6

INTELLIGENT TRANSPORT SYSTEM (ITS) DEVELOPMENT AND DEPLOYMENT IN THE REGION AND MALAYSIA

6.0 INTELLIGENT TRANSPORT SYSTEM (ITS) DEVELOPMENT AND DEPLOYMENT IN THE REGION AND MALAYSIA

6.1 Necessity of ITIS

One of the main reasons that ITIS is recommended to the study area is that a large amount of benefits both direct and indirect can be expected with its introduction.

The current traffic situation in the Study Area suggests great potential for the deployment of ITIS to optimise the utilisation of existing road transport infrastructure and the SMURT-KL Study conducted in 1998 lends support to its need.

According to the opinion survey conducted in this Study, more than 60% of the drivers interviewed regard various traffic information as important to them. Among the information, 'severity of congestion', 'route guidance' and 'cause of congestion' ranked highest and the percentage of respondents who consider these kinds of information very important or important, are 96%, 89% and 83%, respectively.

According to the same opinion survey, an overwhelming 94% of drivers responded that they would take alternative routes if information on traffic congestion were provided to them.

The collective loss time of all drivers could be very substantial and the nation's productivity is thus seriously affected by traffic problems. ITIS can contribute significantly in mitigating CO_2 emissions thereby preserving the environment.

6.2 Current ITS Services & Development in the Region

The existing traffic reports on Kuala Lumpur from FM radio broadcasting station rely chiefly on observations of traffic condition through TV camera installed at ten locations in the city. The coverage area is limited and no quantitative data are available.

Some toll road operators have installed vehicle detector, TV camera, and variable message sign on their highways for traffic management purposes. But the existing system is not well designed to provide real-time congestion information.

The current effort on traffic management is piecemeal and very little co-ordination seems to exist among the toll road operators, DBKL, JKR and other agencies. No organisation collectively handles all traffic information. An integrated and systematic approach is required to manage more efficiently the road network in the study area as a whole. Introduction and operation of an Integrated Transport Information System provides a good opportunity to establish such an organisation and to implement network-wide approach to better manage the traffic in the study area.

A number of ITS user services are in fact already in operation in the study area. The Kuala Lumpur City Hall (DBKL) is the only municipal council currently in the Study Area that operates a centrally computerised traffic control system.

There are several toll road operators who operate the toll roads in the Klang Valley and MSC region. Some of them have virtually no traffic management facilities on the toll road, while others have installed vehicle detectors, TV cameras and variable message signs

6.3 Selection ITIS Services in the Study Area

Eight (8) ITIS user services were selected for further examination for purposes of introducing themto the Klang Valley and the MSC.

- Pre-trip traveller information system
- En-route driver information system
- Traveller services information system
- Route guidance system
- Parking availability information system
- Environmental monitoring system
- Emergency vehicle management system
- Public transportation information system

The factors in the prioritising of user services are as follows:

- Need for user service
- Beneficiary and potential amount of benefits
- Information availability
- Technology used
- Ease of implementation

Each user service is rated according to the evaluation criterion. The priority is finally classified into four groups, A through D, where A has the highest priority whilst D has the lowest. See Table 6.1.

Pre-trip traveller information and en-route driver information systems belong to Group A. They are highly needed, produce large benefit and are relatively simple to implement. Their immediate introduction is recommended.

Table 6.1 Priority Ranking of User Services

	User Services	Needs	Benefits	Information availability	Technology	Implementation	Overall Priority
1	Pre-trip traveller information system	Large (3)	Large (3)	Moderate (2)	Moderate (2)	Simple (3)	A (13)
2	En-route driver information system	Large (3)	Large (3)	Moderate (2)	Moderate (2)	Simple (3)	A (13)
3	Traveller service information system	Small (1)	Small (1)	Moderate (2)	Moderate (2)	Moderate (2)	D (8)
4	Route guidance system	Large (3)	Large (3)	Complex (1)	Advanced (3)	Complex (1)	B (11)
5	Parking guidance system	Large (3)	Medium (2)	Simple (3)	Conventional (1)	Simple (3)	B (12)
6	Environmental monitoring system	Medium (2)	Small (1)	Simple (3)	Moderate (2)	Moderate (2)	C (10)
7	Emergency vehicle management system	Medium (2)	Small (1)	Moderate (2)	Advanced (3)	Moderate (2)	C (10)
8	Public transportation information system	Large (3)	Medium (2)	Moderate (2)	Advanced (3)	Moderate (2)	B (12)

Note : numbers in ( ) are scores

Route guidance system, parking guidance system and public transport information system are rated as Group B. They have high demand and large to medium benefits. Although data collection for route guidance system is a complex task, data already collected for the pre-trip traveller information and en-route driver information systems can provide a strong foundation for establishing a route guidance system. For this reason, route guidance system is considered as an expansion of the pre-trip traveller and en-route driver systems and can be introduced one or two years later.

