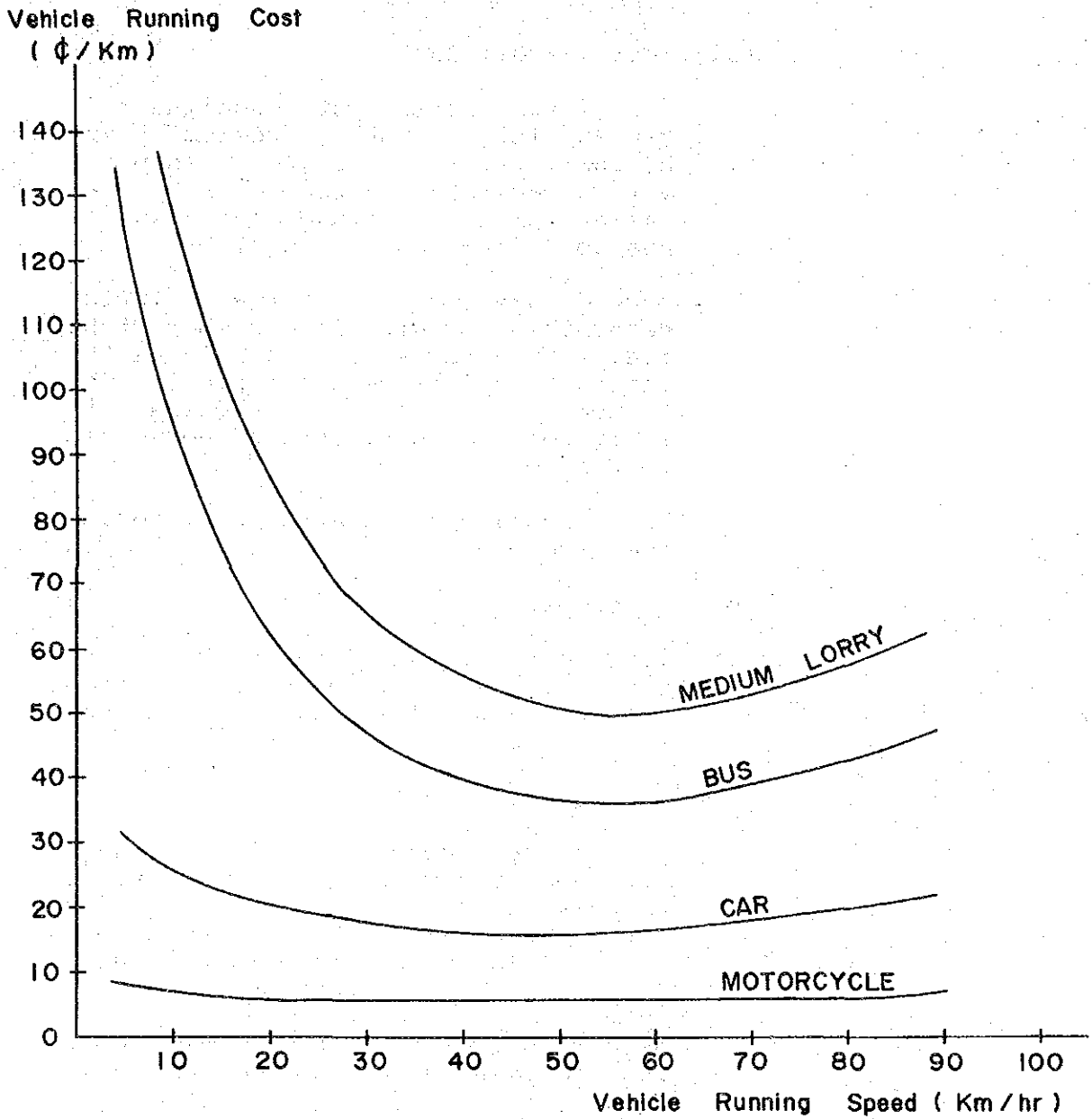
Fig. 7.2.3: Relationship between Vehicle Running Cost ( $\nabla$OC ) & Running Speed.

Table 7.2.3 : Vehicle Running Cost

(Unit: M$/km)

| Veh. Type<br>Cost | Motor<br>cycle | Car | Taxi | Van/<br>Pick-up | Medium<br>Lorry | Bus |
|---|---|---|---|---|---|---|
| Total Running Cost | 0.050 | 0.157 | 0.138 | 0.181 | 0.501 | 0.359 |
| Depreciation | 0.009 | 0.019 | 0.023 | 0.034 | 0.072 | 0.046 |
| Maintenance | 0.016 | 0.063 | 0.032 | 0.054 | 0.152 | 0.092 |
| Fuel | 0.019 | 0.045 | 0.045 | 0.057 | 0.098 | 0.070 |
| Oil | 0.003 | 0.008 | 0.008 | 0.009 | 0.011 | 0.011 |
| Tyre | 0.002 | 0.023 | 0.030 | 0.027 | 0.167 | 0.139 |

(b) Fixed Cost

(i) Depreciation Cost

The time-related depreciation cost is calculated by subtracting the distance determined portion from the total depreciation cost.

(ii) Interest

The opportunity cost of capital at 12% is employed for the interest rate.

(iii) Crew Cost

The crew cost is also updated by using the current crew wages and annual operating hours.

(iv) Overhead

As a substitution of accident cost, insurance and overhead are included in the fixed cost.

Consequently, the resultant fixed cost by
type of vehicle is shown in Table 7.2.4.


Table 7.2.4 : Vehicle Fixed Cost

(Unit: M$/hr)

| Veh. Type<br>Cost | Motor<br>cycle | Car | Taxi | Van/<br>Pick-up | Medium<br>Lorry | Bus |
|---|---|---|---|---|---|---|
| Total Fixed Cost | N.A. | N.A. | 4.48 | 2.40 | 6.90 | 9.53 |
| Depreciation | 0.24 | 0.84 | 0.13 | 0.22 | 0.42 | 0.59 |
| Interest | 0.23 | 1.18 | 0.43 | 0.54 | 1.39 | 1.93 |
| Crew Wage | – | – | 2.80 | 3.36 | 5.03 | 6.94 |
| Overhead | – | – | 1.12 | 0.67 | 3.02 | 4.16 |
| Sub-total | 0.47 | 2.02 | 4.48 | 4.79 | 9.86 | 13.62 |
| Fleet<br>Substituting<br>Factor | – | – | 1.00 | 0.50 | 0.70 | 0.70 |


(3) Travel Time Cost

Time value is assessed in terms of hourly
productivity of the vehicle passengers.

There is no general theory on which portion
of time savings should be considered in an
economic evaluation of highway projects.

Following the previous highway project
studies in Malaysia, travel time savings have
been estimated for the following travel
purposes:-

Trips to and from work        ...   50%
Trips for business purpose   ...  100%

The basic data for measuring time savings are
the time value by vehicle ownership obtained
through the Home Interview Survey in 1985.

Household income is considered to generally
increase in proportion to per capita GDP.
Due to the low growth of GDP in the recent
years, the per capita GDP growth during the
past three years is almost zero. Hence, the
time value obtained through Home Interview
Survey is updated by taking only the
inflation during the period into account.

As a result, time value per worker is estimated as follows:-

|  | Time Value in 1988 M$/hr/worker |
| --- | --- |
| Non Vehicle Owners | 2.35 |
| Motorcycle Owners | 2.65 |
| One Car Owners | 4.50 |
| Multi-car Owners | 8.92 |

The value of time savings by vehicle type is calculated by the following formula:-

$$Vk = Nk \times Tk \times \Sigma_i \, fi \times pi$$

Where:-

Vk - Value of time savings for vehicle type k
Nk - Average occupancy of vehicle type k
fi - Time saving factor for trip purpose i
Tk - Time value per worker for vehicle type k
pi - Percentage share of trip purpose i

Consequently, the value of time savings by vehicle type is obtained as shown in Table 7.2.5.

Table 7.2.5 : Value of Time Savings by Vehicle Type

| Vehicle Type | Average Occupancy (person/veh) | Value of Time Savings (M$/hr/veh) |
| --- | --- | --- |
| Motorcycle | 1.2 | 1.524 |
| Car | 1.8 | 4.770 |
| Bus | 30 | 33.600 |

(4) Estimated Economic Benefit

   Economic benefit is calculated by summing up
   the total savings in vehicle operating cost
   and the passenger time resulting from the
   investment.

   The savings are calculated from the
   differences in travel cost between the "Do-
   nothing Case" and the alternative evaluation
   cost where the corresponding project is
   implemented.

   Table 7.2.6 shows the estimated benefit in
   1995 and 2005.

   The benefits are interpolated by assuming a
   constant annual growth rate for the
   intermediate years from 1995 to 2005 and
   assumed to remain at the same level as that
   in 2005 for the years after 2005.

Table 7.2.6 : Estimated Economic Benefit

(Unit: M$'000)

|  | 1995 | 2005 |
|---|---|---|
| Shah Alam Highway/MRR-II and N-S Link | 184,179.0 | 473,222.5 |
| Shah Alam Highway/MRR-II | 169,323.5 | 406,135.5 |
| N-S Link Only | 66,685.5 | 298,095.5 |
| Jalan Cheras to KL-Seremban Expressway | 26,170.5 | 52,450.5 |
| KL-Seremban Expressway to HICOM | 88,512.5 | 246,338.5 |
| HICOM to Jalan Langat | 36,536.5 | 79,460.5 |
| Jalan Langat to NKSB | 18,104.0 | 27,886.0 |
| NKVE to Shah Alam Highway | 38,763.0 | 105,923.0 |
| Shah Alam Highway to KL-Seremban Expressway | 20,257.5 | 185,675.5 |

7.2.4  Evaluation Results

(1) Evaluation as a Whole

Firstly, the economic viability of the project as a whole is evaluated based on the assumed schedule.

The economic indicators obtained are shown in Table 7.2.7.

It is found that both the projects Shah Alam Highway/MRR-II and N-S Link are highly economically feasible.

Table 7.2.7: Economic Evaluation Indicators for Whole Length

|  | B/C | NPV (M$mil) | IRR (%) |
|---|---|---|---|
| Whole Project | 1.96 | 525.0 | 21.3 |
| Shah Alam Highway/MRR-II | 2.52 | 570.5 | 25.7 |
| N-S Link | 3.24 | 390.1 | 28.5 |

(2) Evaluation by Section

Table 7.2.8 shows the evaluation results by road section. Except for the section of Shah Alam Highway/MRR-II from Langat IC to Klang West IC (Jalan Langat to NKSB), the B/C ratio in all other sections are higher than 1.0.

If the construction of the section from Langat IC to Klang West IC is postponed for as long as 6 years, i.e. opening to traffic in the year 2001, then the B/C ratio for this section also will be higher than 1.0. Hence, all the sections are economically feasible.

The highest B/C ratio is found in the short-stretch of N-S Link from NKVE to Shah Alam Highway, followed by the section of Shah Alam Highway/MRR-II between KL-Seremban Expressway to HICOM and between HICOM to Jalan Langat.

Accordingly, these sections should be given a higher priority than the other sections in implementation.

Table 7.2.8 : Economic Evaluation Indicators by Section

| | B/C | NPV (M$mil) | IRR |
|---|---|---|---|
| **SHAH ALAM HIGHWAY/MRR-II** | | | |
| Jalan Cheras - KL-Seremban Expressway | 1.6 | 50.6 | 19.0 |
| KL-Seremban Expressway to HICOM | 4.6 | 425.1 | 37.5 |
| HICOM to Jalan Langat | 2.2 | 102.7 | 23.0 |
| Jalan Langat to NKSB | 0.8 | -19.7 | 9.5 |
| **N-S LINK** | | | |
| NKVE to Shah Alam Highway | 4.8 | 186.3 | 41.0 |
| Shah Alam Highway to KL-Seremban Ex'way | 1.9 | 131.5 | 20.6 |

Note: Discount Rate   ..   12% per year
      Life Span       ..   20 years

(3) Evaluation According to the Proposed Implementation Schedule

The project implementation is scheduled during the period from 1991 to 2000. So, herein the economic feasibility is re-examined for the whole project according to the established Implementation Schedule described in Table 7.2.8.

The results of the benefit cost analysis tabulated in Table 7.2.9 show the project as a whole is highly economically feasible if it is implemented according to the proposed scheduled. That is, the indicators which show that the net present value amounting to M$593 million and B/C ratio of 2.63 can be expected, thus proving the economic soundness of the two Project Roads.

Table 7.2.9 : Economic Evaluation Indicators for the Whole Project Based on the Established Implementation Schedule

| | | |
|---|---|---|
| B/C | .. | 2.63 |
| NPV (M$million) | .. | 593.0 |
| IRR (%) | .. | 30.0 |

## 7.3　Financial Analysis

### 7.3.1　General

#### (1) Purpose

The purpose of financial analysis is two-fold; one is to establish a phasing plan to carry out the two highway projects while the other is to find the conditions required for realizing their privatization based on the established Implementation Schedule.

These are achieved by examining the following issues on condition that the Project Roads are operated as tollways.

(a) Whether the construction and operation costs can be recovered by the levied toll or not under the given conditions regarding various influencing factors such as toll level, loan, equity share, term, etc.?

This theme turns out to be more severe if the project is to be implemented as a privatization project.

Namely, the project should be attractive as a business venture, therefore, the revenue should be sufficient not only to recover all the investment but also to make enough profit within a reasonably short period.

(b) On the contrary, what kind of conditions will be required for making the project financially viable?

In the case of privatization scheme, the questioned conditions might be loan conditions, concession period or supporting conditions provided by the Government, etc.

#### (2) Evaluation Procedure

The procedure for financial analysis is shown in Figure 7.3.1. At first, the analysis is made for establishing a phasing plan to carry out the two highway projects. This analysis is made for a tentatively assumed schedule as in the case of economic evaluation.

Based on this analysis, the implementation
schedule of the projects is formulated.

The financial analysis is made again to find
the conditions required for realizing their
privatization based on the established
implementation schedule.

