

Table 7-10 Grand Separation Construction Cost

				x10 ⁶ B\$
Alter- native	No. of Places	Total Cost	Breakdown	
Alter- native 1	2 places	28.8	Construction cost	18.4
			Engineering cost including design	0.84
			Construction supervision cost	0.84
			Land acquisition cost	8.7
Alter- natives 2, 3, 4	1 place	14.4	Construction cost	9.2
			Engineering cost including design	0.4
			Construction supervision cost	0.4
			Land acquisition cost	4.4

6-6 Parking Facilities

As to the improvement of parking facilities, we determined applying the same service level as the current one to the future and reviewed the number of cars to be parked for each alternative. There are the following two factors for the necessity of improving the parking facilities in the future.

The first factor is the measures to increase of the traffic demand in each alternative and the second factor is the measures to substitute demand as a result of prohibiting to park cars on road shoulders which is enforced to smoothen the bus traffic in the central parts of cities.

As a result of reviewing the situation, the demand increase caused by the above two factors is estimated about 400 cars at the maximum, although there are some differences among the alternatives.

At the same time, the government is proceeding with construction plans of public parking areas in the city central parts. They are the multi-story parking built in the site of closed market in the city center and the ground parking area on the reclaimed land of

river along JLN PRETTY, and the increase of parking capacity by these parking areas is estimated to be about 700 cars.

In view of this, we do not consider that construction of parking facilities by this project is necessary to maintain the current service level.

Table 7-12 Total Construction Cost by Alternatives

(Unit: million B\$)

Item	Alt 1	Alt 2	Alt 3	Alt 4
Bus System	-	23.20	19.41	19.41
Bus Terminal	-	2.02	1.77	1.77
Bus Stop	-	7.40	7.40	7.40
Bus Operation Office	-	8.39	6.71	6.71
Workshop	-	3.47	1.73	1.73
F/S, D/D, S/V	-	1.92	1.80	1.80
Road System	339.0	109.3	109.3	122.2
Road	292.6	89.8	89.8	101.9
Grade Separate Intersection	27.1	13.6	13.6	13.6
F/S, D/D, S/V	19.3	5.9	5.9	6.7
Total	339.0	132.5	128.7	141.6

CHAPTER 7 EVALUATION OF ALTERNATIVE PLANS

7-1 Major Assumptions in the Evaluation

Project life was fixed at 10 years from 1986 to 1995 considering the inclusion of public bus transport; however, supplementary calculation of costs/benefits was conducted for 20 years up to 2005. Discount rate of 12% was determined from the investigation in Brunei, for obtaining the present values of costs/benefits. The base year in the evaluation was 1986 and all the values were indicated at constant prices of mid-1984.

7-2 Economic Benefits to be Calculated

Firstly considered were 3 types of benefits; namely, road user's benefits, benefits relative to parking and the savings of costs for the passenger car ownership. However, only the road user's benefits were calculated because of the difficulty of obtaining the latter 2. The road user's benefits comprises 2 major benefits, which are:

- Savings of vehicle operating costs
- Savings of passengers' time costs

Each would be calculated from the difference of the said costs, between Alternative 0 (without project) and Alternatives 1, 2, 3 and 4 (with project).

7-3 Savings of Vehicle Operatings Costs in 1995

The vehicle operating costs of Alternative plans were obtained from the multiplication of the projected traffic volume by speed and the vehicle operating costs in response to the speed, by vehicle type. As the traffic volume was given by the range of running speeds, the appropriate representative speed was determined in each range. The vehicle operating costs by vehicle type was calculated, in the first step, for standard conditions with each cost component as shown below.

- (1) Fuel cost
- (2) Engine oil cost

- (3) Tyre and tube cost
- (4) Repair and maintenance cost
- (5) Depreciation cost (the portion related to running distance, only)
- (6) Overhead cost (only for bus and truck)
- (7) Crew cost (only for bus and truck)

In the next step, the standard vehicle operating costs by vehicle type were transformed to meet the required speeds by applying the conversion factors quoted. The vehicle type consists of passenger car, bus and truck, of which to the bus the following important assumptions were made:

- As the Alternatives 2, 3 and 4 are essentially for the improvement of bus operation including the procurement, depreciation costs were excluded
- The buses proposed are those with one-man operation equipments; the conductor's wages were also excluded in Alternatives 2, 3 and 4.