Environmental monitoring and emergency vehicle management systems are classified into Group C. The need for the former is relatively less urgent and it is moderately simple to implement. Thus their introduction has lower priority than these classified as A or B.

The traveller service information system is rated as Group D. It does not produce much benefit when introduced at this moment. It may be reconsidered in the future when the need arises or road traffic environment changes.

7

ROAD USERS AWARENESS AND OPINIONS ON ITIS

7.0 ROAD USERS AWARENESS AND OPINIONS ON ITIS

The opinion surveys were conducted at a variety of land uses at various locations. The locations selected to conduct these surveys include Kuala Lumpur city centre, Petaling Jaya, Klang, Shah Alam, Subang Jaya and Gombak.

In total, more than 800 forms were distributed, following which a return of approx. 560 forms was achieved.

For Private Vehicle Users, the survey was categorised into the following four areas:

a) Trip Purposes
b) Frequency of Driving
c) Duration Spent in Driving Per Day
d) Varying Driving Route

The overwhelming majority of those interviewed considered congestion or route guidance information as very important or important, followed by estimated journey time and parking information.

Between 30% to 40% of those interviewed are willing to pay for the items of such traffic information. This is considered to be an encouraging response, as many of them have had little or no direct experience on the workings of this Integrated Traffic Information System.

For Public Transport Users, the survey was categorised into the following five areas:

a) Trip Purpose
b) Frequency of Use
c) Duration in Riding Public Transport
d) Choice of Public Transport Mode
e) Ranking on Importance of Items of Information

From the results of the opinion survey, it is clear that the general public in the Klang Valley area is very interested in traffic information, in particular in traffic congestion and route choice information for private vehicle users, and in bus route information for public transport users. More than 90% of those surveyed considered the above-mentioned information as important or very important.

8

CONCEPTUAL PLANNING AND DESIGN OF AN ITIS IN KLANG VALLEY

8.0 CONCEPTUAL PLANNING AND DESIGN OF AN ITIS IN KLANG VALLEY

8.1 Overall Concept Plan for ITIS

Four user services, namely pre-trip traveller information system, en-route driver information system, parking guidance system and public transport information system are selected among the remaining eight for the conceptual design. The other four user services are identified for future implementation and will not be studied in further details in this study.

In terms of system component, all four user services consist of information collection, information processing and information dissemination systems as summarised in Table 8.1.

8.2 Pre-Trip Traveller And En-Route Driver Information Systems

The Integrated Traffic Information System, which offers pre-trip traveller information and en-route driver information, will be installed to the study area in two phases, Phase 1 system and Phase 2 system, in terms of system functions and coverage area. The functions of Phase 1 and Phase 2 system are summarised in Table 8.2. Conceptual system configuration of the traffic information system at the final stage is presented in *Figure 8.1.*

Table 8.2 System Functions

	Phase 1	Phase 2
Concept	Basic traffic information system	Advanced in-vehicle traffic information system
Information collection	**Objective** • Monitor traffic flow/condition • Detect incidents/queues • Estimate travel times along selected routes • Exchange data with other systems	**Objective** (additional) • Compute travel time • Estimate travel time for car navigation service
	Location • All toll roads and highways • Frequent congestion/queue and bottleneck road section/spots • High traffic volume road sections on arterial and major distributors	**Location** (additional) • Other arterial and distributor roads within the study area
	Equipment • Vehicle detector (ultrasonic and inductive loop) • TV camera	**Equipment** • AVI detector • Additional detector • Additional TV camera

Table 8.1 Configuration of Selected User Services

User Services	Information Collection		Information Processing	Information Dissemination		
	Collection Device	Information	Processing Output	Areawide		Roadside
				Broadcasting	Interactive	
Pre-trip traveller information system	• Vehicle detector • AVI detector • TV camera • Communication with other systems/agencies • General public	• Traffic volume • Occupancy rate • Speed • Incident • Various traffic related information	• Congestion level • Queue length • Travel time • Incident database	• Radio broadcasting • TV broadcasting • Cable TV	• Telephone answering system • Fax service • Internet	
En-route driver information system	Devices above are common to both pre-trip and en-route information systems.	Same as above	Same as above but limited to current incidents	• Radio broadcasting		• Variable message sign • Graphic display panel • Travel time display • Highway radio
Parking guidance system	• Parking management system	• Number of available spaces	• Display information			• Parking guidance sign
Public transport information system	• On-board bus location sensor	• Bus location in co-ordinates	• Bus location along bus route			• Bus stop display

