8-4 Economic Evaluation and Sensitivity Analysis

8-4-1 Economic Evaluation

The flows of annualized economic costs and benefits of Alternative Plans are the sources in the economic evaluation. An optimum Alternative would be selected in comparing the key indicators of B/C, NPV and EIRR.

As a summary of the benefit calculation and cost estimation, 4 cost-benefit streams of the respective Alternative Plans are shown parallelly in Table 8-19.

Table 8-19 Economic Costs/Benefits by Alternative

Unit : B10^6

Year	Alternative 1		Alternative 2		Alternative 3		Alternative 4	
	Cost	Benefit	Cost	Benefit	Cost	Benefit	Cost	Benefit
1986	4.0	-	1.8	-	1.8	-	2.0	-
1987	5.9	-	2.0	-	1.9	-	2.1	-
1988	59.2	-	33.0	-	29.5	-	30.4	-
1989	59.4	-	41.9	-	36.1	-	35.1	-
1990	59.6	51.1	26.8	40.1	25.5	36.7	27.7	34.3
1991	59.7	53.9	24.9	46.1	23.5	42.2	24.4	39.4
1992	59.9	56.8	19.4	52.9	19.4	48.4	21.7	45.2
1993	0.9	59.9	4.4	60.7	3.1	55.6	2.1	51.9
1994	0.9	63.2	0.3	69.7	0.3	63.9	0.3	59.7
1995	0.9	66.6	0.3	80.1	0.3	73.4	0.3	68.5

Table 8-20 Present Values of Costs/Benefits by Alternative Plan, 1986

Unit : B10^6

Year	Alternative 1		Alternative 2		Alternative 3		Alternative 4	
	Cost	Benefit	Cost	Benefit	Cost	Benefit	Cost	Benefit
1986	4.0	-	1.8	-	1.8	-	2.0	-
1987	5.3	-	1.8	-	1.7	-	1.9	-
1988	47.2	-	26.3	-	23.5	-	24.2	-
1989	42.3	-	29.8	-	25.7	-	25.0	-
1990	37.9	32.5	17.0	25.5	16.2	23.3	17.6	21.8
1991	33.9	30.6	14.1	26.2	13.3	23.9	13.8	22.4
1992	30.3	28.8	9.8	26.8	9.8	24.5	11.0	22.9
1993	0.4	27.1	2.0	27.5	1.4	25.2	0.9	23.5
1994	0.4	25.5	0.1	28.1	0.1	25.8	0.1	24.1
1995	0.3	24.0	0.1	28.9	0.1	26.5	0.1	24.7
Total	202.0	168.5	102.8	163.0	93.6	149.2	96.6	139.4

Remarks; Discounted with the rate of 12%.

To these cost/benefit streams, the discounting of each annual value with the rate of 12% was firstly conducted. The results of this discounting are shown in Table 9-20, together with the present value of all the costs (C) and that of all the benefits (B). Among the 4 Alternative Plans, C is the biggest in Alternative 1 while the smallest value is found in Alternative 3. Alternative 1 has also the largest B, followed by Alternative 2. The smallest benefits are observed in Alternative 4.

The B/C and NPV (namely, B-C) were calculated using the above B and C; which are:

Alternative Plan	B/C	NPV (B10^6)
Alternative 1	0.83	-33.5
Alternative 2	1.59 *)	60.2
Alternative 3	1.59 *)	55.6
Alternative 4	1.44	42.8

Remarks; *) Actual figures:
Alternative 2 : 1.5856
Alternative 3 : 1.5940

From the viewpoint of efficiency of the investment, Alternative 1 is revealed not viable and to be dropped firstly. The inferiority of both indicators of B/C and NPV is observed in Alternative 4 compared to the remainder 2. From these characteristics, Alternative 4 was also dropped at this stage. It could not be determined which is the optimum Plan, either Alternative 2 or Alternative 3; Alternative 2 has the larger NPV but the value of B/C is better in Alternative 3. Another indicator would have to be employed for the selection.

The last key indicator, EIRR, was calculated only for Alternatives 2 and 3, using the cost/benefit streams in Table 8-19. Repeat calculation was done over and finally EIRR was fixed:

Unit: %

Alternative Plan	EIRR
Alternative 2	30.3
Alternative 3	30.7

Slightly larger EIRR was obtained in Alternative 3. The values of EIRR in both Alternatives are over 12% of the current interest rate prevailing in Brunei, which is the standard criterion of the economic evaluation. It was justified to implement both the Alternatives in view of the national economy. The value of this EIRR has the prominent influence in the evaluation.

The summary of comparison of 3 key indicators between Alternatives 2 and 3 is:

Alternative	B/C	NPV	EIRR
Alternative 2	x	o	x
Alternative 3	o	x	o

Considering the superiority in B/C and EIRR, Alternative 3 was taken as an optimum Plan in this step. The results of economic evaluation brought about the selection of Alternative 3 out of the 4 prepared Plans.

The above discussions are under the condition of 10-year project life period. The order of superiority among 4 Alternative Plans might alter if the project life become longer. For this reason, 20 years of project life was set off for examining the probability of order change in the evaluation.

To make the cost/benefits streams of Alternative Plans, the difficulty was encounted in projecting future traffic conditions and bus service efficiency. It was finally assumed that the same amount of the economic benefits as in 1995 would continue to appear, even after 1995, until 2005. In case of economic costs, the same operation/maintenance costs as in 1995 would be required, and the re-purchasing of the worn buses after 10 years of service life. The purchasing costs of buses were added after 10 years from the first procurement. The same concepts applied to the machineries in bus workshop, which should be re-purchased in 2005 after the service life of 15 years. Table 8-21 shows thus fixed economic costs/benefits up to 2005.

Table 8-21 Annualized Economic Costs/Benefits, 1986 – 2005

Unit : $B\$10^6$

Year	Alternative 1		Alternative 2		Alternative 3		Alternative 4	
	Cost	Benefit	Cost	Benefit	Cost	Benefit	Cost	Benefit
1986	4.0	-	1.8	-	1.8	-	2.0	-
1987	5.9	-	2.0	-	1.9	-	2.1	-
1988	59.2	-	33.0	-	29.5	-	30.4	-
1989	59.4	-	41.9	-	36.1	-	35.1	-
1990	59.6	51.1	26.8	40.1	25.5	36.7	27.7	34.3
1991	59.7	53.9	24.9	46.1	23.5	42.2	24.4	39.4
1992	59.9	56.8	19.4	52.1	19.4	48.4	21.7	45.2
1993	0.9	59.9	4.4	60.7	3.1	55.6	2.1	51.9
1994	0.9	63.2	0.3	69.7	0.3	63.9	0.3	59.7
1995	0.9	66.6	0.3	80.1	0.3	73.4	0.3	68.5
1996	0.9	66.6	0.3	80.1	0.3	73.4	0.3	68.5
1997	0.9	66.6	0.3	80.1	0.3	73.4	0.3	68.5
1998	0.9	66.6	6.7	80.1	4.4	73.4	3.1	68.5
1999	0.9	66.6	15.5	80.1	10.9	73.4	7.7	68.5
2000	0.9	66.6	0.3	80.1	0.3	73.4	0.3	68.5
2001	0.9	66.6	5.8	80.1	4.4	73.4	3.1	68.5
2002	0.9	66.6	0.3	80.1	0.3	73.4	0.3	68.5
2003	0.9	66.6	4.4	80.1	3.1	73.4	2.1	68.5
2004	0.9	66.6	0.3	80.1	0.3	73.4	0.3	68.5
2005	0.9	66.6	0.8	80.1	0.8	73.4	0.8	68.5

As a discount rate, the same 12% as in the evaluation with 10-year project life was adopted. The results of discounting and the calculated C, B, B/C and NPV are tabulated in Table 8-22. In this case, EIRR was not calculated. From the comparison of these indicators, it was revealed that the order of superiority among 4 Alternatives would not be changed even if the project life extend over the year 2005. The optimum Plan would also be Alternative 3.

Table 8-22 Present Values of Costs/Benefits, 1986

Unit : B10^6

Year	Alternative 1		Alternative 2		Alternative 3		Alternative 4	
	Cost	Benefit	Cost	Benefit	Cost	Benefit	Cost	Benefit
1986	4.0	-	1.8	-	1.8	-	2.0	-
1987	5.3	-	1.8	-	1.7	-	1.9	-
1988	47.2	-	26.3	-	23.5	-	24.2	-
1989	42.3	-	29.8	-	25.7	-	25.0	-
1990	37.9	32.5	17.0	25.5	16.2	23.3	17.6	21.8
1991	33.9	30.6	14.1	26.2	13.3	23.9	13.8	22.4
1992	30.3	28.8	9.8	26.8	9.8	24.5	11.0	22.9
1993	0.4	27.1	2.0	27.5	1.4	25.2	0.9	23.5
1994	0.4	25.5	0.1	28.1	0.1	25.8	0.1	24.1
1995	0.3	24.0	0.1	28.9	0.1	26.5	0.1	24.7
1996	0.3	21.4	0.1	25.8	0.1	23.6	0.1	22.1
1997	0.3	19.1	0.1	23.0	0.1	21.1	0.1	19.7
1998	0.2	17.1	1.7	20.6	1.1	18.8	0.8	17.6
1999	0.2	15.3	3.6	18.4	2.5	16.8	1.8	15.7
2000	0.2	13.6	0.1	16.4	0.1	15.0	0.1	14.0
2001	0.2	12.2	1.1	14.6	0.8	13.4	0.6	12.5
2002	0.1	10.9	-	13.1	-	12.0	-	11.2
2003	0.1	9.7	0.6	11.7	0.5	10.7	0.3	10.0
2004	0.1	8.7	-	10.4	-	9.5	-	8.9
2005	0.1	7.7	0.1	9.3	0.1	8.5	0.1	8.0
Total	203.8	304.2	110.2	326.3	98.9	298.6	100.5	279.1
B/C	1.49		2.96		3.02		2.78	
NPV (B10^6)	100.4		216.1		199.7		178.6	

Remarks: The annual figures were those discounted at 12%

In conclusion, Alternative 3 was selected as the optimum Plan for the implementation, with enough justification in the economic viability.

The treatment of this evaluation result should be full notice, considering the following points:

- In this study, construction costs were reduced against the road proposal the Government already committed. More minutely stated, the construction costs for Ring Road, Jalan Berakas-Jalau Muara (Major Arterial Road Phase II) were estimated with 2-lanes. It was based on the traffic demand forecasting up to 1995.

- Under the planning by the PWD, Major Arterial Road Phase II is 4-lanes. The PWD carried out its own traffic demand forecasting (target year: 2000), proposed, and already started the construction of the said road section.

The difference was derived mainly from that between the respective target years. Namely, the forecasted traffic volume has been varied according to assumptions and used data. In this study, the required costs for each Alternative Plan were intended to be minimal, and it would not hinder the road proposal by the PWD. It is possible to be interpretated as a stagewise construction plan of major Arterial Road Phase II. Furthermore, superiority order of Alternative Plans would not be altered even if the construction costs of the section be based on 4-lane proposal by the PWD. This is because the costs would be increased parallelly and Alternative 3 would be optimum without regard.

8-4-2 Sensitivity Tests and the Elasticity of EIRR

To the selected optimum Plan, Alternative 3, sensitivity analysis was carried out. The sensitivity tests of EIRR were conducted under the following conditions:

Case 1 - Cost 20% rise

This would correspond to the cost increase affected by the economic environment. The influence of inflation is partly included.

Case 2 - 20% decrease of the benefits

It may occur if the shift from passenger cars to public buses be attained at the slower pace than anticipated.

Case 3 - Combination of the above 2 cases

The more unfavourable situation is assumed to the public bus transport.

The result of calculation in these 3 cases are:

Unit : %

Case	EIRR
Case 1	22.9
Case 2	21.3
Case 3	14.2

The optimum Plan has been revealed to have a tenacious feature. Its economic viability is well enough even when the 20% rise of costs and 20% decrease of benefits take place at the same time. The justification would, therefore, be placed once more on the selection of Alternative 3.

Supplementary calculation was made in order to examine the elasticity of EIRR in the optimum Plan. In response to either the cost increase or the benefit decrease, the values of EIRR were traced. The cost/benefit changes were assumed to occur independently and the corresponding EIRR was calculated. The results are as shown below.

Unit : %

Condition of Change	0%	10%	20%	30%	40%	50%	60%
Cost Increase	30.7	26.5	22.9	19.8	16.8	14.1	11.8
Benefit Decrease	30.7	26.1	21.3	16.0	10.8	-	-

Remarks; Limit of cost increase : 59% (EIRR: 12.1%)
Limit of benefit decrease: 37% (EIRR: 12.1%)

From this EIRR-elasticity testing, the optimum Plan would be feasible under the road proposal by the PWD. The increase in construction costs for Major Arterial Road Phase II was estimated to be around 10% when the said road section be widened from 2-lanes to 4-lanes. In this case, the calculated EIRR is 26.5% and it is far justifiable over the standard criterion of discount rate 12%.

CHAPTER 9
MASTER PLAN OF PUBLIC TRANSPORT SYSTEM

CHAPTER 9 MASTER PLAN OF PUBLIC TRANSPORT SYSTEM

9-1 Master Plan of Public Transport System

It was judged that Alternative 3 is most desirable from the standpoint of national economy as the master plan of the public transport system with year 1995 set as the target year.

The public transport system improvement plan based on Alternative 3 is described below.

9-1-1 Improvement plan of public bus system

It is desirable that public buses, which are currently at a low service level, would be the subject of the public transport system by improvement of their service level.

Furthermore, school buses, which are used by only 9% of all students moving to/from schools, are not economical. It is therefore desirable that school buses are converted to public buses and are effectively used. Furthermore, it is desirable that student season ticket system of high discount rates would be introduced in order to promote use of public buses by students.

Vehicles: To purchase 235 new public buses with air conditioners and auto doors of one-man operation (without conductor).

Bus network: Routes should be newly established in the whole bus network and the operating frequency should be increased to a level that is about three times of the present level.

The bus routes of the average operating interval once every 10 minutes are the following five routes.

	Bus Route No.
B.S.B. - Muara	(3)
B.S.B. - Seria	(10)
Kuala Bebit - Seria	(14)
B.S.B. circular bus route	(18)
Lambak - Rimba	(20)

Bus services of a high level should be provided by these five routes for the passenger movement in the areas around capital city B.S.B. and from Muara on the east side to Kuala Belait on the west side.

The bus routes of the average operating interval once every 15 - 30 minutes are as follows.

	Bus Route No.
B.S.B. - Gadong	(1)
B.S.B. - Berakas	(2)
B.S.B. - Kota Batu	(4)
B.S.B. - Jerudong	(6)
B.S.B. - Limau Manis	(7)
Seria - Labi	(16)
Seria - Sungai Liang	(17)
B.S.B. - Subok	(19)
B.S.B. - Kuala Belait (high speed bus)	(21)
Tutong - Lamunin	(22)

The bus routes in Brunei Muara District and the bus route between Kuala Belait and Seria where a large demand for bus services can be expected, would be operated for 15 hours a day and other routes would be operated for 10 hours a day. Operation on schedule should be established at all routes.

Bus terminals: Existing bus terminals in B.S.B. and Kuala Belait would be utilized, and the bus terminal in Seria would be improved to a terminal having around 10 berths. In addition, bus terminals having around 5 berths each would be provided in Tutong and Gadong, and a bus terminal having around 10 berths would be provided at the airport.

Bus stops: Bus stops having bus bays would be provided along main bus routes in order not to obstruct general traffic, and in addition, shelters, chairs, time tables, etc. would be provided at all bus stops.

Offices & workshops: Offices would be located at four places, i.e., Seria, Tutong, Gadong and Airport. The office in Gadong would have the head office function for the new organization for operation of these bus services. Furthermore, the office in Gadong would be accompanied by a standardized bus workshop for conducting periodic maintenances of buses.