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                          ┌─────────────────────────┐
                          │ Priority Section        │
                          │ identified through      │
                          │ Economic Evaluation     │
                          └─────────────────────────┘
                                      │
                                      ▼
┌─────────────────────────┐  ┌─────────────────────────┐
│ Tentatively Assumed     │─▶│ Financial Analysis for  │
│ Schedule                │  │ establishing a phasing  │
└─────────────────────────┘  │ plan                    │
                             │ a) Evaluation for       │
                             │    determining the      │
                             │    Highest Priority     │
                             │    Project              │
                             │ b) Evaluation for       │
                             │    determining the      │
                             │    Second Phase         │
                             │    Project              │
                             └─────────────────────────┘
                                      │
                                      ▼
┌─────────────────────────┐  ┌─────────────────────────┐
│ Establishment of        │─▶│ Financial Analysis      │
│ Implementation Schedule │  │ for Privatization       │
└─────────────────────────┘  │ based on the            │
                             │ Implementation          │
                             │ Schedule                │
                             │ a) Maximum Package      │
                             │ b) Minimum Package      │
                             │ c) Medium Package       │
                             └─────────────────────────┘
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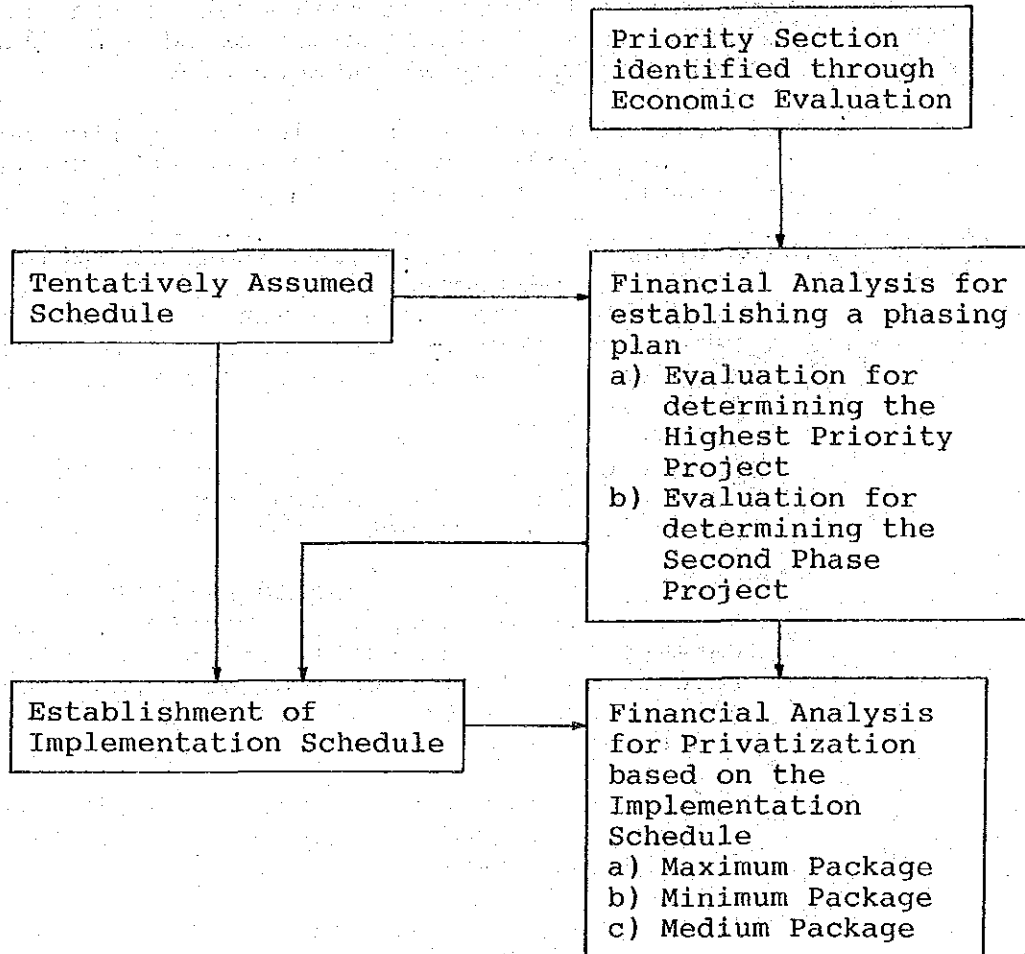
Figure 7.3.1 : Procedure for Financial Evaluation

(3) Projects to be Evaluated

The section of MRR-II from Jalan Cheras to KL-Seremban Expressway should be analyzed within the framework of MRR-II as a whole including the section between Batu Caves and Jalan Cheras. Hence, the financial analysis in this Study is focussed on the road sections from KL-Seremban Expressway to NKSB and N-S Link.

The evaluation cases are as follows:-

(i)     Analysis for establishing a phasing plan

The analysis for the first purpose is made stepwise as follows:-

(i)-a   1st Step - Evaluation for determining the highest priority or Phase 1 project

(i)-b   2nd Step - Evaluation for determining the second phase project

Based on this result, the implementation schedule will be established.


(ii)    Analysis for privatization based on the established Implementation Schedule

The analysis for finding the privatization conditions is made for the following cases according to the established Implementation Schedule.

(ii)-a Maximum Package Case
       - Privatization of whole project

(ii)-b Minimum Package Case
       - Privatization of Highest Priority Project Only

(ii)-c Medium Package Case
       - Privatization of the projects up to the second phase

(4) Toll Levy System

As elaborated in Chapter 4, the toll levy system is assumed as follows:-

Shah Alam Highway/MRR-II – Barrier Type Open Toll System

N-S Link – Closed System by distance proportional tariff

The location of toll barriers on Shah Alam Highway/MRR-II is assumed as follows:-

- one will be at around Puchong area
- the second one at the eastern side of its junction with the N-S Link
- the third one lies in between SKSB and Jalan Langat

As for N-S Link, it is assumed that the toll is levied only when the throughway is constructed.

7.3.2 Estimation of Revenue

(1) Toll Charge

Presently in Malaysia, tollways consist of the segments of North-South Highway and Kuala Lumpur-Karak Highway operated by PLUS and LLM respectively and other privatized road projects such NKSB and Jalan Kuching Improvement Project.

The toll charge adopted by LLM under the closed system is as shown in Table 7.3.1.

The ordinary passenger cars are tolled at 5 sen/km.

Table 7.3.1: Present Toll Charge Under Closed System

(Unit: sen/km)

| Class | Description | Toll Charge |
|-------|-------------|-------------|
| 1 | Ordinary Cars | 5 |
| 2 | Two axles and six wheels excluding bus | 7.5 |
| 3 | Three or more axles | 10 |
| 4 | Taxi | 2.5 |
| 5 | Bus | 5 |

On the other hand, under the zone or flat system, toll charges vary with tollway length and as a general measure they are also calculated on the basis of 5 sen per km.

With regard to the Shah Alam Highway/MRR-II, three barriers are planned to be installed if it is operated as a tollway.

Since the road length of the segment from the KL-Seremban Expressway to Jalan Langat, which might be implemented at a relatively similar stage is 32.3km.

If the same toll rate is applied to the Shah Alam Highway/MRR-II, the toll for an ordinary car will be 50sen at each barrier.

This is almost the same or slightly lower compared with the toll charges of privatized roads.

Hence, it will be acceptable for road users to adopt this toll rate for Shah Alam Highway/MRR-II and the same rate as the closed system by LLM for N-S Link.

The widening project of Federal Route 2 and the new construction of NKVE which are located in parallel with Shah Alam Highway, are on-going as a privatization project undertaken by PLUS, the company which is given the concession for these projects.

Hence, the toll rate of Shah Alam Highway should be at the same level as these parallel highways, otherwise, unpreferable traffic concentration onto a certain highway will be created.

According to the Ministry of Works, the current toll rates for North-South Highway are to be adjusted in the future according to the schedule set out in the concession agreement between the Government and PLUS.

Under the concession provisions, the rates are calculated at 5sen per km up to the end of 1992, 7.5sen per km until the end of 1995 and 10sen per km from January to December 1996.

From 1996 until the agreement ends in 2018, the rate is to be increased by six per cent or higher should the consumer price index become higher.

Following the above calculation, the toll rates of the Project Roads in this Study are assumed to be set as shown in Table 7.3.3

Table 7.3.2 : Toll Rates of Project Roads

| Year | Shah Alam Highway MRR-II (M$/barrier) | N-S Link (sen/km) |
|------|---------------------------------------|-------------------|
| 1994 - 1995 | 0.70 | 7.0 |
| 1996 - 1999 | 1.00 | 10.0 |
| 2000 | 1.30 | 13.0 |

Notes: 1) Above figures are applied to ordinary cars and buses.
Medium and heavy lorries will be charged double.
2) After the year 2000, the rates will be raised every 5 years with the annual increase rate of 6%.
3) The initial toll rate of M$0.70/barrier is obtained from the current rate M$0.50/barrier considering the inflation 4% per annum during the period from 1988 to 1994.

(2) Revenue

The toll revenue is calculated according to the following procedure shown in Figure 7.3.2.

Evaluation Case

Estimation of Traffic Volume
at Toll Barrier for Shah Alam Highway
Traffic Volume between Interchanges
for N-S Link

Toll Rates

Calculation of Toll Revenue
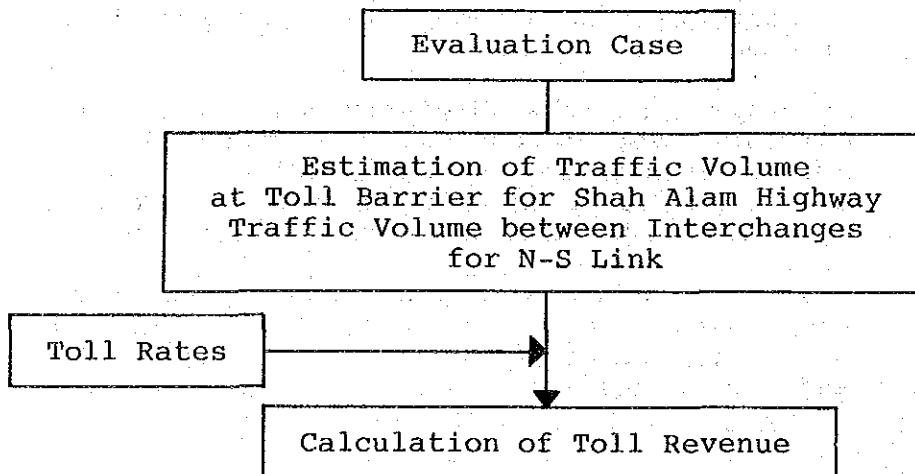
Figure 7.3.2 : Calculation Procedure of Toll Revenue

The future traffic volume is obtained through the traffic assignment for the respective cases, the method of which is explained in Chapter 2.

As the traffic volume in the year 2005 is exceeding the traffic capacity on some sections, the traffic volume beyond the year 2005 is assumed to remain constant in this Study.

## 7.3.3 Toll Operation Cost

Toll operation cost has been estimated in 1988 prices for tollway management and toll levy respectively in accordance with the deliberations described in Section 6.6.2.

(i) Toll Management Cost

Shah Alam Highway/MRR-II      .. M$533,500/year
N-S Link                      .. M$379,100/year

(ii) Toll Levy Cost           .. M$38,000/booth/year

The summary of toll operation cost is presented in Table 7.3.3.

Table 7.3.3 : Toll Operation Cost

(Unit: M$'000/yr)

|  |  | Toll Levy | Management | Total |
|---|---|---|---|---|
| Shah Alam Highway/ MRR-II | Section 1: NKSB to Jalan Langat L = 9.3km | 0 | | |
| | Section 2: Jalan Langat to HICOM L = 13.7km | 380.0 | | |
| | Section 3: HICOM to KL-Seremban Expressway L = 18.6km | 950.0 | 533.5 | 1,863.5 |
| | Section 4: KL-Seremban Expressway to Jalan Cheras L = 6.1km | 0 | | |
| N-S Link | Section 1: NKVE to Shah Alam Highway L = 4.9km | 950.0 | | |
| | Section 2: Shah Alam Highway to KL-Seremban Ex'way L = 28.2km | 684.0 | 379.1 | 2,013.1 |

## 7.3.4 Alternative Conditions for Financial Analysis

### (1) Implementation/Operation Body

As already discussed in Chapter 4, there are three alternatives as an implementation and operating body for the Project Roads, namely:-

- Government or Related Agency
- Private Sector
- Third Sector

Which form of the above alternatives should be taken is a matter of government policy. However, as the case of private sector requires the most severe test by financial viability, the possibility of privatization will be examined in this Study.

Nevertheless, 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.

The Government also has to retain the prerogative over the issue of toll charges and control over traffic surveillance.

For this reason, even in the case of privatization, the government might be requested to provide some kind of support/assistance to the implementation/operating body in terms of initial investment, land acquisition, long-term loan or sometimes subsidy.

In this Study, however, the financial analysis is made for the case that the government's contribution is minimum.

(2) Concession Period

Under its privatization policy, the Malaysian Government has granted to three private companies the exclusive right to construct, maintain and operate certain highways and facilities. In return these three companies are given the right and authority to collect for their own benefit and retention, toll from the users of these highways and facilities for a concession period of nine (9) years to thirty (30) years, depending on the terms of concession agreement signed between the Government and the concession company.

The concession period is significantly sensitive for the financial viability. Therefore, it is tentatively assumed as follows in this Study:-

(a) Financial analysis of the Whole Project Case
   - 30 years including the construction period

(b) Financial analysis of high priority project in Phase 1 or up to Phase 2
   - 20 years or 25 years including the construction period

(3) Equity Share and Dividend

Since the proposed project requires large amount of investment, the equity share (equity to loan allocation ratio) is supposed to be comparatively low if exclusively prepared by the private sector.

Hence, the alternative equity loan allocation plans are assumed as follows:-

|        | Equity | Loan |
|--------|--------|------|
| Case 1 | 10%    | 90%  |
| Case 2 | 50%    | 50%  |

As for the dividend, in general, the higher the dividend rate and the earlier the start of payment, the easier the equity can be prepared.

Dividend should be paid in accordance with the profitability of the business entity, however, if the first year of the surplus is in the far future, investors may not be interested in this project. Accordingly, the dividend payment is assumed to be started in the third year from the opening to traffic irrespective of the financial situation of the corresponding years.

The dividend rate is assumed as 10% per year, which is higher than the interest rate of the long term loan.

(4) Government's Share

As stated above, the case that the Government's share is minimized will be is examined first. That is, the Government's contribution in terms of initial investment is set up as follows:-

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

In Case 1, all the investment is made under the full responsibility of the private sector.

On the other hand, in Case 2, the right-of-way is acquired by the Government.

In case that land acquisition is made by a private entity, the entity may face a difficulty, sometimes a social problem. Therefore, Case 2 will be more preferable in order to implement the project smoothly.

(5) Long-Term Loan Condition

For preparing the initial investment of Project Roads the following two types of long-term loan are considered in this Study.

Table 7.3.4: Long-Term Loan Type

| 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 |

Note: The interest during the grace period should be included in the repayment

The first type is the loan from a local development bank while the second type is a two-step loan derived from an international financing agency or foreign development aid.

The long-term loan allocation ratio is assumed as the following alternative cases.

| | Type 1 | Type 2 |
| --- | --- | --- |
| Case 1 | 100% | 0% |
| Case 2 | 50% | 50% |

(6) Short-Term Loan

Since the project requires large amount of long-term loans for the initial investment, once the repayment is started, the implementing/operating business entity will often encounter a shortage of cash in hand.

This shortage has to be offset by the short-term loan financed by an ordinary commercial bank, otherwise, the entity cannot continue its operation.

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

(7) Inflation Rate

According to the Economic Report 1987/88 issued by the Ministry of Finance, the consumer price in Malaysia during the years from 1980 to 1987 is fairly stable with an average annual growth rate of 3.6% as shown in Table 7.3.5.

The average growth in consumer price of the industrialized countries is also very stable, only 3.5% per annum during the recent five years.

Table 7.3.5: Changes in Consumer Price Index in Malaysia

| Year | Index | Growth Rate to the Previous Year |
|------|-------|----------------------------------|
| 1980 | 100.0 | — |
| 1983 | 120.4 | +3.4% |
| 1984 | 125.1 | +3.9% |
| 1985 | 125.5 | +0.3% |
| 1986 | 126.4 | +0.7% |
| 1987 | 128.1 | +1.5% |
| Average Growth Rate | | +3.6% |

Hence, taking some allowances into account, the inflation rate for the financial analysis is assumed to be 4% per annum for both the foreign and local portion of the construction and operation/maintenance costs.

(8) Tax

The total tax is set at 40% of the net profit before tax, taking into account the corporate income tax and development tax.

## 7.3.5 Evaluation Indices

The financial viability of the project is evaluated from the following viewpoints:-

* Project as a whole and
* Investors

As to the evaluation indices from the viewpoint of the project as a whole, Financial Internal Rate of Return (FIRR), Financial Net Present Value (FNPV), Financial Cost Benefit Ratio (B/C) are used. On the other hand, Return on Equity (ROE) is used as the evaluation index from the viewpoint of the investors.

FIRR shows the marginal interest rate with which the investment cost balances with the accumulated net profit.

Therefore, if the FIRR exceeds the interest rate of long term loan, the project is judged to be financially viable. In this Study, 10% is adopted as the interest rate to be compared with the calculated FIRR.

Likewise, ROE indicates the rate of return on the paid-up equity.