The calculated total savings of vehicle operating costs by Alternative in 1995 are:

Alternative Plan	Total Savings (B\$10 ⁶)
Alternative 1	24.6
Alternative 2	39.9
Alternative 3	34.9
Alternative 4	30.4

7-4 Savings of Passengers' Time Costs in 1995

The savings of passengers' time costs were counted only for passenger cars and buses, using the projected travel time and the passengers' time value by vehicle type. The determination of passengers' time value, which means the amount in unit time they would like to pay for the time savings, was the most important aspect in the calculation of this benefit. It was obtained from the hourly income of the passengers of cars and buses, based on the results of the traffic survey; B\$6.82 for passenger cars and B\$2.38 for buses.

(The income level in buses is low due to the inclusion of immigrant workers and the persons without job). Considering the trip purpose composition and the respective earning powers together with the adaptability of the raw income values, time values of a vehicle to be applied to Alternatives were determined as follows:

Unit: B\$/Vehicle·hour

Alternative Plan	Passenger Car	Bus
Alternative 0	0.98	6.31
Alternative 1	0.98	6.31
Alternative 2	0.98	9.05
Alternative 3	0.98	9.05
Alternative 4	0.98	9.05

The calculated total savings of passengers' time costs by Alternative in 1995 are:

Alternative Plan	Total Savings (B\$10 ⁶)
Alternative 1	42.0
Alternative 2	40.2
Alternative 3	38.5
Alternative 4	38.1

7-5 Appearance of the Economic Benefits

All the benefits were assumed to appear from the 5th year after the opening, by making use of a temporary scheduling for each Alternative Plan. In Alternative 1, which is composed of only the road construction, the first benefit would appear in 1990 with the 76.8% of the benefits in 1995. On the contrary, in the other 3 Alternatives, half of the benefits in 1995 was assumed to appear in the year 1990, taking into considerations the gradual permeation of the bus service improvement. Between 1990 and 1995, a continuous increase of the economic benefit would be recorded.

7-6 Temporary Scheduling of Construction and the Transfer Component Deduction

For annualizing the economic costs, temporary scheduling was made for the construction of roads and bus-related facilities and the bus procurement.

Year	Construction Schedule		Bus Procurement			
	Roads	Bus-related Facilities	Alt. 1	Alt. 2	Alt. 3	Alt. 4
1986	F/S, D/D, Engineering	F/S, D/D, Engineering	-	-	-	-
1987	F/S, D/D, Engineering	F/S, D/D, Engineering	-	-	-	-
1988	Construction	Construction	-	70	45	30
1989	- do -	- do -	-	165	115	80
1990	- do -	- do -	-	-	-	-
1991	- do -	-	-	60	45	30
1992	- do -	-	-	-	-	-
1993	Maintenance	-	-	45	30	20
1994	- do -	-	-	-	-	-
1995	- do -	-	-	-	-	-

The previously estimated financial costs for construction would be reduced into annual flows of costs, according to this schedule. In this step, the due considerations of transfer components in the national economy were taken as shown below.

- The costs for F/S, D/D and engineering do not include transfer components.
- The rest of the construction costs might include 10% of transfer components due to the frequent use of heavy machineries with 15 - 20% import duties and the inclusion of right-of-way costs along the barren land and in the government lands.
- The operation/maintenance costs of roads do not include these components since they are obtained from the multiplication with

0.3% to the disbursed capital costs after the reduction as stated above.

In the bus procurement, the unit price of the improved bus, B\$92,000, was used, which is the CIF price at Muarra port and does not include any transfer component. The economic costs by Alternative were thus obtained, to be annualized. In the last step, annualization was conducted by allocating capital investment equally in annual amount to each year of the construction period.

7-7 Economic Evaluation

Cost/benefit streams of the Alternative Plans were obtained in the procedures as mentioned above, which are:

Unit: B\$10⁶

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	60.7	-	33.0	-	29.5	-	30.4	-
1989	60.9	-	41.9	-	36.1	-	35.1	-
1990	61.1	51.1	26.8	40.1	25.5	36.7	27.7	34.3
1991	61.2	53.9	24.9	46.1	23.5	42.2	24.4	39.4
1992	61.4	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

These cost/benefit streams were the sources in the economic evaluation. The discounting of each annual value was firstly conducted with the rate of 12%. The present values of all the costs (C) and that of all the benefits (B) resulted in:

Unit: B\$10⁶

Alternative Plan	C	B
Alternative 1	206.7	168.5
Alternative 2	102.8	163.0
Alternative 3	93.6	149.2
Alternative 4	96.6	139.4

Remarks: Discounted values at the rate of 12%.

