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PRINCIPAL TRAFFIC CONSULTANT'S REPORT
(Prepared for inclusion in the Prospectus)

10 November 2003

The Board of Directors
Sunway Infrastructure Berhad ; and
Sistem Lingkaran-Lebuhraya Kajang Sdn. Bhd.
Level 16, Menara Sunway
Jalan Lagoon Timur, Bandar Sunway
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Selangor

Dear Sirs

PRINCIPAL TRAFFIC CONSULTANTS REPORT OF SISTEM LINGKARAN - LEBUHRAYA KAJANG SDN. BHD'S NEW RING ROAD PROJECT

This report has been prepared for inclusion in the Prospectus of Sunway Infrastructure Berhad ("SIB") in connection with :

- the institutional issue of 40,000,000 new ordinary shares of RM 0.50 each at an issue price of RM 1.50 per share together with 20,000,000 new warrants to be allotted at no consideration on the basis of one (1) new warrant for every two (2) new ordinary shares of RM 0.50 each subscribed; and

- the retail issue of 12,000,000 new ordinary shares of RM 0.50 each at an issue price of RM 1.50 per share together with 6,000,000 new warrants to be allotted at no consideration on the basis of one (1) new warrant for every two (2) new ordinary shares of RM 0.50 each subscribed,

in conjunction with the listing of SIB on the Main Board of the Kuala Lumpur Stock Exchange.

1. Introduction And Background To The Study

The town of Kajang and its surrounding area is experiencing unprecedented demographic and economic growth. The area, lying on Federal Highway 1, some 25 kilometres south of Kuala Lumpur, falls within the ambit of the Klang Valley development, which forms the focus and main engine for Malaysia's drive towards Vision 2020.

During the period 1990 to 2000, the population of the Kajang area grew by more than 50%. Employment rose by a similar or slightly greater amount. Despite the economic recession of 1997, growth has re-established itself and is forecast to continue and accelerate in the period up to 2020. As a consequence of the developing situation, there is an urgent demand for new and upgraded infrastructure, particularly in the field of transport, which is vital to the local economy.

The Kajang Traffic Dispersal Ring Road is designed to provide the much needed framework of roads to completely re-structure traffic patterns within the area, provide essential relief to the severely congested existing roads, and to form important urban bypass elements within the national highway system of federal roads.

In 1995, in recognition of the area's potential and to expedite development of the road infrastructure, Barisan Minda and Sungei Way Holdings established the joint venture company, Barisan Minda Sungei Way JV. The joint venture company duly initiated procedures to construct and operate the proposed ring road as a privatised highway under the Government's Build-Operate-Transfer (BOT) arrangements and appointed MAG Technical & Development Consultants to undertake the necessary traffic studies to prepare traffic and revenue forecasts. In December 1995, the joint venture also set up Sistem Lingkaran - Lebuhraya Kajang Sdn. Bhd. to undertake the concessionary rights to manage and toll the new highway system.

MAG Technical & Development Consultants duly presented their report on traffic and revenue forecasts in January, 1996. In the subsequent period, 1997 to 2000, MAG undertook and reported on a series of traffic studies of the ring road proposals to reflect the changed circumstances arising from the 1997 recession.

MAG presented their last report on traffic and revenue forecasts in July, 2002 and subsequently were requested to undertake two reviews to ascertain the need for any changes arising from updated Government economic and demographic forecasts. These found that the main Study had broadly anticipated the revised forecasts and that no changes to the 2002 forecasting exercise were warranted.

This document introduces MAG Technical & Development Consultants, their credentials as an independent consultant and summarises their report on study methodology and findings.

2. MAG Technical & Development Consultants

MAG Technical & Development Consultants is a wholly Malaysian owned firm founded in 1978. It is active in the fields of land-use transport planning, traffic engineering, traffic impact studies and development both in Malaysia and overseas. It has successfully undertaken more than 700 projects involving a range of services which includes :

- Urban and Regional Planning
- Highway and Toll Studies
- Infrastructure Masterplan Studies
- Land-Use Transportation Studies
- Traffic Studies
- Environmental Planning Studies
- Financial and Economic Studies

MAG's recent relevant experience includes :

- Traffic Dispersal Study For Interchange At Persiaran Lagun Selatan, Sunway (2002)
- Batu Pahat - Kluang Highway Improvement Study (2001)
- Kajang Ring Road (1995/6, 1999, 2000 and 2001).
- Selangor Infrastructure Master Plan (2001)
- Kajang Seremban Highway (1996 and 2000).
- Traffic Study For Interchanges At LDP And Jalan Puchong Utama And Traffic Master Plan For Surrounding Area (2001)
- Shah Alam Expressway (1995 - 2000).
- Wuhan Yichang Highway, Peoples' Republic of China (1997/1998).
- Lebuhraya Damansara Puchong (1995).
- Yangjiang - Zhangjiang Expressway, Peoples' Republic of China (1994).