The Financial Internal Rate of Return (FIRR) is determined as the discount rate that equalizes the present value of the stream of the financial costs and benefits over the concession period. The FIRR can be expressed as the following formula:-

The Financial Internal Rate of Return (FIRR) is determined as the discount rate that equalizes the present value of the stream of the financial costs and benefits over the concession period. The FIRR can be expressed as the following formula:-

$$\sum_{t=1}^{T} \frac{I_t}{(1+\gamma)^t} = \sum_{t=1}^{T} \frac{B_t - C_t}{(1+\gamma)^t}$$

Where:-
$\gamma$ — FIRR
$I_t$ — Investment costs in year $t$
$B_t$ — Revenue in year $t$
$C_t$ — Operating expenses in year $t$

The Financial Net Present Value (FNPV) and Financial Cost Benefit Ratio (B/C) are expressed by the following formula:-

$$FNPV = \sum_{t=1}^{T} \frac{B_t}{(1+\overline{\gamma})^t} - \sum_{t=1}^{T} \frac{I_t + C_t}{(1-\overline{\gamma})^t}$$

$$B/C = \sum_{t=1}^{T} \frac{B_t}{(1+\overline{\gamma})^t} \bigg/ \sum_{t=1}^{T} \frac{I_t + C_t}{(1+\overline{\gamma})^t}$$

Where:-
$\overline{\gamma}$       Discount rate

The Return on Equity (ROE) can be expressed as the following formula:-

$$\sum_{t=1}^{T} \frac{E_t}{(1+\gamma)^t} = \sum_{t=1}^{T} \frac{B_t - C_t^1 - C_t^2 - C_t^3}{(1+\gamma)^t}$$

Where:-
$\gamma$ — ROE
$E_t$ — Paid-up Equity in year $t$

$C_t^1$ — Operating expenses in year $t$

$C_t^2$ — Repayment of principal portion of debt borrowed in year $t$

$C_t^3$ — Repayment of interest portion of the debt borrowed in year $t$

$B_t$ — Revenue in year $t$

7.3.6 Financial Analysis for Establishing Phasing Plan

(1) Evaluation for Determining the Highest Priority Project

(a) Alternative Cases

As a result 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 7.3.6 are examined in order to select the highest priority project.

The alternatives are also illustrated in Figure 7.3.3.

Table 7.3.6: Alternatives For Highest Priority Project

| Alternative Case | N-S LINK NKVE to Shah Alam Highway | SHAH ALAM HIGHWAY/ MRR-II | |
|---|---|---|---|
| | | 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 | - |

As for Alt.1 through Alt.6, on the short stretch of N-S Link from NKVE to Subang West IC, only three interchanges and a connecting road from the up-graded Jalan TUDM-Shah Alam to Shah Alam Highway are to be constructed so as to minimize initial capital outlay.

On the other hand, for Alt.7, the 4-lane throughway as well as the three interchanges are to be constructed.
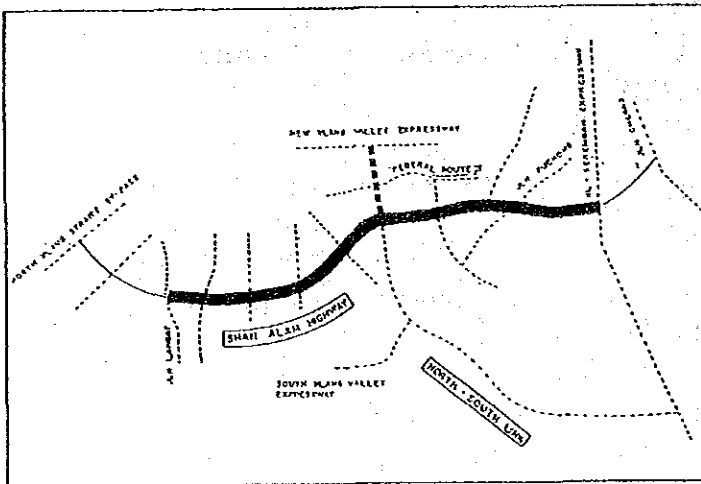
The cross-sections of the short stretch of N-S Link for Alt.6 and Alt.7 are shown in Figures 6.5.11 and 6.5.12 respectively in Chapter 6.
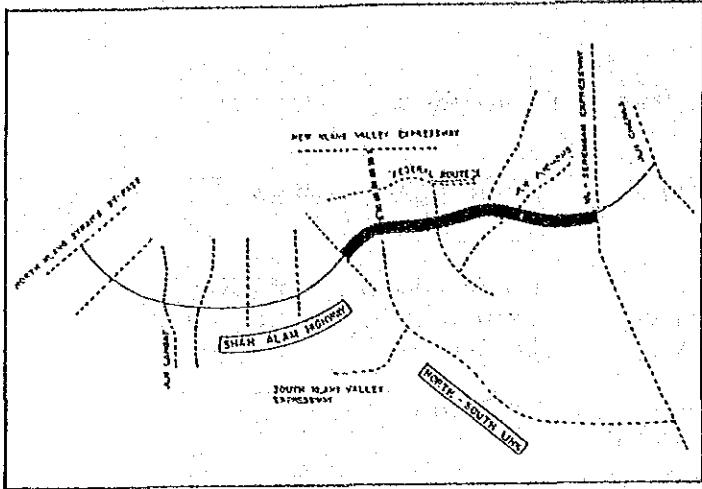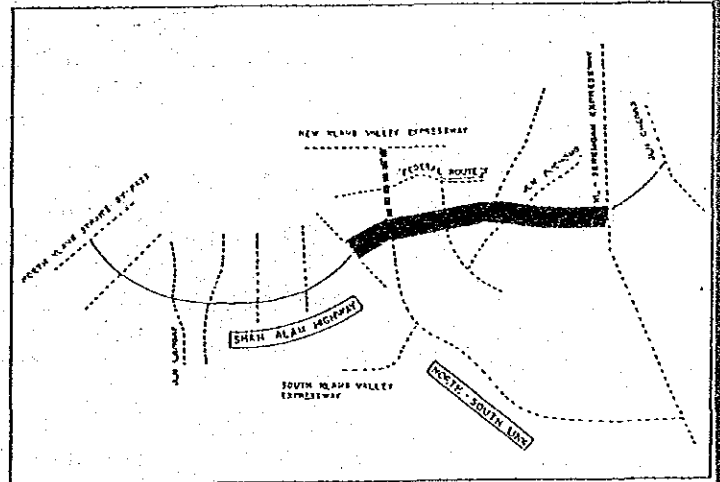
ALTERNATIVE 1
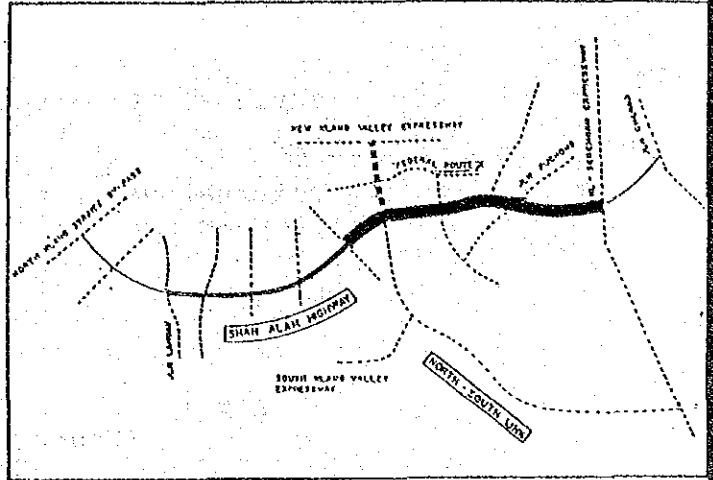
ALTERNATIVE 2

ALTERNATIVE 3

ALTERNATIVE 4
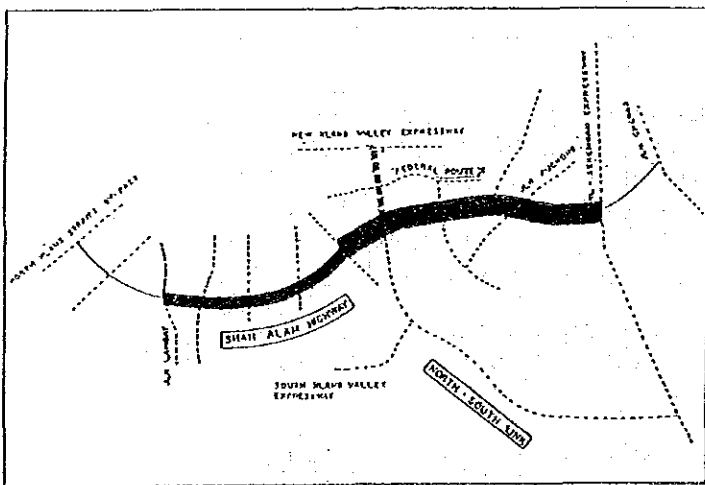
ALTERNATIVE 5

LEGEND

| CONSTRUCTION OF THROUGH WAY | CONNECTING ROAD ONLY |
|---|---|
| 2 LANES | |
| 4 LANES | |
| 6 LANES | |

Figure 7.3.3: Alternatives for Highest Priority Project

Figure 7.3.3: (Cont.)



ALTERNATIVE 6



ALTERNATIVE 7

LEGEND

| CONSTRUCTION OF THROUGH WAY | CONNECTING ROAD ONLY |
|---|---|
| 2 LANES | ........... |
| 4 LANES | ▬ ▬ ▬ ▬ |
| 6 LANES | |

Therefore, only for the case of Alt. 7, the short stretch of N-S Link will be tolled under closed system while for the other cases, it is assumed to be untolled as it is difficult to do so from the engineering and social viewpoints. N-S Link in the cases Alt. 1 to Alt. 6 is practically the same as Jalan TUDM-Shah Alam currently under construction by JKR Selangor State.

As for the other two sections, the highest priority project cases show alternative combination of the number of lanes.

In setting up the alternatives, the minimum number of lanes required as a highway and the realistic affordability of a private sector are taken into account.

The project cost by alternative is estimated as follows:-

Table 7.3.7: Project Cost of Alternatives for Highest Priority Project

(Unit: M$million)

| Alternative | Construction Cost including Design Cost | Land Acquisition Cost | Total |
|---|---|---|---|
| Alt. 1 | 180.0 | 19.3 | 199.3 |
| Alt. 2 | 234.1 | 28.4 | 264.5 |
| Alt. 3 | 255.8 | 40.4 | 296.2 |
| Alt. 4 | 213.3 | 26.2 | 239.5 |
| Alt. 5 | 289.1 | 47.3 | 336.4 |
| Alt. 6 | 191.2 | 19.3 | 210.5 |
| Alt. 7 | 231.4 | 19.4 | 250.8 |

(c) Disbursement Schedule

The disbursement schedule is assumed to be same as the tentative schedule set-up for the economic evaluation.

Accordingly, the project road will be completed by the end of 1994 and be open at the beginning of 1995.

Table 7.3.8: Disbursement Schedule for Highest
         Priority Project

|                  | 1991 | 1992 | 1993 | 1994 | 1995 |
|------------------|------|------|------|------|------|
| Detailed Design  | 100% |      |      |      |      |
| Land Acquisition |      | 100% |      |      |      |
| Construction     |      |      | 50%  | 50%  |      |

(c) Results of Analysis

Table 7.3.9 shows the evaluation
indicators by alternative case for
determining the highest priority project
based on the concession period of 20
years.

Other conditions applicable to all cases
are:-

- Equity share to the initial investment
  is 10%
- The interest rate of the short-term
  loan is 10% per annum
- The long-term loan is exclusively
  dependent on the local loan

From the results, the following findings
are noted:-

(i) Alt.1 shows the most preferable
    indicators of financial feasibility:
    its FIRR is more than 13% even
    including land acquisition cost.

    On the financial situation during the
    concession period the accumulated
    short-term loan is notably small,
    only M$6.7 million in the 7th year
    after the opening even if the land
    cost is to be reimbursed. It will
    further reduce to M$2.0 million if
    the land cost is borne by the
    Government (Refer to Table 7.3.10).

(ii) Alt.6 also shows preferable
     indicators of financial feasibility:
     its FIRR is 13.3% for the case of
     including land acquisition cost and
     14.6% for excluding the land cost.
     Table 7.3.10 also shows Alt.6 having
     a good financial performance during
     the concession period.

If the land cost is borne by the Government, the maximum accumulated short-term loan is only M$3.3 million in the first year. Therefore, the debt is cleared off in the second year from the opening.

(iii) The indicators for Alt.4 as well as Alt.7 also show that these cases will be financially viable even including land cost.

However, Table 7.3.10 shows that the maximum accumulated short-term loan reaches up to M$50 million and M$38 million respectively in the 10th year after opening if the land cost is to be reimbursed.

The late clearing up year of the short-term loan which comes at the 10th or 13th year from the opening may require a careful financial management.

(iv) As for the other Cases, although financially barely viable, the indicators are relatively low in any condition. This may be attributed to the following:-

(a) As for Alt.2, a high return ratio to the investment cannot be expected at the 2-lane section between HICOM-Jalan Langat since the construciton cost of the 2-lane road does not decrease so much as the traffic volume decreases compared with multiple-lane case;

(b) As for Alt.3 and Alt.5, the initial investment is too large, therefore, the operating entity will suffer from shouldering this large debt during the concession period.

The above observation indicates that the following sections should be given the highest priority:-

(a) The section of Shah Alam Highway/ MRR-II from KL-Seremban Express-way to HICOM (18.6km);

(b) the section of N-S Link from NKVE to Shah Alam Highway (4.9km).

As a consequence, although Alt.6 has the second highest FIRR, this case was selected as the highest priority project taking into account the need to ensure:-

- Smoother traffic flow
- Future traffic growth
- Effective use of the existing road

Table 7.3.9: Financial Evaluation Indicators for Selecting Highest Priority Project - Concession Period 20 years

| Alternative Case | | FIRR | | NPV Nominal | B/C Nominal | ROE | |
|---|---|---|---|---|---|---|---|
| | Land Cost | Nominal % | Real % | (M$mil) | | Nominal % | Real % |
| Alt.1 | Including | 13.9 | 9.5 | 67.5 | 1.34 | 27.2 | 22.3 |
| 4-2 | 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 |
| 4-2-2 | 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 |
| 4-4-2 | 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 |
| 6-2 | 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 |
| 6-4-2 | 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 |
| 4-4 | 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 |
| 4-4 | Excluding | 13.9 | 9.5 | 76.0 | 1.33 | 27.4 | 22.5 |

Table 7.3.10: Financial Situation for Selecting Highest Priority Project (Concession Period 20 Years)

| Alternative Case | Land Cost | First Year of Operating Surplus (Year) | Maximum Short-term Loan in Single Year M$mil | (Year) | Maximum Accumulated Short-term M$mil | (Year) | Clearing-up Year of Short-term Loan (Year) |
|---|---|---|---|---|---|---|---|
| Alt.1 | Including | 5th | 5.0 | (5th) | 6.7 | (7th) | 11th |
|  | Excluding | 4th | 2.0 | (1st) | 2.0 | (1st) | 2nd |
| Alt.2 | Including | 6th | 19.1 | (5th) | 89.2 | (10th) | 15th |
|  | Excluding | 6th | 11.1 | (5th) | 25.5 | (10th) | 12th |
| Alt.3 | Including | 6th | 21.5 | (5th) | 109.1 | (12th) | 16th |
|  | Excluding | 6th | 4.3 | (1st) | 20.3 | (10th) | 12th |
| Alt.4 | Including | 6th | 14.7 | (5th) | 50.5 | (10th) | 13th |
|  | Excluding | 6th | 7.1 | (5th) | 8.0 | (6th) | 10th |
| Alt.5 | Including | 6th | 25.6 | (5th) | 128.6 | (10th) | 16th |
|  | Excluding | 6th | 8.9 | (5th) | 23.4 | (10th) | 12th |
| Alt.6 | Including | 6th | 11.0 | (5th) | 22.4 | (9th) | 12th |
|  | Excluding | 5th | 3.8 | (1st) | 3.8 | (1st) | 2nd |
| Alt.7 | Including | 6th | 13.8 | (5th) | 37.9 | (10th) | 13th |
|  | Excluding | 6th | 4.7 | (1st) | 4.7 | (1st) | 10nd |

Note: Year is counted from the first year of open to traffic

(2) Evaluation for Determining the Second Phase Project

(a) Evaluation Case

To find the second priority project, the two (2) alternatives shown in Table 7.3.11 are examined (Refer to Figure 7.3.4).

Table 7.3.11: Alternatives for Second Phase Project

| Alternative Case | SHAH ALAM HIGHWAY/ MRR-II | | N-S LINK | |
|---|---|---|---|---|
| | KL-Seremban Expressway to HICOM | HICOM to Jalan Langat | NKVE to Shah Alam Highway | Shah Alam H'way to KL-Seremban Ex'wy |
| Alt.1 | (4) to 6 lanes | *6 lanes | (4) lanes (Connecting road) | - |
| Alt.2 | (4) lanes | - | 6 lanes | 4 lanes |

Note: * Section between SKSB to Jalan Langat is only 4 lanes

( ) Indicates the number of lanes in the section which would be already completed in Phase 1

For both alternatives, the highest priority project identified earlier is assumed to have been implemented in the first phase during the years from 1991 to 1994 and the second phase project is to be implemented during the years 1994 to 1997.