Fig. 9-1 Public Bus System of the Master Plan

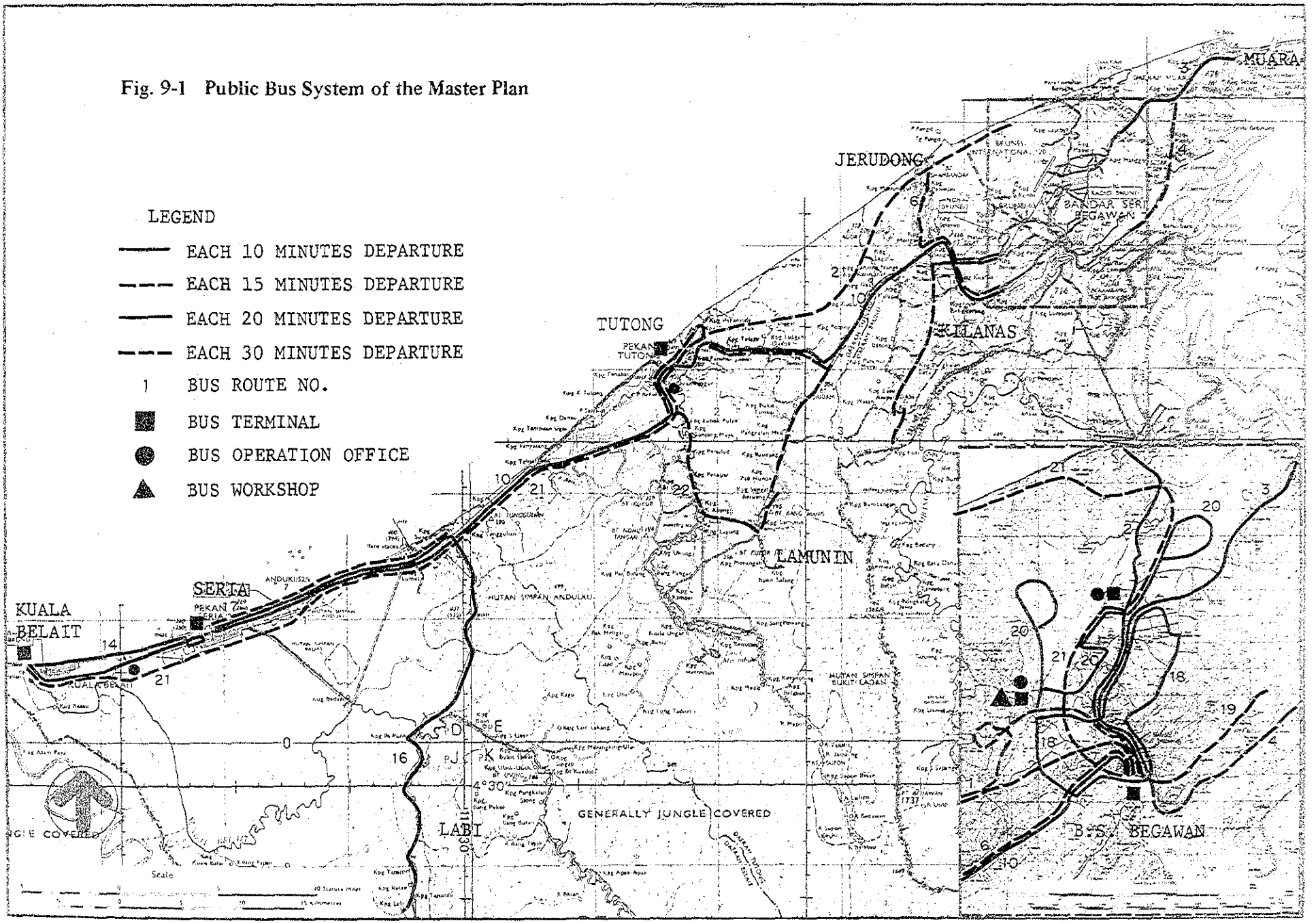
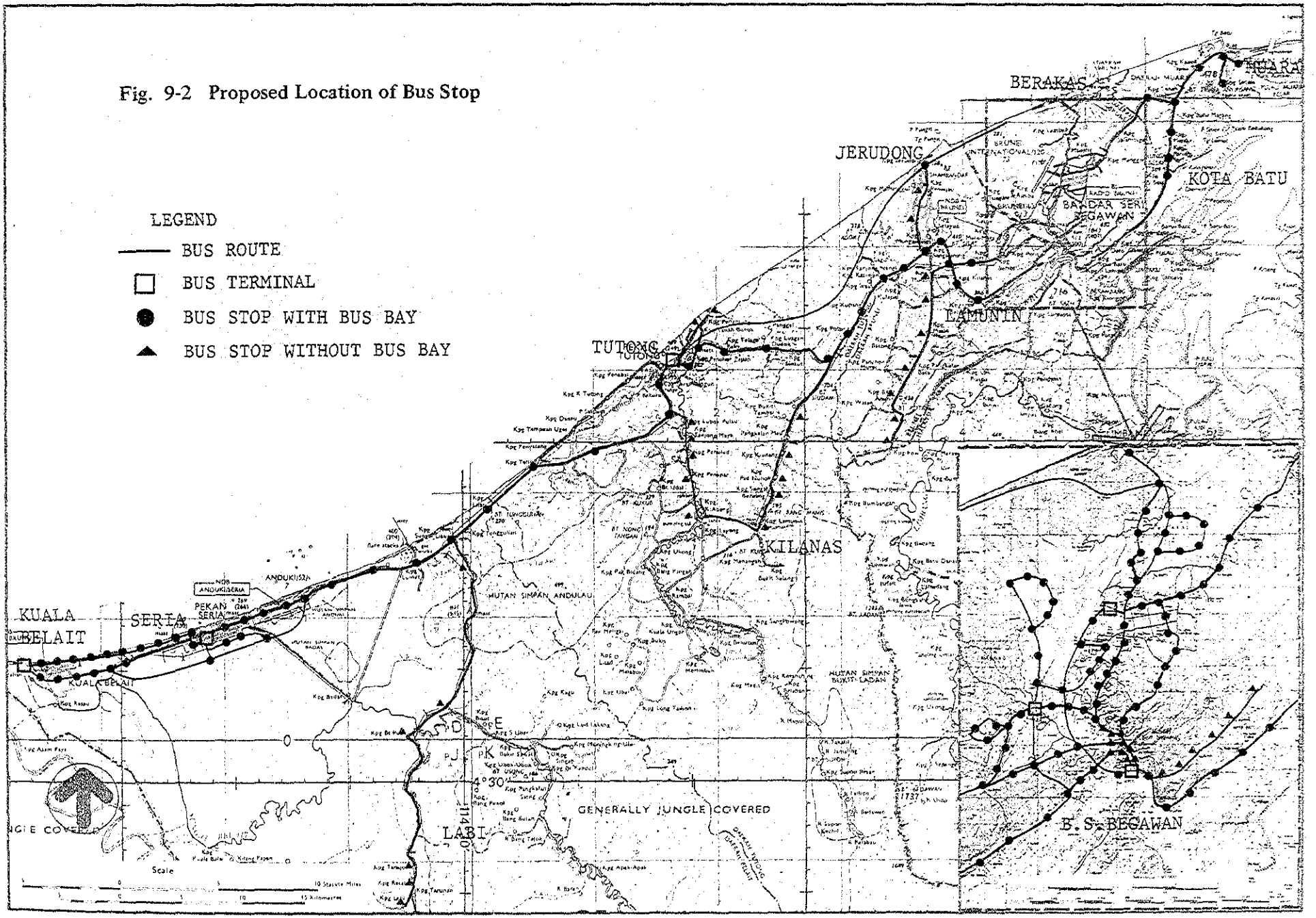
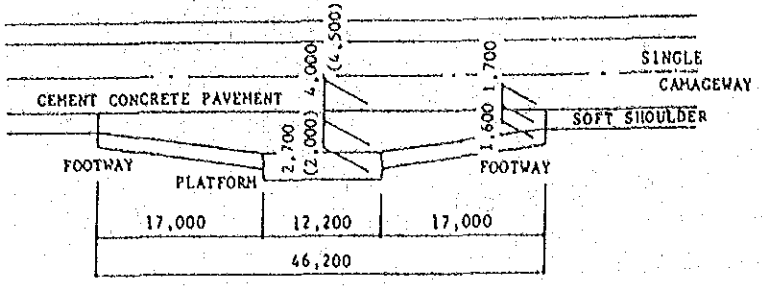


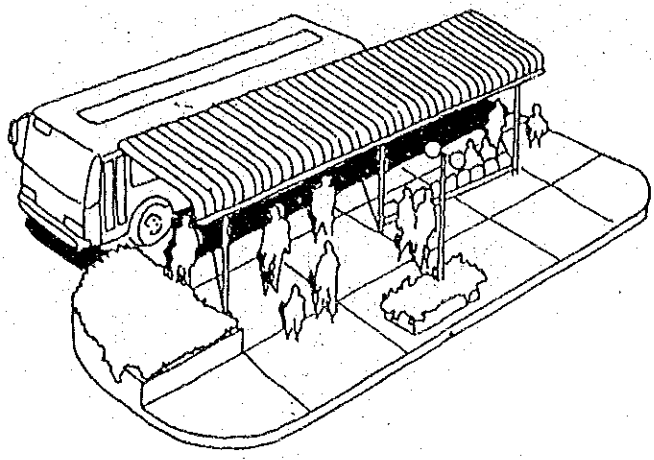
Fig. 9-2 Proposed Location of Bus Stop

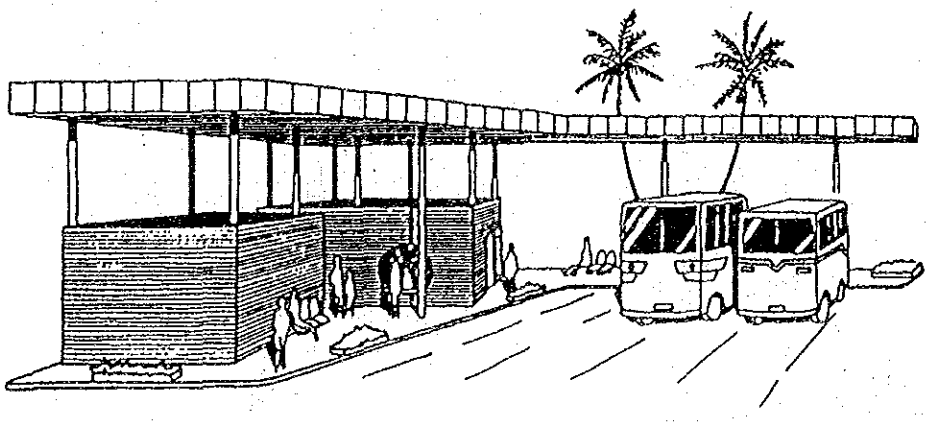




PLOT PLAN

BUS STOP





BUS TERMINAL
(5 BERTHS)

9-1-2 Improvement plan of taxi system

No cruising taxis are available at the present time and taxis equipped with radio installations are not available, either. The current situation is such that passengers should walk to taxi pools of a small number. The following countermeasures are required for improving such a situation.

(1) Telephone calling system at taxi stations

As the number of taxi passengers is small and profitability of taxi business is inferior at the present time, it is hard to execute cruising for improving services. It is therefore necessary to provide taxi stations jointly with bus terminals and to permit taxi calling through telephone at these taxi stations.

(2) Taxis with radio installations

Improvement of taxis with radio installations is desirable in order to efficiently operate taxis and to pick up passengers on the return courses. A radio installation of about B$2,000 is rquired for each taxi, and radio equipment with antenna of around B$30,000 and one operator are required at each one of six taxi stations. It is desirable that the same radio frequency is used by these taxi stations to provide services to taxis in inter-area sections.

(3) Provision of taxi stations

Taxi stations are currently provided at bus terminals in B.S.B., K.B. and Seria and also in Tutong. But they are not sufficient.

It is therefore desirable that all bus terminals to be constructed in the future will be jointly provided with taxi stations and taxi pools.

The scale of the anticipated taxi pool is as follows.

a) It is expected that the number of passengers will increase accompanying improvement of various taxi services, but further careful consideration is necessary to provide facilities corresponding to excessive increase of demand.

Therefore, the number of taxis to be departed per 12-hour period in the future is estimated with future increase rate of daytime population by zone multiplied to the number of taxis departed per 12-hour period by zone obtained as a result of car OD and taxi survey.

b) It is desirable that taxi pools are constructed jointly with bus terminals. The service areas are divided to each taxi stations to meet the demand for taxis in the area.

b) When parking spaces are secured for the demand in the peak 30-minute period in each area, spaces for 86 taxis are required in total.

The demand for taxis and the number of taxis to be serviced at each taxi pool are shown in Table 9-1 and Table 9-2.

The proposed taxi pools can be amply accommodated within the site of bus terminals being planned, except for the B.S.B. bus terminal. The spaces for offices of taxi stations can also be amply accommodated in the buildings of bus terminals.

The existing bus terminal in B.S.B. has a parking space for 10 taxis and also there is a parking space on the front road for about 15 taxis. Furthermore, the government plans to construct a new multi-storied parking building at the site of the fish market, and it is judged that a taxi pool can be amply accommodated in the building.

(4) Method for improvement

As the existing taxis are private individuals and their profitability is low. It is anticipated that it is hard for them to bear expenses for improvement.

Therefore, it is desirable that taxi stations are constructed by the government simultaneously with bus terminals.

It is also desirable that government loan of a low interest rate is used for purchase of radio installations and other required equipment.

At the same time, it is necessary to permit use of a fixed radio frequency band by taxis in order to introduce taxis with radio installations which are popular in advanced nations.

In addition, it is desirable that taxi parking spaces matched with the demand are provided at airport and hotels.

Table 9-1 Taxi Trips by Zone

Zone No.	Increasing Rate of Daytime population	No. of Taxi Trips in 12 Hrs. 1984	1995
11	1,258	234	294
12	1,376	0	0
13	1,375	0	0
14	1,944	0	0
15	1,655	55	91
16	1,139	6	7
17	1,053	0	0
21	2,308	24	55
22	1,400	33	46
23	1,818	74	135
24	1,673	13	22
25	3,552	32	114
26	4,554	6	27
27	2,381	0	0
28	1,966	57	112
29	2,174	0	0
30	2,273	0	0
31	2,376	47	112
41	1,660	48	80
42	1,638	65	106
43	1,771	3	5
51	1,723	28	48
52	1,525	0	0
61	1,649	0	0
Total	-	719	1,254

Table 9-2 No. of Taxi Parking by Taxi Station

Location of Taxi Station	Zone No. of Service Area	No. of Taxi (A) Trips in 1995	No. of Taxi Parking in 1995 (B) 1/
K.B.	41	80	7
Seria	42, 43	111	9
Tutong	51, 52	48	4
B.S.B.	11, 12, 13, 14, 15, 16, 17, 21	447	37
Airport	22, 23, 24	203	17
Gadong	25, 26	141	12
Total	-	1,030	86

1/ $B = \frac{A \times \text{Peak rate}}{12 \times 2}$, Peak rate = 2

9-1-3 Intermediate programme for public transport system

The intermediate programme that sets year 1990 as the intermediate year is as follows.

The intermediate programme intends to improve with priority the matters which are problems in the existing traffic system, and its contents are as follows.

(1) Reinforcement of bus network

The existing bus network is of future population coverage ratio of only around 52%. It should be improved to the network proposed in the master plan.

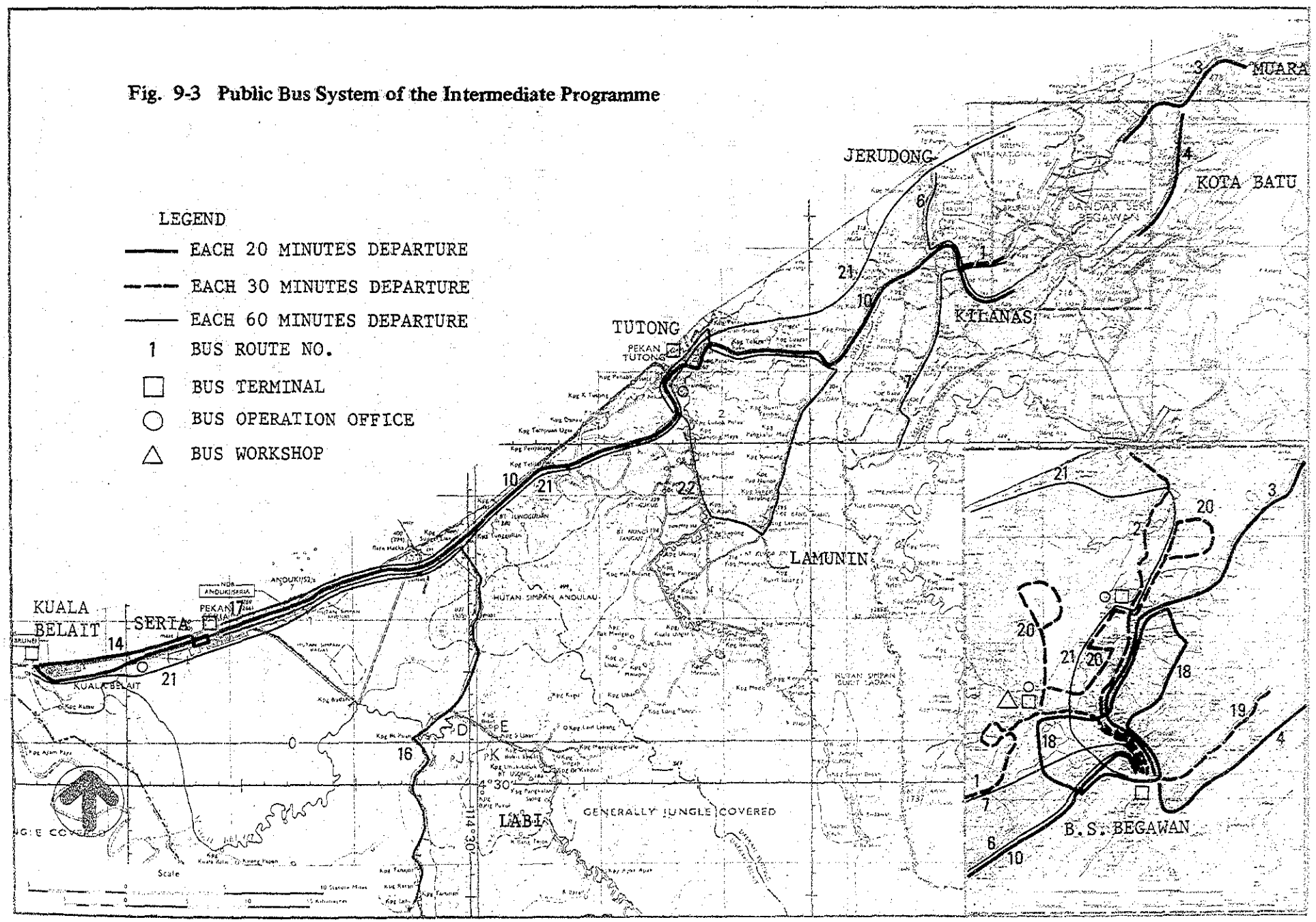
(2) Improvement of bus operating frequency

The average bus operating frequency in the master plan is about three times of the present level. But improvement will be made by the intermediate program to a level that is about twice of the present level.

(3) Improvement of vehicles

160 buses would be required for increasing the operating frequency to a level that is about twice of the present level. Furthermore, present buses are of varied vehicle types and ages and it is considered that all of them

Fig. 9-3 Public Bus System of the Intermediate Programme



will retire by 1990. Therefore, 160 air-conditioned buses of one-man operation will be purchased.

(4) Provision of bus stops

Satisfactory bus stops are not provided and buses are not operated on schedule at the present time. But the bus stops indicated in the master plan will be consolidated and operation on schedule will be fixed by the intermediate year.

(5) Provision of bus terminals

Improvement of bus terminals is required to a level of the twice of the present average operating frequency.

According to the design described earlier, bus terminals of identical numbers are required in Alternative 3 and Alternative 4. Therefore, the bus terminals indicated in the master plan will be completed by the intermediate year.

(6) Offices and workshops

The present using buses are of varied vehicle types and ages and involve large problems in the servicing. Furthermore, provision of offices is required for performing operation on schedule. Furthermore, offices and workshops of identical numbers are required in Alternative 3 and Alternative 4. Therefore, offices and workshops indicated in the master plan will be completed by the intermediate year.

(7) Provision of taxi stations

The taxi stations to be constructed jointly with bus terminals, the function to permit calling of taxis by phone will be provided to improve the convenience of taxis.

(8) Introduction of taxis with radio installations

It is desirable that radio installations are introduced by making use of government loan of a low interest rate in order to materialize efficient taxi operations.

9-2 Relevant Improvement Plans

Various relevant improvement plans which are required for the improvement of public transport system and which are useful for smooth operation of public transport are described below.

9-2-1 Highway improvement plans

Improvement of roads proposed in Alternative 3 is required. Road congestion of bus routes will be solved with road improvement shown in Table 9-3 and also in Fig. 7-7. Two-lane roads will be expanded to four lanes (7.4 km), two-lane roads will be newly constructed (6.3 km) and four-lane roads will be newly constructed (2.5 km) in order to cover the traffic demand. These plans include reduction of a part of a ring road, which was planned as a four-lane road, to two lanes (2.4 km) based on the result of the forecast of traffic demand. The roads to be improved are as follows.