3. The Kajang Ring Road

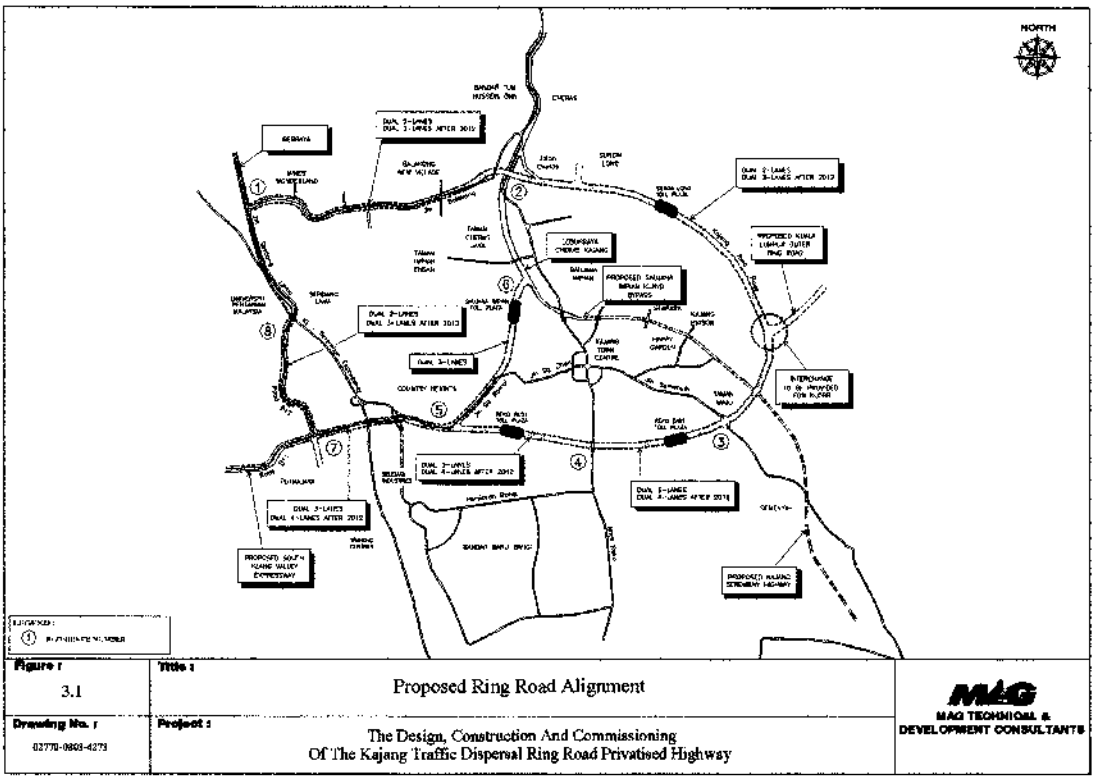
The Kajang Ring Road is in all some 37 kilometres in total length, encircling the town of Kajang and its neighbouring areas. It links and interchanges with several main roads including the Federal Highway 1 and Lebuhraya Cheras Kajang. From Federal Highway 1, it runs along Jalan Balakong to Lebuhraya Cheras Kajang, on to Sungai Long and round Kajang prison to an interchange with Jalan Semenyih (Federal Highway 1). From Jalan Semenyih, the ring road runs westwards, south of Kajang, via Kampung Sungai Ramal, interchanging with Jalan Reko, Jalan Sungai Ramal and the North South Expressway at the Country Heights interchange, before terminating on road B13 at Universiti Pertanian Malaysia (UPM). At Kampung Sungai Ramal, a spur road takes off northeastwards from the ring road to interchange with Lebuhraya Cheras Kajang at the Sungai Long link.

The proposed ring road varies in width from dual two lane to dual three carriageways, but with provision to widen some road sections to dual three and dual four lane carriageways respectively.

The Kajang Ring Road will be operated as an 'open' toll system with four toll plazas. These are located at:

- Sungai Long - on road section 2-3
- Reko East - on section 3-4
- Reko West - on section 4-5
- Saujana Impian - on section 5-6

These locations, the plan layout of the proposed ring road, its road section numbers and widths are shown in Figure 3.1.



4. The Traffic Study

The detailed traffic study undertaken by MAG processes a wide range of relevant information through a series of logical steps to develop forecasts of toll traffic volumes over the 30 year concession period. Fundamental information was obtained from traffic surveys specifically undertaken for the study and from other important transportation studies carried out within the Klang Valley and its environs. Due account was taken of trends and official forecasts of economic growth, population and employment, vehicle ownership and proposed infrastructure plans for the area. The methodology adopted gives careful consideration to competing routes and any deterrent effect on route choice that tolled highways may cause.

The main steps used in the traffic studies were as follows:

a) Definition of Study Area and Study Area Zones

Because of the interaction between and interchanges with the economically active surrounding areas, the study area extends to cover Kuala Lumpur and most of the Klang Valley, but the prime focus and greatest detail was concentrated on the area containing the proposed highway. The traffic and zoning system used to define the spatial distribution of the relative parameters describing the area was developed from that used in the Klang Valley Transport Study carried out by the Japanese International Cooperation Agency (JICA). Zone boundaries and sizes were adjusted to account for new development and to give better definition of major traffic generators in the areas of greatest interest.

b) Traffic Surveys and Road Inventories

Traffic surveys were undertaken at key screen-line locations in the Kajang area during December, 1995. These recorded data on hourly and daily traffic volumes by vehicle type. Similar surveys were also undertaken for the subsequent review study. The screen-lines were located to maximise information along the corridors of the proposed route and to take in to account the proposed toll plaza locations. Road inventory surveys and moving observer travel time surveys of roads in the Kajang area were also carried out during this period.

c) Coding the Existing Network

A study area road network of all major expressways, roads and other significant road links was developed from inventories of physical and operational characteristics. The coded network information included road classification and type, link length, capacity and speed characteristics. Within the Kajang area, the network was necessarily detailed, but this coarsened progressively away from the more important areas.

d) Assembling Support Data

In addition to surveyed information specifically collected for the project, a wide range of supporting data in various disciplinary fields was assembled from government statistics and other sources. These included:

Annual Traffic Census Data - historic and current traffic flow information for all relevant survey stations was extracted from published data prepared by the Highway Planning Unit (HPU) of Jabatan Kerja Raya (JKR). This data is derived from traffic counts made at permanent survey point locations twice a year over 24 hours for a period of 7 days. This source also provided the data for supplementary screen-lines used to independently check and validate the accuracy of the traffic model.

Other Transport Studies - data from other transport studies was used to derive additional information on traffic flows, demographic data, road network details, etc. One of the most important sources was the JICA study mentioned above.

Economic and Demographic Data - Extensive use was made of statistical data from Government sources. Central to these were the Malaysian 5 Year Plans, Economic Reports by the Ministry of Finance and Local Authority information.

Land Use Plans and Development Approvals - all relevant data was extracted from statutory land use plans published by the Local Authorities in the area. Details were obtained of all approved developments and those in the pipeline, that will have a bearing on the future traffic in the area and are likely to go ahead.