Among the 4 Alternatives, C is the biggest in Alternative 1, while 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 calculation results of B/C and NPV (name B-C) are:

Alternative Plan	B/C	NPV (B\$10 ⁶)
Alternative 1	0.83	-33.5
Alternative 2	1.5856	60.2
Alternative 3	1.5940	55.6
Alternative 4	1.44	42.8

Alternatives 1 and 4 were to be dropped at this stage because of the inferiority of both the indicators. It could not be said which is the optimum, either Alternative 2 or 3. For these two Alternatives, the calculation of EIRR was carried out:

Alternative Plan	EIRR (%)
Alternative 2	30.3
Alternative 3	30.7

Slightly larger EIRR was obtained in Alternative 3. Considering the superiority of both EIRR and B/C, Alternative 3 was taken as an optimum Alternative Plan, finally.

7-8 Supplementary Evaluation with 20 Years of Project Life

20 years of project life was set off for examining the probability of the order change of Alternatives. Assuming the same amount of economic benefit as in 1995, up to 2005, the addition of O/M costs of roads and re-purchasing costs of the worn buses to the cost flows. In the 2005, the re-purchasing costs of the machineries in bus-workshop would also be required. After discounting with the same rate of 12%, it was revealed that the order of superiority among the 4 Alternatives would not be changed. The optimum plan was also Alternative 3, in comparing the B/C and NPV. In this case, EIRR was not calculated.

7-9 Sensitivity and Elasticity of the Optimum Plan

To the selected Optimum Plan, Alternative 3, sensitivity tests of EIRR were conducted under the conditions of (1) cost 20% rise, (2) 20% decrease of benefits, and (3) combination of these 2 conditions. It was revealed that the Optimum Plan have a tenacious feature. The economic feasibility would be well enough even in the case (3) above. In addition to this, the limit of independent cost increase would be 59% and that of benefit decrease alone 37%, as an elasticity, in comparison with the standard evaluation criterion of 12%.

7-10 Consideration on Evaluation Results

In this study, construction costs for Major Arterial Road Phase II were reduce with 2-lanes against the road proposal by the PWD, in which the said road section is planned to be 4-lanes. This difference is derived from that between the target years as well as socio-economic framework in future traffic demand forecasting.

While the PWD carried out the forecasting with the target year of 2000, the cost estimation in this study was based on that up to 1995. The minimal costs for roads were intended, and it would not hinder the PWD's road proposal. It is possible to interpret as the first step of a stagewise construction schedule.

Even in the road proposal by the PWD, the superiority order of 4 Alternative Plans would not alter. The increase in construction costs for Major Arterial Road Phase II was estimated to be around 10% to Alternative 3 when widened to 4-lanes as in the PWD's proposal. The costs increase parallely in the other Alternatives, and Alternative 3 would be optimum without regard. Furthermore, from the sensitivity/elasticity tests, the feasibility of the Optimum Plan was well justified.

CHAPTER 8 RECOMMENDATIONS

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 Master Plan for the public transport system based on the Alternative 3 is composed of the following improved plans of public bus system and taxi system and relevant improvement plans.

8-1 Improvement Plan of Public Bus System

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

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

(1) Bus type

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

(2) 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 Belait - Seria	(14)

B.S.B. circular bus route	(18)
Lambak - Rimba	(20)

A high level bus services should be provided by these five routes for the passenger movement in the areas around 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. - Gedong	(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 will be operated for 15 hours a day and other routes will be operated for 10 hours a day. On-schedule operation should be established at all routes.

(3) Bus terminals

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

(4) Bus stops

Bus stops having bus bays will be provided along main bus routes in order not to obstruct general traffic, and in addition,

shelters, chairs, time tables, etc. will be provided at all bus stops.

(5) Operation offices and workshops

Operation offices will be located at four places, i.e., Seria, Tutong, Gadong and Airport. The office in Gadong will have the head office function for the new organization for operation of these bus services. Furthermore, the office in Gadong will be accompanied by a standardized bus workshop for conducting periodic servicing of buses.

(6) Intermediate program for bus improvement

As the intermediate program of improving the public traffic system by the target year of 1990, the priority is given to improve the problems of the current situation.