Table 9-3 List of Roads to be Improved

Link Name	Extension	No. of Lanes	
5. Tungku Link Road	3.5 km	Additional expansion	2 lanes
9. Berakas Link	1.4	"	2
17. Kilanas Link	1.7	New construction	2
19. Burong Pingai Link	1.3	"	2
21. Jln. Mulaut/ Jln. Tutong Link	1.8	"	2
22. Major Arterial Road III	1.3	"	4
23. Jln. Residency	0.7	Additional expansion	2
24. Tungku/Gadong Link	1.2	New construction	4
27. Tungku/Airport Rama Link	1.5	"	2
29. Jln. Gadong (Outside of ring road)	1.4	Additional expansion	2
30. Jln. Berakas (Serusop Link)	0.4	"	2
7. Major Arterial Road II	(2.4)	(Reduction of number of lanes)	2
Total	16.2 km (13.8)		

9-2-2 Intersection improvement plans

It was determined based on the result of the forecast of traffic demand to convert the intersection of Major Arterial Road I and Tungku Link Road to a grade separated intersection. A plan, view and a vertical section of a typical grade separation are shown below.

9-2-3 Other improvement plans

The following improvements will be made in order to support smooth bus operations.

a) Improvement of footways

The plantation zones will be removed and footways will be improved between the Jln. Sekolah intersection of Jln. Kumbang Pasang and the intersection before Istana Edinburgh, which has been pointed out as an arterial road without footways in the town center and its vicinity. See Fig. 9-4.

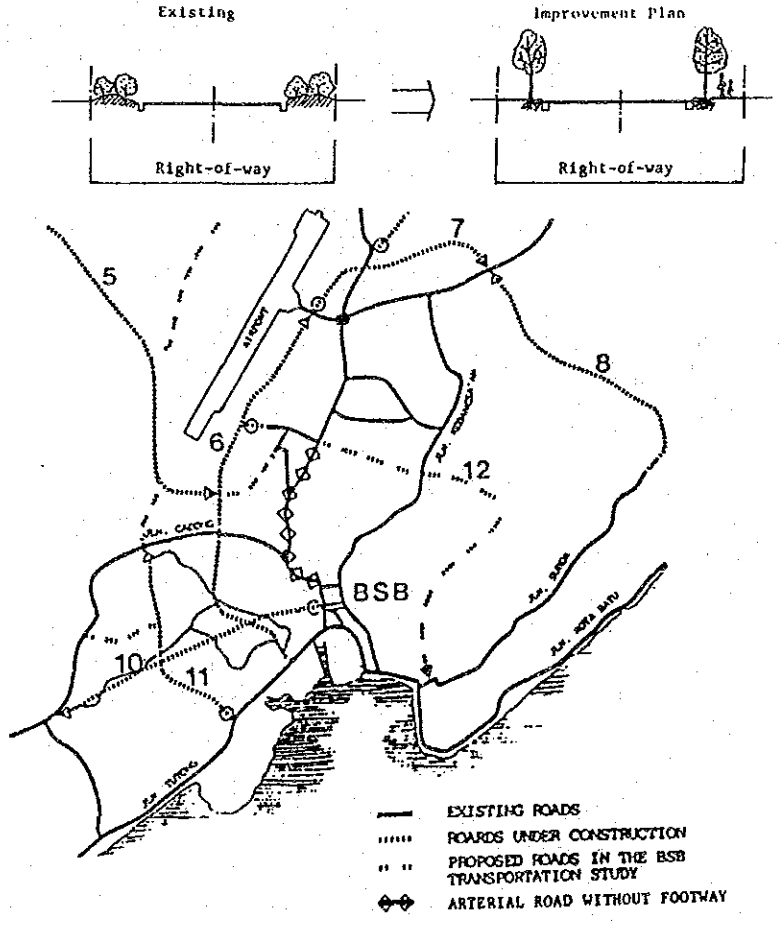
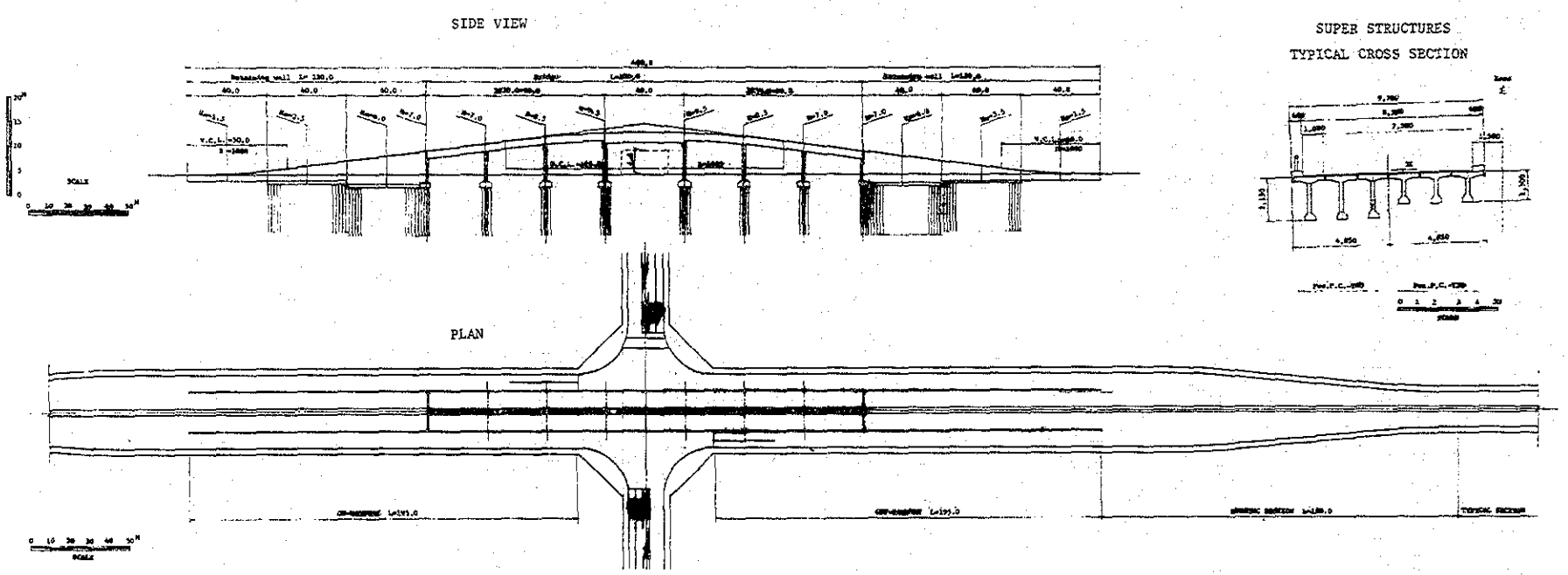


Fig. 9-4 Arterial Road without Footway

Fig. 9-5 General View of Grade Separated Intersection

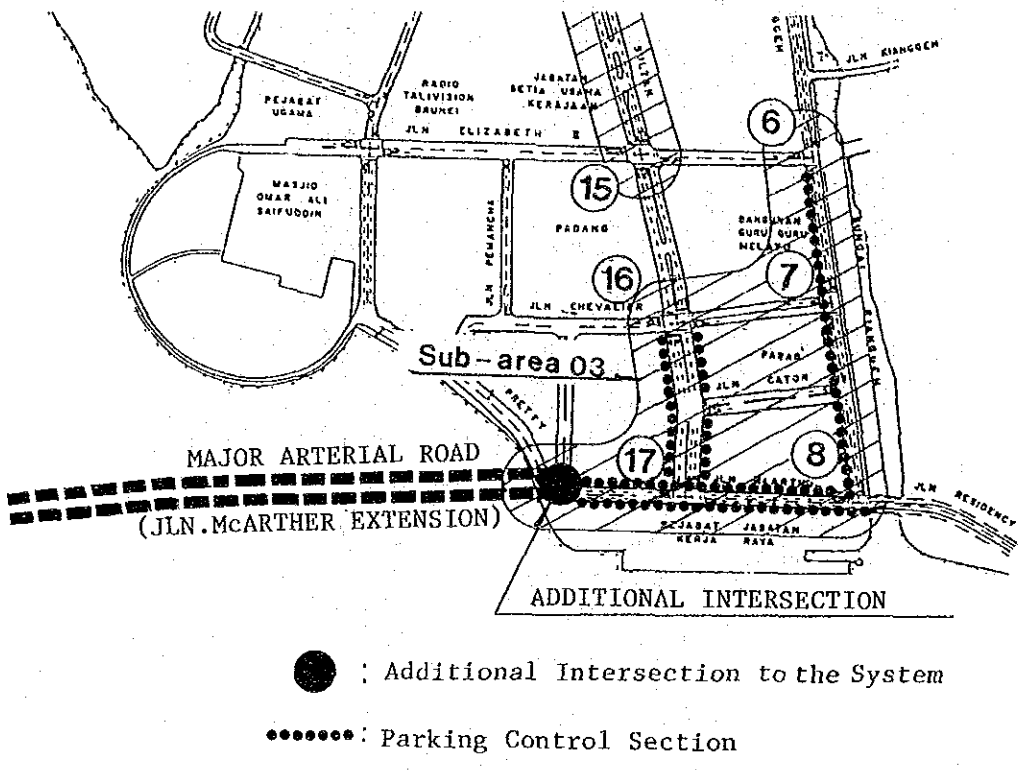


b) Incorporation to systematic signal control system

The intersection connecting with Major Arterial Road III and Jln. McArthur will be added to the sub-area that is same as that of No. 17 and processing will be made as a systematic signal system. (See Fig. 9-6.)

c) Traffic control for smooth bus operation

On-road-parking on Jln. Sultan and Jln. McArthur will be prohibited and the degree of observance of no parking on the west side of Jln. Sg. Kianggeh will be elevated for smooth bus operation.



● : Additional Intersection to the System

●●●●●●● : Parking Control Section

Fig. 9-6 Intersection to be Added to Systematic Signal System and No Parking Section

9-2-4 Intermediate programme for road improvement

The intermediate programme will be consisted of the roads, which are found out to be large demand traffic volume as a result of forecast of future demand toward 1995 and which are desired to be improved as early as possible.

The roads shown in Fig. 9-7 will be improved in the intermediate program based on the examination of assigned future traffic volumes and importance of each links in the road network.

That is;

. NO. 22 Major Arterial Road III	ℓ = 1.3 km	4-lane road to be newly consturcted
. NO. 23 Jln. Residency	ℓ = 0.7	2-lane road to be expanded to 4 lanes
. NO. 29 Jln. Gadong (Outside of ring road)	ℓ = 1.4	2-lane road to be expanded to 4 lanes

The total amount for construction of these three roads occupies about 52% of the construction cost proposed in the master plan.

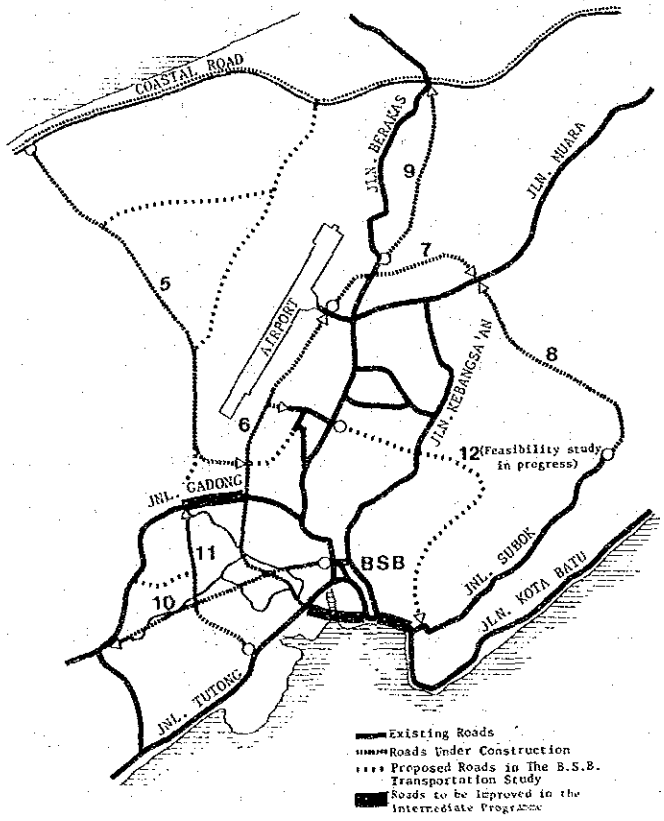


Fig. 9-7 Roads to be Improved in the Intermediate Programme

9-3 Financial Aspents

9-3-1 Financial Analysis of the Public Transport System

To the public transport system recommended in the Master Plan, financial analysis would be required. It is to be conducted towards the contents of the optimum Alternative Plan; namely, Alternative 3 prepared in Chapter 5. The Plan involves provision of the public bus transport as a major component and the facilitation to taxi service was recommended.

In the public bus transport system, the appropriateness of its operation would be evaluated from financial points of view. The principal evaluation criterion was the financial viability; profitability and the possibility of attaining a sound financial basis would be the major concerns. For this purpose, streams of revenue and expenditures and cash flows of capital funds were estimated. Concurrently, employed as an evaluation indicator was the Financial Internal Rate of Return (EIRR) which shows how fast the invested cost to be restored by the profitability of undertakings. From these examinations, a recommendable funding programme for the public bus transport would be identified. Extent of the Government intervention in terms of financial aid is to be clarified as well, in addition to the necessity to revise the present bus-fare level.

On the other hand, such a financial analysis was not conducted in the operation of taxi service business. It was because the integrated operation would not be accomplished by the year 1995; it is difficult to evaluate the profitability of the individual taxi companies. Only the minor improvement such as radio equipment provision was envisaged as the requirements for taxi companies. The Government actions would be composed of financial assistance in the form of lending.

(1) Financial analysis of the operating body for the public bus transport

Financial viability in the operation of public bus transport was evaluated with the target year of 1995. Profitability and financial stability would be the major points to be

examined. For the latter, it was considered that the probable repayment opportunity of the borrowings by 1995 be an evaluation criterion. The operating body was assumed to cover the whole country, not divided into the separate entities either by area or by function. Construction of bus terminals and the bus-stop provision were initially assumed to be provided by the Government, as well as road construction/improvement maintenance. The operating body would be remitted the burden of these capital investment costs. Firstly, the existing bus-fare system was applied in making income/outlay and capital finance statements. In the next step, the revision of revenue/expenditure items and borrowing conditions for capital investment costs were made to meet the financial requirements clarified in the analysis.

a) Major pre-conditions set up before the evaluation

The followings were assumed before the estimation of operating revenue/expenditures and financial accounts:

- The construction works for bus terminals/bus-stops would be completed by the year 1990. Bus operation offices and workshop are also to be constructed and commissioned in 1990.

- Bus operation schedule would be doubled in 1990 and tripled in 1995 against the present operation level. For this enhancement, the buses required in operation number 160 in 1990 and 235 in 1995. Under the condition that holiday operation be at 75% of that in weekday, the number of operating buses required were fixed as shown in (a) of the table below.

- The bus procurement schedule was fixed at 45 in 1988, 115 in 1989, 45 in 1991 and 30 in 1993, which satisfies the bus operation schedule mentioned above. (See (b) in the table below.)

- Holdings of buses would be at the minimum level to meet the operation schedule. The utilization of the existing buses (175 in total as of October 1984, consisting of both public buses and school-buses) would also be minimal towards the requirements, considering the decrease in operating number due to the retirement from the actual services. The bus holdings were assumed as in (c) of the table below, including the use of these existing buses.

Year	(a) Required Number of Operating Buses	(b) Number of Buses to be Newly Purchased	(c) Number of Bus Holdings
1986	100	-	(100)
1987	115	-	(115)
1988	130	45	(85)+45
1989	145	115	160
1990	160	-	160
1991	175	45	205
1992	190	-	205
1993	205	30	235
1994	220	-	235
1995	235	-	235

Remarks: ( ): Portion of the existing buses utilized.

- It was assumed that the number of staff would be minimal in the bus operation. These comprise drivers, clerical workers and mechanics and engineers in the workshop. In the administration, managerial staff would be 3 at the first stage in 1986 and the fixed number of 5 to be filled up by 1989.

- The capital costs requried for the bus procurement and for the construction of 4 operation offices and a workshop would be financed by the Government soft loans. Loan conditions were applied from those in the Economic Development Board (EDB) Loan Scheme prevailing in Brunei. They are:

Interest rate:	6% per annum
Grace period:	None
Amortization period:	4 years
Repayment method:	Payable annually in equal amount
Ceiling amount of the borrowing:	No upper limit

Of the above conditions, only the ceiling amount is different from the EDB Loan in which the limit of lending amount is fixed at B$500 x 10^3. It was assumed that the borrowing and amortization would be made at the beginning of each year, and repayment of the interest would occur by th year end.

- When the working capital in hand shows a deficit, interest-free fund might be accommodated from the Government. These should be repayed if the accounts is in surplus. Other kind of financial aid would be available, such as in the forms of subsidies and equity participation, from the Government.

- To render general services to the public, tax exemption measures were to be applied in the bus operation and with regard to the profits (for chargeable income) of the operating body. More minutely stating, the road tax payable annually would be exempted under the Road Traffic (Exemption) Order, 1955; concessions of the total reduction of the levied income taxes would be granted for the public interest, based on the provisions in the Income Tax Enactment, 1949.

- No subsidizing system would be applied to the operating expenses; for the fuel costs, oil costs, operating costs of bus-facilities, depreciation of buses/buildings/machineries and salary/wage. The expenditures in the bus purchasing would not be exempted from taxes; none of the actions for financial assistance be taken, either.

- All prices would be indicated at constant prices in mid-1984. Price increase in the future was not considered.

b) Estimation of the operating revenue and expenditures

The receipts from the bus-fare were the only operating revenue and other revenues were considered to be nil. The operating expenditures were counted for 4 major categories; namely, costs pertaining to bus purchasing/holdings, costs due to bus operation, salary/wages and costs due to office/equipment operation. The details of the estimation of these expenses are delineated below.

Operating revenue

The current bus-fare level was obtained from the interview with the major bus operators. The average value of bus-fare (B$/km) was calculated as follows:

Brunei-Muara District:	0.07
Other Regions:	0.04

From the projected future traffic demand, the composition ratio of trips inside and outside Brunei-Muara District was obtained to be 70.45% and 29.55%, respectively; which would not change at the constant from 1986 to 1995.

For the students, the discounted bus-fare has been applied in Brunei; it is the half of the above values. To the portion of 20.6% of total trips, according to the results of the traffic survey, this half value of bus-fare was applied.

Between weekdays and holidays, the utilization of public buses would alter. It was assumed there would be 8 months (67%) of the former and 4 months (33%) of the latter a year and that the trips with the purposes for work/school/business would not take place in holidays. The total volume of trips in holiday was thus to be 30% of the normal volume in weekdays.

The projected volume of person trips was 945,700 km/day for the year 1995. To this, the values and ratios as mentioned above were applied, taking the enhancement of bus utilization ratio (6.8% in 1986, 10.9% in 1990 and 18.6% in 1995, among all the transportation modes) and the projected growth of total person trips into consideration. The results of estimation for 1986, 1990 and 1995 are as follows:

Unit: $B\$10^3$

Year	Receipts from Bus-Fare
1986	3,237.3
1990	6,995.3
1995	14,566.6

Operating revenues in the other years were calculated through the interpolation with these figures. The yearly operating revenues at the present level of bus-fares were thus obtained.