Matrix of Inter-zonal traffic flows - An inter-zonal traffic flow matrix originally derived from the JICA transport study of the Klang Valley was used as the starting point for the creation of a 1995 base year traffic matrix. This entailed modifying traffic patterns to reflect up-to-date survey data and adjustment to the new zoning system.

Vehicle Ownership Data - Historic and current vehicle registration data from the HPU's annual publication, 'Road Traffic Volumes', was extensively referenced.

List of Approved Transport Projects - an agreed list of all road projects affecting the area was drawn up following consultations with Lembaga Lebuhraya Malaysia (LLM) and JKR. Details of alignments, road standards and opening dates to traffic were also obtained.

e) Review of the Existing Situation

The daily traffic flows observed on the main roads in and around Kajang were of the order of 22,000 - 63,000 vehicles. Due to capacity problems at road junctions, traffic passing through the Kajang town centre travels at relatively low speeds. Peak hour journey times for travel in the town centre were noted to be of the order of 25 - 35 kph, rising to 35 - 50 kph further away from town. These speeds have fallen even further in the intervening years as traffic demand has grown.

In Kajang, the highest traffic flows are observed at Lebuhraya Cheras Kajang, between Balakong and Kajang. Survey carried out near the Lebuhraya Cheras Kajang toll plaza, indicated traffic flows of around 80,000 tollable vehicles per day.

Jalan Sungai Ramal and Jalan Sungai Chua, which are basically single carriageway 2-lane roads, carried 45,000 to 58,000 vehicles per day in 1995, and both roads are now operating at or close to design capacity limits. Due to the presence of closely spaced road junctions, the road capacities are limited. The section of Jalan Sungai Chua close to Kajang town is operating at saturation limits. Due to numerous at-grade signalised junctions, the road geometry and gradients, traffic on this road travels relatively slower than on other arterial roads.

Roads in Kajang town centre are mostly single carriageway with on-street, kerbside parking, and no stopping restrictions. Congestion is therefore problematic and sometimes chronic, especially during peak periods or when there is heavy rainfall.

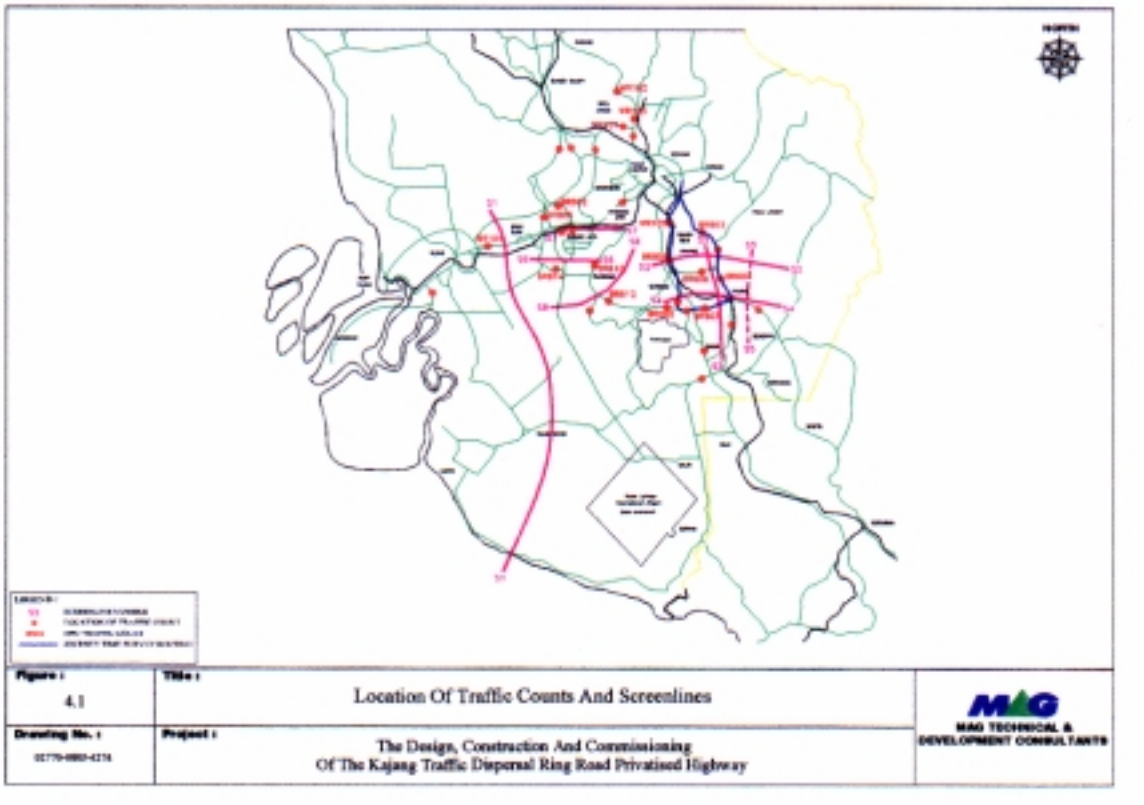
Jalan Semenyih, part of Federal Highway 1, is a single 2-lane road, though additional lanes have been provided at signalised junctions east of Kajang, leading to recently completed residential estates.

Jalan Reko is the most direct road connecting Kajang with Bangi. This road has a single 2-lane carriageway. Daily traffic flows ranged from a high of 40,300 vehicles on the section closer to Kajang, to a low of 18,500 towards Bangi.

f) Analysis of Growth Indicators

Traffic Growth - Historic growth rates for traffic in the Kajang area have been abstracted from the HPU record source referred to above. Table 4.1 shows traffic flow records for the period 1986 -2001 for 7 survey points located on roads that will have a direct influence on the traffic flows using the ring road. The location of these survey points relative to the proposed ring road is shown in Figure 4.1.

14.0 PRINCIPAL TRAFFIC CONSULTANT'S REPORT *(Cont'd)*



The table 4.1 shows traffic strong growth on all census stations through the period 1986 - 2001. This is particularly so for the roads with results for the post recession period 1997 - 2001, where growth is averaging in excess of 20% per annum.