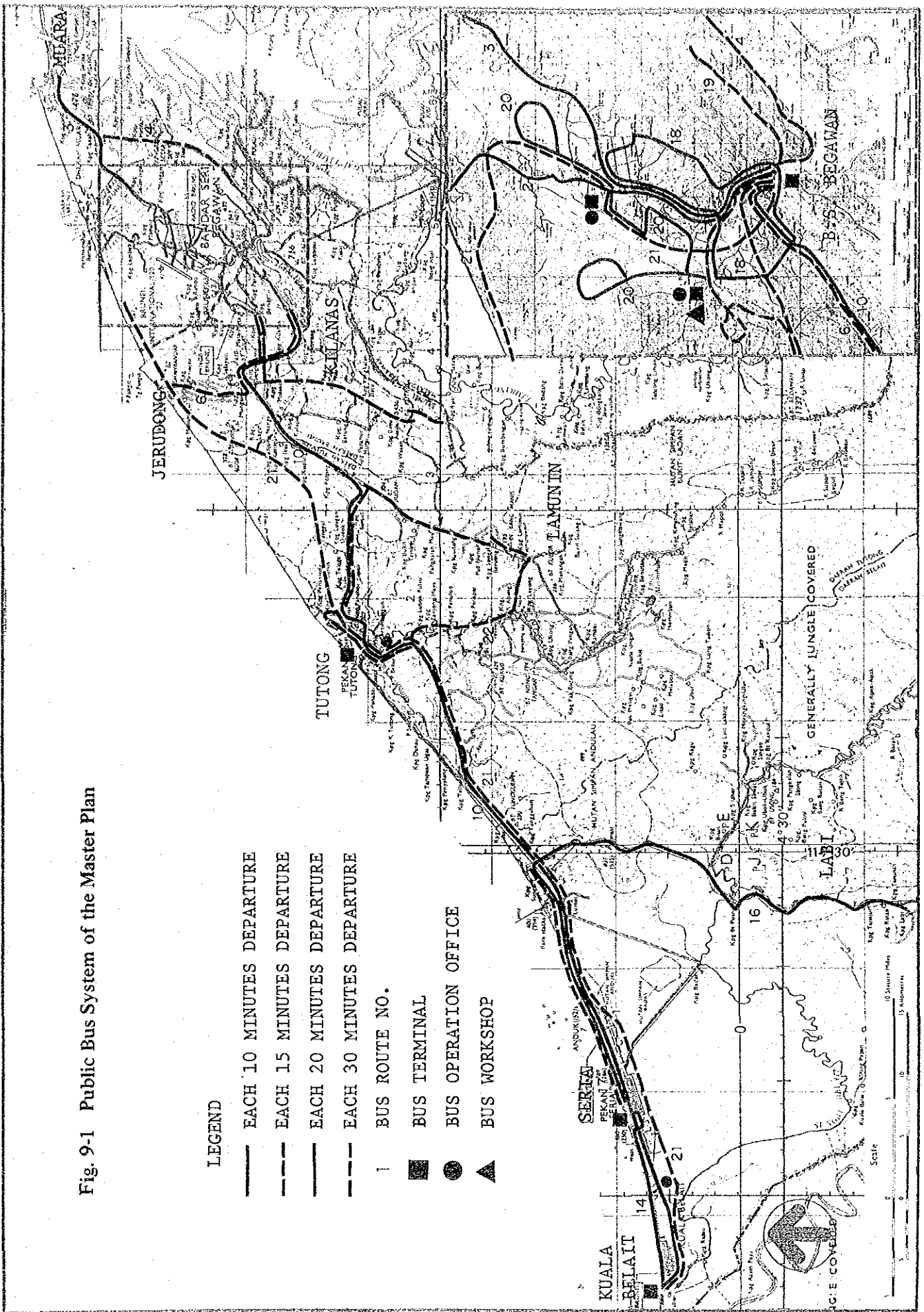
The bus network is to be improved to the network same as the master plan, increasing the operation frequency gradually up to twice of the current level. As a result of this improvement, 160 buses are needed and one-man buses with air-conditioner are to be purchased as needed.

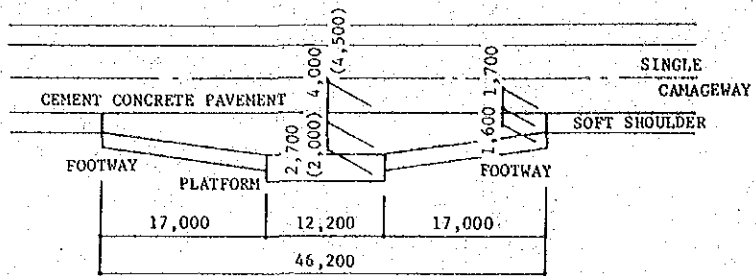
On bus terminals, bus stops, operation offices and workshops, the scales needed are the same on both of Alternative 3 and Alternative 4 which plans bus operation in frequency of about twice as much as the current one, and a plan is made to complete improving all these by the intermediate year of 1990.