Alt.1 is to complete the section of the Shah Alam Highway/MRR-II from KL-Seremban Expressway to Jalan Langat as a 6-lane highway while Alt. 2 is to complete only N-S Link in the form of its final scheme but not to extend the length of Shah Alam Highway.

As for Alt.1, it is assumed that toll will not be levied on N-S Link, since the throughway is not constructed yet as explained in the previous section.

However, toll will be levied on N-S Link for Alt.2.

The project cost by alternative is estimated as follows:-

(Unit: M$million)

| Alternatives | Construction Cost including Design Cost | Land Acquisition Cost | Total |
|---|---|---|---|
| Alt.1 | 130.8 | 44.1 | 174.9 |
| Alt.2 | 246.6 | 47.5 | 294.1 |

SELECTED PROJECT
FOR PHASE I
(1991 – 1994)
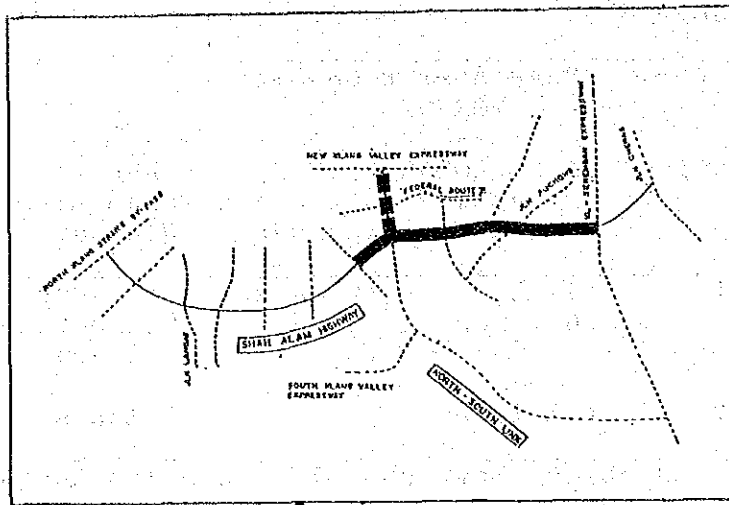


ALTERNATIVES
FOR PHASE 2



Figure 7.3.4: Alternatives for Phase 2

LEGEND

CONSTRUCTION
OF
THROUGH WAY

CONNECTING
ROAD ONLY

4 LANES

6 LANES

(b) Disbursement Schedule

> The disbursement schedule is as shown in
> Table 7.3.12. Accordingly, the project
> will be implemented during the years from
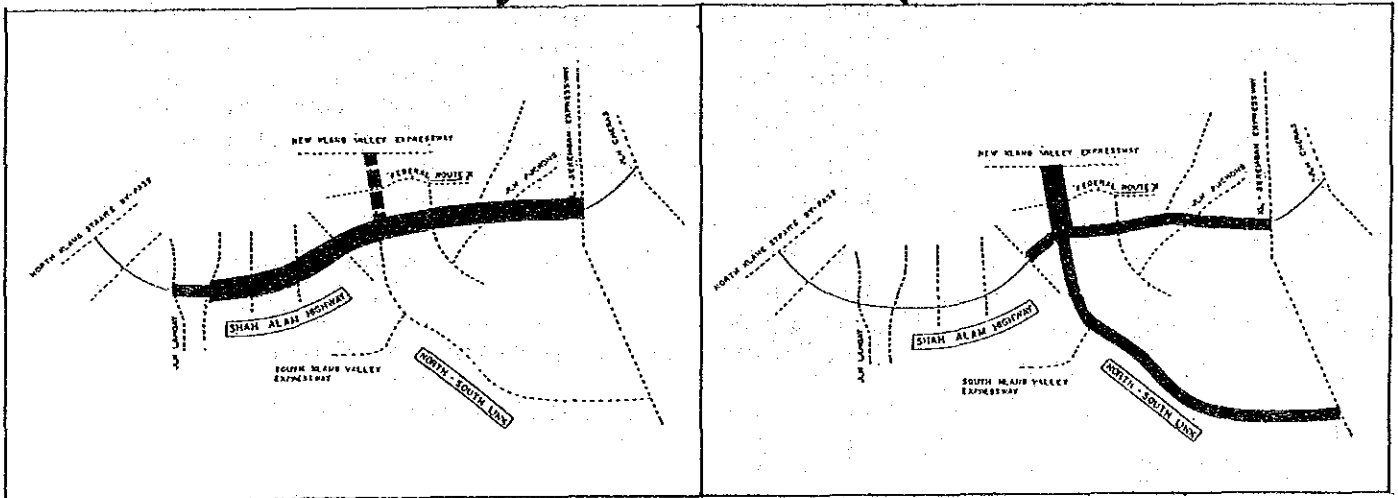> 1994 to 1997 and be open at the beginning
> of 1998.

Table 7.3.12: Disbursement Schedule for Second
Phase Project

|  | 1994 | 1995 | 1996 | 1997 | 1998 |
|---|---|---|---|---|---|
| Detailed Design | 100% |  |  |  |  |
| Land Acquisition |  | 100% |  |  |  |
| Construction |  |  | 50% | 50% |  |

(c) Results of Analysis

> Table 7.3.13 shows the evaluation
> indicators of the alternative cases for
> selecting the Second Phase Project based
> on the concession period of 25 years.
> Other financial conditions are same as
> the highest priority case.

> It is apparent from Tables 7.3.13 abd
> 7.3.14 that Alt.1 shows higher financial
> returns and better financial performance
> during the 25-year concession period.

> Consequently, Alt.1 is selected as the
> second phase project.

Table 7.3.13: Financial Evaluation Indicators for Selecting Second
Phase Project - Concession Period 25 years

| Alternative Case | | FIRR | | NPV | B/C | ROE | |
|---|---|---|---|---|---|---|---|
|  |  | Nominal | Real | Nominal | Nominal | Nominal | Real |
|  | Land Cost | % | % | (M$mil) |  | % | % |
| Alt.1 | Including | 12.4 | 8.1 | 82.1 | 1.23 | 18.0 | 13.5 |
|  | Excluding | 14.4 | 10.0 | 128.3 | 1.42 | 27.0 | 22.1 |
| Alt.2 | Including | 11.9 | 7.6 | 80.3 | 1.17 | 14.4 | 10.0 |
|  | Excluding | 13.4 | 9.0 | 128.8 | 1.32 | 21.1 | 16.5 |

Table 7.3.14: Financial Situation of the Alternatives for Selecting Second Phase Project During the Concession Period

| Alternative Case | | First Year of Operation Surplus<br>Land Cost | Maximum Short-Term Loan in Single Year M$mil (Year) | | Maximum Accumulated Short-term Loan M$mil (Year) | | Clearing-up Year of Short-term Loan |
|---|---|---|---|---|---|---|---|
| Alt.1 | Including | 7th | 21.4 | (10th) | 125.1 | (13th) | 17th |
| | Excluding | 6th | 5.6 | ( 8th) | 14.7 | (10th) | 11th |
| Alt.2 | Including | 11th | 46.1 | (10th) | 252.2 | (13th) | 18th |
| | Excluding | 9th | 27.3 | (10th) | 114.6 | (10th) | 15th |

Note: Year is counted from the first year of opening to traffic

7.3.7 Analysis for Privatization based on the Implementation Schedule

In order to clarify the conditions for privatization, financial analysis is carried out for the following project packages based on the implementation schedule described in Table 7.3.15.

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

(1) Maximum Package

(a) Alternative Cases

As a concession for undertaking the whole project, the two (2) cases shown in Table 7.3.15 are envisaged:-

Table 7.3.15:Alternatives for the Maximum Package

| Case | Shah Alam Highway/MRR-II | N-S Link | Disbursement Schedule |
|---|---|---|---|
| 1 | All the schemes except the section of 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 |

For both the cases, the project package is assumed to be implemented during the years from 1991 to 2000 in accordance with the established Implementation Schedule.

The total project cost is estimated as follows:-

Table 7.3.16: Total Project Cost for Maximum Package
(Unit: M$million)

| Case | Construction Cost including Design Cost | Land Acquisition Cost | Total |
|------|------------------------------------------|-----------------------|-------|
| 1 | 731.9 | 141.9 | 873.8 |
| 2 | 568.6 | 110.9 | 679.5 |

(b) Results of Analysis

Table 7.3.17 shows the evaluation indicators for the Maximum Package by alternative concession period. These figures are also illustrated in Figure 7.3.5 where the alternative cases for land cost are defined as "Condition a" and "Condition b".

More detailed financial statements during the concession period, i.e. Profit/Loss Statement, Cash Flow and Balance Sheet are shown in Tables 7.3.19 and 7.3.20.

In case that the whole project except the section on Jalan Cheras to KL-Seremban Expressway is to be implemented as a privatization project, the FIRR exceeds 10% only if the concession period is longer than 25 years and land acquisition cost is borne by the Government. Therefore, it can be said that the whole project is financially viable to be privatized.

In practical sense, however, longer concession period, say 35 years or a larger equity share such as more or less 50% will be required in order to make the project sufficiently attractive to the private sector.

Table 7.3.17: Financial Evaluation Indicators for the Maximum Package

| Case | Concession Period (yrs) | Land Cost | FIRR % | NPV (M$mil) | B/C | ROE % |
|------|-------------------------|-----------|--------|-------------|------|-------|
| | 25 | Including | 9.8 | -12.5 | 0.98 | 9.8 |
| | | Excluding | 11.7 | 76.3 | 1.13 | 18.6 |
| 1 | 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 |
| | 25 | Including | 11.4 | 66.0 | 1.12 | 15.3 |
| | | Excluding | 13.4 | 137.9 | 1.29 | 21.4 |
| 2 | 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 7.3.18: Financial Situation During the Concession Period for Maximum Package

| Alternative Conditions | | First Year of Operating Surplus | Maximum Short-Term Loan in Single Year M$mil (Year) | | Maximum Accumulated Short-term Loan M$mil (Year) | | Clearing-up Year of Short-term Loan |
|------|-----------|---------|------|--------|--------|--------|--------|
| Case | Land Cost | | | | | | |
| 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 |

| 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

FIRR 20
(%)

15

10

CONCESSION   PERIOD  ( yrs )

(b)   Case 2

FIRR 20
(%)

15

10
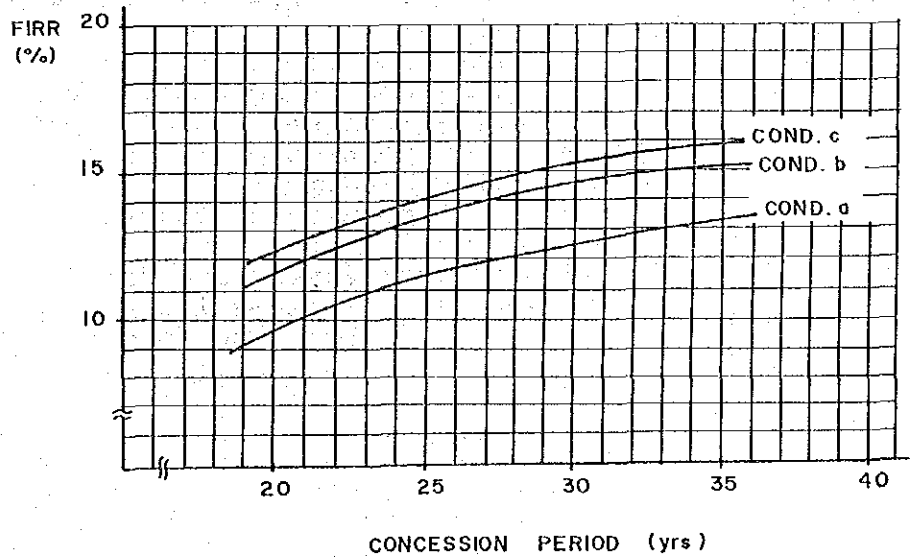
CONCESSION   PERIOD  (yrs)
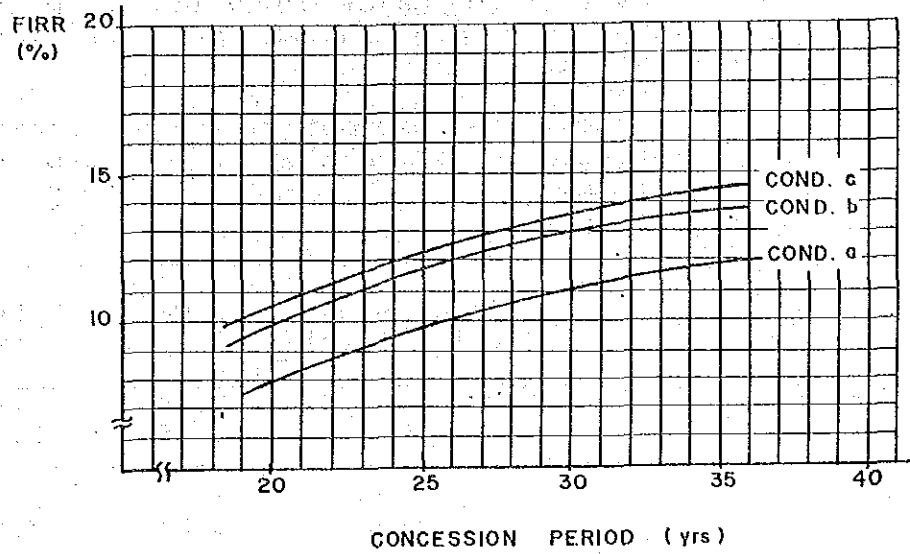
Figure 7.3.5:  FIRR for Whole Project

In case of 35 years, DSCR (Debt Service
Coverage Ratio) is calculated as 2.45 and
interest cover is 6.25. It is said that
the desirable level of the DSCR is over
2.0 in a stable stage and the interest
cover of the major companies in Malaysia
and Singapore in healthy condition is
over 4.0.

Hence, the project will be sufficiently
profitable if a 35-year concession is
given.

| Case | Concession Period (yrs) | 1) DSCR | 2) Interest Cover |
|------|------------------------|---------|-------------------|
| 1 | 30 | 1.74 | 4.46 |
|   | 35 | 2.45 | 6.25 |
| 2 | 30 | 2.31 | 6.36 |
|   | 35 | 3.25 | 8.88 |

Note: 1) DSCR; Debt Service Coverage
Ratio is defined as:-
$DSCR = (Bt - Ct)/(Lt + It)$
Where:
$Bt$ - Revenue in year t
$Ct$ - Operating cost in year t
$Lt$ - Repayment of principal
portion of loans
$It$ - Repayment of interest
portion of loans

2) Interest cover is defined as the
number of times interest payable
covered by the profit before
interest and tax.