Operating expenditures

The particulars of the expenditure estimation were as follows:

i) Cost pertaining to bus purchasing/holdings

- Seal/Number plate/registration fee

  The unit cost value of B$150 per vehicle per one time was multiplied to the number of newly purchased buses.

- Premium for insurance

  The annual amount of B$2,200 per one concluded contract was multiplied to the number of bus holdings. Although the premium of the same vehicle would be decreased in amount year by year depending upon the altered conditions, it was assumed to be uniform.

ii) Costs due to bus operation

- Direct expense

  Utilizing the values of fuel costs, engine oil costs, tyre/tube costs and repair/maintenance costs, which had been prepared for the calculation of vehicle operating costs in Chapter 8, obtained were the followings:

  1986 to 1989: B$0.1751 per vehicle.km
  1990 to 1995: B$0.1472 per vehicle.km

  The difference of the unit values between above 2 period was derived from the exclusion of labour-cost portion (40%) out of the repair/maintenance costs after the commissioning of the bus workshop. Only the costs for spare-parts (60%) would be needed, as repair/maintenance costs after 1990.

  The value of each cost component was applied from that at average running speed of 48 km/hour; however, the original values of total sum were transformed into those plus 20% considering the frequent starting and stops along the streets. (The bus routes comprise mainly those through the built-up areas such as in and around B.S.B., which is shown in the table below. In addition, the provision of a number of bus-stops is proposed under the Master Plan). The vehicle.kilometerage of the bus was obtained from the distance and operation frequency of the proposed bus routes, for the years 1990 and 1995; which are:

Unit: Vehicle·km/day

No.	Bus Route (Origin/Destination)	Vehicle·Kilometerage 1990	1995
1.	B.S.B. - Gadong	384	768
2.	B.S.B. - Berakas	900	1,350
3.	B.S.B. Muara	2,394	4,788
4.	B.S.B. - Kota Batu	900	1,200
5.	Sg. Kebun - Lumapas	-	-
6.	B.S.B. - Jerudong	750	1,500
7.	B.S.B. - Limau Manis	639	1,278
8.	B.S.B. - Lamunin	-	-
9.	B.S.B. - Tutong	-	-
10.	B.S.B. - Seria	8,325	11,100
11.	B.S.B. - Hospital	-	-
12.	B.S.B. - Airport	-	-
13.	Tutong - Tutong Camp	-	-
14.	K.B. - Seria	2,880	2,880
15.	K.B. - Miri	-	-
16.	Seria - Labi	1,209	2,418
17.	Seria - Sg. Liang	609	812
18.	B.S.B. - B.S.B.	2,520	5,040
19.	B.S.B. - Subok	282	282
20.	Lambak Kanan - Rimba	2,079	4,158
21.	B.S.B. - K.B.	3,720	4,960
22.	Tutong - Lamunin	1,540	2,056
Total (All bus routes)		29,133	44,590

These total vehicle.kilometerage in 1990 and 1995 were further modified by multiplying with 1.15 (for 15% increase), for the adjustment to meet the projected bus traffic volume and in consideration of the detour or long trips in the actual courses.

Finally, the vehicle.kilometerage of the operating buses resulted in as follows, assuming the holiday operation level of 75%.

Unit: Vehicle·km x 10^3

Year	Annual Vehicle·Kilometerage
1990	11,219.7
1995	17,172.5

The annual values before 1990 and between the above 2 years were calculated through the exterpolation and the interpolation, respectively; a stream of direct bus operation expenses was obtained by the multiplication of these vehicle.kilometerages and the unit operating cost as mentioned earlier.

- Indirect expenses

  It was assumed to be 10% of the above direct bus operation expense in each year.

iii) Salary/wages

The required number of drivers would be triple of the number of operating buses, since the 3-shift working system is to be employed in operation. Clerical workers would have to be increased in proportion to the number of drivers; the minimal requirements be satisfied, not full of the capacity of office spaces. The first recruitment would be started in 1986. The on-the-job training of the engineers/mechanics would be required though the workshop would be in full commission in 1990. For this reason, these crew shoud be manned firstly from around 1988 and the total forces would be 40 in 1990. With regard to the managerial staff, the required number was already fixed in setting preconditions. As a summary of staff numbers, it was assumed:

Unit: person

Year	Bus Drivers	Clerical Workers	Mechanics/ Engineers	Managerial *) Staff
1986	300	15	-	3
1987	345	20	-	3
1988	390	25	10	4
1989	435	30	15	5
1990	480	40	40	5
1991	525	45	40	5
1992	570	50	40	5
1993	615	55	40	5
1994	660	60	40	5
1995	705	65	40	5

Remarks: *): Each is the chief of 4 operation offices and that of the workshop.

To this staffing schedule, the respective amounts of positional payments be multiplied. These average annual positional payments were determined from the data provided by the Educational Transport Department or the Labour Department. In this determination, due consideration was taken in the salary ranks of the Government officers.

- Drivers: B$5,400 per year (from the information of the Educational Transport Dept.)

- Clerical workers: B$7,800 per year (corresponding to D1 of Div. II)

- Mechanics/engineers: B$5,700 per year (determined from the wage data of Labour Dept.)

- Managerial staff: B$30,000 per year (corresponding to C3 of Div. III)

iv) Costs due to office/equipment operation

- Expense for the headquarters

It would be required to rent a office space before the operation center is completed. Even after this completion, the same amount of expense would be required to sustain the functions of the head office. These include the maintenance costs of the building and office expenses. The assumed amount was B$120 x 10^3 annually from 1986.

- Costs derived from 4 operation offices

It was assumed that the 3% of the capital costs excluding land price be operation/maintenance costs of these offices; which was B$172,500 yearly required after 1990.

- Costs derived from the workshop

The annual amount of B$81,666 was assumed to be the operation/maintenance costs of the workshop, calcualted by multiplying 5% to the capital costs of building and machineries. It would be required after the commission in 1990.

The table below summarized operating revenue and expenditures thus calculated.

Unit: $B\$10^3$

Item	1986	1987	1988	1989	1990
I. Operating Revenue	3,237.3	4,176.9	5,116.6	6,056.2	6,995.3
II. Operating Expenditures					
1. Costs pertaining to Bus Purchasing/ Holdings	220.0	253.0	292.8	369.3	352.0
2. Costs due to Bus Operation	1,243.8	1,473.1	1,702.5	1,931.7	1,816.7
3. Salary/Wages	1,827.0	2,109.0	2,478.0	2,818.5	3,282.0
4. Costs due to Office/Equipment Operation	120.0	120.0	120.0	120.0	374.2
Sub-Total	3,410.8	3,955.1	4,593.3	5,239.5	5,824.9

Item	1991	1992	1993	1994	19953
I. Operating Revenue	8,509.1	10,022.9	11,536.6	13,050.4	14,566.6
II. Operating Expenditures.					
1. Costs pertaining to Bus Purchasing/ Holdings	457.8	451.0	521.5	517.0	517.0
2. Costs due to Bus Operation	2,009.5	2,202.2	2,395.0	2,587.8	2,780.6
3. Salary/Wages	3,564.0	3,846.0	4,128.0	4,410.0	4,692.0
4. Costs due to Office/ Equipment Operation	374.2	374.2	374.2	374.2	374.2
Sub-Total	6,405.5	6,873.4	7,418.7	7,889.0	8,363.8

c) Estimation of depreciation allowance

Depreciation was considered in the newly purchased buses, buildings of 4 operation offices and the workshop, and machineries in the workshop. As the existing buses would be left worn out, depreciation expenses were not counted. The fixed percentage method was employed in the estimation. The service lives and the annual depreciation reserve to be allowed are as shown below, together with the prices of the objects:

- Newly purchased bus

  Market price: B$110,400 per vehicle
  (CIF price at Muara port + 20% of levied import duty)
  Service life assumed: 10 years
  Annual amount of allowance: B$11,040 per vehicle holding

  It would be required from the first bus procurement in 1988.

- Buildings of 4 operation offices

  Construction cost: B$1.0 x 10^6 per operation office
  Service life assumed: 30 years
  Annual amount of allowance: B$133,333, in total

  The reservation of this annual amount is to be commenced in 1990.

- Buildings of the workshop

  Construction cost: B$1.0 x 10^6
  Service life assumed: 20 years
  Annual amount of allowance: B$50 x 10^3 (from 1990)

- Machineries in the workshop

  Purchasing price: B$500 x 10^3
  Service life assumed: 15 years
  Annual amount of allowance: B$33,333 (from 1990)

As a summary, the required amount for depreciation are:

Unit: B$$10^3$

Year	Newly Purchased Buses	Operation Centers	Workshop	Total
1986	-	-	-	-
1987	-	-	-	-
1988	496.8	-	-	496.8
1989	1,766.4	-	-	1,766.4
1990	1,766.4	133.3	83.3	1,983.0
1991	2,263.2	133.3	83.3	2,479.8
1992	2,263.2	133.3	83.3	2,479.8
1993	2,594.4	133.3	83.3	2,811.0
1994	2,594.4	133.3	83.3	2,811.0
1995	2,594.4	133.3	83.3	2,811.0

d) Basic loan programme

All the capital investment costs would be financed by the Government loans, and the conditions for loans were already set forth: no grace period is appointed; repayment of the capital is to be made from the next year in equally-divided annual amount for 4 years; an annual interest rate is 6%. The amortization would be required to finish before the year 1995.

If the bus procurement and construction of bus operation offices and workshop be all undertaken by the operating body of public bus transport services, the borrowing and repayment schedule would be as follows:

Unit: B10^3

Year	Borrowing	Repayment of Capital	Payment of Interest
1986	-	-	-
1987	-	-	-
1988	7,782.4	-	466.9
1989	15,510.4	1,945.6	1,280.8
1990	2,814.4	5,823.2	1,123.5
1991	4,968.0	6,526.8	1,006.7
1992	-	7,768.8	540.7
1993	3,312.0	5,823.2	389.9
1994	-	3,601.6	173.9
1995	-	2,898.0	-
Total Amount	34,387.2	34,387.2	4,982.4

In this schedule, the borrowing in 1993 should be paid back in 2 years, in view of the completion of amortization within the target year of 1995. The amount borrowed and that of the capital are to be included together in the capital finance accounts, while payment of the interest appear in the operating expenditures, as a borrowing cost.

e) Examination of a basic case of funding

The assumptions in the basic funding case are:

- The operating revenue is derived from the receipts at the current level of bus-fares.
- Capital investment is composed of bus procurement costs, construction costs of bus operation offices and the workshop, and purchasing cost of workshop's machineries.
- No capital appropriation is laid down at the initial stage in 1986.

Under these assumptions, both the income/outlay statement and the capital finance statement were estimated in the operation of public bus transport, for 10 years' duration from 1986 to 1995. From the former statement, yearly profit/loss and its accumulation would be clarified. On the other hand, the shortage/reserved amount of capital funds would be obtained from the balance in the latter. The depreciation reserve was assumed to be utilized as funds in the latter. The estimated statements are as shown below.

- The operating loss would occur in the first year 1986. Although the second year has small net profit in operation, the structural imbalance would continue up to 1991. (According to the income/outlay statement.)
- The accumulated losses would be dissolved only in 1995. (From the income/outlay statement.)
- Centering around 1990, depreciation allowance and payment of interest would be hardly possible. (From the income/outlay statement.)
- To make up the deficit in working capital, interest-free Government funds would be required for 5 years from 1989 to 1993; the repayment of which might not be finished by the end of 1995. (According to the capital finance statement.)
- At the point of 1995, there would be no internal reserve nor the depreciation fund. (Also from the capital finance statement.)

Putting all the above together, it was revealed that the financial situation in the basic case would be straitened.

Income and Outlay Statement (Basic Case)

Unit: B$10^3

Particular	1986	1987	1988	1989	1990
I. Revenue					
Revenue from Bus Operation	3,237.3	4,176.9	5,116.6	6,056.2	6,995.3
II. Expenditure					
1. Operating Expenses	3,410.8	3,955.1	4,593.3	5,239.5	5,824.9
2. Depreciation Allowance	-	-	496.8	1,766.4	1,983.0
3. Payment of Interest	-	-	466.9	1,280.8	1,123.5
Sub-total	3,410.8	3,955.1	5,557.0	8,286.7	8,931.4
III. Balance					
1. Income before Depreciation/ Interest	-173.5	220.9	523.3	816.7	1,170.4
2. Net Profit	-173.5	220.9	-440.4	-2,230.5	-1,936.1
3. Profit to be Accumulated	-173.5	47.4	-393.0	-2,623.5	-4,559.6

Particular	1991	1992	1993	1994	1995
I. Revenue					
Revenue from Bus Operation	8,509.1	10,022.9	11,536.6	13,050.4	14,566.6
II. Expenditure					
1. Operating Expenses	6,405.5	6,873.4	7,418.7	7,889.0	8,363.8
2. Depreciation Allowance	2,479.8	2,479.8	2,811.0	2,811.0	2,811.0
3. Payment of Interest	1,006.7	540.7	389.9	173.9	-
Sub-total	9,892.0	9,893.9	10,619.6	10,873.9	11,174.8
III. Balance					
1. Income before Depreciation/ Interest	2,103.6	3,149.5	4,117.9	5,161.4	6,202.8
2. Net Profit	-1,382.9	129.0	917.0	2,176.5	3,391.8
3. Profit to be Accumulated	-5,942.5	-5,813.5	-4,896.5	-2,720.0	671.8

Capital Finance Statement (Basic Case) Unit: B$10^3

Particular	1986	1987	1988	1989	1990
I. Source of Funds					
1. Balance Brought Forward	-	-	47.4	103.8	-
2. Equity	-	-	-	-	-
3. Public Loan	-	-	7,782.4	15,510.4	2,814.4
4. Interest-free Funds from Government	173.5	-	-	305.9	5,776.3
5. Depreciation Reserve	-	-	496.8	1,766.4	1,983.0
6. Annual Profit	-173.5	220.9	-440.4	-2,230.5	-1,936.1
Sub-total	-	220.9	7,886.2	17,456.0	8,637.6
II. Application					
1. Investment	-	-	7,782.4	15,510.4	2,814.4
2. Loan Repayment	-	-	-	1,945.6	5,823.2
3. Repayment of Govt. Funds	-	173.5	-	-	-
Sub-total	-	173.5	7,782.4	17,456.0	8,637.6
III. Balance					
Internal Reserve	-	47.4	103.8	-	-

Particular	1991	1992	1993	1994	1995
I. Source of Funds					
1. Blanace Brought Forward	-	-	-	-	-
2. Equity	-	-	-	-	-
3. Public Loan	4,968.0	-	3,312.0	-	-
4. Interest-free Funds from Government	5,429.9	5,160.0	2,095.2	-	-
5. Depreciation Reserve	2,479.8	2,479.8	2,811.0	2,811.0	2,811.0
6. Annual Profit	-1,382.9	129.0	917.0	2,176.5	3,391.8
Sub-total	11,494.8	7,768.8	9,135.2	4,987.5	6,202.8
II. Application					
1. Investment	4,968.0	-	3,312.0	-	-
2. Loan Repayment	6,526.8	7,768.8	5,823.2	3,601.6	2,898.0
3. Repayment of Govt. Funds	-	-	-	1,385.9	3,304.8
Sub-total	11,494.8	7,768.8	9,135.2	4,987.5	6,202.8
III. Balance					
Internal Reserve	-	-	-	-	-

f) Alteration of funding conditions and the evaluation with FIRR

In order to enhance the profitability of operation, the formere set up assumptions would have to be varied. It is impossible to alter the composition of operating expenditures as well as that of depreciation expenses. Possible measures are increase in operating revenue by raising bus-fare level, cut in the amount of capital investment and change of financing method.

Of the possible 3 measures to improve financial situation, the former 2 would be evaluated, utilizing the indicate FIRR. FIRR is a tool of measuring the profitability of undertakings, calculated as the discount rate which makes the total present values of both capital investment and income before depreciation/interest equal. In the calculation of FIRR, the residual values of the assets would have to be added to the income in the year 1995, provided that the project life be finished in the same year. In the actual calculation, added as the residual values were those of the newly purchased buses, buildings of operation offices/workshop, and machineries in the workshop.

Besides the basic case, the combination of 2 major alterations were assumed; namely, increase of bus-fare level and cut in capital investment items. The latter was set in 2 cases as follows:

Case-1: The capital would be disbursed for the construction of operation offices/workshop and for the purchasing machineries, in addition to the bus procurement.

Case-2: The capital investment only covers the bus procurement.

The calculation results of FIRR in the varied conditions are as shown below.

Unit: %

Bus-fare Level	Case-1	Case-2
Same as at present	2.0 (Basic case)	5.8
10% Increase	7.8	14.9
15% Increase	10.9	19.3
20% Increase	14.3	-
30% Increase	22.1	-

Remarks: Adding amount of the residual values of assets in 1995 was different between Cases-1 and 2.

When the prevailing interest rate of 12% be the screening criterion, the evaluation of various conditions would be attained. In Case-1, 20% increase in bus-fare would be necessary, while only the 10% increase be required for Case-2. Based on these FIRR values and considerations of effectiveness in the actual actions, the latter combination was adopted. The recommendable programme would be, therefore, composed of limiting the capital investment costs only for the bus procurement and raising bus-fare level by 10%.

Furthermore, the other financial assistance from the Government was taken into account. In the trial estimation of both income/outlay statement and capital finance statement under the above-mentioned conditions, the following were revealed:

> Net profit would appear from the year 1992; however, in capital finance accounts, the interest-free Government funds would have to be provided in 1990, 1991 and 1992. (Total amount: B$6,680,100)

To reduce this total fund requirement, equity participation by the Government was assumed; B$2.0 x 10^6 would be the capital appropriation at the initial stage in 1986. The required amount of interest-free

Government funds is to be decreased by 30% in this action.

g) Examination of the recommendable case of funding

The assumptions in the recommendable funding case are:

- The operating revenue is the receipts from the bus-fare raised up by 10%.
- Capital investment covers only the bus purchasing costs.
- Capital appropriation in 1986 is with B$2.0 x 10^6 under the equity participation by the Government.

To meet these assumptions, the loan programme was modified as shown below.

Unit: B10^3

Year	Borrowing	Repayment of Capital	Payment of Interest
1986	-	-	-
1987	-	-	-
1988	4,968.0	-	298.1
1989	12,696.0	1,242.0	985.3
1990	-	4,416.0	720.4
1991	4,968.0	4,416.0	753.5
1992	-	5,658.0	414.0
1993	3,312.0	4,416.0	347.8
1994	-	2,898.0	173.9
1995	-	2,898.0	-
Total Amount	25,944.0	25,944.0	3,693.0

Using the above borrowing/repayment schedule, the income and outlay statement and the capital finance statement were estimated. The characteristics of this recommendable case are enumerated as follows:

- The operating losses occur for a period of 3 years

from 1989; net profits would appear after that to be accumulated up to B$10,288,900 in 1995.