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

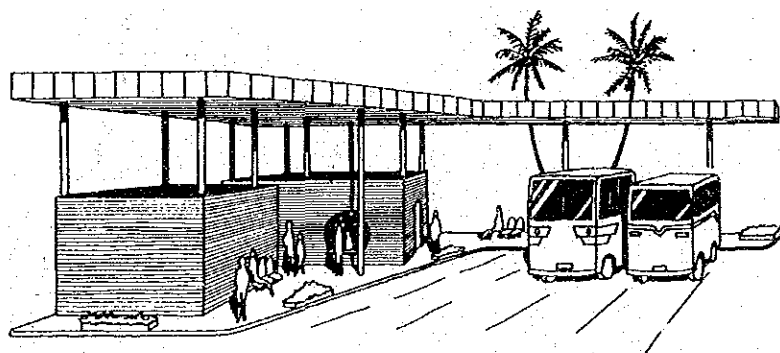
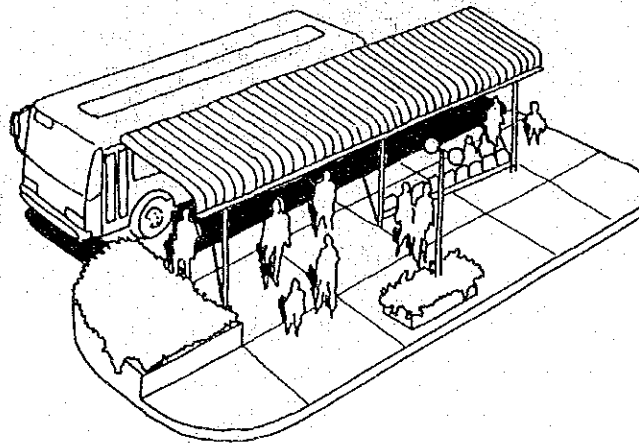
LEGEND

- EACH 10 MINUTES DEPARTURE
- - - EACH 15 MINUTES DEPARTURE
- EACH 20 MINUTES DEPARTURE
- - - EACH 30 MINUTES DEPARTURE
- 1 BUS ROUTE NO.
- BUS TERMINAL
- BUS OPERATION OFFICE
- ▲ BUS WORKSHOP





PLOT PLAN BUS STOP



BUS TERMINAL
(5 BERTHS)

8-2 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.
- ② All existing taxis are privately owned and the profitability seems to be low. Accordingly, it is preferable that the improvement of taxi stations is conducted by the government concurrently with the improvement of the bus terminal.
- ③ The necessary parking spaces for taxis are estimated as a result of taxi trip investigation for each traffic zone.
- ④ It is preferable that taxi stations are installed in the same place of bus terminal for the convenience of transit. The bus terminal of Capital B.S. Begawan has a space to park 10 taxis and in addition there is a parking space for about 15 taxis on the road in the terminal front. The government is planning to construct a bus terminal of about the same scale in the adjacent area, and it is possible to have twice as much taxis as the current number parked in this area.
- ⑤ 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 2,000B\$ is required for each taxi, and radio equipment with antenna of around 30,000B\$ and one operator are required at each one of six taxi stations.
- ⑥ A certain frequency band must be released to taxis in order to introduce radio taxis.
- ⑦ It is preferable that the government provides a low interest

loan for improvement of the radio system.

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 1955	No. of Taxi Parking in 1995 (B) $\frac{1}{2}$
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

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

8-3 Relevant Improvement Plans

(1) Road improvement

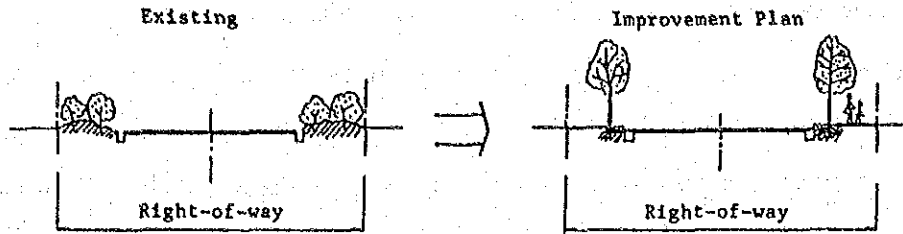
Improvement of roads proposed in Alternative 3 is required. Two-lane roads will be expanded to four lanes (7.4 km), two-lane roads will be newly constructed (6.3 km) and four-lane roads will be newly constructed (2.5 km) in order to cover the traffic demand. These plans include reduction of a part of a ring road, which was planned as a four-lane roads, to two lanes (2.4 km) based on the result of the forecast of traffic demand.

(2) Grade separated intersection

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.

(3) 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.