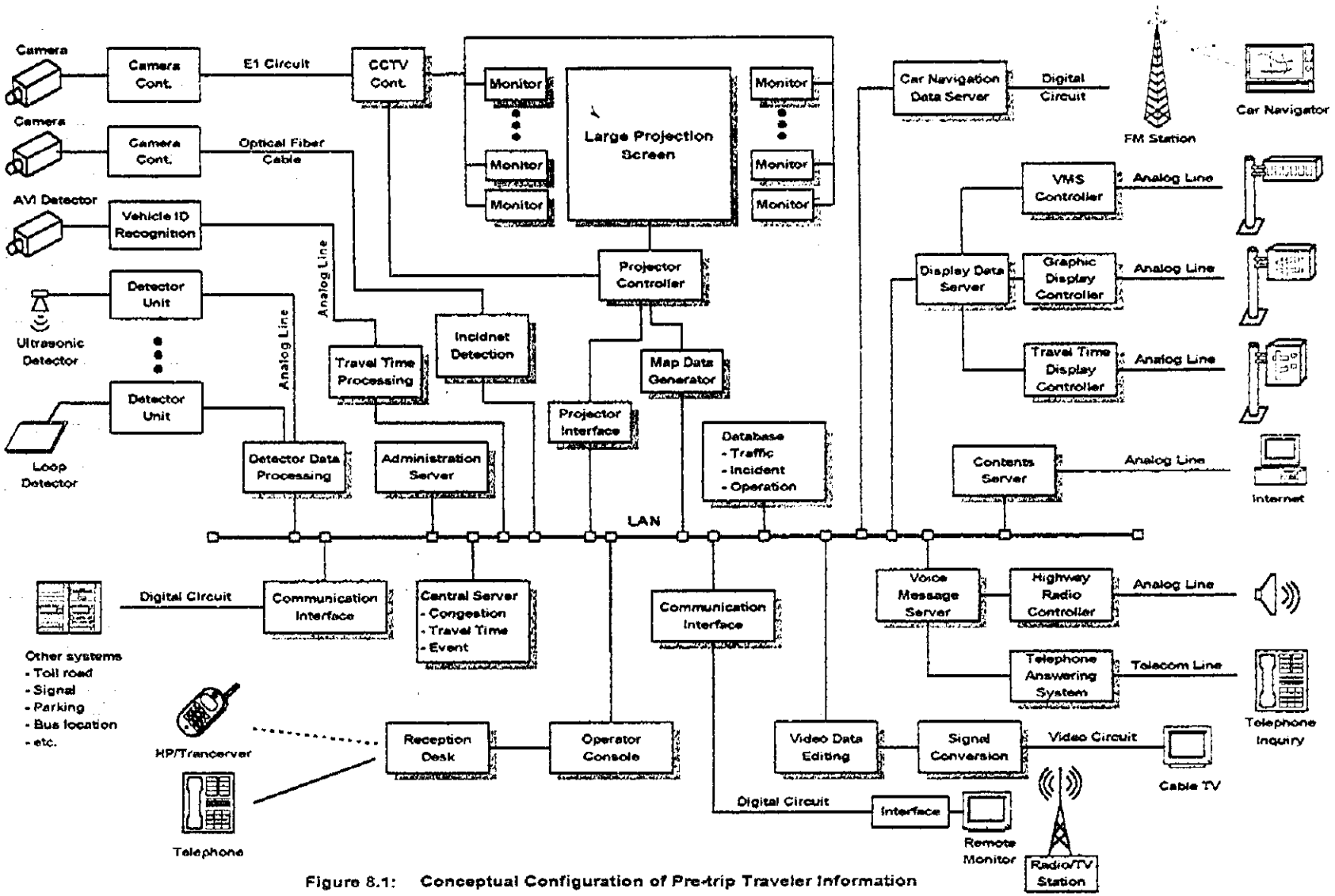
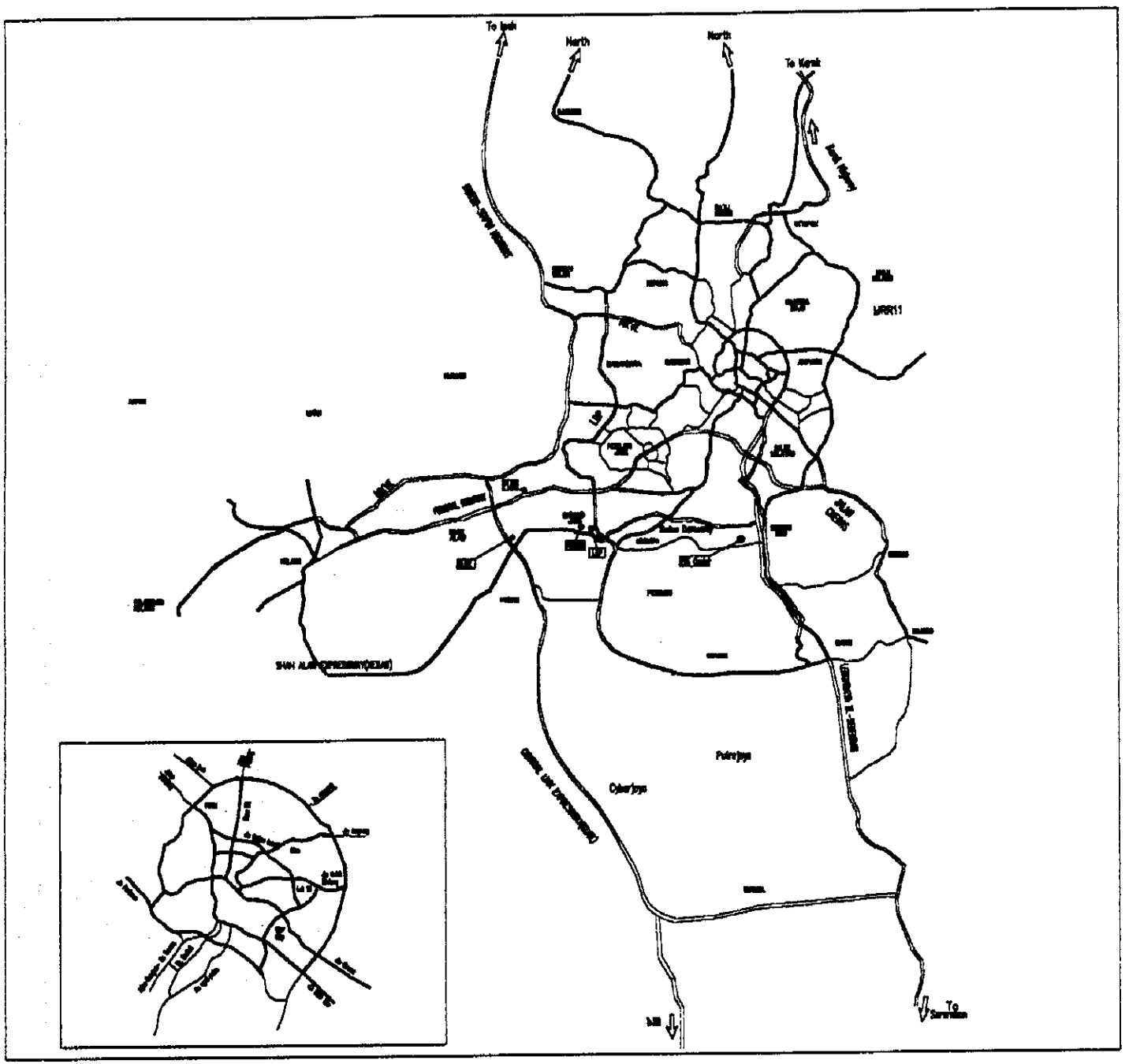