- The interest-free funds from the Government would be required for 3 years from 1990 (total amount: B$4,680,100), which could be repaid completely within 1995.

- The internal reserve in 1995 would reach B$3,983,700. From the next year, actual reserve for depreciation could be allowed. The depreciation fund would be enough for the year 1998 when the first repurchase of buses take place.

- All the repayment would be finished by 1995; payment of interest might not be a heavy burden of the management, compared to the basic case.

Income and Outlay Statement (Recommendable Case)

Unit: B10^3

Particular	1986	1987	1988	1989	1990
I. Revenue					
Revenue from Bus Operation	3,561.0	4,594.6	5,628.3	6,661.7	7,694.8
II. Expenditure					
1. Operating Expenses	3,410.8	3,955.1	4,593.3	5,239.5	5,824.9
2. Depreciation Allowance	-	-	496.8	1,766.4	1,983.0
3. Payment of Interest	-	-	298.1	985.3	720.4
Sub-total	3,410.8	3,955.1	5,388.2	7,991.2	8,528.3
III. Balance					
1. Income before Depreciation/ Interest	150.2	639.5	1,035.0	1,422.3	1,869.9
2. Net Profit	150.2	639.5	240.1	-1,329.4	-833.5
3. Profit to be Accumulated	150.2	789.7	1,029.8	-299.6	-1,133.1

Particular	1991	1992	1993	1994	1995
I. Revenue					
Revenue from Bus Operation	9,360.0	11,025.2	12,690.3	14,355.4	16,023.3
II. Expenditure					
1. Operating Expenses	6,405.5	6,873.4	7,418.7	7,889.0	8,363.8
2. Depreciation Allowance	2,479.8	2,479.8	2,811.0	2,811.0	2,811.0
3. Payment of Interest	753.5	414.0	347.8	173.9	-
Sub-total	9,638.8	9,767.2	10,577.5	10,873.9	11,174.8
III. Balance					
1. Income before Depreciation/ Interest	2,954.5	4,151.8	5,271.6	6,466.4	7,659.5
2. Net Profit	-278.8	1,258.0	2,112.8	3,481.5	4,848.5
3. Profit to be Accumulated	-1,411.9	-153.9	1,958.9	5,440.4	10,288.9

Capital Finance Statement (Recommendable Case) Unit: B$10^3

Particular	1986	1987	1988	1989	1990
I. Source of Funds					
1. Balance Brought Forward	-	2,150.2	2,789.7	3,526.6	2,721.6
2. Equity	2,000.0	-	-	-	-
3. Public Loan	-	-	4,968.0	12,696.0	-
4. Interest-free Funds from Government	-	-	-	-	544.9
5. Depreciation Reserve	-	-	496.8	1,766.4	1,983.0
6. Annual Profit	150.2	639.5	240.1	-1,329.4	-833.5
Sub-total	2,150.2	2,789.7	8,494.6	16,659.6	4,416.0
II. Application					
1. Investment	-	-	4,968.0	12,696.0	-
2. Loan Repayment	-	-	-	1,242.0	4,416.0
3. Repayment of Govt. Funds	-	-	-	-	-
Sub-total	-	-	4,968.0	13,938.0	4,416.0
III. Balance					
Internal Reserve	2,150.2	2,789.7	3,526.6	2,721.6	-

Particular	1991	1992	1993	1994	1995
I. Source of Funds					
1. Balance Brought Forward	-	-	-	-	-
2. Equity	-	-	-	-	-
3. Public Loan	4,968.0	-	3,312.0	-	-
4. Interest-free Funds from Government	2,215.0	1,920.2	-	-	-
5. Depreciation Reserve	2,479.8	2,479.8	2,811.0	2,811.0	2,811.0
6. Annual Profit	-278.8	1,258.0	2,112.8	3,481.5	4,848.5
Sub-total	9,384.0	5,658.0	8,235.8	6,292.5	7,659.5
II. Application					
1. Investment	4,968.0	-	3,312.0	-	-
2. Loan Repayment	4,416.0	5,658.0	4,416.0	2,898.0	2,898.0
3. Repayment of Govt. Funds	-	-	507.8	3,394.5	777.8
Sub-total	9,384.0	5,658.0	8,235.8	6,292.5	3,675.8
III. Balance					
Internal Reserve	-	-	-	-	3,983.7

h) Recommendation on the Government financial actions

It is recommended to take the following actions towards the public bus transport system, from the financial viewpoints:

- Road taxes and income taxes would be exempted in the public interest.
- Public soft loans would be provided for the bus procurement (total amount: B$26.0 x 10^6, approximately).
- 4 bus operation offices and a workshop would be constructed by 1990 with the Government funds and given away gratis to the operating body. (total construction cost including engineering expenses: B$9.4 x 10^6, approximately).
- Interest-free lending of around B$4.6 x 10^6 would be released from the Government, for 3 years after 1990, with the condition of immediate repayment in case of favourable financial situations.
- At a starting of the operating body in 1986, the Government would furnish the major portion of capital appropriation of B$2.0 x 10^6, as an equity participation.
- The 10% increase of bus-fares against the current level would be approved and brought to effect in 1986.
- The basic infrastructure for bus operation would be provided by the Government, based on the implementation schedule to be delineated later. (bus terminals/bus-stops: B$10.0 x 10^6 by 1990, and road system B$109.3 x 10^6 between 1988 and 1992, including design/engineering costs).

Besides, every effort including promotion activities would have to be made for the attainment of the target set forth in the Master Plan. The smooth shift of passengers from the car to buses is the key factor at the helm.

(2) Recommendation on the financial assistance towards taxi service business

The Master Plan would provide the taxi stations

adjoining to the respective bus terminals, the costs of which were counted internally. To enhance the availability of taxis, telephone and radio equipments are to be installed in each taxi stations. The costs relative to these equipments would be the major objectives of the Government financial assistance. Contrary to the public bus transport, an intensive improvement or reorganization of taxi service business is not advisable. The present situation in Brunei has been far from the matured to the full development of such kind of public transport services. The Government would have to provide prerequisites to establish the firm bases of the taxi business.

In view of these considerations, small-scale financial assistance measures were envisaged for taxi service business. The telephone equipment and radio equipments inside the taxi stations would have to be installed with the Government funds, by the year 1990. To the individual taxi vehicle, a radio receiver/transmitter is to be equipped. The unit price of the equipments for the radio station is B$30 x 10^3, to be installed at 6 taxi stations for the local services. About one hundred taxis would be equipped with the radio receiver/transmitter; the unit price is B$2 x 10^3. In this consequence, total amount of approximately B$0.4 x 10^6 is to be required by 1990 for the provision of radio services. As the existing taxi companies are almost all with sole proprietor and their profitability is low, it would be difficult to purchase the equipments individually. For this reason, it is desirable that the Government accommodate the necessary funds to taxi business with soft conditions as in the loans to the public bus transport.

The labour costs would also be required by the provision of telephone/radio equipments in the taxi station. The personnel to be manned in the station was assumed to be a cheif, a telephone operator and a radio operator; to which the annual amount of wage would be B$10,000,

B$5,700 and B$7,000, respectively. Annual amount of more than B$0.1 x 10^6 is thus to be required from 1990. It is desirable that these salaries be paid by the Government only for the first 3 years' period. After this transitional period, the newly formed local association or the like would have to be responsible for the telephone/radio services. These Government subsidies towards the labour costs sum to B$0.3 x 10^6 for the years 1990, 1991 and 1992.

No other form of financial aid would be extended to taxi service business, since the emphasis be placed on the facilitation of available utilization of taxi services.

9-3-2 Situation in the National Finance Context

(1) Proportion of the proposed financial assistance towards the public transport to the Government expenditures

The required amounts in the financial assistance towards the public transport system, bus and taxi, are roughly estimated as follows:

Unit: B10^6 at constant prices of 1984

Year	Bus Procurement	Bus-related Facilities		Bus Operating Body		Taxi Business		Total
		Terminals/ Bus-stops	Operation Office/ Workshop	Equity	Interest-free Lending	Radio Equipments	Labour Cost	
1986	-	0.5*	0.5*	2.0	-	-	-	3.0
1987	-	0.5*	0.5*	-	-	-	-	1.0
1988	5.0	3.0*	2.8*	-	-	-	-	10.8
1989	12.7	3.0*	2.8*	-	-	0.2	-	18.7
1990	-	3.0*	2.8*	-	0.5	0.2	0.1	6.6
1991	5.0	-	-	-	2.2	-	0.1	7.3
1992	-	-	-	-	1.9	-	0.1	2.0
1993	3.3	-	-	-	-	-	-	3.3
1994	-	-	-	-	-	-	-	-
1995	-	-	-	-	-	-	-	-
Total	26.0	10.0*	9.4*	2.0	4.6	0.4	0.3	
(Funding)	(Loan)	(Public Works)*		(Capital)	(Lending)	(Loan)	(Subsidy)	52.7

Remarks: Only the items with * are included in the development fund accounts. Others are accounted as the ordinary expenditures. Loans and lending would be finally repaid.

The classification into the development fund requirement and that in the ordinary expenditures for the Master Plan was carried out which is:

Unit: B10^6 at constant 1984 prices

Fund Classification	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
Ordinary Expenditure	2.0	-	5.0	12.9	0.8	7.3	2.0	3.3	-	-
Development Expenditure	1.0	1.0	5.8	5.8	5.8	-	-	-	-	-

The actual disbursement of the Government expenditures, 1972 - 1981 are applied from the "Brunei Statistical Yearbook, 1981/1982":

Unit: $B\$10^6$ at current prices

Fund Classification	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981
Ordinary Expenditure	156.4	172.4	226.8	370.9	448.2	520.4	623.7	948.0	920.4	1,126.2
Development Expenditure	51.0	45.6	46.9	88.1	115.7	86.8	83.8	100.0	175.8	200.1

In the comparison between these figures, the required annual and total funds for the Master Plan would be well endurable in the national budget, even with the account to the price increase. From the viewpoints of financing, the recommendation on the public transport system would be easily implemented by the Government.

(2) Proportion of the required amount of capital investment for the Master Plan to 5-year development funds

The actual disbursement in the previous NDPs, 3rd and 4th, are summarized as shown below.

Unit: B10^6 at current prices

Investment Sector	3rd NDP (1975-1979)	4th NDP (1980-1984)
1. Agriculture	28.4	28.4
2. Forestly	0.4	1.1
3. Fisheries	1.5	2.2
4. Industrial Estates	0.8	1.1
5. Commerce	4.4	4.8
Sub-total (Industry/Commerce)	35.4	37.6
6. Roads	59.8	186.2
7. Civil Aviution	30.8	86.9
8. Marine and Ports	13.5	50.9
9. Telecommunications	74.8	84.7
10. Postal Services	0.4	2.1
Sub-total (Transport/Communication)	179.4	410.9
11. Education	66.5	99.4
12. Medical/Health	24.1	152.6
13. Governmant Housing	40.8	161.4
14. Towa/Country Planning	0.5	62.0
15. Religious Affairs	13.0	19.8
16. Radio/TV	50.3	4.7
Sub-total (Social Services)	105.2	499.9
17. Electricity	41.2	97.9
18. Samitation	8.3	20.0
19. Water Supplies	55.4	77.7
20. Public Facilities	3.2	50.7
Sub-total (Public Utilities)	108.2	246.3
21. Public Buildings	15.4	311.8
22. Royal Brunei Armed Forces	220.4	268.6
23. Police	0.4	31.7
Sub-total (Security)	220.8	300.3
24. Survey/Investigations	-	1.2
25. Contingency Reserve	-	-
Total	754.3	1,807.9

Source: Figures provided from the EPU

For the Master Plan, required amount of capital investment were divided and allocated to 2 NDP periods of 1985 to 1989 and 1990 to 1994.

Unit: $B\$10^6$ at constant 1984 prices

Item	5th NDP (1985-1989)	6TH NDP (1990-1904)	Total Value	(Clasification) of Sector)
Bus-related Facilities				
(1) Bus Terminal/ Bus-stop	7.0	3.0	10.0	(Public Facilities)
(2) Operation Offices/ Workshop	6.6	2.8	3.4	(Public Facilities)
Roads	57.6	51.7	109.3	(Roads)
Total Required Amount	71.2	57.5	128.7	(Development Fund)

In the above table, road maintenance costs were excluded assuming it covered by the ordinary expenditures of the Consolidated Fund which is prepared for both operating and development accounts of the Government. Operation costs of bus-related facilities were also excluded since they would be paid by the operating body of the public bus transport. Furthermore, the bus procurement costs would not be involved in the Development Fund Account, financed by the public soft loans which are disbursed from the Ordinary Fund.

If the development funds for 5th NDP be 1.5 times of those in 4th NDP, and the percentage distribution of respective sectoral values be preserved, the funds for Roads and Public Facilities for the 5 years' duration would be.

Item	Assumed Amount for 5th NDP (B$10)	Proportion in 4th NDP
Roads	279.3	45.3% of Transport/Communication
Transport/ Communication	616.4	22.7% of Total Development Fund
Public Facilities	76.1	20.5% of Public Utilities.
Public Utilities	369.5	13.6% of Total Development Fund
Total Development Fund	2,711.9	

Assuming the price increase due to the inflation be nil, proportion of fund requirement in the 5th NDP was calculated to be 20.6% for Roads and 17.0% for Public Facilities. It was concluded that the percentage distribution less than 25.0% of the Sectoral Value would be reasonable. The required amount for both Sectoral Values in 6th NDP would be decreased compared to those in 5th NDP. On the other hand, the total amount of the actual disbursement of Development Fund is foreseeable to increase according to the past trend. Consequently, no problematic feature in the development fund account was observed for the future.

As a result, implementation of the Master Plan would be ensured in the development fund context.

9-4 Implementation Program

A feasibility study as well as detailed designing and bidding activities are scheduled to take 2 years prior to the start of construction or improvement work for roads, their related facilities, bus terminals, works, etc.

Construction of roads will require a great investment. The road construction project as a whole is scheduled to take 5 years, with specific construction or improvement work being implemented in stages along with increases in traffic volume, to maximize the economic benefits of the project. Existing buses are scheduled to be fully utilized.

The bus transportation systems were planned so that the local environment in each region and the needs of the general public are fully reflected from various aspects such as the type of operation (public or private) and financial assistance.

With respect to the operational system, it was planned to construct all bus terminals, bus stops, offices, works, and to investigate the operation system within 4 years.

The cost of the whole project was estimated in August 1984 prices. It was assumed that the proportions of foreign currency and taxes in the total cost need not be mentioned at this stage and they were not considered in this study.

It is recommended that some of the proposed construction work for bus terminals, bus stops, offices, works and roads be implemented in the government's next 5-year program.

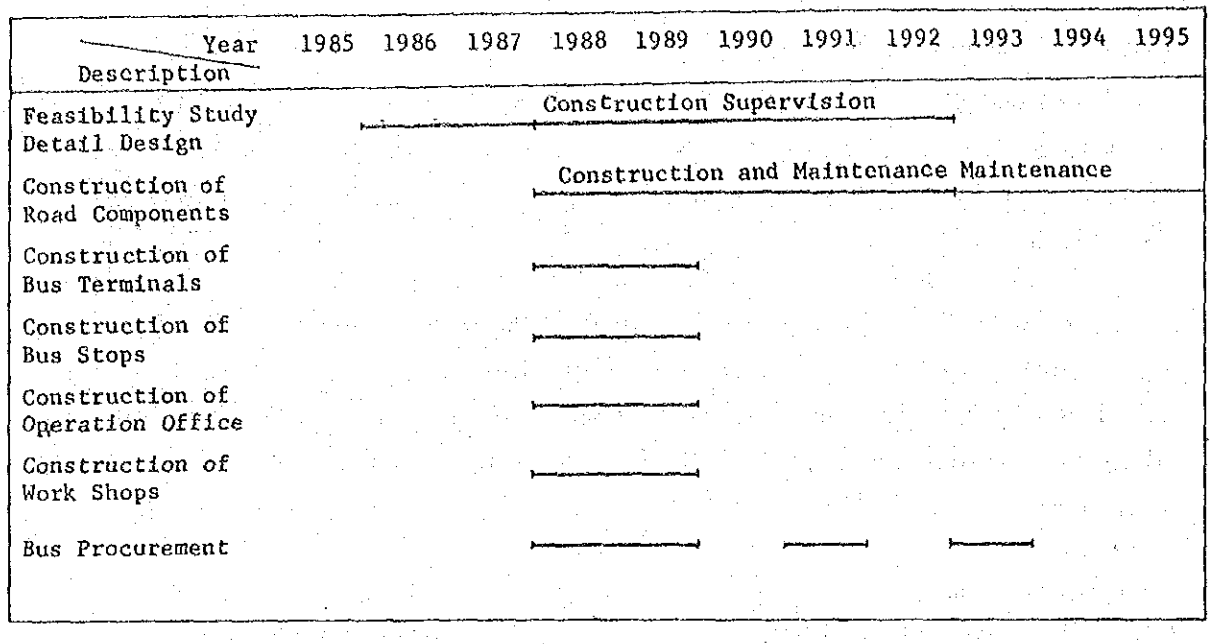


Fig. 9-8 Recommended Implementation Schedule for the Project

Table 9-4 Disbursement Schedule of the Project Cost under Alternative 3

(B/ in million, 1984 prices)

Item	Total Cost	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
Feasibility Study Detail Design	7.7	2.0	2.1	0.9	0.9	0.6	0.6	0.6	-	-	-
Construction of Road Components	104.9	-	-	26.8	27.0	16.6	16.8	16.8	0.3	0.3	0.3
Construction of Bus Terminals	1.8	-	-	0.9	0.9	-					
Construction of Bus Stops	7.4	-	-	3.7	3.7	-					
Construction of Operation Office	6.7	-	-	3.3	3.4	-					
Construction of Work Shops	1.7	-	-	0.8	0.9	-					
Bus Procurement	21.6	-	-	4.1	10.6	-	4.1	-	2.8	-	
Total	151.8	2.0	2.1	40.5	47.4	17.2	21.5	17.4	3.1	0.3	0.3

9-5 Institutional Framework

9-5-1 Implementing body of the Master Plan

To the contents of the Master Plan, various government departments or the agencies are related, under the present distribution of functions. It could be summarized as follows:

- To public bus transport is licenced by the LTD; the permits of school-buses are also issued by the LTD.
- The school-bus operation has been planned by the Educational transport Department and actual operation under contract with private bus operators.
- Bus-related facilities, such as bus terminals and bus-stops, are provided by the PWD upon its own planning.
- Taxi service business is supervised by the LTD.
- Road system provision and improvement/maintenance are the responsibility of the PWD from planning to construction work.
- Parking facilities are managed by the Municipalities as in and around B.S.B.
- Traffic control devices are under the complicated jurisdiction of the Municipalities, Poilce Dept., Electrical Dept., and the PWD.