Table 4.1 : Historic Traffic Growth

	HPU STATION	YEAR																Annual Growth % Per Annum		
		1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	1986 -1999	1990 - 1997	1997 -2001
1	HR001	4,336	5174	4,488	5,705	5,526	6,997	8,068	9,130	10,182	18,113	24,747	30,306	31,350	33,469	30,449	30,431	6.9%	27.5%	27.6%
2	HR002	1,642	1,222	1,672	1,568	1,818	2,056	2,385	2,709	5,816	14,246	24,192	22,075	23,158	27,206	33,289	76,603	2.6%	42.9%	36.9%
3	HR003	39,178	38,758	42,358	44,923	53,077	63,434	65,721	71,543	107,360	77,720	90,255	102,530	-	-	-	-	12.5%	9.9%	-
4	HR004	24,665	26,558	31,554	32,009	31,952	35,132	39,612	41,039	42,971	43,273	42,059	42,529	42,050	53,085	54,971	89,214	6.7%	6.2%	20.3
5	HR006	6,897	8,439	10,560	15,142	19,324	19,387	22,885	23,911	19,759	27,641	28,910	32,263	34,444	31,627	-	-	29.6%	7.6%	-
6	HR007	17,107	22,140	18,472	21,083	24,835	26,663	24,990	23,465	26,433	34,516	36,813	42,881	46,297	43,473	-	-	9.8%	8.1%	-
7	HR009	14,118	16,927	16,112	17,985	20,133	14,494	20,359	20,070	30,828	29,856	50,553	61,947	127,843	-	-	-	9.3%	17.4	-

Traffic growth is a function of the following causal demographic and socio-economic parameters:

- Population Growth
- Employment Growth
- Gross Domestic Product (GDP) per capita
- Vehicle Ownership Growth
- Future Development Within The Area

14.0 PRINCIPAL TRAFFIC CONSULTANT'S REPORT *(Cont'd)*

Population and Employment Growth - Table 4.2 shows population and employment statistics for the period 1990 -2000. These show how the rural areas of Selangor have experienced the highest growth rates, well in excess of the national average and the Kuala Lumpur area. Although growth rates are forecast to decline with time, Selangor is forecast to enjoy continued above average growth and indications on the development front, are that the Kajang area will attract a substantial part of this growth.

Table 4.2: Population And Employment Estimates

Region	In Thousands				Annual Growth Rate (%)		
	1970	1980	1990	2000	1970 - 1980	1980 - 1990	1990 - 2000
	Population						
Kuala Lumpur	648	920	1,202	1,424	3.6	2.7	1.7
Selangor	982	1,426	2,309	3,303	3.8	4.9	3.6
KL + Selangor	1,630	2,346	3,511	4,727	3.7	4.1	3.0
Malaysia	10,439	13,136	17,923	23,263	2.3	3.2	2.6
	Employment						
Kuala Lumpur	-	-	620	698	-	-	1.2
Selangor	-	-	1,125	1,294	-	-	1.4
KL + Selangor	-	-	1,745	1,992	-	-	1.3
Malaysia	-	-	7,915	9,087	-	-	1.4

Source: *Census and Statistics Department, Malaysia*
Seventh Malaysia Plan
A Study on Integrated Urban Transportation Strategies for Environmental Improvement in Kuala Lumpur" (also known as SMURT) - commissioned in August 1998
Selangor Infrastructure Masterplan (2001)

GDP Growth - Prior to the late 1997/1998 financial crisis in Asia, the Malaysian economy was buoyant and recorded an 8.0% growth in 1996, making this the ninth year in which the economy sustained a growth rate of over 8%. In 1997 GDP growth slowed to 7.8%, before contracting sharply by -7.5% in 1998. This recession was the most severe since independence in 1957.

By early 1999, the economy showed signs of recovery and recorded growth of 5.4%. In 2000, GDP grew by 8.3%, before again slowing to 0.4% in 2001. Since 2001, the economy has again picked up, albeit at a more modest GDP growth rate of 4.5%. The national GDP record is shown in Figure 4.2.

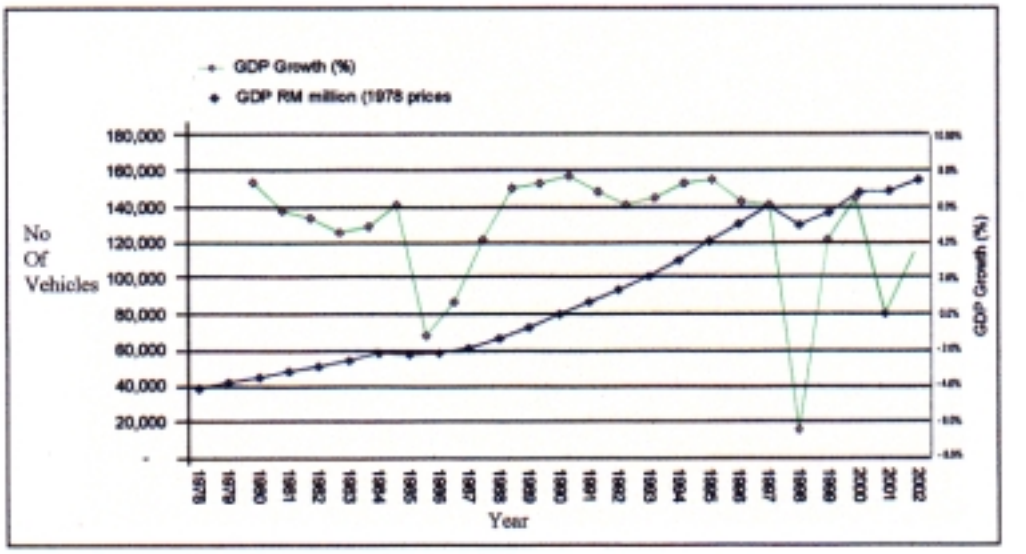


Figure 4.2 : Historic National Gross Domestic Product

The Government's policy of diversification to develop and sustain the natural resources of the country and to move towards a fully industrialised society by year 2020 provides a robust platform on which the country can continue to recover from these economic crises. These policies, together with the introduction of the 1998 fiscal controls on capital flows and pegging of the ringgit to the US dollar, have aided the economic recovery.