If the section from Jalan Langat to NKSB
is further excluded from the package,
then the project can become more
profitable, even for the case of 30-year
concession period. Under the conditions
that land cost is borne by the Government
and the equity share being 10%, the FIRR
is calculated 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 7.3.19 : Financial Situation during Concession Period for Maximum Pakage ( Case 1 )
(Excluding Land Cost, 30 years Concession)

PROFIT AND LOSS STATEMENT (STATEMENT OF INCOME)

| | 1 1991 | 2 1992 | 3 1993 | 4 1994 | 5 1995 | 6 1996 | 7 1997 | 8 1998 | 9 1999 | 10 2000 | 11 2001 | 12 2002 | 13 2003 | 14 2004 | 15 2005 | 16 2006 | 17 2007 | 18 2008 | 19 2009 | 20 2010 | 21 2011 | 22 2012 | 23 2013 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1.OPERATING REVENUE | 9373 | 0 | 121490 | 143345 | 22074 | 23372 | 33466 | 33440 | 33145 | 78896 | 130837 | 107103 | 140338 | 151272 | 222012 | 222012 | 222012 | 222012 | 222012 | 299627 | 299627 | 299627 | 299627 |
| NO. OF VEHICLES / DAY | | | | | 73484 | 84281 | 89422 | 137236 | 146130 | 153359 | 257758 | 243319 | 266569 | 277189 | 301857 | 301857 | 301857 | 301857 | 301857 | 301857 | 301857 | 301857 | 301857 |
| NO. OF VEHICLES (PCU/DAY) | | | | | 103227 | 111473 | 118153 | 183995 | 194728 | 204177 | 314317 | 323453 | 345677 | 360147 | 395955 | 396955 | 396955 | 396955 | 396955 | 396955 | 396955 | 396955 | 396955 |
| 2.OPERATING EXPENSES | | | | | 14111 | 14530 | 14556 | 15903 | 16508 | 26730 | 62220 | 63113 | 54941 | 55066 | 56309 | 67055 | 58139 | 67367 | 73441 | 71362 | 72932 | 74252 | 75526 |
| 1)MAIN OPERATING EXPENSES | | | | | 5208 | 8417 | 5603 | 10146 | 10551 | 10973 | 22603 | 23196 | 24124 | 25685 | 26092 | 27115 | 28222 | 29350 | 30524 | 31745 | 33015 | 34335 | 35709 |
| 2)DEPRECIATION | | | | | 8903 | 8903 | 8903 | 15757 | 15757 | 15757 | 39917 | 39917 | 39717 | 39917 | 39917 | 39917 | 39917 | 39917 | 39917 | 39917 | 39917 | 39917 | 39917 |
| 3.OPERATING PROFITS | | | | | 7963 | 18912 | 20930 | 29557 | 31857 | 52166 | 68664 | 73995 | 79847 | 86266 | 157003 | 155769 | 163473 | 155745 | 152351 | 227963 | 226695 | 225575 | 224061 |
| 4.OTHER EXPENSES | | 110355 | 131063 | 20695 | 23643 | 33520 | 33627 | 34471 | 34471 | 35374 | 35574 | 34145 | 62040 | 62232 | 63973 | 65232 | 56402 | 47003 | 36735 | 23770 | 11309 | | |
| 1)FINANCIAL COST(INTEREST) | | | | | 20695 | 21073 | 20643 | 36820 | 35827 | 34471 | 38835 | 37541 | 35574 | 34145 | 82040 | 73985 | 67727 | 62282 | 56402 | 47003 | 36735 | 23770 | 11309 |
| -(LONG TERM LOAN) | | | | | 20695 | 20655 | 20643 | 36820 | 35827 | 34526 | 36853 | 36598 | 35364 | 30035 | 74661 | 66866 | 55525 | 49474 | 41023 | 33677 | 25642 | 18024 | 11309 |
| -(SHORT TERM LOAN) | | | | | | 355 | | | | 143 | 0 | 945 | 2410 | 4060 | 7379 | 9119 | 11202 | 13808 | 15319 | 15329 | 11113 | 5746 | 0 |
| 2)SALES TAX | | | | | | | | | | | | | | | | | | | | | | | |
| 5.NET PROFITS BEFORE TAX | | | | | -12732 | -1966 | 287 | -6983 | -3990 | 17695 | -20139 | -13546 | -6027 | 2121 | 74963 | 79974 | 85146 | 90463 | 96169 | 178959 | 189940 | 201605 | 212692 |
| 6.INCOME TAX | | | | | | | 115 | | | 7078 | | | | 848 | 29985 | 31990 | 34058 | 36135 | 38468 | 71584 | 75976 | 80642 | 85077 |
| 7.NET PROFITS AFTER TAX | | | | | -12732 | -1966 | 172 | -6983 | -3999 | 10617 | -20139 | -13546 | -6027 | 1273 | 44978 | 47984 | 51088 | 54278 | 57701 | 107078 | 113964 | 120963 | 127615 |
| 8.DIVIDENDS | | | | | | | 2363 | 2362 | 2363 | 4182 | 4182 | 4182 | 10593 | 10593 | 10593 | 10593 | 10593 | 10593 | 10593 | 10593 | 10593 | 10593 | 10593 |
| 1)DIVIDEND (1) | | | | | | | | | | | | | | | | | | | | | | | |
| 2)DIVIDEND (2) | | | | | | | 2363 | 2363 | 2363 | 4182 | 4182 | 4182 | 10593 | 10593 | 10593 | 10593 | 10593 | 10593 | 10593 | 10593 | 10593 | 10593 | 10593 |
| 9.RETAINED EARNINGS | | | | | -12732 | -1966 | -2191 | -9346 | -6353 | 6435 | -24371 | -17728 | -16620 | -9320 | 34385 | 37391 | 40495 | 43685 | 47108 | 96782 | 103371 | 110370 | 117022 |

TABLE OF SOURCES AND APPLICATION OF FUNDS (CASH FLOW)

| | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1.SOURCES OF FUNDS | 9373 | 0 | 121490 | 143345 | 0 | 106458 | 140234 | 8774 | 33093 | 401925 | 29159 | 41041 | 50556 | 75026 | 132283 | 140720 | 151129 | 145489 | 136137 | 218876 | 229857 | 241522 | 252609 |
| 1)NET PROFITS BEFORE TAX | 9373 | 0 | 0 | 0 | -12732 | -1966 | 287 | -6983 | -3990 | 17695 | -20139 | -13546 | -6027 | 2121 | 74963 | 79974 | 85146 | 90463 | 96169 | 178859 | 189940 | 201605 | 212692 |
| 2)DEPRECIATION | 0 | 0 | 0 | 0 | 8903 | 8903 | 8903 | 15757 | 15757 | 15757 | 39917 | 39917 | 39917 | 39917 | 39917 | 39917 | 39917 | 39917 | 39917 | 39917 | 39917 | 39917 | 39917 |
| 3)SHORT TERM LOAN | 0 | 0 | 0 | 0 | 3829 | 0 | 0 | 0 | 1455 | 0 | 9431 | 14670 | 16655 | 32968 | 17403 | 20829 | 26066 | 15109 | 101 | 0 | 0 | 0 | 0 |
| 4)LONG TERM LOAN | 8962 | 0 | 110355 | 131063 | 0 | 54930 | 119679 | 0 | 299955 | 337037 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5)PAID-UP EQUITY | 911 | 0 | 11135 | 12252 | 0 | 8571 | 11565 | 0 | 30227 | 31456 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 6)GRANT | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2.APPLICATION OF FUNDS | 9373 | 0 | 121490 | 143345 | 0 | 97954 | 124173 | 10513 | 349834 | 400345 | 30719 | 41041 | 50556 | 75026 | 132283 | 140720 | 151129 | 145489 | 136187 | 218876 | 229857 | 227694 | 181373 |
| 1)CAPITAL EXPENDITURE | 9373 | 0 | 121490 | 143345 | 0 | 93521 | 131044 | 0 | 329723 | 358473 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2)REPAYMENT OF SHORT TERM LOAN | 0 | 0 | 0 | 0 | 0 | 3829 | 0 | 0 | 0 | 1455 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 42166 | 55664 | 57461 | 0 |
| 3)REPAYMENT OF LONG TERM LOAN | 0 | 0 | 0 | 0 | 0 | 604 | 836 | 9150 | 11673 | 13179 | 16637 | 36889 | 33793 | 63535 | 91709 | 98157 | 106478 | 96711 | 87103 | 74553 | 29422 | 73973 | 85708 |
| 4)INCOME TAX | 0 | 0 | 0 | 0 | 0 | 0 | 115 | 0 | 0 | 7078 | 0 | 0 | 0 | 848 | 29985 | 31990 | 34058 | 34185 | 38468 | 71584 | 75976 | 80642 | 85077 |
| 5)DIVIDENDS | 0 | 0 | 0 | 0 | 0 | 0 | 2363 | 2363 | 2363 | 4182 | 4182 | 4182 | 10593 | 10593 | 10593 | 10593 | 10593 | 10593 | 10593 | 10593 | 10593 | 10593 | 10593 |
| -DIVIDEND (1) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| -DIVIDEND (2) | 0 | 0 | 0 | 0 | 0 | 0 | 2363 | 2363 | 2363 | 4182 | 4182 | 4182 | 10593 | 10593 | 10593 | 10593 | 10593 | 10593 | 10593 | 10593 | 10593 | 10593 | 10593 |
| 3.CASH SURPLUS OR DEFICIT | 0 | 0 | 0 | 0 | 0 | 2504 | 6656 | -1739 | -6821 | 1550 | -1560 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 13553 | 71231 |

Table 7.3.19 (Continued)

BALANCE SHEET

| | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1.ASSETS | 9873 | 9873 | 131363 | 274708 | 274708 | 370733 | 507853 | 506094 | 829056 | 1199089 | 1197529 | 1197529 | 1197529 | 1197529 | 1197529 | 1197529 | 1197529 | 1197529 | 1197529 | 1197529 | 1197529 | 1211357 | 1282568 |
| 1)CURRENT ASSETS (CASH) | 0 | 0 | 0 | 0 | 0 | 2554 | 8580 | 6821 | 0 | 1560 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 13828 | 85059 |
| 2)FIXED ASSETS | 9873 | 9873 | 131363 | 274708 | 274708 | 368227 | 499273 | 499272 | 829055 | 1197529 | 1197529 | 1197529 | 1197529 | 1197527 | 1197529 | 1197529 | 1197529 | 1197529 | 1197529 | 1197529 | 1197529 | 1197529 | 1197529 |
| -DESIGN | 9873 | 9873 | 9873 | 17483 | 17483 | 17483 | 44041 | 44041 | 44041 | 44041 | 44041 | 44041 | 44041 | 44041 | 44041 | 44041 | 44041 | 44041 | 44041 | 44041 | 44041 | 44041 | 44041 |
| -LAND | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| -CONST-1 | 0 | 0 | 121490 | 257225 | 257225 | 350746 | 455332 | 455332 | 785615 | 1153489 | 1153488 | 1153488 | 1153488 | 1153488 | 1153488 | 1153488 | 1153488 | 1153488 | 1153488 | 1153488 | 1153488 | 1153488 | 1153488 |
| -CONST-2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2.LIABILITIES | 8962 | 8962 | 119317 | 250380 | 263112 | 352552 | 480458 | 488065 | 787195 | 1119815 | 1142126 | 1159854 | 1176474 | 1185794 | 1151409 | 1114918 | 1075525 | 1029838 | 922730 | 885948 | 782577 | 686035 | 640244 |
| 1)OUTSTANDING OF LOAN (SHORT) | 0 | 0 | 0 | 0 | 3829 | 0 | 0 | 0 | 1432 | 0 | 9451 | 24101 | 40777 | 74785 | 71128 | 112017 | 158083 | 155192 | 153293 | 111127 | 57461 | 0 | 0 |
| 2)OUTSTANDING OF LOAN (LONG) | 8962 | 8962 | 119317 | 250380 | 250380 | 334726 | 453749 | 445599 | 727477 | 1048335 | 1018798 | 981939 | 941946 | 878361 | 786655 | 688519 | 582041 | 483330 | 332235 | 201671 | 212049 | 133051 | 27343 |
| 3)ACCUMULATED DEPRECIATION | 0 | 0 | 0 | 0 | 8963 | 17806 | 26709 | 42466 | 58225 | 73980 | 113897 | 153814 | 193731 | 233643 | 273565 | 313482 | 353379 | 393316 | 433235 | 473150 | 513067 | 552934 | 592901 |
| 3.NET WORTH | 911 | 911 | 12046 | 24323 | 11556 | 18201 | 27373 | 18029 | 41993 | 79774 | 55403 | 37675 | 21055 | 11733 | 46120 | 85511 | 124096 | 167691 | 214779 | 311361 | 414352 | 525322 | 642344 |
| 1)PAID-UP EQUITY | 911 | 911 | 12046 | 24328 | 24328 | 32699 | 44264 | 44264 | 74491 | 105727 | 105927 | 105927 | 105927 | 105927 | 105927 | 105927 | 105927 | 105927 | 105927 | 105927 | 105927 | 105927 | 105927 |
| 2)GRANT | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3)RETAINED EARNINGS | 0 | 0 | 0 | 0 | -12732 | -14698 | -16889 | -26235 | -32588 | -26153 | -50524 | -68252 | -84872 | -74192 | -59807 | -22416 | 18079 | 61764 | 108872 | 205434 | 308925 | 419395 | 536417 |
| 4.TOTAL LIABILITIES AND NET WORTH | 9873 | 9873 | 131363 | 274708 | 274708 | 370733 | 507853 | 506094 | 829056 | 1199089 | 1197529 | 1197529 | 1197529 | 1197529 | 1197529 | 1197529 | 1197529 | 1197529 | 1197529 | 1197529 | 1197529 | 1211357 | 1282568 |

BALANCE SHEET

| | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 |
|---|---|---|---|---|---|---|---|
| 1.ASSETS | 1375698 | 1618270 | 1839916 | 2060597 | 2280276 | 2498912 | 2775556 |
| 1)CURRENT ASSETS (CASH) | 198169 | 420741 | 642387 | 863068 | 1082747 | 1301382 | 1598027 |
| 2)FIXED ASSETS | 1197529 | 1197529 | 1197529 | 1197529 | 1197529 | 1197529 | 1197527 |
| -DESIGN | 44041 | 44041 | 44041 | 44041 | 44041 | 44041 | 44041 |
| -LAND | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| -CONST-1 | 1153488 | 1153488 | 1153488 | 1153488 | 1153488 | 1153488 | 1153488 |
| -CONST-2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2.LIABILITIES | 632818 | 672735 | 712652 | 752569 | 792486 | 832403 | 872320 |
| 1)OUTSTANDING OF LOAN (SHORT) | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2)OUTSTANDING OF LOAN (LONG) | 0 | 0 | 0 | 0 | 0 | 0 | 153293 |
| 3)ACCUMULATED DEPRECIATION | 632818 | 672735 | 712652 | 752569 | 792484 | 832403 | 872320 |
| 3.NET WORTH | 762880 | 945555 | 1127354 | 1308028 | 1487790 | 1666509 | 1903236 |
| 1)PAID-UP EQUITY | 105927 | 105927 | 105927 | 105927 | 105927 | 105927 | 105927 |
| 2)GRANT | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3)RETAINED EARNINGS | 656953 | 839608 | 1021337 | 1202101 | 1381863 | 1560582 | 1817309 |
| 4.TOTAL LIABILITIES AND NET WORTH | 1395698 | 1618270 | 1839916 | 2060597 | 2280276 | 2498912 | 2775556 |

## Table 7.3.19 (Continued)

PROFIT AND LOSS STATEMENT (STATEMENT OF INCOME)

| | 24 2014 | 25 2015 | 26 2016 | 27 2017 | 28 2018 | 29 2019 | 30 2020 | 31 TOTAL |
|---|---|---|---|---|---|---|---|---|
| 1.OPERATING REVENUE | 257627 | 400620 | 400620 | 400620 | 400620 | 400620 | 552241 | 5597241 |
| NO. OF VEHICLES / DAY | 301957 | 301957 | 301957 | 301957 | 301957 | 301957 | 301957 | |
| NO. OF VEHICLES (PCU/DAY) | 396955 | 396955 | 396955 | 396955 | 396955 | 396955 | 396955 | |
| 2.OPERATING EXPENSES | 77355 | 78540 | 80084 | 81691 | 83362 | 88100 | 86707 | 1584408 |
| 1)MAIN OPERATING EXPENSES | 37153 | 38623 | 40167 | 41774 | 43445 | 45183 | 46990 | 713038 |
| 2)DEPRECIATION | 39717 | 39917 | 39917 | 39917 | 39917 | 39917 | 39917 | 872229 |
| 3.OPERATING PROFITS | 222372 | 322080 | 320536 | 318929 | 317258 | 315520 | 445534 | 4010955 |
| 4.OTHER EXPENSES | 4024 | 0 | 0 | 0 | 0 | 0 | 0 | 98747 |
| 1)FINANCIAL COST(INTEREST) | 4024 | 0 | 0 | 0 | 0 | 0 | 0 | 87747 |
| -(LONG TERM LOAN) | 4024 | 0 | 0 | 0 | 0 | 0 | 0 | 30971 |
| -(SHORT TERM LOAN) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 56976 |
| 2)SALES TAX | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5.NET PROFITS BEFORE TAX | 218348 | 322080 | 320536 | 318929 | 317258 | 315520 | 445534 | 3422956 |
| 6.INCOME TAX | 87419 | 128332 | 128214 | 127572 | 126903 | 126208 | 178214 | 1395568 |
| 7.NET PROFITS AFTER TAX | 131129 | 193248 | 192322 | 191357 | 190355 | 189312 | 267320 | 2027618 |
| 8.DIVIDENDS | 10593 | 10593 | 10593 | 10593 | 10593 | 10593 | 10593 | 210309 |
| 1)DIVIDEND (1) | 10593 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2)DIVIDEND (2) | 10593 | 10593 | 10593 | 10593 | 10593 | 10593 | 10593 | 210309 |
| 9.RETAINED EARNINGS | 120536 | 182655 | 181729 | 180764 | 179762 | 178719 | 256727 | 1817309 |