In view of the present jurisdiction with Inter-Ministry issues, it is advisable that the responsible body of the Master Plan be the Ministry of Communication as a co-ordinator among the above-mentioned agencies. The LTD is an internal department to the Ministry and would be the directly implementing unit.

The initiative to improve the public transport, either bus or taxi, would be taken by the LTD. On the othe hand, the road improvement and provision of the new road system would be under the responsibility of the PWD same as at present; however, these will have to be undertaken in close consultation with the LTD which examine the road proposals from the viewpoint of the public transport system. The development funds for roads should be allocated mainly to the PWD, while it is necessary to distribute minor portion of these to the LTD, for the public interest. Bus-related facilities are to be

constructed by the PWD with the majority of LTD funds, based on the planning considering public transport system as a whole.

For the facilitation of the public transport system, the LTD would have to cover the wide functions, in addition to the present. These include the following specific roles.

- Adjustment of the bus-routes with the development tendency in the major populated areas. (with the individual development plans/schemes under the other agencies such as TCPD, HDD and PWD).
- Provision of traffic control device bus-route planning (coordination with the HDD/TCPD and Municipalities).
- Supervision/inspection of the operation of the public transport, especially bus and taxi.
- Revision of road traffic regulations to meet the improvement in the public transport system.
- Financial agrrangement through the liaison with the Treasury, EPU or the EDB, with a view to obtaining loans, subsidies and the lending without interest.
- Management participation in the public transport services.

In line with the reommendations mentioned above, the organization and functions of the LTD would have to be expanded. It will a central/responsible agency for any kind of public transport.

9-5-2 Organizations for the public transport system

Institutional requirements in the operation of the public transport would result in the following recommendation:

(1) Establishment of new joint-corporation for bus operation

The large-scale reorganization of the existing bus-operators would be necessary for effective operation of the public bus transport. It is advisable to establish a new organization covering the nationwide bus-route network. It should be orgazined as an independent joint-undertaking between the Government and private sector. The reasons are:

- It must be in public interest, in view of the services to be rendered.

- The tax exemption would have to be granted.

- With only the manning of the government officers, the labour cost would be raised up extremely, leading to the management in straits.

- The existing privately-owned buses should be utilized at the initial stage of operation.

- The expertise and experience both in Government and in the private sector would have to be employed.

- The private sector, especially bus operators, will not be able to offer capital appropriations so much.

- Every kind of financial assistance would be provided from the Government; in this consequence, the Government would have to participate from the beginning.

The envisaged participants in the new corporation and their respective roles are as follows:

Government department/agency

LTD (promotion, coordination, guidance, financial arrangement, etc.)

Educational Transport Dept.
(planning of bus operation schedule, participation in management, etc.)

EDB (management, operation control, equity participation, etc.)

Private sector enterprise

Existing bus-operator
(tender of the bus holding, provision of necessary manpower, management, share-holding, etc.)

Other enterprises such as banks and truck operator
(management, provision of expertise, share-holding, etc.)

The existing bus-operators would gradually be integrated into this new corporation. The target year of the integration will be 1990.

(2) Reorganization of taxi service business

With regard to taxi operation, the local association and the like would have to be organized for the efficiency in the proposed telephone/radio services at the taxi station. In taxi service business, the integration of the existing companies would not always be aimed at.

9-6 Other Recommendations

For the future, feasibility studies and detailed design activities must be started at the earliest possible date based on the results of this study. The following approach is recommended for such studies and activities.

(1) Study of other improvement measures for the realization of the Master Plan

Preparation of the Master Plan is made without exchanging the existing transport policy where no restrictive policy is established by the government to use and own a car at present.

In order to study the improvement of a Public Transport System and a Road Traffic System, many steps and measures are examined in the Master Plan Study.

The study of the other measures for to secure against practical results of the above measures will be necessary for the realization of the Master Plan in future. Therefore, adding to a detailed study of the measures studied in the Master Plan, Pricing Strategies and Promotion as shown in table 9-5 will be studied at the next stage of a Feasibility Study of this project.

In the first step for taking the effective measures selected at the stage of the Feasibility Study, priority be given to the improvement of existing low level Public Transport System and the improvement of roads required for that. As the result of this implementation, Public

Transport System will be established to provide good services to the public bus passengers assumed to be 18.6% of future person trips.

In the second step, effective measures on Pricing Strategies and Promotion will be taken by the government due to the necessity of making amendment to the present transport policy. If the first step measures have a low effect on the proposed level, the second step measures will be required as a suporting measure for realization of the Master Plan.

Table 9-5 Public Transport System Improvement Measures

Traffic problem	improvement direction	Measures	Investigation stage M/P	Investigation stage F/S,D/D
Improvement of Public transport system	To fit the Bus network on the pattern of Trip desire	1. To newly open bus routes to almost all development scheduled areas.	o	o
		2. To newly open bus routes to the areas having no bus routes at the present time, as long as roads which permit passage of buses are vailable.	o	o
		3. To newly open a circular bus routes around B.S.B.	o	o
		4. To introduce high speed bus routes which make connection among major cities by making use of expressway for long distance trips.	o	o
		5. To provide bus terminals improved convenience and comfort for passengers	o	o
		6. To convert School bus to Public bus for the effective bus operation	o	o
	To shorten bus travel time	7. To increase of bus operating frequency.	o	o
		8. To shorten Waiting time by improvement of transfer system.	o	o
		9. To introduce bus exclusive lanes.	-	o
		10. To introduce bus priority signals.	-	o
	To improve bus comfortability	11. Introduction of air-conditioned and one-man buses.	o	o
		12. Provision of improved bus-stops	o	o
	Other improvement	13. Extention of bus operating hours.	o	o
		14. Information system of bus operation.	-	o
		15. Introduction of area-wide uniform fare system.	-	o
		16. Introduction of discount fare.	o	o
		17. Improvement of bus operation offices and work shops.	o	o
		18. Establishment of new bus operating body.	o	o
		19. Subsidy for bus operation.	o	o
		20. To finance public soft loans.	o	o
		21. Improvement of taxi.	o	o
Improvement of road traffic system	Increasing of traffic capacity. Elimination of through traffic.	1. Widening and newly provision of major radial roads.	o	o
		2. Widening of inter-city highway.	o	o
		3. Provision of ring road.	o	o
	Traffic smoothing	4. Prohibitation of street parking in town center.	o	o
		5. Introduction of linked signal system.	o	o
		6. Provision of additional grade separated intersection.	o	o
Pricing strategies and others	Shiffting purblic transport by disincentives for automobile travel.	1. Automobile price disincentives.	-	o
		2. Intensification of loan conditions for automobile purchasing.	-	o
		3. Repeal automobile commuter allowance and open bus commuter allowance.	-	o
		4. Price increasing of car-parking.	-	o
		5. Road pricing in town center.	-	o
	Promotion	6. Promotion of stagger commuting hours.	-	o
		7. Promotion of automobile high-occupancy ride.	-	o
		8. Promotion of public transport.	-	o

(2) Introduction of Bus Lane

In establishing alternative plans, the introduction of a bus lane has been made to the existing 4-lane road between JLN.SG.KIANGGEH and JLN.BERAKAS, running from the BSB bus terminal to the airport.

The introduction would be justified by the following reasons:

a. Many bus routes are intensively running along the 4-lane road and a great number of buses are being put into operation.

b. An exclusive bus lane is needed to put buses under regular operation

To the contrary, the introduction of the exclusive bus lane would cause the following problems:

a. Strict parking control is needed because the outside two lanes of the 4-lane road are used as a bus lane.

b. It is necessary to re-investigate the functions of the existing access roads diverting from the proposed bus lane route.

c. Instructing and training drivers by policeman as well as revising the existing traffic regulations are essential to bringing the above traffic under full control.

The introduction of the above bus lane has not been recommended in the master plan because of difficulties in judging the advantages and disadvantages caused by its introduction.

However, as the introduction cannot be said to have very little effect on increase in bus passengers, it would be deemed necessary to make a technical study on the problems attached to its introduction at the stage of the subsequent feasibility sutdy and to establish an appropriate policy for its introduction by the Government of Brunei Darussalam.

(3) Necessity of Traffic Survey

At present, no traffic survey is conducted periodically, Traffic data collected on time series are useful not only for planning of various traffic facilities but also for monitoring the effects of the implementation of the Master Plan.

It is, therefore, desirable to conduct a periodical traffic survey by practical use of the traffic survey method adopted in this study.

(4) Up-to-date Topographical Maps

The most detailed topographical maps available for this study were on a scale of 1/12,500 for local areas and 1/50,000 for the whole country. As a result, only an approximate figure could be obtained in estimating construction cost. Site selection for bus terminals, bus stops, offices and works could also only be approximate. Therefore, it is recommended that, for future feasibility and other studies, topographical maps on a 1/2,500 scale be prepared through serial and other surveys, at least for urban areas.

(5) Consultations with related Organizations

Transportation improvement programs are related not only to the transportation authorities but also with other administration activities in general such as construction, economic management and education. Therefore, consultations are necessary with all related organizations in preparing specific programs in the future.

It is recommended that many of the present facilities would be improved during the 5-year plan scheduled to start in 1985. In light of this, sufficient consultations with all related organizations must be held at an earlier time to establish a well-coordinated organizational foundation for implementation of the master plan.

APPENDICES

Appendix I ORIGIN-DESTINATION TABLE IN THE YEAR 1984 - GOODS VEHICLE (1)

UNIT: VEHICLE TRIP

ZONE	11	12	13	14	15	16	17	*10	21	22	23	24	25	26	***BRUNE
11	0.	0.	19.	69.	304.	0.	0.	412.	103.	153.	0.	153.	251.	251.	2159.
12	0.	0.	0.	0.	325.	0.	0.	325.	43.	21.	0.	77.	52.	52.	787.
13	63.	0.	0.	0.	28.	0.	0.	91.	0.	8.	0.	8.	104.	104.	329.
14	92.	62.	0.	0.	39.	40.	0.	233.	0.	40.	0.	27.	112.	112.	605.
15	1121.	236.	0.	49.	0.	0.	0.	1405.	166.	442.	0.	323.	34.	34.	2375.
16	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	14.	0.	0.	57.
17	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	16.
*10	1276.	297.	19.	137.	696.	40.	0.	2466.	312.	663.	0.	600.	553.	553.	6827.
21	289.	0.	0.	0.	156.	52.	52.	549.	0.	96.	36.	0.	72.	72.	1035.
22	15.	0.	0.	15.	448.	16.	116.	611.	0.	0.	99.	30.	904.	49.	2000.
23	55.	0.	0.	0.	28.	0.	0.	83.	0.	70.	0.	10.	49.	49.	451.
24	200.	0.	96.	0.	349.	0.	0.	645.	5.	36.	42.	0.	18.	18.	1148.
25	674.	0.	0.	129.	41.	0.	0.	844.	47.	904.	27.	21.	0.	213.	2281.
26	674.	0.	0.	129.	41.	0.	0.	844.	47.	55.	27.	21.	0.	0.	1219.
27	604.	127.	0.	26.	0.	0.	0.	757.	90.	238.	0.	174.	19.	19.	1548.
28	88.	0.	0.	23.	212.	0.	0.	323.	5.	20.	0.	48.	105.	105.	845.
29	0.	0.	0.	0.	0.	0.	0.	0.	0.	88.	0.	0.	0.	0.	155.
30	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
31	836.	74.	44.	0.	104.	0.	0.	1058.	77.	73.	71.	91.	121.	121.	1974.
*2-3	3435.	201.	140.	323.	1378.	68.	169.	5714.	269.	1579.	303.	396.	1287.	646.	12657.
**1-3	4711.	498.	160.	460.	2074.	108.	169.	8180.	581.	2242.	303.	996.	1840.	1199.	19484.
41	54.	0.	0.	0.	0.	0.	0.	54.	0.	0.	0.	0.	12.	12.	2208.
42	36.	0.	0.	0.	0.	0.	0.	36.	0.	49.	26.	0.	6.	6.	2310.
43	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	129.
*40	90.	0.	0.	0.	0.	0.	0.	90.	0.	49.	26.	0.	18.	18.	4647.
51	217.	0.	0.	0.	61.	0.	0.	279.	43.	0.	0.	32.	9.	9.	615.
52	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	5.
*50	217.	0.	0.	0.	61.	0.	0.	279.	43.	0.	0.	32.	9.	9.	620.
***BRUNE	5019.	498.	160.	460.	2136.	108.	169.	8549.	624.	2291.	329.	1028.	1867.	1226.	24751.

Appendix I ORIGIN-DESTINATION TABLE IN THE YEAR 1984 - GOODS VEHICLE (2)

UNIT: VEHICLE TRIP

ZONE	11	12	13	14	15	16	17	*10	21	22	23	24	25	26
11	0.	0.	0.	14.	40.	0.	0.	54.	147.	31.	108.	132.	12.	74.
12	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	5.	0.	0.	0.
13	5.	0.	0.	0.	0.	0.	0.	5.	9.	0.	12.	0.	0.	0.
14	24.	0.	0.	0.	0.	2.	0.	27.	0.	0.	0.	0.	0.	0.
15	0.	0.	0.	6.	0.	0.	2.	8.	22.	6.	21.	0.	2.	0.
16	0.	0.	0.	0.	0.	0.	0.	0.	0.	8.	0.	0.	2.	5.
17	3.	0.	0.	0.	0.	0.	0.	3.	22.	15.	0.	30.	6.	18.
*10	32.	0.	0.	19.	40.	2.	2.	96.	200.	60.	146.	163.	22.	96.
21	106.	2.	5.	0.	22.	6.	6.	147.	0.	0.	6.	15.	5.	0.
22	61.	0.	0.	0.	0.	7.	219.	288.	5.	0.	11.	0.	0.	0.
23	65.	0.	0.	0.	8.	12.	0.	85.	5.	4.	0.	8.	4.	0.
24	145.	0.	0.	0.	9.	17.	7.	178.	15.	8.	0.	0.	0.	18.
25	12.	0.	0.	0.	2.	12.	7.	33.	8.	0.	12.	0.	0.	0.
26	35.	0.	0.	0.	0.	0.	0.	35.	0.	0.	4.	0.	0.	0.
27	0.	0.	0.	0.	0.	0.	5.	5.	0.	0.	0.	0.	0.	0.
28	89.	0.	123.	0.	0.	6.	0.	217.	0.	0.	4.	0.	0.	0.
29	52.	0.	0.	0.	0.	0.	0.	52.	0.	0.	0.	0.	0.	0.
30	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
31	170.	0.	2.	0.	9.	12.	48.	241.	4.	47.	0.	19.	26.	4.
*2-3	734.	2.	130.	0.	50.	72.	293.	1281.	38.	59.	37.	42.	36.	23.
**1-3	767.	2.	130.	19.	90.	74.	295.	1377.	238.	119.	182.	205.	58.	119.
41	23.	4.	0.	0.	0.	28.	5.	61.	9.	12.	0.	0.	0.	11.
42	32.	0.	0.	0.	33.	15.	4.	85.	4.	7.	12.	0.	7.	13.
43	56.	0.	0.	0.	13.	10.	12.	91.	5.	0.	0.	0.	0.	0.
*40	111.	4.	0.	0.	46.	54.	21.	236.	18.	19.	12.	0.	7.	25.
51	86.	0.	0.	7.	13.	5.	21.	132.	5.	0.	11.	6.	7.	13.
52	14.	0.	0.	0.	7.	0.	0.	20.	0.	0.	0.	0.	0.	0.
*50	100.	0.	0.	7.	20.	5.	21.	152.	5.	0.	11.	6.	7.	13.
***BRUNE	978.	6.	130.	26.	157.	133.	337.	1766.	261.	138.	205.	211.	72.	156.

Appendix I ORIGIN-DESTINATION TABLE IN THE YEAR 1984 - PASSENGER CARS

UNIT: PERSON TRIP

ZONE	11	12	13	14	15	16	17	*10	21	22	23	24	25	26
11	0.	79.	457.	1524.	7531.	92.	54.	9737.	2549.	3305.	769.	2267.	3024.	3024.
12	101.	0.	22.	0.	349.	0.	0.	472.	282.	170.	0.	61.	398.	398.
13	594.	85.	0.	253.	540.	84.	38.	1595.	226.	357.	52.	205.	434.	434.
14	1855.	58.	279.	0.	271.	85.	0.	2549.	181.	134.	81.	310.	313.	313.
15	6713.	835.	807.	700.	0.	625.	189.	9870.	771.	783.	83.	783.	776.	776.
16	8.	77.	39.	152.	562.	0.	30.	868.	267.	284.	25.	102.	171.	171.
17	50.	21.	0.	0.	424.	0.	0.	495.	39.	215.	34.	119.	224.	224.
*10	9322.	1155.	1605.	2635.	9676.	886.	311.	25591.	4314.	5247.	1044.	3847.	5340.	5340.
21	3603.	123.	282.	205.	359.	267.	30.	4871.	0.	636.	29.	150.	447.	447.
22	5649.	244.	723.	850.	1448.	343.	322.	9579.	812.	0.	427.	2462.	7387.	172.
23	1978.	46.	137.	38.	520.	67.	59.	2845.	108.	875.	0.	484.	312.	312.
24	5255.	178.	283.	113.	1545.	125.	72.	7572.	465.	1162.	319.	0.	242.	242.
25	4614.	567.	527.	871.	614.	166.	98.	7458.	513.	7387.	194.	496.	0.	138.
26	4614.	567.	527.	871.	614.	166.	98.	7458.	513.	130.	194.	496.	77.	0.
27	3615.	449.	435.	380.	25.	237.	102.	5342.	415.	421.	45.	422.	418.	418.
28	801.	58.	8.	6.	205.	0.	50.	1127.	104.	96.	19.	322.	163.	163.
29	104.	69.	0.	22.	54.	0.	0.	249.	0.	0.	0.	17.	34.	34.
30	111.	0.	0.	69.	50.	0.	0.	230.	0.	22.	0.	31.	22.	22.
31	3457.	213.	321.	73.	326.	258.	64.	4712.	427.	595.	372.	556.	306.	306.
*2-3	33802.	2514.	3242.	3499.	5760.	1730.	895.	51442.	3357.	11326.	1598.	5435.	9409.	2255.
**1-3	43124.	3669.	4847.	6134.	15436.	2616.	1207.	77033.	7671.	16573.	2641.	9281.	14749.	7596.
41	263.	0.	4.	0.	22.	0.	0.	289.	88.	33.	58.	14.	71.	71.
42	241.	0.	5.	29.	3.	0.	5.	284.	58.	10.	10.	23.	31.	31.
43	59.	0.	0.	21.	10.	0.	0.	90.	0.	0.	0.	4.	3.	3.
*40	562.	0.	10.	50.	35.	0.	5.	663.	145.	43.	68.	42.	105.	105.
51	572.	0.	0.	21.	159.	29.	0.	781.	119.	181.	43.	188.	58.	58.
52	196.	0.	0.	21.	41.	0.	0.	259.	8.	22.	22.	42.	34.	34.
*50	768.	0.	0.	42.	200.	29.	0.	1040.	126.	204.	65.	230.	91.	91.
***BRUNE	44454.	3669.	4857.	6226.	15672.	2645.	1212.	78736.	7943.	16819.	2774.	9553.	14945.	7792.