Selangor, as the engine responsible for some 30% of the national GDP, is well placed to benefit from growth and better able to withstand periods of recession.

Vehicle Ownership Growth - Figure 4.3 shows the growth in the numbers of vehicles registered in Kuala Lumpur and Selangor over the period 1985 - 2001. The figure shows the relative decline in motorcycle growth rates compared with that of cars. Generally speaking there is a good correlation between vehicle and GDP growth rates.

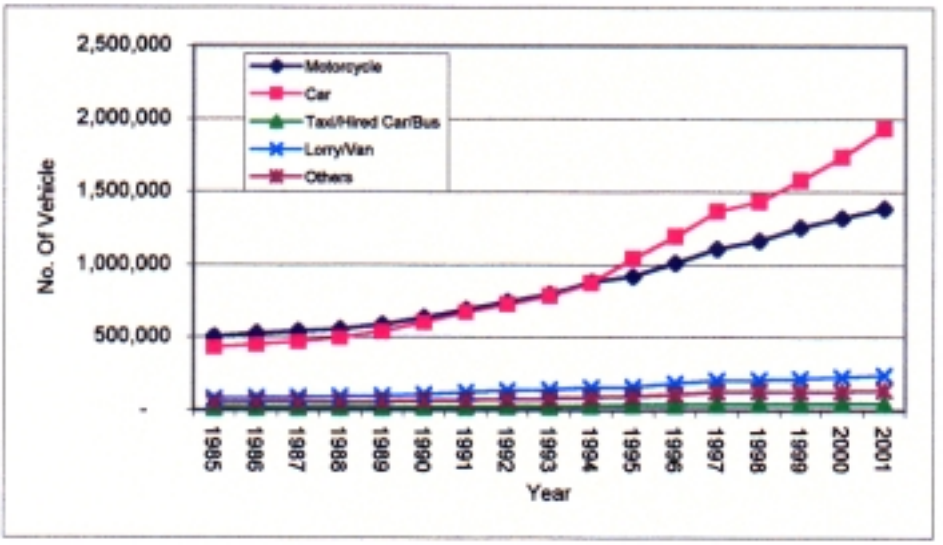


Figure 4.3 : Licensed Vehicles In Kuala Lumpur And Selangor

g) Development of the Traffic Model

The traffic model uses statistically derived mathematical relationships to relate traffic flows to the basic predictable underlying causal factors listed above. These data are input at two levels; land use parameters and demographic statistics are input at the zonal level, economic criteria are input on a broader basis relating to wider areas. Starting from the input of an initial inter-zonal traffic flow matrix, the procedure includes the means to adjust certain coefficients within the model to enable it to adjust the trip matrix to reproduce existing traffic patterns and flows. The resulting traffic matrix is then assigned to the road network using routing based on generalised cost that reflects the capacity and operational characteristics of individual road links. This stage of replicating existing traffic flows is termed "model calibration". Once calibrated, the model undergoes a "model validation" stage, in which its ability to satisfactorily replicate flows on a set of independent screen-lines, not used in the calibration procedure is checked out.

The model was developed using the SATURN (Simulation and Assignment of Traffic to Urban Road Networks) suite of computer programs developed by the Institute of Transportation Studies at the University of Leeds in the United Kingdom. SATURN is a comprehensive transport planning package that has become an industry standard used through the world.

14.0 PRINCIPAL TRAFFIC CONSULTANT'S REPORT *(Cont'd)*

The steps in the model development are :

Traffic Generation - this step relates daily vehicle trip ends to zonal parameters. The relationship used is based on a regression equation derived by JICA suitably modified to reflect changes that have occurred over time since the JICA study. The principal adjustments reflect changes in GDP per capita and the changing balance in car and motorcycle ownership. The updated zonal trip ends were used in conjunction with surveyed screen-line traffic flows to interactively adjust the traffic matrix until screen line totals within the matrix matched those input. The initial output from this step was an inter-zonal 1995 base year daily traffic matrix. Over the intervening years, the same technique has been applied to update the model to more recent base year situations and this process culminated with the production of the final base year matrix for the year 2000.

Traffic Assignment - traffic is assigned to the least generalised cost routes between zones. The generalised costs used to assign the inter-zonal traffic are the aggregate sums of travel costs along each individual road link of the route. The costs are made up of behavioural time costs, travel distance costs and any direct monetary charges involved. The behavioural costs represents the vehicle occupants' perceived value of their time; the travel distance cost is the perceived vehicle operating cost, which tends to ignore many past out-goings such as purchase cost, insurance and maintenance costs, etc. and the direct monetary costs are any toll charges involved in the journey.

The assignment procedure takes link operating conditions, such as congestion, in to account using capacity restraint methods whereby speeds are adjusted to reflect traffic volume. This is achieved by the use of speed /flow relationships for the various categories of roads in the network. This procedure allows the possibility that as some routes become congested and their speeds reduce, traffic diverts to less congested alternatives.

To reflect the effect of different vehicle types on road capacity, the assignments are carried out in units of equivalent passenger car units (pcu's). Table 4.3 sets out the standard conversion factors used to achieve this. Ultimate daily road capacity limits were set at 180,000 and 240,000 vehicles per day for the dual three and dual four lane sections of the ring road respectively.

Table 4.3: PCU Factors

Vehicle Type	PCU Factor
Motorcycles	0.40
Car/taxi/private or light van	1.00
Light and medium lorries	1.75
Heavy lorries	2.50
Buses	2.50

To make allowance for the varying traffic conditions during different periods of the day, daily traffic was disaggregated in to three typical time periods and typical hourly matrices produced for these using proportions derived from HPU data. Three separate assignments were undertaken and the results combined to obtain the daily flows. This reflects variations in vehicle mix by time of day and allows the possibility of different inter-zonal routes to be followed at different times of day because of prevailing road conditions. The relationship between the three peak periods and daily flows for the three vehicle categories modeled are shown in Tables 4.4 and 4.5.