TABLE OF SOURCES AND APPLICATION OF FUNDS (CASH FLOW)

| | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | TOTAL |
|---|---|---|---|---|---|---|---|---|
| 1.SOURCES OF FUNDS | 255465 | 361997 | 360453 | 358846 | 357175 | 355457 | 485451 | 5651410 |
| 1)NET PROFITS BEFORE TAX | 218348 | 322080 | 320536 | 318929 | 317258 | 315520 | 445534 | 3422956 |
| 2)DEPRECIATION | 39917 | 39917 | 39917 | 39917 | 39917 | 39917 | 39917 | 872320 |
| 3)SHORT TERM LOAN | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 156575 |
| 4)LONG TERM LOAN | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1091602 |
| 5)PAID-UP EQUITY | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 105727 |
| 6)GRANT | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2.APPLICATION OF FUNDS | 146355 | 139423 | 138807 | 138165 | 137496 | 136801 | 188807 | 4053283 |
| 1)CAPITAL EXPENDITURE | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1197529 |
| 2)REPAYMENT OF SHORT TERM LOAN | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 156575 |
| 3)REPAYMENT OF LONG TERM LOAN | 47343 | 0 | 0 | 0 | 0 | 0 | 0 | 1091602 |
| 4)INCOME TAX | 87419 | 128332 | 128214 | 127572 | 126903 | 126208 | 178214 | 1395568 |
| 5)DIVIDENDS | 10593 | 10593 | 10593 | 10593 | 10593 | 10593 | 10593 | 210309 |
| -DIVIDEND (1) | 10593 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| -DIVIDEND (2) | 10593 | 10593 | 10593 | 10593 | 10593 | 10593 | 10593 | 210309 |
| 3.CASH SURPLUS OR DEFICIT | 113110 | 222572 | 221646 | 220681 | 219677 | 218636 | 296644 | 1598027 |

Table 7.3.20 : Financial Condition during Concession Period for Maximum Pakage ( Case 2 )
(Excluding Land Cost, 30 years Concession)

## PROFIT AND LOSS STATEMENT (STATEMENT OF INCOME)

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 |
| 1. OPERATING REVENUE | 0 | 0 | 0 | 0 | 22074 | 33432 | 35466 | 55440 | 58145 | 78894 | 122734 | 128817 | 134455 | 141197 | 210003 | 210003 | 210003 | 210003 | 210003 | 282107 | 282107 | 282107 | 282107 |
| NO. OF VEHICLES / DAY | 0 | 0 | 0 | 0 | 79484 | 84281 | 89422 | 139236 | 146130 | 153595 | 221947 | 231793 | 242909 | 254181 | 281850 | 281850 | 281850 | 281850 | 281850 | 281850 | 281850 | 281850 | 281850 |
| NO. OF VEHICLES (PCU/DAY) | 0 | 0 | 0 | 0 | 105227 | 111475 | 118155 | 185995 | 194728 | 204179 | 291999 | 304695 | 318507 | 333325 | 369129 | 369129 | 369129 | 369129 | 369129 | 369129 | 369129 | 369129 | 369129 |
| 2. OPERATING EXPENSES | 0 | 0 | 0 | 0 | 14111 | 14320 | 14556 | 25903 | 26308 | 26770 | 50413 | 51217 | 52054 | 52925 | 53830 | 55261 | 56259 | 57298 | 58378 | 59501 | 60670 | 61885 | 63149 |
| 1) MAIN OPERATING EXPENSES | 0 | 0 | 0 | 0 | 5208 | 5417 | 5653 | 10146 | 10551 | 10973 | 20121 | 20925 | 21762 | 22633 | 23558 | 24969 | 25957 | 27006 | 28086 | 29209 | 30378 | 31595 | 32857 |
| 2) DEPRECIATION | 0 | 0 | 0 | 0 | 8903 | 8903 | 8903 | 15757 | 15757 | 15757 | 30292 | 30292 | 30292 | 30292 | 30292 | 30292 | 30292 | 30292 | 30292 | 30292 | 30292 | 30292 | 30292 |
| 3. OPERATING PROFITS | 0 | 0 | 0 | 0 | 7963 | 19112 | 20930 | 29557 | 31887 | 52156 | 72321 | 77100 | 82401 | 88272 | 156175 | 154742 | 153744 | 152705 | 151625 | 222606 | 221437 | 222222 | 219958 |
| 4. OTHER EXPENSES | 0 | 0 | 0 | 0 | 20695 | 21078 | 20643 | 36520 | 35827 | 34471 | 66479 | 64224 | 61145 | 58007 | 54787 | 47576 | 40313 | 33125 | 26753 | 21540 | 15883 | 10946 | 5906 |
| 1) FINANCIAL COST (INTEREST) | 0 | 0 | 0 | 0 | 20695 | 21078 | 20643 | 36520 | 35827 | 34471 | 66479 | 64224 | 61145 | 58007 | 54787 | 47576 | 40313 | 33125 | 26753 | 21540 | 15883 | 10946 | 5906 |
| -(LONG TERM LOAN) | 0 | 0 | 0 | 0 | 20695 | 20695 | 20643 | 36520 | 35827 | 34326 | 66479 | 64224 | 61145 | 57806 | 53150 | 46938 | 40313 | 33125 | 26753 | 21540 | 15883 | 10946 | 5906 |
| -(SHORT TERM LOAN) | 0 | 0 | 0 | 0 | 0 | 383 | 0 | 0 | 0 | 145 | 0 | 0 | 0 | 201 | 1637 | 638 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2) SALES TAX | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5. NET PROFITS BEFORE TAX | 0 | 0 | 0 | 0 | -12732 | -1966 | 287 | -6983 | -3990 | 17695 | 5842 | 12876 | 21256 | 30285 | 101386 | 107166 | 113431 | 119580 | 124872 | 201066 | 205554 | 209376 | 212152 |
| 6. INCOME TAX | 0 | 0 | 0 | 0 | 0 | 0 | 115 | 0 | 0 | 7078 | 2337 | 5150 | 8502 | 12106 | 40554 | 42866 | 45372 | 47832 | 49949 | 80426 | 82222 | 83750 | 84861 |
| 7. NET PROFITS AFTER TAX | 0 | 0 | 0 | 0 | -12732 | -1966 | 172 | -6983 | -3990 | 10617 | 3505 | 7726 | 12754 | 18159 | 60832 | 64300 | 68059 | 71748 | 74923 | 120640 | 123332 | 125626 | 127291 |
| 8. DIVIDENDS | 0 | 0 | 0 | 0 | 0 | 0 | 2363 | 2363 | 2363 | 4182 | 4182 | 4182 | 8039 | 8039 | 8039 | 8039 | 8039 | 8039 | 8039 | 8039 | 8039 | 8039 | 8039 |
| 1) DIVIDEND (1) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2) DIVIDEND (2) | 0 | 0 | 0 | 0 | 0 | 0 | 2363 | 2363 | 2363 | 4182 | 4182 | 4182 | 8039 | 8039 | 8039 | 8039 | 8039 | 8039 | 8039 | 8039 | 8039 | 8039 | 8039 |
| 9. RETAINED EARNINGS | 0 | 0 | 0 | 0 | -12732 | -1966 | -2191 | -9346 | -6353 | 6435 | -677 | 3544 | 4715 | 10120 | 52793 | 56261 | 60020 | 63709 | 66894 | 112401 | 115293 | 117587 | 119252 |

## TABLE OF SOURCES AND APPLICATION OF FUNDS (CASH FLOW)

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 |
| 1. SOURCES OF FUNDS | 9873 | 0 | 121490 | 143345 | 0 | 100458 | 129563 | 8774 | 211652 | 255173 | 36134 | 43168 | 53558 | 74918 | 131678 | 137458 | 143723 | 149872 | 155164 | 231358 | 235846 | 239668 | 242444 |
| 1) NET PROFITS BEFORE TAX | 0 | 0 | 0 | 0 | -12732 | -1966 | 287 | -6983 | -3990 | 17695 | 5842 | 12876 | 21256 | 30265 | 101386 | 107166 | 113431 | 119580 | 124872 | 201066 | 205554 | 209376 | 212152 |
| 2) DEPRECIATION | 0 | 0 | 0 | 0 | 8903 | 8903 | 8903 | 15757 | 15757 | 15757 | 30292 | 30292 | 30292 | 30292 | 30292 | 30292 | 30292 | 30292 | 30292 | 30292 | 30292 | 30292 | 30292 |
| 3) SHORT TERM LOAN | 0 | 0 | 0 | 0 | 3829 | 93521 | 120373 | 0 | 180243 | 202805 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4) LONG TERM LOAN | 8962 | 0 | 110355 | 131063 | 0 | 0 | 0 | 0 | 18189 | 18916 | 0 | 0 | 2010 | 14361 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5) PAID-UP EQUITY | 911 | 0 | 11135 | 12282 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 6) GRANT | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1453 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2. APPLICATION OF FUNDS | 9873 | 0 | 121490 | 143345 | 0 | 97954 | 123506 | 10513 | 218473 | 253613 | 33056 | 45538 | 55826 | 74918 | 131678 | 135234 | 137982 | 130812 | 119325 | 157016 | 149518 | 139322 | 144482 |
| 1) CAPITAL EXPENDITURE | 9873 | 0 | 121490 | 143345 | 0 | 93521 | 120372 | 0 | 198432 | 221721 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2) REPAYMENT OF SHORT TERM LOAN | 0 | 0 | 0 | 0 | 0 | 3829 | 0 | 0 | 0 | 1453 | 2000 | 0 | 0 | 0 | 9988 | 6383 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3) REPAYMENT OF LONG TERM LOAN | 0 | 0 | 0 | 0 | 0 | 604 | 656 | 8150 | 17678 | 19179 | 24537 | 36206 | 39285 | 54773 | 73097 | 77944 | 84571 | 74941 | 61337 | 68551 | 59257 | 47533 | 51582 |
| 4) INCOME TAX | 0 | 0 | 0 | 0 | 0 | 0 | 115 | 0 | 0 | 7078 | 2337 | 5150 | 8502 | 12106 | 40554 | 42866 | 45372 | 47832 | 49949 | 80426 | 82222 | 83750 | 84861 |
| 5) DIVIDENDS | 0 | 0 | 0 | 0 | 0 | 0 | 2363 | 2363 | 2363 | 4182 | 4182 | 4182 | 8039 | 8039 | 8039 | 8039 | 8039 | 8039 | 8039 | 8039 | 8039 | 8039 | 8039 |
| -DIVIDEND (1) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| -DIVIDEND (2) | 0 | 0 | 0 | 0 | 0 | 0 | 2363 | 2363 | 2363 | 4182 | 4182 | 4182 | 8039 | 8039 | 8039 | 8039 | 8039 | 8039 | 8039 | 8039 | 8039 | 8039 | 8039 |
| 3. CASH SURPLUS OR DEFICIT | 0 | 0 | 0 | 0 | 0 | 2504 | 6056 | -1739 | -6821 | 1560 | 3078 | -2370 | -2248 | 0 | 0 | 2224 | 5741 | 19060 | 35839 | 74342 | 86328 | 100345 | 97942 |

Table 7.3.20 (Continued)

BALANCE SHEET

| | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1.ASSETS | 9873 | 9873 | 131363 | 274708 | 274708 | 370733 | 497161 | 495422 | 687033 | 910314 | 913392 | 911022 | 908754 | 908754 | 908754 | 910978 | 916719 | 935779 | 971618 | 1047960 | 1134288 | 1234654 | 1332596 |
| 1)CURRENT ASSETS (CASH) | 9873 | 9873 | 131363 | 0 | 0 | 2504 | 8560 | 6821 | 0 | 1560 | 4638 | 2268 | 0 | 0 | 0 | 2224 | 7965 | 27025 | 62864 | 139206 | 225534 | 325880 | 423842 |
| 2)FIXED ASSETS | 9873 | 908754 | 131363 | 274708 | 274708 | 368229 | 488601 | 488601 | 687033 | 908754 | 908754 | 908754 | 908754 | 908754 | 908754 | 908754 | 908754 | 908754 | 908754 | 908754 | 908754 | 908754 | 908754 |
| -DESIGN | 9873 | 9873 | 9873 | 17483 | 17483 | 17483 | 33369 | 33369 | 33369 | 33369 | 33369 | 33369 | 33369 | 33369 | 33369 | 33369 | 33369 | 33369 | 33369 | 33369 | 33369 | 33369 | 33369 |
| -LAND | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| -CONST-1 | 0 | 0 | 121490 | 257225 | 257225 | 350746 | 455232 | 455232 | 653664 | 875385 | 875385 | 875385 | 875385 | 875385 | 875385 | 875385 | 875385 | 875385 | 875385 | 875385 | 875385 | 875385 | 875385 |
| -CONST-2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2.LIABILITIES | 8962 | 8962 | 119317 | 250380 | 263112 | 352532 | 470771 | 478378 | 658153 | 655083 | 659838 | 655924 | 846941 | 835821 | 784028 | 728991 | 675712 | 631063 | 600018 | 565759 | 534794 | 517553 | 494263 |
| 1)OUTSTANDING OF LOAN (SHORT) | 0 | 0 | 0 | 0 | 3929 | 0 | 0 | 0 | 1453 | 0 | 0 | 0 | 2010 | 16571 | 6383 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2)OUTSTANDING OF LOAN (LONG) | 8962 | 8962 | 119317 | 250380 | 250380 | 334726 | 444062 | 435912 | 598477 | 782103 | 755556 | 719360 | 680075 | 625302 | 559205 | 474259 | 389688 | 314747 | 255410 | 182259 | 127602 | 80069 | 22487 |
| 3)ACCUMULATED DEPRECIATION | 911 | 911 | 12046 | 24328 | 8903 | 17805 | 26709 | 42466 | 59223 | 73980 | 104272 | 134564 | 164856 | 195148 | 225440 | 255732 | 286024 | 316314 | 346608 | 376900 | 407192 | 437484 | 467776 |
| 3.NET WORTH | 911 | 911 | 12046 | 24328 | 11596 | 18201 | 26390 | 17044 | 28860 | 54231 | 53354 | 57098 | 61813 | 71935 | 124726 | 190997 | 241007 | 304716 | 371600 | 484201 | 599494 | 717081 | 836333 |
| 1)PAID-UP EQUITY | 911 | 911 | 12046 | 24328 | 24328 | 32899 | 43279 | 43279 | 61468 | 80384 | 80384 | 80384 | 80384 | 80384 | 80384 | 80384 | 80384 | 80384 | 80384 | 80384 | 80384 | 80384 | 80384 |
| 2)GRANT | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3)RETAINED EARNINGS | 0 | 0 | 0 | 0 | -12732 | -14698 | -16889 | -26235 | -32598 | -26153 | -26830 | -23284 | -18571 | -8451 | 44342 | 100603 | 160623 | 224332 | 291216 | 403817 | 519110 | 636497 | 755949 |
| 4.TOTAL LIABILITIES AND NET WORTH | 9873 | 9873 | 131363 | 274708 | 274708 | 370733 | 497161 | 495422 | 687033 | 910314 | 913392 | 911022 | 908754 | 908754 | 908754 | 910978 | 916719 | 935779 | 971618 | 1047960 | 1134288 | 1234654 | 1332596 |