Appendix I ORIGIN-DESTINATION TABLE IN THE YEAR 1984 - PASSENGER CARS

UNIT: PERSON TRIP

ZONE	27	28	29	30	31	*2-3	**1-3	41	42	43	*40	51	52	*50	***BRUNE
11	4055.	996.	328.	250.	1806.	22374.	32112.	388.	268.	62.	718.	1001.	289.	1290.	34119.
12	188.	15.	0.	0.	148.	1659.	2131.	0.	0.	0.	0.	77.	0.	77.	2208.
13	291.	15.	0.	0.	230.	2241.	3835.	0.	0.	0.	0.	4.	15.	18.	3852.
14	146.	104.	0.	45.	87.	1714.	4263.	0.	58.	0.	58.	38.	12.	50.	4371.
15	195.	288.	63.	0.	556.	5074.	14950.	14.	14.	11.	39.	46.	16.	62.	15050.
16	303.	9.	0.	0.	140.	1471.	2339.	5.	0.	84.	89.	84.	0.	84.	2513.
17	228.	25.	0.	0.	113.	1221.	1717.	5.	0.	0.	5.	188.	0.	188.	1909.
*10	5405.	1451.	391.	296.	3080.	35755.	61346.	411.	341.	157.	909.	1436.	333.	1769.	64024.
21	194.	79.	11.	0.	574.	2569.	7440.	31.	82.	0.	113.	90.	0.	90.	7643.
22	780.	343.	86.	0.	812.	13280.	22859.	31.	31.	0.	62.	151.	22.	173.	23094.
23	280.	31.	0.	0.	346.	2747.	5592.	0.	245.	0.	245.	119.	0.	119.	5956.
24	832.	403.	26.	0.	570.	4261.	11835.	20.	30.	0.	50.	263.	100.	363.	12246.
25	331.	188.	0.	0.	363.	9609.	17066.	19.	12.	4.	34.	277.	68.	345.	17445.
26	331.	188.	0.	0.	363.	2291.	9748.	19.	12.	4.	34.	277.	68.	345.	10127.
27	0.	155.	34.	0.	299.	2627.	7969.	7.	8.	6.	21.	25.	9.	33.	8024.
28	110.	0.	173.	46.	164.	1361.	2489.	14.	68.	7.	89.	122.	69.	190.	2767.
29	29.	108.	0.	0.	8.	230.	479.	0.	0.	0.	0.	15.	0.	15.	494.
30	27.	15.	0.	0.	9.	148.	377.	84.	0.	0.	84.	0.	0.	0.	462.
31	176.	65.	19.	24.	0.	2846.	7558.	48.	75.	0.	122.	145.	23.	168.	7848.
*2-3	3088.	1574.	349.	70.	3507.	41969.	93411.	271.	563.	21.	855.	1484.	357.	1841.	96106.
**1-3	8494.	3025.	740.	366.	6587.	77723.	154757.	682.	904.	178.	1764.	2920.	689.	3610.	160130.
41	12.	29.	0.	0.	87.	462.	751.	0.	7808.	202.	8010.	204.	10.	213.	8974.
42	2.	16.	29.	10.	55.	275.	559.	7351.	0.	355.	7706.	240.	0.	240.	8505.
43	5.	29.	0.	0.	23.	67.	156.	86.	245.	0.	331.	86.	0.	86.	574.
*40	19.	74.	29.	10.	165.	803.	1466.	7437.	8053.	557.	16048.	530.	10.	540.	18054.
51	86.	289.	23.	0.	63.	1108.	1889.	153.	290.	57.	500.	0.	0.	0.	2389.
52	22.	41.	0.	0.	23.	248.	506.	2.	0.	0.	2.	0.	0.	0.	509.
*50	108.	331.	23.	0.	86.	1356.	2395.	156.	290.	57.	502.	0.	0.	0.	2897.
***BRUNE	8621.	3420.	792.	375.	6838.	79882.	158618.	8275.	9247.	792.	18314.	3450.	699.	4149.	181082.

Appendix I ORIGIN-DESTINATION TABLE IN THE YEAR 1984 - PUBLIC BUS

UNIT: PERSON TRIP

ZONE	27	28	29	30	31	*2-3	**1-3	41	42	43	*40	51	52	*50
11	164.	70.	0.	0.	441.	1590.	2002.	34.	53.	21.	108.	0.	48.	48.
12	175.	0.	0.	0.	43.	462.	787.	0.	0.	0.	0.	0.	0.	0.
13	15.	0.	0.	0.	0.	238.	329.	0.	0.	0.	0.	0.	0.	0.
14	21.	0.	0.	0.	61.	372.	605.	0.	0.	0.	0.	0.	0.	0.
15	0.	131.	0.	0.	266.	1397.	2803.	0.	23.	0.	23.	48.	0.	48.
16	0.	0.	0.	0.	43.	57.	57.	0.	0.	0.	0.	0.	0.	0.
17	0.	16.	0.	0.	0.	16.	16.	0.	0.	0.	0.	0.	0.	0.
*10	375.	223.	0.	0.	654.	4133.	6598.	34.	76.	21.	132.	48.	48.	97.
21	84.	65.	0.	0.	14.	439.	989.	0.	0.	0.	0.	0.	47.	47.
22	241.	15.	0.	0.	44.	1382.	1993.	0.	7.	0.	7.	0.	0.	0.
23	15.	8.	0.	0.	49.	250.	333.	49.	69.	0.	118.	0.	0.	0.
24	188.	97.	0.	0.	83.	487.	1131.	0.	0.	0.	0.	0.	17.	17.
25	22.	89.	0.	0.	111.	1435.	2279.	0.	2.	0.	2.	0.	0.	0.
26	22.	89.	0.	0.	111.	372.	1217.	0.	2.	0.	2.	0.	0.	0.
27	0.	70.	0.	0.	143.	752.	1509.	0.	13.	0.	13.	26.	0.	26.
28	114.	0.	18.	20.	0.	434.	756.	0.	0.	0.	0.	89.	0.	89.
29	0.	68.	0.	0.	0.	155.	155.	0.	0.	0.	0.	0.	0.	0.
30	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
31	56.	119.	0.	0.	0.	729.	1786.	16.	35.	8.	60.	127.	0.	127.
*2-3	742.	619.	18.	20.	556.	6436.	12150.	65.	128.	8.	201.	242.	64.	306.
**1-3	1117.	842.	18.	20.	1410.	10569.	18748.	99.	204.	30.	333.	290.	112.	403.
41	0.	0.	0.	0.	6.	30.	84.	0.	2046.	26.	2072.	52.	0.	52.
42	0.	0.	0.	0.	26.	114.	150.	2041.	0.	81.	2122.	38.	0.	38.
43	0.	0.	0.	0.	0.	0.	0.	54.	37.	0.	90.	38.	0.	38.
*40	0.	0.	0.	0.	33.	143.	233.	2095.	2083.	106.	4284.	129.	0.	129.
51	33.	86.	13.	0.	50.	276.	555.	23.	31.	7.	61.	0.	0.	0.
52	0.	0.	0.	0.	0.	0.	0.	5.	0.	0.	5.	0.	0.	0.
*50	33.	86.	13.	0.	50.	276.	555.	27.	31.	7.	65.	0.	0.	0.
***BRUNE	1150.	928.	31.	20.	1493.	10988.	19536.	2222.	2318.	143.	4682.	420.	112.	532.

Appendix I ORIGIN-DESTINATION TABLE IN THE YEAR 1984 - PUBLIC BUS

UNIT: PERSON TRIP

ZONE	27	28	29	30	31	*2-3	**1-3	41	42	43	*40	51	52	*50	***BRUNE
11	6.	87.	29.	0.	232.	857.	910.	94.	109.	20.	223.	125.	5.	130.	1263.
12	5.	0.	0.	0.	6.	17.	17.	10.	5.	0.	16.	12.	0.	12.	45.
13	0.	40.	6.	11.	20.	99.	104.	0.	5.	0.	5.	0.	0.	0.	109.
14	0.	7.	0.	0.	0.	7.	33.	0.	0.	0.	0.	12.	0.	12.	45.
15	0.	19.	11.	0.	60.	141.	149.	0.	13.	5.	19.	21.	5.	26.	193.
16	13.	0.	0.	0.	6.	33.	33.	5.	8.	0.	14.	22.	0.	22.	69.
17	0.	0.	0.	0.	13.	105.	108.	0.	11.	28.	39.	21.	0.	21.	168.
*10	25.	152.	46.	11.	336.	1258.	1354.	109.	152.	53.	315.	213.	10.	223.	1892.
21	0.	6.	0.	0.	26.	59.	206.	5.	0.	5.	11.	0.	0.	0.	217.
22	0.	12.	0.	0.	54.	82.	370.	0.	11.	0.	11.	6.	9.	15.	396.
23	0.	0.	0.	0.	0.	21.	106.	0.	5.	5.	10.	13.	4.	16.	132.
24	4.	7.	0.	0.	8.	60.	238.	5.	19.	0.	24.	0.	0.	0.	263.
25	0.	0.	0.	0.	0.	20.	53.	5.	0.	7.	12.	0.	0.	0.	65.
26	0.	0.	0.	0.	0.	4.	38.	5.	0.	0.	5.	5.	0.	5.	49.
27	0.	0.	0.	0.	0.	0.	5.	0.	16.	0.	16.	12.	0.	12.	33.
28	5.	0.	0.	0.	0.	9.	226.	0.	19.	0.	19.	16.	0.	16.	261.
29	0.	0.	0.	0.	0.	0.	52.	0.	0.	0.	0.	0.	0.	0.	52.
30	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
31	0.	0.	0.	0.	0.	102.	342.	0.	5.	16.	22.	0.	0.	0.	364.
*2-3	10.	25.	0.	0.	88.	356.	1637.	22.	74.	34.	130.	52.	13.	65.	1831.
**1-3	34.	177.	46.	11.	424.	1614.	2991.	131.	227.	87.	445.	265.	23.	288.	3724.
41	0.	0.	0.	0.	0.	32.	92.	0.	775.	9.	784.	14.	0.	14.	890.
42	0.	0.	0.	0.	6.	49.	134.	775.	0.	29.	804.	35.	4.	40.	977.
43	0.	0.	0.	0.	0.	5.	96.	9.	12.	0.	21.	3.	0.	3.	120.
*40	0.	0.	0.	0.	6.	86.	322.	784.	787.	37.	1608.	52.	4.	57.	1987.
51	0.	0.	0.	0.	14.	55.	187.	0.	16.	0.	16.	0.	0.	0.	204.
52	7.	0.	0.	0.	0.	7.	27.	0.	0.	0.	0.	0.	0.	0.	27.
*50	7.	0.	0.	0.	14.	62.	215.	0.	16.	0.	16.	0.	0.	0.	231.
***BRUNE	41.	177.	46.	11.	443.	1762.	3528.	915.	1030.	124.	2069.	317.	27.	345.	5942.

Appendix II ORIGIN-DESTINATION TABLE OF ALTERNATIVE-3 IN THE YEAR 1995 - GOODS VEHICLE (1)

UNIT: VEHICLE TRIP

ZONE	11	12	13	14	15	16	17	*10	21	22	23	24	25	26
11	0.	0.	10.	24.	236.	0.	0.	269.	52.	37.	0.	70.	576.	365.
12	0.	0.	0.	0.	272.	0.	0.	272.	24.	5.	0.	38.	127.	81.
13	10.	0.	0.	0.	16.	0.	0.	26.	0.	1.	0.	2.	177.	110.
14	29.	29.	0.	0.	44.	28.	0.	130.	0.	13.	0.	18.	370.	234.
15	806.	242.	0.	44.	0.	0.	0.	1092.	272.	349.	0.	468.	242.	159.
16	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	9.	0.	0.
17	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
*10	844.	272.	10.	68.	568.	28.	0.	1789.	348.	406.	0.	606.	1492.	950.
21	158.	0.	0.	0.	292.	61.	82.	594.	0.	57.	43.	0.	396.	256.
22	2.	0.	0.	3.	241.	5.	53.	304.	0.	0.	34.	10.	1438.	49.
23	20.	0.	0.	0.	35.	0.	0.	55.	0.	28.	0.	7.	180.	115.
24	81.	0.	90.	0.	484.	0.	0.	654.	4.	16.	37.	0.	74.	48.
25	948.	0.	0.	227.	196.	0.	0.	1372.	150.	1396.	85.	61.	0.	1933.
26	1472.	0.	0.	354.	301.	0.	0.	2127.	232.	131.	131.	93.	0.	0.
27	624.	188.	0.	34.	0.	0.	0.	847.	210.	270.	0.	363.	188.	123.
28	28.	0.	0.	9.	240.	0.	0.	277.	4.	7.	0.	32.	351.	223.
29	0.	0.	0.	0.	0.	0.	0.	0.	0.	107.	0.	0.	0.	0.
30	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
31	572.	72.	69.	0.	242.	0.	0.	957.	120.	54.	107.	128.	826.	536.
*2-3	3906.	261.	159.	628.	2032.	66.	135.	7187.	721.	2066.	438.	694.	3454.	3282.
**1-3	4750.	533.	169.	696.	2599.	94.	135.	8975.	1068.	2472.	438.	1300.	4945.	6231.
41	23.	0.	0.	0.	0.	0.	0.	23.	0.	0.	0.	0.	48.	31.
42	14.	0.	0.	0.	0.	0.	0.	14.	0.	21.	22.	0.	25.	16.
43	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
*40	37.	0.	0.	0.	0.	0.	0.	37.	0.	21.	22.	0.	73.	48.
51	116.	0.	0.	0.	112.	0.	0.	228.	52.	0.	0.	35.	48.	31.
52	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
*50	116.	0.	0.	0.	112.	0.	0.	228.	52.	0.	0.	35.	48.	31.
***BRUNE	4904.	533.	169.	696.	2711.	94.	135.	9241.	1120.	2493.	460.	1335.	5066.	4311.

ORIGIN-DESTINATION TABLE OF ALTERNATIVE-3 IN THE YEAR 1995 - GOODS VEHICLE (2)

UNIT: VEHICLE TRIP

ZONE	27	28	29	30	31	*2-3	**1-3	41	42	43	*40	51	52	*50	***BRUNE
11	183.	31.	0.	0.	277.	1590.	1660.	25.	35.	16.	76.	0.	33.	33.	1968.
12	210.	0.	0.	0.	29.	515.	780.	0.	0.	0.	0.	0.	0.	0.	786.
13	13.	0.	0.	0.	0.	304.	330.	0.	0.	0.	0.	0.	0.	0.	330.
14	34.	0.	0.	0.	55.	725.	855.	0.	0.	0.	0.	0.	0.	0.	855.
15	0.	168.	0.	0.	522.	2190.	3282.	0.	48.	0.	48.	82.	0.	82.	3412.
16	0.	0.	0.	0.	37.	46.	46.	0.	0.	0.	0.	0.	0.	0.	46.
17	0.	12.	0.	0.	0.	12.	12.	0.	0.	0.	0.	0.	0.	0.	12.
*10	440.	210.	0.	0.	931.	5382.	7170.	25.	83.	16.	124.	82.	33.	115.	7409.
21	226.	6.	0.	0.	22.	1064.	1698.	0.	0.	0.	0.	0.	77.	77.	1735.
22	186.	4.	0.	0.	19.	1739.	2044.	0.	3.	0.	3.	0.	0.	0.	2047.
23	27.	5.	0.	0.	50.	412.	467.	57.	74.	0.	131.	0.	0.	0.	597.
24	375.	70.	0.	0.	95.	720.	1374.	0.	0.	0.	0.	0.	21.	21.	1395.
25	152.	224.	0.	0.	437.	4437.	5809.	0.	8.	0.	8.	0.	0.	0.	5817.
26	233.	347.	0.	0.	674.	1840.	3967.	0.	12.	0.	12.	0.	0.	0.	3979.
27	0.	130.	0.	0.	412.	1697.	2544.	0.	37.	0.	37.	63.	0.	63.	2644.
28	186.	0.	24.	34.	0.	861.	1138.	0.	0.	0.	0.	69.	0.	69.	1208.
29	0.	134.	0.	0.	0.	242.	242.	0.	0.	0.	0.	0.	0.	0.	242.
30	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
31	188.	146.	0.	0.	0.	2106.	3063.	36.	69.	19.	125.	209.	0.	209.	3396.
*2-3	1573.	1123.	24.	34.	1709.	15118.	22305.	92.	204.	19.	316.	342.	98.	439.	23059.
**1-3	2013.	1334.	24.	34.	2640.	20500.	29475.	117.	286.	36.	439.	424.	131.	554.	30469.
41	0.	0.	0.	0.	7.	87.	110.	0.	2494.	37.	2530.	53.	0.	53.	2693.
42	0.	0.	0.	0.	29.	113.	128.	2522.	0.	107.	2628.	36.	0.	36.	2802.
43	0.	0.	0.	0.	0.	0.	0.	78.	48.	0.	126.	42.	0.	42.	168.
*40	0.	0.	0.	0.	37.	201.	238.	2609.	2542.	143.	5294.	131.	0.	131.	5663.
51	87.	83.	28.	0.	75.	439.	668.	39.	48.	13.	100.	0.	0.	0.	768.
52	0.	0.	0.	0.	0.	0.	0.	5.	0.	0.	5.	0.	0.	0.	5.
*50	87.	83.	28.	0.	75.	439.	668.	44.	48.	13.	105.	0.	0.	0.	773.
***BRUNE	2100.	1416.	52.	34.	2752.	21140.	30381.	2770.	2877.	192.	5839.	554.	131.	685.	36904.