(4) 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)

(5) Traffic control for smooth bus operation

On-road-parking on Jln. Sultan and Jln. McArthur will be prohibited the degree of observance of no parking on the west side of Jln. Sg. Kianggeh will be elevated for smooth bus operation. (See Fig. 9-6)

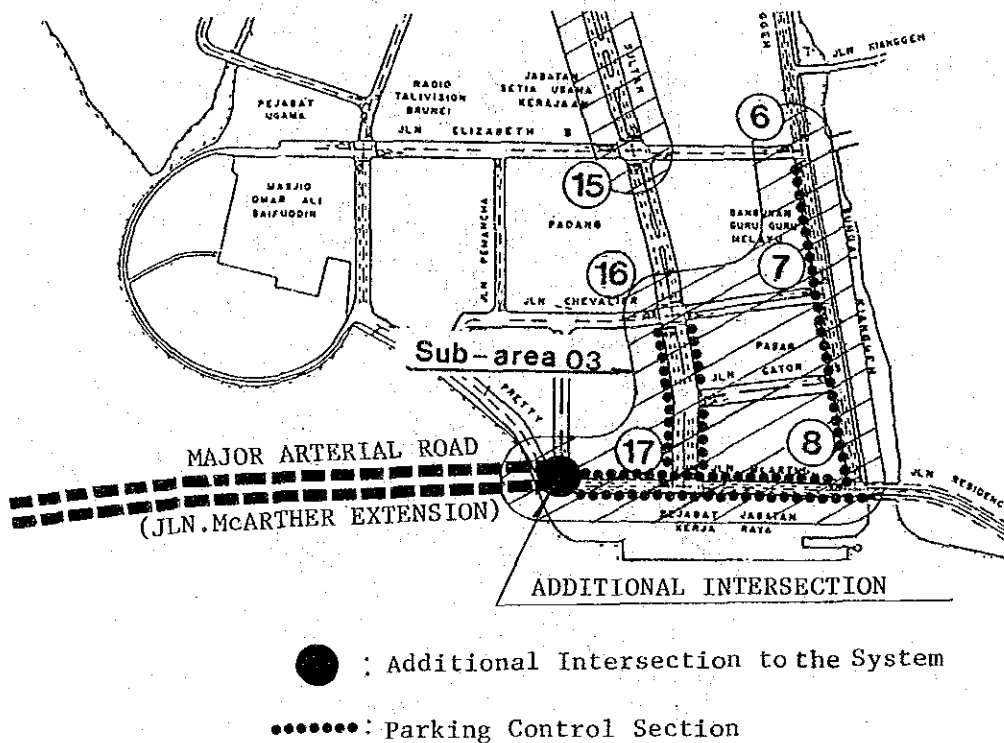


Fig. 9-6 Intersection to be Added to Systematic Signal System and No Parking Section

(6) Intermediate program for road improvement

The target year of the master plan is 1995, and an intermediate program toward 1990 was prepared as follows.

The program 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.