BALANCE SHEET

| | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 |
|---|---|---|---|---|---|---|---|
| 1.ASSETS | 1455496 | 1664615 | 1872881 | 2080260 | 2286717 | 2492214 | 2771109 |
| 1)CURRENT ASSETS (CASH) | 546742 | 755861 | 964127 | 1171506 | 1377963 | 1583460 | 1862355 |
| 2)FIXED ASSETS | 908754 | 908754 | 908754 | 908754 | 908754 | 908754 | 908754 |
| -DESIGN | 33369 | 33369 | 33369 | 33369 | 33369 | 33369 | 33369 |
| -LAND | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| -CONST-1 | 875385 | 875385 | 875385 | 875385 | 875385 | 875385 | 875385 |
| -CONST-2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2.LIABILITIES | 498068 | 528360 | 558652 | 588944 | 619236 | 649528 | 679820 |
| 1)OUTSTANDING OF LOAN (SHORT) | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2)OUTSTANDING OF LOAN (LONG) | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3)ACCUMULATED DEPRECIATION | 498068 | 528360 | 558652 | 588944 | 619236 | 649528 | 679820 |
| 3.NET WORTH | 957428 | 1136255 | 1314229 | 1491316 | 1667481 | 1842686 | 2091289 |
| 1)PAID-UP EQUITY | 80384 | 80384 | 80384 | 80384 | 80384 | 80384 | 80384 |
| 2)GRANT | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3)RETAINED EARNINGS | 877044 | 1055871 | 1233845 | 1410932 | 1587097 | 1762302 | 2010905 |
| 4.TOTAL LIABILITIES AND NET WORTH | 1455496 | 1664615 | 1872881 | 2080260 | 2286717 | 2492214 | 2771109 |

Table 7.3.20 (Continued)

PROFIT AND LOSS STATEMENT (STATEMENT OF INCOME)

| | 24 2014 | 25 2015 | 26 2016 | 27 2017 | 28 2018 | 29 2019 | 30 2020 | 31 TOTAL |
|---|---|---|---|---|---|---|---|---|
| 1.OPERATING REVENUE | Y 282107 | 377273 | 377273 | 377273 | 377273 | 377273 | 501265 | 3380129 |
| NO. OF VEHICLES / DAY | I 281850 | 281850 | 281850 | 281850 | 281850 | 281850 | 281850 | |
| NO. OF VEHICLES (PCU/DAY) | X 369129 | 369129 | 369129 | 369129 | 369129 | 369129 | 369129 | |
| 2.OPERATING EXPENSES | X 64463 | 65930 | 67251 | 68730 | 70267 | 71866 | 73529 | 1336694 |
| 1)MAIN OPERATING EXPENSES | I 34171 | 35538 | 36959 | 38438 | 39975 | 41574 | 43237 | 455864 |
| 2)DEPRECIATION | X 30292 | 30292 | 30292 | 30292 | 30292 | 30292 | 30292 | 879820 |
| 3.OPERATING PROFITS | I 217644 | 311443 | 310022 | 308543 | 307006 | 305407 | 427736 | 4321452 |
| 4.OTHER EXPENSES | I 2421 | 0 | 0 | 0 | 0 | 0 | 0 | 679139 |
| 1)FINANCIAL COST(INTEREST) | I 2421 | 0 | 0 | 0 | 0 | 0 | 0 | 679139 |
| -(LONG TERM LOAN) | I 2421 | 0 | 0 | 0 | 0 | 0 | 0 | 674115 |
| -(SHORT TERM LOAN) | I 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5004 |
| 2)SALES TAX | I 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5.NET PROFITS BEFORE TAX | I 215223 | 311443 | 310022 | 308543 | 307006 | 305407 | 427736 | 3642515 |
| 6.INCOME TAX | I 86089 | 124577 | 124009 | 123417 | 122802 | 122163 | 171094 | 1467271 |
| 7.NET PROFITS AFTER TAX | I 129134 | 186866 | 186013 | 185126 | 184204 | 183244 | 256642 | 2175242 |
| 8.DIVIDENDS | I 8039 | 8039 | 8039 | 8039 | 8039 | 8039 | 8039 | 164337 |
| 1)DIVIDEND (1) | I 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2)DIVIDEND (2) | I 8039 | 8039 | 8039 | 8039 | 8039 | 8039 | 8039 | 164337 |
| 9.RETAINED EARNINGS | I 121095 | 178827 | 177974 | 177087 | 176165 | 175205 | 248603 | 2010905 |

TABLE OF SOURCES AND APPLICATION OF FUNDS (CASH FLOW)

| | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | TOTAL |
|---|---|---|---|---|---|---|---|---|
| 1.SOURCES OF FUNDS | I 245515 | 341735 | 340314 | 338835 | 337298 | 335699 | 458028 | 5252740 |
| 1)NET PROFITS BEFORE TAX | I 215223 | 311443 | 310022 | 308543 | 307006 | 305407 | 427736 | 3642515 |
| 2)DEPRECIATION | I 30292 | 30292 | 30292 | 30292 | 30292 | 30292 | 30292 | 879820 |
| 3)SHORT TERM LOAN | I 0 | 0 | 0 | 0 | 0 | 0 | 0 | 21653 |
| 4)LONG TERM LOAN | I 0 | 0 | 0 | 0 | 0 | 0 | 0 | 828370 |
| 5)PAID-UP EQUITY | I 0 | 0 | 0 | 0 | 0 | 0 | 0 | 80384 |
| 6)GRANT | I 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2.APPLICATION OF FUNDS | I 122615 | 132616 | 132048 | 131456 | 130841 | 130202 | 179133 | 3390385 |
| 1)CAPITAL EXPENDITURE | I 0 | 0 | 0 | 0 | 0 | 0 | 0 | 908754 |
| 2)REPAYMENT OF SHORT TERM LOAN | I 0 | 0 | 0 | 0 | 0 | 0 | 0 | 21653 |
| 3)REPAYMENT OF LONG TERM LOAN | I 28487 | 0 | 0 | 0 | 0 | 0 | 0 | 828370 |
| 4)INCOME TAX | I 86089 | 124577 | 124009 | 123417 | 122802 | 122163 | 171094 | 1467271 |
| 5)DIVIDENDS | I 8039 | 8039 | 8039 | 8039 | 8039 | 8039 | 8039 | 164337 |
| -DIVIDEND (1) | I 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| -DIVIDEND (2) | I 8039 | 8039 | 8039 | 8039 | 8039 | 8039 | 8039 | 164337 |
| 3.CASH SURPLUS OR DEFICIT | I 122900 | 209119 | 208266 | 207379 | 206457 | 205497 | 278895 | 1862355 |

(2) Minimum Package

    (a) Project Description

The project scheduled in Phase 1 is as follows:-

- The section of Shah Alam Highway/MRR-II from KL-Seremban Expressway to HICOM
  .. 4 lanes

- The section of N-S Link from NKVE to Shah Alam Highway
  .. 3 interchanges and connecting road only (4 lanes)

The total project cost is estimated to be M$210.5 million.

    (b) Results of Analysis

Table 7.3.21 shows the evaluation indicators by alternative concession period which is also given in Figure 7.3.6 where the alternative cases for land cost are denoted as "Conditon a" and "Condition b".

If the project in Phase 1 only 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.

Table 7.3.21: Financial Evaluation Indicators for the Minimum Package

| Concession Period (yrs) | Land Cost | FIRR % | NPV (M$mil) | B/C | ROE % |
|---|---|---|---|---|---|
| 15 | Including | 10.7 | 9.6 | 1.05 | 22.2 |
|    | Excluding | 11.9 | 22.6 | 1.12 | 28.8 |
| 20 | Including | 13.3 | 60.2 | 1.29 | 23.6 |
|    | Excluding | 14.6 | 75.2 | 1.40 | 29.8 |
| 25 | Including | 14.8 | 109.4 | 1.51 | 25.4 |
|    | Excluding | 16.0 | 125.6 | 1.64 | 30.9 |

Note: The figures are expressed in nominal value

Table 7.3.22: Financial Situation During the Concession Period for the Minimum Package

| Land Cost | First Year of Operating Surplus | Maximum Short-Term Loan in Single Year M$mil (Year) | Maximum Accumulated Short-term Loan M$mil (Year) | Clearing-up Year of Short-term Loan |
|---|---|---|---|---|
| Including | 6th | 11.0 (5th) | 22.4 (9th) | 12th |
| Excluding | 5th | 3.8 (1st) | 3.8 (1st) | 2nd |

(3) Medium Package

(a) Project Description

The project scheduled up to Phase 2 is as follows:-

- The section of Shah Alam Highway/MRR-II from KL-Seremban Expressway to SKSB as 6-lane highway and SKSB to Jalan Langat as 4-lane highway

- The section of N-S Link from NKVE to Shah Alam Highway as 4-lane highway

These sections are assumed to be constructed in accordance with the established Implementation Schedule. The total project cost is estimated to be M$385.4 million.

(b) Results of Analysis

The results are shown in Table 7.3.23, Table 7.3.24 and Figure 7.3.7.

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 7.3.23: Financial Evaluation Indicators for the Medium Package

| Concession Period (yrs) | Land Cost | FIRR % | NPV (M$mil) | B/C | ROE % |
|---|---|---|---|---|---|
| 20 | Including | 10.8 | 23.3 | 1.07 | 14.8 |
|    | Excluding | 12.8 | 64.9 | 1.22 | 25.5 |
| 25 | Including | 12.4 | 82.1 | 1.23 | 18.0 |
|    | Excluding | 14.4 | 127.8 | 1.42 | 27.0 |
| 30 | Including | 13.4 | 130.4 | 1.38 | 19.6 |
|    | Excluding | 15.3 | 186.6 | 1.59 | 27.7 |

Note: The figures are expressed in nominal values


Table 7.3.24: Financial Situation During the Concession Period for the Medium Package

| Land Cost | First Year of Operating Surplus | Maximum Short-Term Loan in Single Year M$mil (Year) | | Maximum Accumulated Short-term Loan M$mil (Year) | | Clearing-up Year of Short-term Loan |
|---|---|---|---|---|---|---|
| Including | 7th | 21.4 | (10th) | 125.1 | (13th) | 17th |
| Excluding | 6th | 5.6 | (8th) | 14.7 | (10th) | 11th |

| 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% |
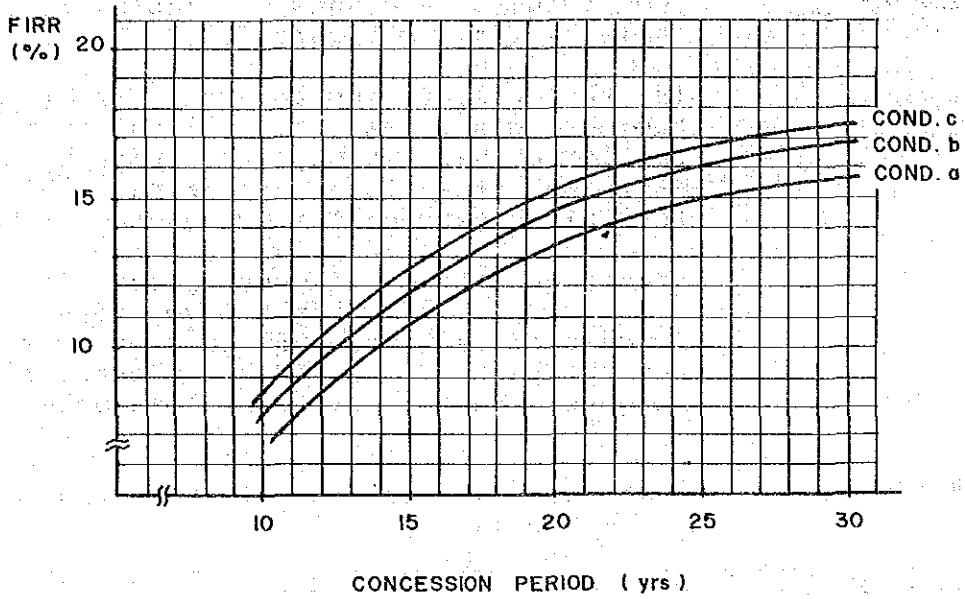


Figure 7.3.6: FIRR for the Projects in Phase 1

| CONDITION | LAND COST | EQUITY SHARE | LONG TERM LOAN | |
|:---:|:---:|:---:|:---:|:---:|
| | | | LOCAL | FOREIGN |
| a | including | 90% | 100% | 0% |
| b | excluding | 90% | 100% | 0% |
| c | excluding | 50% | 50% | 50% |
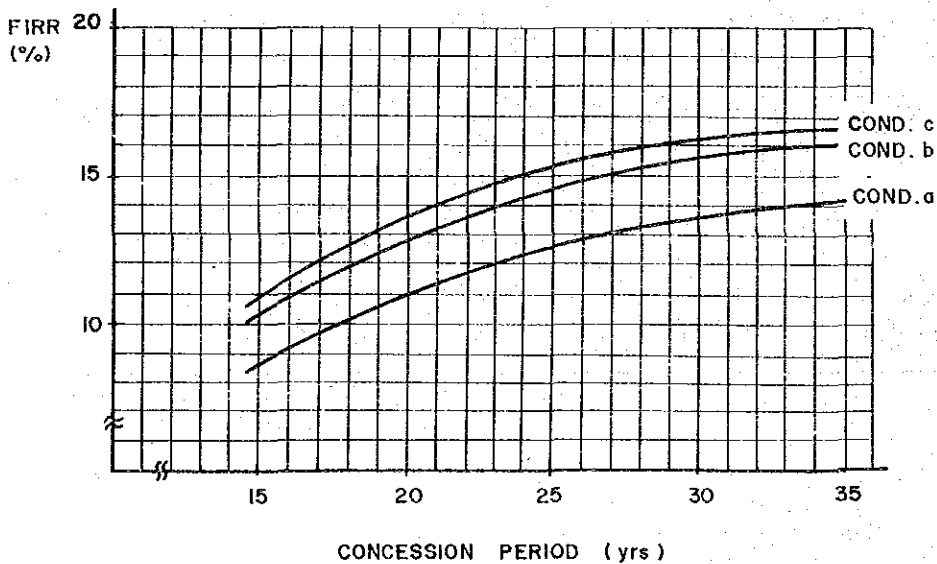


Figure 7.3.7: FIRR for the Projects Up to Phase 2

## 7.3.8 Sensitivity Analysis

Sensitivity Analysis is made with regard to the following factors:-

- Additional toll levy on the short stretch of N-S Link
- Changes in the estimated traffic volume
- Changes in the estimated project cost

(1) 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 Highway has been assumed to be toll free unless the throughway is constructed.

During the first and second phases in this short stretch, only the connecting road from Jalan TUDM-Shah Alam to Shah Alam Highway will be constructed thereby fully using the upgraded Jalan TUDM-Shah Alam as part of N-S Link. In this case, it is extremely difficult to apply a closed toll system to this section.

However, if open toll barrier system is applied on a temporary basis until the completion of throughway in later years, it may be possible, though it is not desirable since the interval between the toll gates is too short for the vehicles which use both N-S Link and Shah Alam Highway.

The following analysis examines the case that a toll barrier is additionally installed in the section between Federal Route 2 and Shah Alam Highway during the period when the throughway is not constructed. It is also assumed that the toll barrier system of N-S Link will be regulated 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 7.3.25 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 FIRR is pushed up by levying additional toll in any package.

In the case of the Maximum Package, "the improvement" of FIRR is small, only 0.2 or 0.3% points for both Cases 1 and 2. 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 even in the original use.

In the cases of Minimum and Medium Packages, however, FIRR increases as much as 1.2 or 1.3% points by applying the additional toll.

As a consequence, the additional toll levy is not so effective to raise the profitability if the Maximum Package is considered, but it might be worthwhile to consider if either the Minimum or Medium Package is taken up.