Table 4.4: Peak Hour Percentages Of Daily Flow By Vehicle Type

Time Period	Goods Vehicles	Private vehicles	Motorcycles
AM peak	4.5%	6.5%	8.9%
PM peak	5.0%	6.0%	8.0%
Off-peak	6.4%	5.6%	4.9%

Table 4.5: Expansion Factors

Expansion Factors	AM peak	PM peak	Off-peak	12 to 24-hour
	2	3	7	1.4

Model Calibration - The model was adjudged calibrated when it was able to successfully replicate observed screen line flows within 10%, both within the matrix screen line checks and after traffic assignment to the existing road network.

Model Validation - the independent model validation checked assigned traffic flows against observed flows along a set of independent screen lines, not used in the calibration. The comparison demonstrated that the model was capable of reproducing these screen-line flows with margins ranging between +/- 5 - 10%. As this level of accuracy is within normal acceptable tolerances, the model was considered to constitute a practical tool to undertake the traffic forecasting exercise.

The traffic forecasting procedure entails defining the model input parameters for key forecast years and running the model to forecast traffic flows for these years. The forecast years modeled in this way are 2004, 2009, 2014, 2019 and 2036. The main key input parameters are based mainly on macro control data from Government and Local Authority studies and forecasts, backed where necessary, by independent research. The macro data was suitably disaggregated to either study area or zonal level for input to the model.

The input parameters assembled for each of the key forecast years covered the following information;

Future Land Use Data - Forecasts of zonal population and employment for the study area were calculated for each of the key forecast years. This information was assembled from a combination of sources which included known project details, Government and Local Authority plans and forecasts, land availability, etc. The growth implicit in this input is summarised in Table 4.6.

Table 4.6: Summary Of Model Input Assumptions

	Item	Assumptions
1	Population – Annual Growth, %pa	
	2000 – 2005	2.0
	2005 – 2010	1.8
	2010 – 2020	1.7
	beyond 2020	1.6
2	Employment – Annual Growth, %pa	
	2000 – 2005	2.8
	2005 – 2010	2.5
	2010 – 2020	2.5
	beyond 2020	2.3
3	GDP – Annual Growth, %pa	
	2000 – 2005	3.0
	2005 – 2010	6.0
	2010 – 2020	4.5
	beyond 2020	4.5
4	Value of Time - RM/hour, 2000	(Private / Goods)
	2005	10.80 / 18.70
	2010	13.20 / 25.10
	2020	14.90 / 31.30
	beyond 2020	+2% per annum
5	Highway Infrastructure Assumptions	See Table 4.7
6	Annualisation Factor	See Table 4.11

Forecast Economic Data and Growth - the most up-to-date forecasts of GDP per capita growth available from the Malaysian Plan, Bank Negara, The Ministry of Finance and other economic forecasting agencies were used as a basis to establish the realistic, but conservative, projected economic growth figures for the concession period. The growth rates assumed for the concession period are given in Table 4.6.

Future vehicle Ownership and Usage - In line with past trends, the forecasts of vehicle ownership assume that growth will continue in line with forecasts of GDP before gradually declining towards a saturation level. Saturation levels for the study area are expected to be around the level of 0.45 cars per person.

Future Road Network Details - The coded road networks input to the model for each of the key forecast years were updated to include all future highway schemes within the study area. This included projects that are firmly committed and those proposed. The list, with a description and projected timing of the highway schemes, is set out in Table 4.7.

Table 4.7: Committed And Proposed Major Highway Infrastructure Assumptions

INFRASTRUCTURE	DESIGN STANDARD	METHOD OF TOLLING	EXPECTED COMPLETION DATE	STATUS OF PROJECT
West Coast Expressway [1]	Dual 3-lanes	Closed toll	2005 (earliest)	-
Lebuhraya Damansara Puchong [2]	Dual 3-lanes	Open toll	Completed	-
Shah Alam Expressway[3]	Dual 3-lanes, segregated motorcycle lanes	Open toll	Completed	-
Middle Ring Road 2 eastern sections [4]	Dual 3-lanes, at-grade junctions. Grade separation by 2005	Toll-free	Completed	-
North South Expressway Central Link [5]	Dual 3-lanes	Closed toll	Completed	-
Sungai Kelang Elevated Road [6]	Dual 2-lanes	Open toll	Completed	
Puchong – Sungai Besi Road [7]	Dual 2-lanes with at-grade junctions	Toll-free	Completed	-
New Pantai Expressway [8]	Dual 2-3 lanes	Open toll	2002/2003	
South Klang Valley Expressway [9]	Dual 3-lanes	Closed toll likely	2005 (earliest)	-
Sungai Besi Improvement [11]	Dual 3-lanes	Open toll	Completed	-
Lebuhraya Cheras Kajang (Jalan Cheras improvement) [12]	Dual 3-4 lanes	Open toll	Completed	-
Northeast Expressway [13]	Dual 3-lanes	Open toll	2005 (earliest)	-
KL Outer Ring Road [14]	Dual 3 lanes	Likely to be closed toll	2020 (proposed)	Preliminary study has completed
Dedicated Highway Link [15]	Dual 3-lanes, expressway standard	Open toll	2005 (earliest)	-
Kajang Ring Road [16]	Dual 2, 3-lanes, expressway standard	Open toll	Mid 2004	On going
Lebuhraya Wangsa Keramat [18]	Dual 3 lanes	No toll		On hold
Kajang – Seremban Highway	Dual 3 lane	Closed toll	2006	

Values of Vehicle Occupants Time - The values of perceived time used to calculate future behavioural costs for inclusion in the generalised costs used in the traffic assignment process were assumed to rise in line with real increases in income. The various model inputs, expressed in terms of year 2000 monetary values, are set out in Table 4.8.

Table 4.8 : Future Value Of Time In RM/Hours
At 2000 Prices

Year	Private Vehicles	Goods Vehicles
2000	10.10	16.00
2005	10.80	18.70
2010	13.20	25.10
2020	14.90	31.30

Toll Charge Assumptions - The toll rates assumed for the various toll roads in the study area for the duration of the concession period are those agreed by Government. The values included for the Kajang Ring Road are shown in Table 4.9.