ORIGIN-DESTINATION TABLE OF ALTERNATIVE-3 IN THE YEAR 1995 - PASSENGER CAR (1)

UNIT: PERSON TRIP

ZONE	11	12	13	14	15	16	17	*10	21	22	23	24	25	26
11	0.	29.	152.	955.	6470.	39.	0.	7645.	2195.	1306.	531.	2299.	4949.	5953.
12	24.	0.	8.	0.	322.	0.	0.	354.	215.	54.	4.	32.	623.	683.
13	287.	30.	0.	172.	604.	29.	40.	1161.	528.	213.	43.	429.	798.	1310.
14	1459.	34.	311.	0.	498.	45.	0.	2346.	500.	158.	90.	576.	1307.	1550.
15	5079.	644.	829.	962.	0.	425.	123.	8082.	1353.	714.	132.	1586.	2638.	3319.
16	3.	28.	16.	89.	410.	0.	13.	558.	196.	111.	11.	68.	237.	280.
17	0.	5.	7.	0.	222.	0.	0.	234.	44.	61.	18.	107.	300.	365.
*10	6852.	769.	1323.	2198.	8526.	537.	176.	20381.	5031.	2617.	830.	5097.	10852.	13459.
21	3018.	94.	526.	517.	755.	208.	23.	5141.	0.	621.	55.	397.	2225.	2487.
22	2156.	113.	367.	768.	1285.	122.	239.	5039.	887.	0.	317.	3164.	14979.	433.
23	1314.	22.	97.	53.	744.	45.	42.	2317.	185.	583.	0.	952.	959.	1093.
24	5560.	138.	525.	181.	3257.	188.	76.	9925.	1167.	2105.	528.	0.	1229.	1683.
25	8281.	869.	887.	2913.	2731.	325.	133.	16140.	1936.	12846.	556.	2361.	0.	1291.
26	8960.	941.	1267.	3413.	2770.	307.	151.	17808.	2359.	296.	629.	2877.	1260.	0.
27	3114.	398.	544.	734.	37.	279.	98.	5204.	880.	435.	86.	1224.	1639.	2177.
28	553.	37.	253.	228.	276.	4.	51.	1400.	160.	100.	26.	589.	573.	716.
29	124.	69.	86.	99.	50.	0.	14.	442.	0.	0.	0.	30.	128.	123.
30	93.	0.	0.	61.	84.	0.	49.	287.	0.	10.	0.	51.	66.	75.
31	3268.	180.	389.	143.	735.	238.	110.	5062.	996.	1102.	556.	1406.	1613.	1912.
*2-3	36443.	2860.	4930.	9110.	12722.	1716.	985.	68765.	8569.	18097.	2754.	13051.	24670.	11989.
**1-3	43295.	3629.	6253.	11307.	21248.	2253.	1161.	89146.	13600.	20714.	3584.	18147.	35522.	25448.
41	154.	4.	4.	0.	31.	15.	4.	212.	129.	23.	71.	18.	224.	312.
42	117.	0.	2.	25.	36.	7.	4.	191.	78.	7.	16.	25.	94.	121.
43	98.	0.	0.	32.	43.	5.	9.	187.	7.	0.	0.	5.	10.	13.
*40	369.	4.	6.	57.	110.	27.	17.	590.	214.	30.	87.	49.	328.	445.
51	436.	0.	0.	38.	240.	22.	16.	751.	215.	138.	52.	378.	196.	315.
52	100.	0.	0.	19.	48.	0.	0.	167.	9.	14.	36.	54.	98.	118.
*50	536.	0.	0.	57.	287.	22.	16.	918.	224.	152.	89.	432.	294.	433.
***BRUNE	44199.	3632.	6259.	11421.	21646.	2302.	1194.	90654.	14039.	20896.	3760.	18627.	36143.	26327.

ORIGIN-DESTINATION TABLE OF ALTERNATIVE-3 IN THE YEAR 1995 - PASSENGER CAR (2)

UNIT: PERSON TRIP

ZONE	27	28	29	30	31	*2-3	**1-3	41	42	43	*40	51	52	*50	***BRUNE
11	3866.	758.	306.	288.	1709.	24160.	31805.	502.	235.	95.	832.	829.	151.	981.	33618.
12	167.	8.	0.	0.	107.	1892.	2245.	9.	3.	0.	12.	57.	0.	57.	2314.
13	654.	245.	136.	11.	340.	4707.	5868.	0.	4.	0.	4.	4.	17.	21.	5893.
14	408.	297.	55.	64.	144.	5148.	7494.	0.	95.	0.	95.	79.	10.	89.	7679.
15	413.	453.	112.	0.	1063.	11783.	19866.	25.	40.	30.	96.	91.	30.	121.	20082.
16	259.	4.	0.	0.	128.	1295.	1853.	14.	4.	104.	123.	56.	0.	56.	2032.
17	168.	14.	19.	49.	83.	1229.	1463.	4.	5.	22.	31.	118.	0.	118.	1612.
*10	5935.	1779.	628.	412.	3574.	50214.	70595.	555.	387.	252.	1194.	1234.	208.	1441.	73230.
21	451.	139.	24.	0.	1318.	7717.	12857.	79.	111.	10.	200.	136.	0.	136.	13193.
22	929.	359.	130.	0.	1362.	22561.	27600.	37.	33.	0.	70.	120.	25.	146.	27816.
23	609.	40.	0.	0.	626.	5047.	7364.	0.	242.	16.	257.	172.	5.	177.	7799.
24	2345.	775.	42.	0.	1549.	11422.	21348.	46.	111.	0.	158.	386.	99.	485.	21990.
25	1961.	690.	0.	0.	1552.	23193.	39333.	103.	49.	67.	219.	820.	155.	975.	40527.
26	2088.	835.	0.	0.	1918.	12262.	30070.	128.	52.	20.	200.	1058.	176.	1234.	31504.
27	0.	308.	100.	0.	620.	7469.	12673.	19.	37.	15.	71.	67.	14.	81.	12825.
28	238.	0.	316.	83.	396.	3197.	4597.	25.	126.	19.	170.	192.	68.	260.	5028.
29	49.	230.	0.	0.	26.	586.	1028.	0.	0.	0.	0.	21.	0.	21.	1049.
30	68.	19.	0.	0.	22.	311.	599.	151.	0.	0.	151.	0.	0.	0.	749.
31	494.	236.	53.	46.	0.	8412.	13474.	116.	147.	42.	306.	259.	27.	286.	14065.
*2-3	9234.	3632.	665.	128.	9389.	102177.	170943.	704.	909.	189.	1801.	3231.	569.	3800.	176545.
**1-3	15169.	5411.	1293.	540.	12963.	152391.	241538.	1258.	1296.	441.	2995.	4465.	777.	5242.	249775.
41	18.	36.	0.	0.	100.	933.	1145.	0.	10088.	459.	10547.	259.	8.	267.	11959.
42	1.	16.	52.	27.	59.	496.	686.	9639.	0.	901.	10540.	225.	2.	227.	11453.
43	9.	38.	0.	0.	33.	114.	302.	208.	637.	0.	845.	130.	0.	130.	1277.
*40	28.	90.	52.	27.	192.	1543.	2133.	9847.	10725.	1359.	21932.	614.	11.	624.	24689.
51	148.	409.	36.	0.	137.	2024.	2775.	259.	374.	135.	769.	0.	675.	675.	4219.
52	39.	41.	0.	0.	29.	440.	606.	3.	0.	0.	3.	550.	0.	550.	1159.
*50	187.	450.	36.	0.	166.	2463.	3381.	262.	374.	135.	772.	550.	675.	1225.	5378.
***BRUNE	15384.	5951.	1381.	567.	13321.	156398.	247052.	11368.	12396.	1936.	25699.	5628.	1463.	7091.	279842

ORIGIN-DESTINATION TABLE OF ALTERNATIVE-3 IN THE YEAR 1995 - PUBLIC BUS (1)

UNIT: PERSON TRIP

ZONE	11	12	13	14	15	16	17	*10	21	22	23	24	25	26
11	0.	9.	63.	324.	1580.	0.	0.	1976.	482.	450.	179.	812.	1060.	2001.
12	7.	0.	2.	0.	71.	0.	0.	80.	42.	16.	1.	10.	144.	228.
13	84.	11.	0.	54.	96.	10.	14.	270.	116.	61.	13.	147.	163.	432.
14	593.	12.	135.	0.	149.	16.	0.	906.	114.	45.	30.	186.	326.	524.
15	1290.	149.	201.	264.	0.	130.	39.	2073.	240.	206.	39.	492.	603.	1085.
16	0.	17.	10.	29.	144.	0.	0.	201.	53.	36.	4.	22.	66.	94.
17	0.	1.	5.	0.	68.	0.	0.	74.	12.	20.	7.	47.	88.	131.
*10	1974.	200.	416.	671.	2108.	157.	53.	5579.	1059.	834.	272.	1716.	2450.	4496.
21	692.	20.	188.	180.	126.	57.	11.	1274.	0.	93.	4.	51.	361.	659.
22	733.	35.	116.	316.	374.	45.	87.	1709.	131.	0.	91.	896.	3259.	136.
23	447.	8.	32.	22.	222.	16.	14.	762.	18.	169.	0.	270.	236.	304.
24	1912.	59.	234.	58.	1071.	60.	25.	3419.	150.	646.	164.	0.	288.	331.
25	1858.	234.	234.	833.	646.	99.	39.	3942.	307.	2883.	154.	618.	0.	377.
26	3033.	363.	556.	1304.	885.	111.	51.	6304.	580.	96.	194.	622.	471.	0.
27	957.	107.	204.	233.	9.	92.	33.	1635.	208.	122.	28.	340.	443.	648.
28	139.	8.	111.	108.	69.	1.	14.	452.	33.	25.	5.	110.	125.	46.
29	34.	20.	44.	46.	9.	0.	8.	161.	0.	0.	0.	8.	28.	29.
30	22.	0.	0.	19.	22.	0.	27.	90.	0.	3.	0.	13.	18.	21.
31	1112.	73.	147.	55.	234.	83.	39.	1744.	226.	451.	188.	364.	480.	485.
*2-3	10937.	928.	1870.	3174.	3669.	564.	349.	21492.	1654.	4489.	827.	3292.	5710.	3037.
**1-3	12911.	1128.	2286.	3846.	5777.	721.	402.	27071.	2713.	5323.	1099.	5009.	8160.	7533.
41	53.	1.	1.	0.	11.	6.	1.	73.	39.	8.	25.	6.	72.	85.
42	41.	0.	1.	9.	13.	2.	2.	68.	27.	2.	5.	9.	29.	32.
43	30.	0.	0.	10.	15.	2.	3.	60.	2.	0.	0.	2.	3.	3.
*40	124.	1.	2.	19.	39.	10.	6.	201.	68.	10.	30.	16.	104.	121.
51	129.	0.	0.	11.	86.	7.	5.	239.	52.	40.	16.	110.	59.	55.
52	26.	0.	0.	4.	11.	0.	0.	41.	2.	3.	8.	12.	24.	28.
*50	155.	0.	0.	15.	98.	7.	5.	280.	54.	43.	23.	122.	83.	83.
***BRUNE	13191.	1130.	2288.	3860.	5913.	738.	413.	27552.	2834.	5376.	1152.	5148.	8348.	7736.

ORIGIN-DESTINATION TABLE OF ALTERNATIVE-3 IN THE YEAR 1995 - PUBLIC BUS (2)

UNIT: PERSON TRIP

ZONE	27	28	29	30	31	*2-3	**1-3	41	42	43	*40	51	52	*50	***BRUNE
11	1150.	175.	81.	81.	591.	7062.	9038.	164.	82.	31.	277.	291.	39.	329.	9644.
12	43.	1.	0.	0.	37.	523.	604.	3.	1.	0.	4.	17.	0.	17.	625.
13	155.	51.	35.	3.	116.	1292.	1562.	0.	1.	0.	1.	1.	3.	4.	1567.
14	119.	68.	16.	18.	47.	1494.	2400.	0.	30.	0.	30.	23.	2.	25.	2454.
15	111.	112.	25.	0.	359.	3272.	5344.	9.	14.	10.	32.	30.	7.	37.	5414.
16	92.	1.	0.	0.	41.	408.	609.	5.	2.	35.	41.	18.	0.	18.	668.
17	55.	4.	6.	15.	28.	412.	486.	2.	1.	7.	10.	38.	0.	38.	534.
*10	1725.	412.	163.	117.	1219.	14463.	20042.	182.	130.	82.	394.	418.	51.	470.	20906.
21	99.	25.	5.	0.	272.	1569.	2844.	25.	34.	2.	61.	33.	0.	33.	2938.
22	235.	66.	30.	0.	428.	5271.	6980.	12.	11.	0.	23.	37.	6.	42.	7045.
23	173.	8.	0.	0.	196.	1374.	2126.	0.	76.	5.	82.	52.	1.	53.	2270.
24	679.	134.	12.	0.	366.	2771.	6189.	16.	35.	0.	50.	113.	24.	137.	6377.
25	533.	137.	0.	0.	469.	5478.	9420.	35.	18.	22.	75.	247.	37.	284.	9779.
26	603.	50.	0.	0.	481.	3097.	9401.	44.	16.	6.	66.	193.	41.	234.	9701.
27	0.	63.	15.	0.	196.	2063.	3698.	7.	14.	5.	26.	21.	3.	24.	3748.
28	55.	0.	29.	13.	73.	514.	966.	9.	45.	5.	59.	52.	15.	67.	1091.
29	9.	23.	0.	0.	8.	105.	266.	0.	0.	0.	0.	4.	0.	4.	270.
30	15.	3.	0.	0.	6.	79.	168.	47.	0.	0.	47.	0.	0.	0.	216.
31	146.	67.	14.	12.	0.	2435.	4179.	36.	48.	13.	96.	68.	7.	75.	4351.
*2-3	2545.	575.	105.	26.	2495.	24756.	46247.	231.	296.	58.	586.	820.	134.	954.	47786.
**1-3	4270.	987.	268.	143.	3714.	39219.	66289.	414.	426.	140.	980.	1238.	185.	1423.	68692.
41	6.	12.	0.	0.	29.	280.	353.	0.	3445.	142.	3587.	87.	3.	90.	4030.
42	1.	6.	14.	9.	18.	152.	221.	3302.	0.	278.	3580.	79.	1.	80.	3881.
43	3.	11.	0.	0.	11.	36.	95.	61.	271.	0.	332.	38.	0.	38.	465.
*40	10.	29.	14.	9.	58.	468.	669.	3363.	3716.	421.	7499.	204.	3.	208.	8376.
51	50.	107.	9.	0.	26.	534.	773.	91.	133.	40.	263.	0.	156.	156.	1192.
52	9.	9.	0.	0.	8.	101.	143.	1.	0.	0.	1.	243.	0.	243.	387.
*50	59.	116.	9.	0.	44.	636.	916.	92.	133.	40.	264.	243.	156.	399.	1579.
***BRUNE	4339.	1132.	291.	152.	3816.	40322.	67874.	3868.	4274.	600.	8743.	1686.	344.	2030.	78647.

Appendix III Road Construction Cost of Alternative 1

Unit: B10^3

Link Name	Length (km)	Number of Lanes	Construction Cost			
			Total cost	Construction & land acquisition	F/S & D/D	Super-vision
1. MUARA/JERUDONG COASTAL ROAD	23.0	E-2	100,519	92,848	3,836	3,835
5. TUNGKU LINK ROAD	8.6	E-2	24,193	22,406	894	893
7. MAJOR ARTERIAL ROAD II	2.4	Width reduced -2	-8,297	-7,672	-313	-312
9. BERAKAS LINK	3.9	E-2	13,484	12,467	509	508
16. JLN. TUTONG (ISTANA-JLN. JERUDONG)	10.0	E-2	39,189	36,589	1,300	1,300
22. MAJOR ARTERIAL ROAD III	1.3	N-4	40,005	38,149	928	928
23. JLN. RESIDENCY	0.7	E-2	11,323	11,086	119	118
24. TUNGKU/GADONG LINK	1.2	N-4	7,097	6,549	274	274
27. TUNGKU/AIRPORT RAMA LINK	1.5	N-2	5,305	4,963	171	171
28. JLN. HAJI BASIR EXT. LINK	0.6	N-4	58,416	57,495	461	460
29 JLN. GADONG (OUTSIDE OF RING ROAD)	1.4	E-2	4,744	4,442	151	151
30. JLN. BERAKAS (SURUSUP LINK)	0.4	E-2	1,355	1,269	43	43
31. JLN. GADONG (Kpg.Beribi - J.TUTONG)	3.8	E-2	12,876	12,056	410	410
			310,209	292,647	8,783	8,779

exp.

E: Expanded Lane

N: Newly constructed

Appendix III Road Construction Cost of Alternative 2 and 3.

Unit: B$10^3

Link Name	Length (km)	Number of Lanes	Construction Cost			
			Total cost	Construction & land acquisition	F/S & D/D	Super-vision
5. TUNGKU LINK ROAD	3.5	E-2	9,845	9,118	364	363
7. MAJOR ARTERIAL ROAD II	2.4	Width reduced -2	-8,297	-7,672	-313	-312
9. BERAKAS LINK	1.4	E-2	4,840	4,475	183	182
17. KILANAS LINK	1.7	N-2	7,963	7,412	276	275
19. BURONG PINGAL LINK	1.3	N-2	3,359	3,167	96	96
21. JLN. MULAUT/JLN. TUTONG LINK	1.8	N-2	7,349	6,859	245	245
22 MAJOR ARTERIAL ROAD III	1.3	N-4	40,005	38,149	928	928
23. JLN. RESIDENCY	0.7	E-2	11,323	11,086	119	118
24. TUNGKU/GADONG LINK	1.2	N-4	7,097	6,549	274	274
27. TUNGKU/AIRPORT RAMA LINK	1.5	N-2	5,305	4,963	171	171
29 JLN. GADONG (OUTSIDE OF RING ROAD)	1.4	E-2	4,744	4,442	151	151
30 JLN. BERAKAS (SURUSUP LINK)	0.4	E-2	1,355	1,269	43	43
			94,888	89,817	2,537	2,534

exp.

E: Expanded lane

N: Newly constructed

Appendix III Construction Cost of Alternative 4

Unit: B10^3

Link Name	Length (km)	Number of Lanes	Construction Cost			
			Total cost	Construction & land acquisition	F/S & D/D	Super-vision
5. TUNGKU LINK ROAD	3.5	E-2	9,845	9,118	364	363
7. MAJOR ARTERIAL ROAD II	2.4	Width reduced -2	-8,297	-7,672	-313	-312
9. BERAKAS LINK	1.4	E-2	4,840	4,475	183	182
17. KILANAS LINK	1.7	N-2	7.963	7,412	276	275
19. BURONG PINGAI LINK	1.3	N-2	3,359	3,167	96	96
21. JLN. MULAUT/JLN. TUTONG LINK	1.8	N-2	7,349	6,859	245	245
22. MAJOR ARTERIAL ROAD III	1.3	N-2	40,005	38,149	924	928
23. JLN. RESIDENCY	0.7	E-2	11,323	11,086	119	118
24. TUNGKU/GADONG LINK	1.2	N-4	7.097	6,549	274	274
27. TUNGKU/AIRPORT RAMA LINK	1.5	N-2	5,305	4,963	171	171
29. JLN. GADONG (OUTSIDE OF RING ROAD)	1.4	E-2	4,744	4,442	151	151
30 JLN. BERAKAS (SURUSUP LINK)	0.4	E-2	1,355	1,269	43	43
31. JLN. GADONG (Kpg.Beribi - J.TUTONG)	3.8	E-2	12,876	12,056	410	410
			107,764	101,873	2,947	2,944

exp.

E: Expanded lane

N: Newly constructed