Table 7.3.25: 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
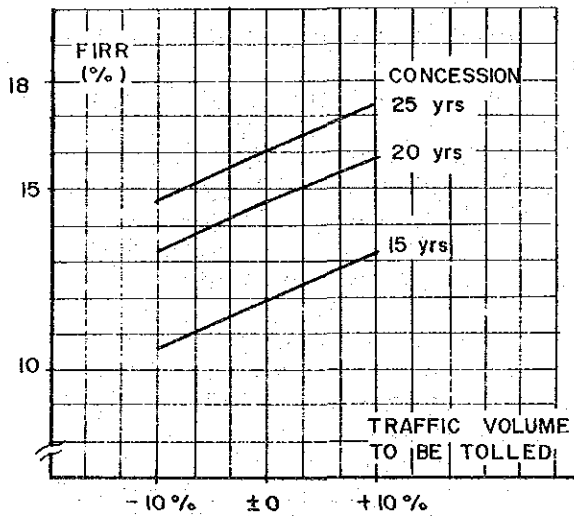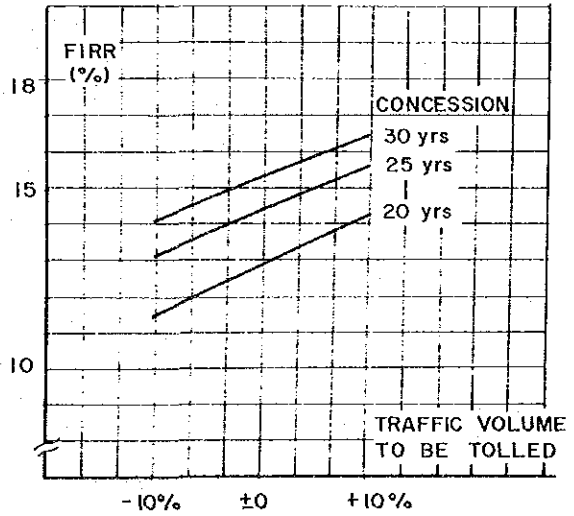4) Other conditions are unchanged from the basic assumptions

(2) Changes in the Estimated Traffic Volume

Generally, by levying a toll, some vehicles would not use the tollway 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 the 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 herein aims to analyse the influence of the changes in the traffic volume to be tolled on the financial viability.

The following cases are examined:-

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

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

Table 7.3.26 shows the FIRR changes due to the changes in the traffic volume to be tolled for the alternative packages.

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 in all cases except Maximum Package Case 1.

The sensitivity of FIRR to changes in the traffic volume for each alternative package is also illustrated in Figures 7.3.8 and 7.3.9.

Table 7.3.26: 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
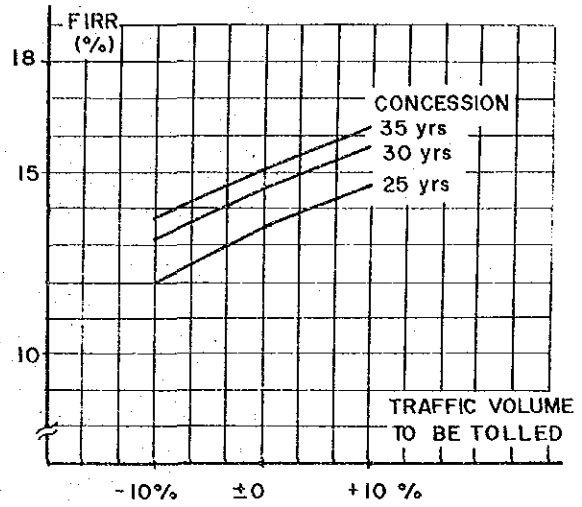
Figure 7.3.8: FIRR Changes due to Traffic Volume Variation for Maximum Package



Figure 7.3.9: FIRR Changes due to Traffic Volume Variation for Minimum and Medium Packages

(3) Changes in the Estimated Project Cost

The estimated project cost also has uncertain factors such as:-
- Construction quantity
- Escalation of unit construction cost

Accordingly, the following cases are examined in the sensitivity analysis:-
- 10% increase of Project Cost
- 10% decrease of Project Cost

Table 7.3.27 shows the FIRR changes due to the changes in the estimated project cost for the alternative packages.

Table 7.3.27: Changes in FIRR due to Project Cost Variation

|  | Project Cost | | |
|---|---|---|---|
|  | -10% | Original | +10% |
| Maximum Package | | | |
| Case 1 | 14.0 | 12.9 | 11.9 |
| Case 2 | 15.7 | 14.5 | 13.5 |
| Minimum Package | 15.9 | 14.6 | 13.5 |
| Medium Package | 15.6 | 14.4 | 13.4 |

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

In any case, 10% increase of project cost reduces the FIRR by as much as about 1.0% point and conversely 10% decrease will push up the FIRR by about 1.0% point.

It can be said that even in the case of 10% increase of project cost all the packages are still financially viable.

In the case of 10% decrease, even if the concession period is reduced by as much as 5 years, all the cases except Maximum Package Case 1 are still sufficiently profitable as can be found from Figures 7.3.10 and 7.3.11.
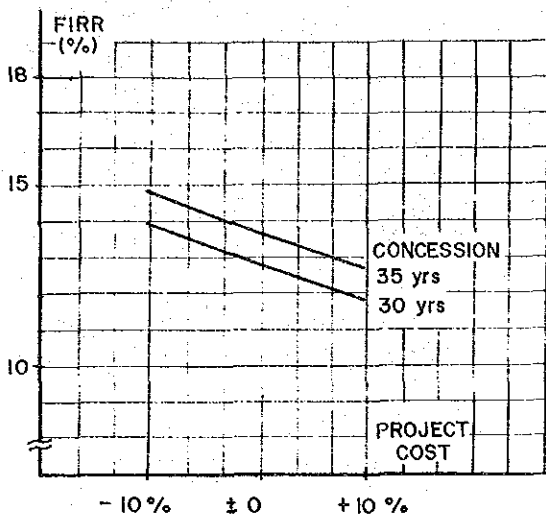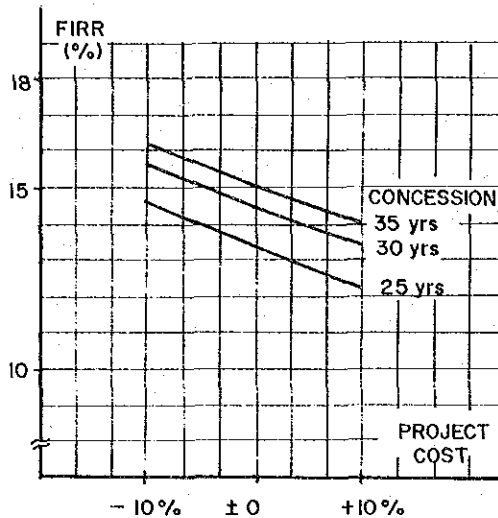
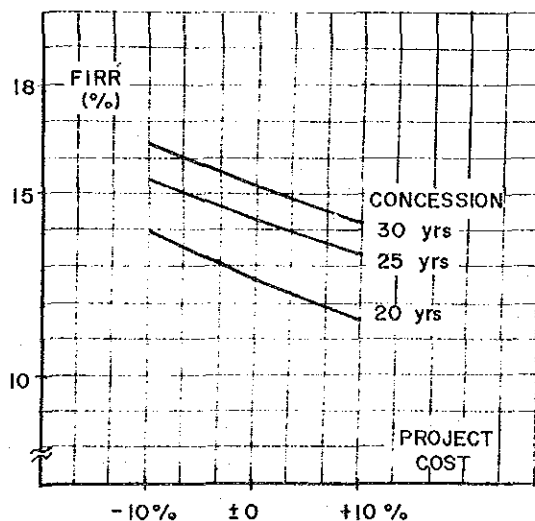(a) CASE 1                              (b) CASE 2

Figure 7.3.10: FIRR    Changes    due    to    Project Cost
Variation for Maximum Package
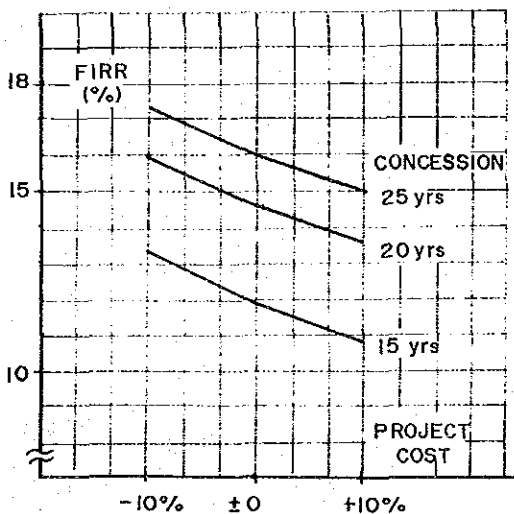


(a) MINIMUM PACKAGE                    (b) MEDIUM PACKAGE

Figure 7.3.11: FIRR    Changes    due    to    Project    Cost
Variation for Minimum and Medium Packages

8.      PROJECT IMPLEMENTATION

8.1     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 8.1.1 and
Figure 8.1.1. The proposed cost by phase is
shown in Table 8.1.2.

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 8.1.1: Proposed Implementation Schedule

| Project | Total Length (km) | No.of Lanes | Project Cost (M$mil) | 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
        SKSB – Jalan Langat

  • 6 lanes
  •• 4 lanes

- - - Detailed Engineering
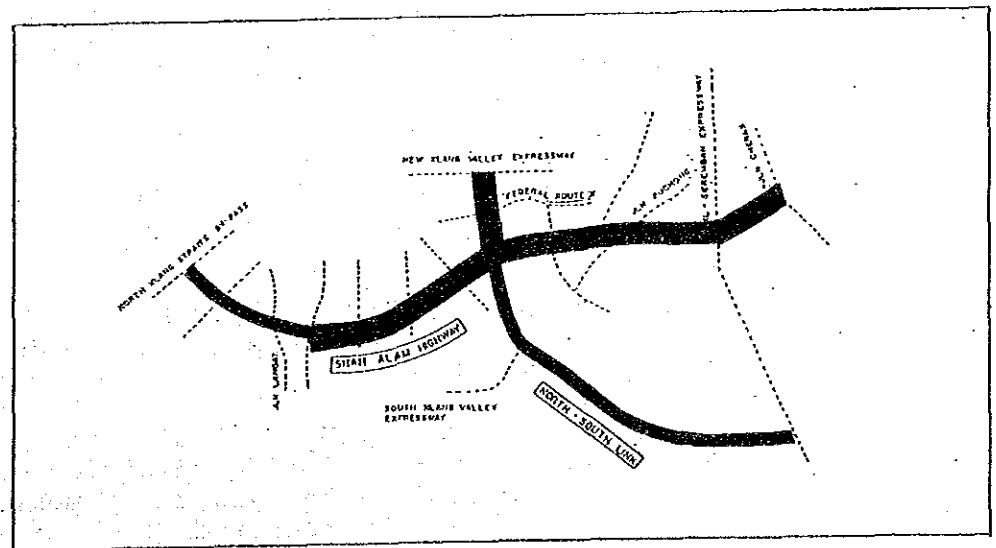——— Land Acquisition and Construction

PHASE 1
(1991 - 1994)
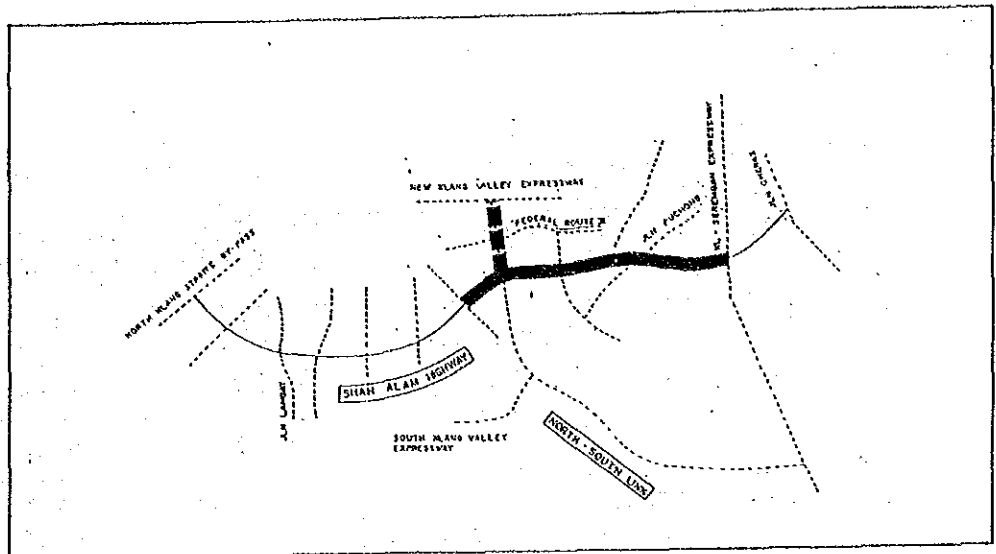
PHASE 2
(1994 - 1997)
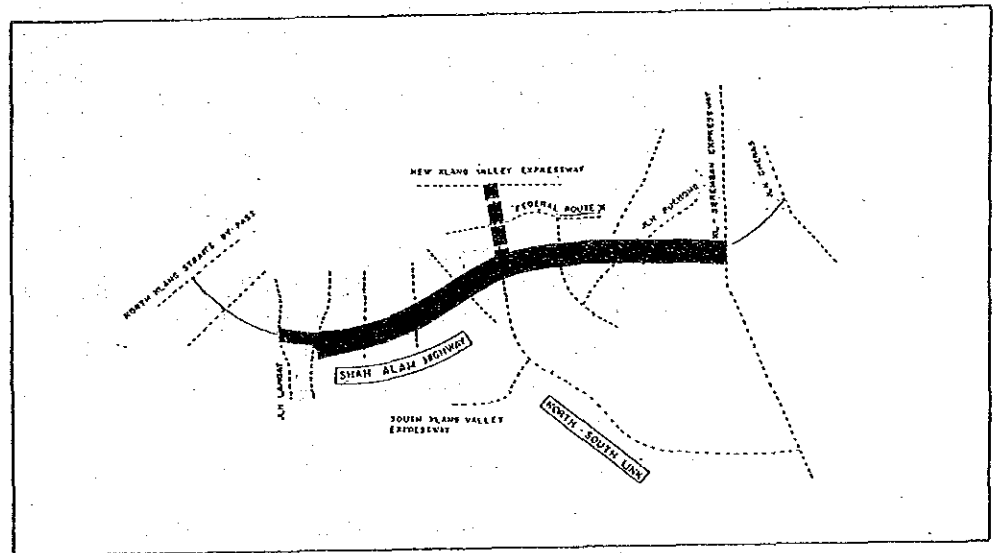
PHASE 3
(1997 - 2000)

LEGEND

CONSTRUCTION
OF
THROUGH WAY

CONNECTING
ROAD ONLY

4 LANES

6 LANES

Figure 8.1.1: Proposed Implementation Schedule

8-3

Table 8.1.2: Total Project Cost by Phase

| Phase | Cost Items | Foreign Portion | Local Portion | Total |
|---|---|---|---|---|
| 1 | Design | 3.8 | 4.3 | 8.1 |
| | Land Acquisition | – | 19.3 | 19.3 |
| | Construction | 86.9 | 96.2 | 183.1 |
| | Total | 90.7 | 119.8 | 210.5 |
| 2 | Design | 2.5 | 3.1 | 5.6 |
| | Land Acquisition | – | 44.1 | 44.1 |
| | Construction | 55.5 | 69.7 | 125.2 |
| | Total | 58.0 | 116.9 | 174.9 |
| 3 | Design | 11.0 | 12.8 | 23.8 |
| | Land Acquisition | – | 84.0 | 84.0 |
| | Construction | 249.6 | 289.2 | 538.8 |
| | Total | 260.6 | 386.0 | 646.6 |
| Grand Total | Design | 17.3 | 20.2 | 37.5 |
| | Land Acquisition | – | 147.4 | 147.4 |
| | Construction | 392.0 | 455.1 | 847.1 |
| | Total | 409.3 | 622.7 | 1032.0 |

8.2    Conditions for Privatization

The following alternatives of concession can be considered:-

* Concession for the Whole 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

8.2.1  Concession for the Whole 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

<u>Option 2</u>
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


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


8.2.2    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 H'wy as 4-lane road)

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


8.2.3    Concession for the Project up to Phase 2

Project : Shah Alam Highway/MRR-II
          (KL-Seremban Expressway to Jalan Langat
          as 6-lane highway)
      : N-S Link
          (NKVE-Shah Alam H'wy as 4-lane road)

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.

# CHAPTER 9 : 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 during the years from 1991 to 2000 according to the implementation schedule described in the forthcoming paragraph (4).

(b) From the results of the economic evaluation made, 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
  NKVE to Shah Alam Highway

(3) Implementation Concept

   The following three alternatives are
   identified as a 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 seen 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 preferable:-

   It is recommended that for sake of conformity
   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.

   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 ten-
   tatively toll free.

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 centre 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 to 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 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
* 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 SKSB to Jalan Langat as 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 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 Express-
way.

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 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 to 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
additionally 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.

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