Table 4.9: Kajang Ring-Road Toll Charges (RM cash prices)

Year	Class 0 (motorcycle)	Class 1 (car)	Class 2 (light lorries with 2 axles)	Class 3 (medium and heavy lorries with more than 2 axles)	Class 4 (taxi, hired car)	Class 5 (bus)
2004 – 2008	0	RM1.00	RM2.00	RM3.00	RM0.50	RM1.00
2009 – 2013	0	RM1.30	RM2.60	RM3.90	RM0.60	RM1.30
2014 – 2018	0	RM1.80	RM3.60	RM5.40	RM0.90	RM1.80
2019-2036	0	RM2.40	RM4.80	RM7.20	RM1.20	RM2.40

Future Traffic Vehicle Composition - To calculate the composite toll values input to the assignment generalised cost procedures, the vehicle compositions of the various traffic flows shown in Table 4.10 was assumed. These figures make allowance for the differential growths in vehicle types and the gradual switch from motorcycles to private car. These assumed compositions were also used to disaggregate forecast traffic flows into toll categories.

Table 4.10: Typical Vehicle Composition

Vehicle Category	Class/Vehicle Type						Total
	0	1	2	3	4	5	
	Motorcycle	Car/Van	Medium Lorry	Heavy Lorry	Taxi	Bus	
Goods vehicles	-	-	75%	25%	-	-	100%
Private vehicles and buses	-	97%	-	-	1	2%	100%
Motorcycle	100%	-	-	-	-	-	100%

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h) Traffic Model Results

The model runs for each of the forecast years produced the average weekday tollable traffic loadings (excluding motor cycles) shown in Table 4.11. To disaggregate the flows into the vehicle toll categories, the traffic compositions set out in Table 4.10 were used. To factor these up to annual tollable traffic, the annualisation factors given in Table 4.12 were applied. Forecasts for the intermediate years between the forecast years were calculated by interpolation.

Table 4.11: Toll Plaza Traffic Flows Forecast By Model– tollable vehicles per day

Year	Toll plaza			
	Sg. Long	**Saujana**	**Reko East**	**Reko West**
2004	28,382	52,811	48,101	47,284
2009	67,119	104,170	97,959	93,289
1014	92,103	135,034	128,420	120,409
2019	114,578	164,054	156,831	144,017
Road capacity Reached by	**2031**	**2021**	**2029**	**2032**

Table 4.12: Annualisation Factors

Vehicle Class	Annualisation Factors
0 – motorcycles	na
1 - car/private or light van	350
2 - light and medium lorries	340
3 - heavy lorries	340
4 – taxis	350
5 buses	340

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5. Traffic Forecasts

The outcome of the traffic studies described above, produced forecasts of average weekday tollable traffic at each of the toll plazas over the duration of the concession period. These forecasts are shown in Table 5.1 and graphically in Figure 5.1. For a full understanding, the data should be read in conjunction with Table 4.7, which details the programme of highway construction within the study area. As can be seen from the stepped variations in the traffic flows along the ring road, some new roads compete for traffic and cause small temporary reductions in flow before being offset by traffic growth. Other roads tend to complement flows on the ring road by acting as feeders to the system.

The average growth rates implicit in the forecasts for various time periods are given in Table 5.2. All the sections of ring road containing the toll plazas are shown to reach their ultimate capacity within the concession period.

Table 5.1: Average Daily Tollable Traffic (Vehicles/Day)

	Toll Plaza			
Year	**Sg Long**	**Saujana**	**Reko East**	**Reko West**
2004	28,382	52,811	48,101	47,284
2005	39,425	68,978	63,479	61,765
2006	47,317	79,280	73,513	70,992
2007	55,209	89,578	83,546	80,218
2008	63,101	99,880	93,578	89,445
2009	67,119	104,170	97,959	93,289
2010	74,581	113,909	107,445	102,012
2011	82,041	123,649	116,931	110,736
2012	89,503	133,387	126,418	119,459
2013	93,609	138,369	131,366	123,670
2014	92,103	135,034	128,420	120,409
2015	98,651	143,777	136,911	127,711
2016	105,198	152,518	145,403	135,012
2017	111,744	161,261	153,894	142,313
2018	118,291	170,003	162,385	149,613
2019	114,578	164,054	156,831	144,017
2020	120,587	172,078	164,624	150,718
2021	126,596	180,000	172,417	157,419
2022	132,097	180,000	179,524	163,493
2023	137,285	180,000	187,892	171,115
2024	145,871	180,000	200,943	183,002
2025	151,183	180,000	209,510	190,806
2026	156,494	180,000	218,077	198,610
2027	161,805	180,000	226,647	206,414
2028	167,114	180,000	235,214	214,217
2029	172,426	180,000	240,000	222,022
2030	177,737	180,000	240,000	229,826
2031	180,000	180,000	240,000	237,630
2032	180,000	180,000	240,000	240,000
2033	180,000	180,000	240,000	240,000
2034	180,000	180,000	240,000	240,000
2035	180,000	180,000	240,000	240,000
2036	180,000	180,000	240,000	240,000

Table 5.2: Study Area Overall Traffic Growth Rates

Period	**Study Area Annual Traffic Growth - % p.a.**
2000 – 2005	3%
2005 – 2010	6%
2010 - 2020	4.5%