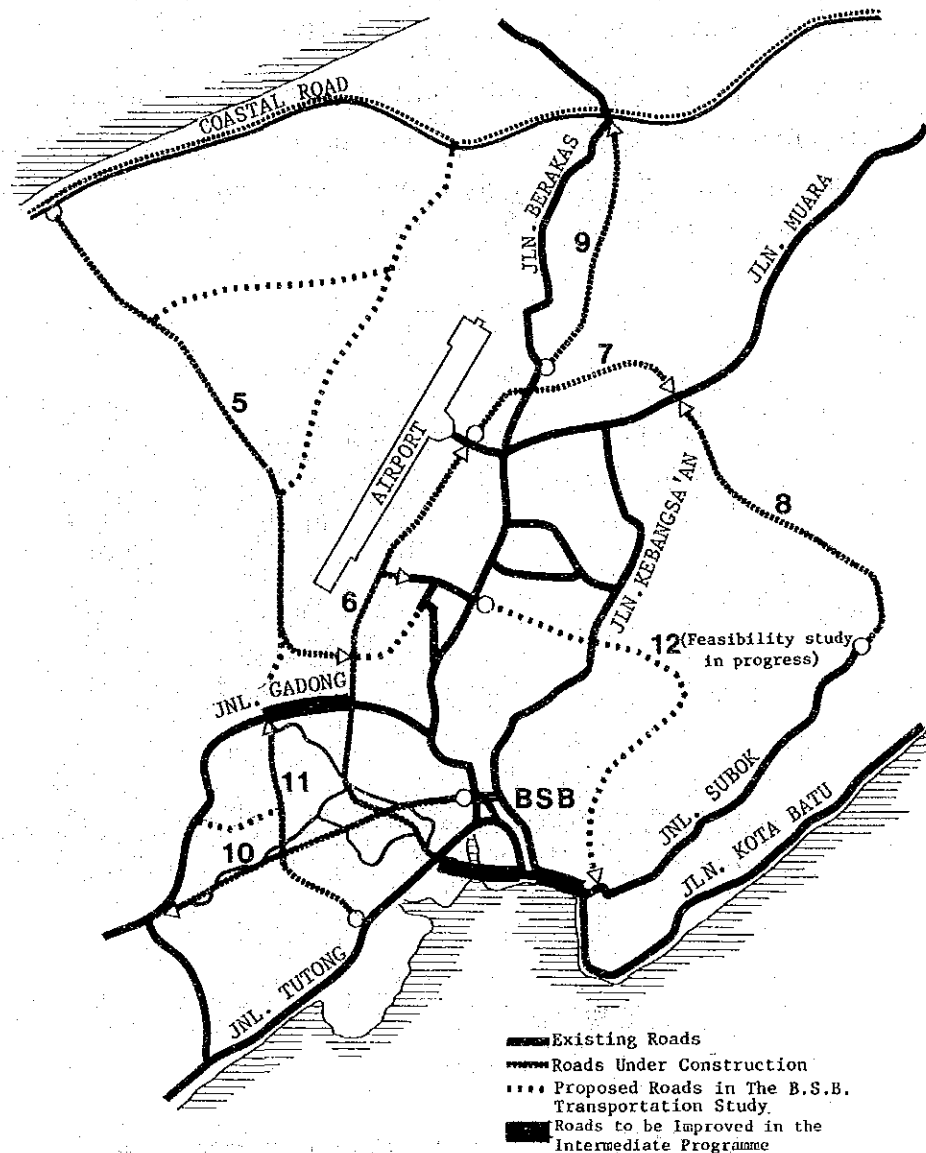


Fig. 9-7 Roads to be Improved in the Intermediate Programme

8-4 Implementation of the Master Plan

(1) Financial aspects

a) Government financial actions to the public bus transport

The following were identified as the necessary measures to be taken by the Government towards the bus transport system from financial points of view:

- Tax exemption; road taxes and income taxes
- Public soft loans for the bus procurement
- Construction of 4 operation offices and a workshop with Government funds and their give-away
- Interest-free lending in case of adverse financial situation
- Equity participation from the beginning
- Around 10% increase of the present bus-fare level
- Provision of basic infrastructure for the bus operation: bus terminals, bus-stops and road system.

b) Financial assistance towards taxi service business

Two major small-scale financial assistance were envisaged for taxi service business; namely, the public soft loans to install the radio equipments at taxi stations and to equip with receiver/transmitter in the individual taxi vehicle; and the labour costs of the telephone/radio service would have to be paid by the Government at the initial stage of operation, for 3 years.

c) Financial situation in the national finance context

In view of the proportion to annual Government expenditures or that to the development funds in 5 year - NDP period, the required costs in the Master Plan would be endurable.

(2) 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 and replaced.

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.