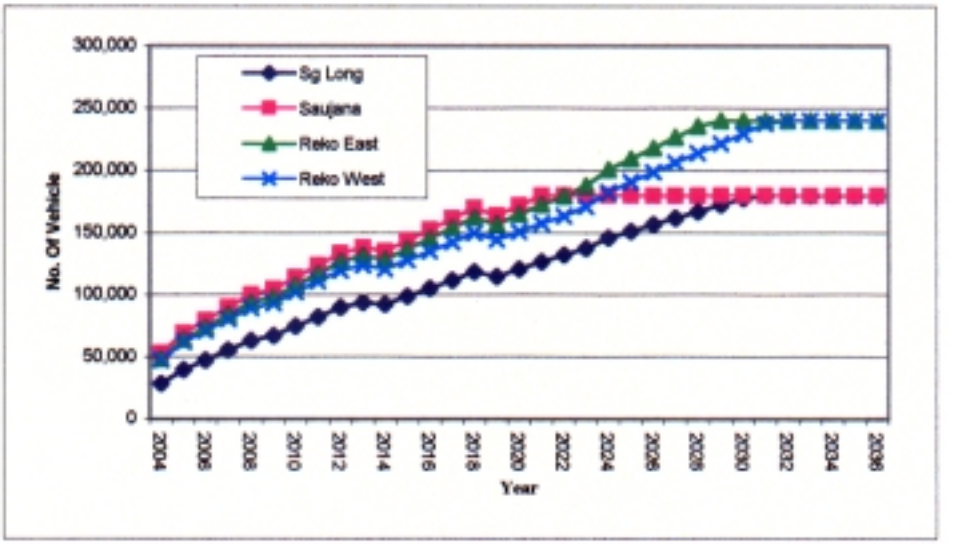

Figure 5.1 : Average Daily Tollable Traffic

6. Toll Revenue Forecasts

Converting the average weekday forecasts to annual tollable traffic flows by vehicle toll category by the methods described above and factoring up by the appropriate toll charges produces the estimated revenues shown in Table 6.1. The results are shown graphically in Figure 6.1. The periodic introduction of revised toll charges and the levelling off in income once the roads are operating at capacity can be clearly seen.

Table 6.1: Annual Revenue (000 RM/YEAR)

Year	Sg Long	Saujana	Reko East	RekoWest	Total
2004	11,367	21,356	19,475	19,073	71,271
2005	15,843	27,979	25,781	24,988	94,592
2006	19,059	32,231	29,922	28,785	109,997
2007	22,273	36,481	34,063	32,581	125,399
2008	25,489	40,733	38,204	36,377	140,803
2009	35,259	55,256	52,018	49,345	191,878
2010	39,209	60,480	57,104	54,008	210,800
2011	43,157	65,703	62,192	58,671	229,722
2012	47,106	70,925	67,280	63,335	248,645
2013	49,330	73,659	70,015	65,643	258,648
2014	67,333	99,716	94,970	88,661	350,680
2015	72,253	106,351	101,469	94,194	374,267
2016	77,173	112,984	107,969	99,727	397,851
2017	82,091	119,619	114,468	105,259	421,437
2018	87,010	126,252	120,967	110,789	445,018
2019	112,499	162,619	155,984	142,349	573,451
2020	118,520	170,738	163,939	149,118	602,316
2021	124,539	178,755	171,892	155,888	631,074
2022	130,067	178,899	179,155	162,037	650,160
2023	135,330	179,080	187,784	169,811	672,005
2024	143,945	179,240	201,101	181,823	706,111
2025	149,335	179,389	209,936	189,784	728,443
2026	154,721	179,529	218,771	197,744	750,765
2027	160,109	179,653	227,608	205,704	773,074
2028	165,494	179,772	236,443	213,664	795,373
2029	170,882	179,881	241,473	221,625	813,860
2030	176,270	179,984	241,677	229,585	827,516
2031	178,630	180,081	241,869	237,545	838,126
2032	178,741	180,169	242,048	240,070	841,028
2033	178,848	180,254	242,217	240,218	841,536
2034	178,953	180,334	242,374	240,348	842,009
2035	179,054	180,413	242,526	240,478	842,472
2036	179,149	180,483	242,669	240,596	842,896
Total	**3,509,038**	**4,258,999**	**4,885,363**	**4,589,825**	**17,243,224**
Share	**20%**	**25%**	**28%**	**27%**	**100%**

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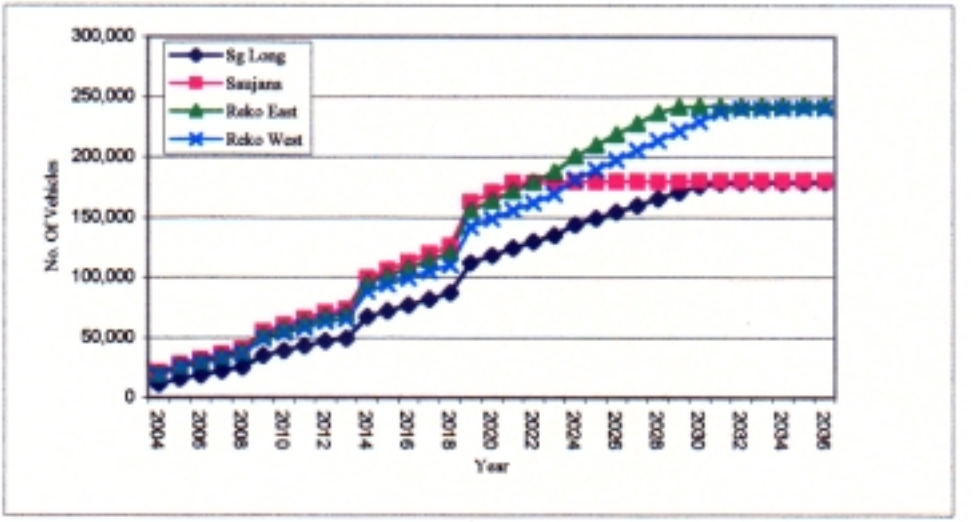

Figure 6.1 : Annual Revenue

Despite the major recessions experienced post 1997 and the second less serious downturn in 2000, the prognostications for the Kajang area appear favourable. Growth in the area has re-established itself and now in 2003, appears to be outstripping government economic growth forecasts. Even with relatively conservative assumptions on economic growth, the traffic forecasts for the proposed Kajang Traffic Dispersal Ring Road look reasonably favourable and form a sound basis for the financial projections of toll revenue

The proposed highway will bring much needed relief to the town centre of Kajang and this in itself could release further development potential. The highway system will also form an integral part of the national road system and will make Federal Highway 1 a much more attractive traffic corridor for drivers and developers alike.

Yours faithfully,
MAG TECHNICAL & DEVELOPMENT CONSULTANTS

GOH BOK YEN
Principal