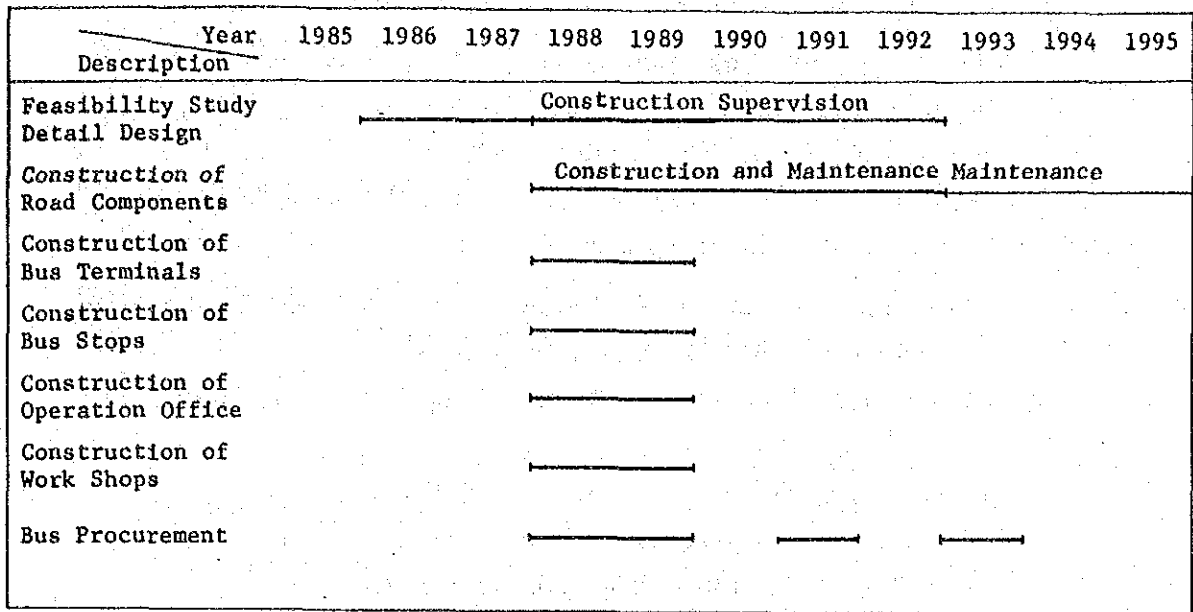


Fig. 9-8 Recommended Implementation Schedule for the Project

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	7.7	2.0	2.1	0.9	0.9	0.6	0.6	0.6	-	-	-
Detail Design											
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

(3) Institutional framework

a) Implementing agencies

Under the existing jurisdiction, it is advisable that the Ministry of Communication be an implementing body as a coordinator among the various related agencies. The LTD would be directly responsible for the implementation under it, playing the following specific roles:

- Adjustment of bus-routes with the development tendency in coordination with the related agencies
- Supervision/inspection of actual operation of buses and taxis
- Necessary revision of traffic regulations
- Financial arrangement for loans, subsidies, and interest-free lending from the Government
- Management participation

b) Establishment of new joint-corporation for the public bus operation

It is advisable to establish a new organization covering the whole country, as a joint-undertaking between the Government and the private sector. The envisaged participants would be:

Government department/agency

LTD, Educational Transport Dept., EDB

Private enterprise

Existing bus-operators

Other enterprises such as banks and truck operator

The integration of the existing bus-operators would be carried out gradually, with the target year of 1990.

c) Reorganization of taxi service business

The local associations and the like would have to be organized for the efficiency of the recommended telephone/radio services. Integration was not always considered in the taxi service business.

d) Expansion of the organization and functions of the LTD

The organization and functions of the LTD would have to be expanded to meet the requirements for the improved public transport systems.

8-5 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 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 will 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 supporting measure for realization of the Master Plan.

(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 study

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 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.

Table 9-5 Public Transport System Improvement Measures

Traffic problem	Improvement direction	Measures	Investigation stage	
			M/P	F/S, P/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.	0	0
		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 available.	0	0
		3. To newly open a circular bus routes around B.S.B.	0	0
		4. To introduce high speed bus routes which make connection among major cities by making use of expressway for long distance trips.	0	0
		5. To provide bus terminals improved convenience and comfort for passengers.	0	0
		6. To convert School bus to Public bus for the effective bus operation	0	0
To shorten bus travel time		7. To increase of bus operating frequency.	0	0
		8. To shorten Waiting time by improvement of transfer system.	0	0
To improve bus comfortability	Other improvement	9. To introduce bus exclusive lanes.	-	0
		10. To introduce bus priority signals.	-	0
		11. Introduction of air-conditioned and one-man buses.	0	0
		12. Provision of improved bus-stops	0	0
		13. Extension of bus operating hours.	0	0
		14. Information system of bus operation.	-	0
		15. Introduction of area-wide uniform fare system.	-	0
		16. Introduction of discount fare.	0	0
		17. Improvement of bus operation offices and work shops.	0	0
		18. Establishment of new bus operating body.	0	0
		19. Subsidy for bus operation.	0	0
Improvement of road traffic system	Increasing of traffic capacity. Elimination of through traffic. Traffic smoothing	20. To finance public soft loans.	0	0
		21. Improvement of taxi.	0	0
		1. Widening and newly provision of major radial roads.	0	0
		2. Widening of inter-city highway.	0	0
		3. Provision of ring road.	0	0
		4. Prohibition of street parking in town center.	0	0
Pricing strategies and others	Shifting public transport by disincentives for automobile travel.	5. Introduction of linked signal system.	0	0
		6. Provision of additional grade separated intersection.	0	0
		1. Automobile price disincentives.	-	0
		2. Intensification of loan conditions for automobile purchasing.	-	0
		3. Repeal automobile commuter allowance and open bus commuter allowance.	-	0
Promotion		4. Price increasing of car-parking.	-	0
		5. Road pricing in town center.	-	0
		6. Promotion of stagger commuting hours.	-	0
		7. Promotion of automobile high-occupancy ride.	-	0
		8. Promotion of public transport.	-	0

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