Figure 8.1: Conceptual Configuration of Pre-trip Traveler Information and En-route Driver Information Systems

	Phase 1	Phase 2
Information processing	**Information to be processed and compiled :** • Congestion levels • Queue length • Incident • Travel time • Other information manually collected and input (accident, roadwork, regulation, events, etc.) • Processing of data obtained from other systems	**Information to be processed and compiled :** • Enhancement of coverage area and accuracy of information processed in Phase 1 • Link travel time for car navigation
Information dissemination	**Information to be disseminated :** • Congestion levels • Incident • Travel time • Manually input information	**Additional information to be disseminated :** • Travel time for car navigation
	Equipment for pre-trip • Radio broadcasting • Telephone inquiry • Internet • Cable TV	
	Equipment for en-route • Variable message sign • Graphic display panel • Travel time display • Highway radio	**Equipment for en-route** • FM sub-carrier broadcasting

It is expected that the Phase 1 system becomes operational in Year 2003, while the Phase 2 system in Year 2006.

The proposed system will cover the Klang Valley and the Multimedia Super Corridor with a lesser number of links included in Phase 1. In Phase 1, traffic condition data will be gathered at all the toll roads and highways such as Federal Highway II in the study area, and arterial roads mostly within Kuala Lumpur and Petaling Jaya. Phase 1 will therefore covers a total of 564.2km of roads, out of which 290.8km are highways. In Phase 2, links will be added which include newly opened toll roads and highways, if any, and more arterial and distributor roads in the study area. Phase 2 will cover another 414.4km of road. Table 8.3 shows the road network and their breakdown by categories for Phase 1 and 2. *Figures 8.2* and *8.3* show the configuration of the road network for Phase 1 and 2 respectively.



A Study on Integrated Transport Information System (ITIS) in Klang Valley And The MSC in Malaysia

Figure : 8.2

Phase 1 Road Network

LEGEND :

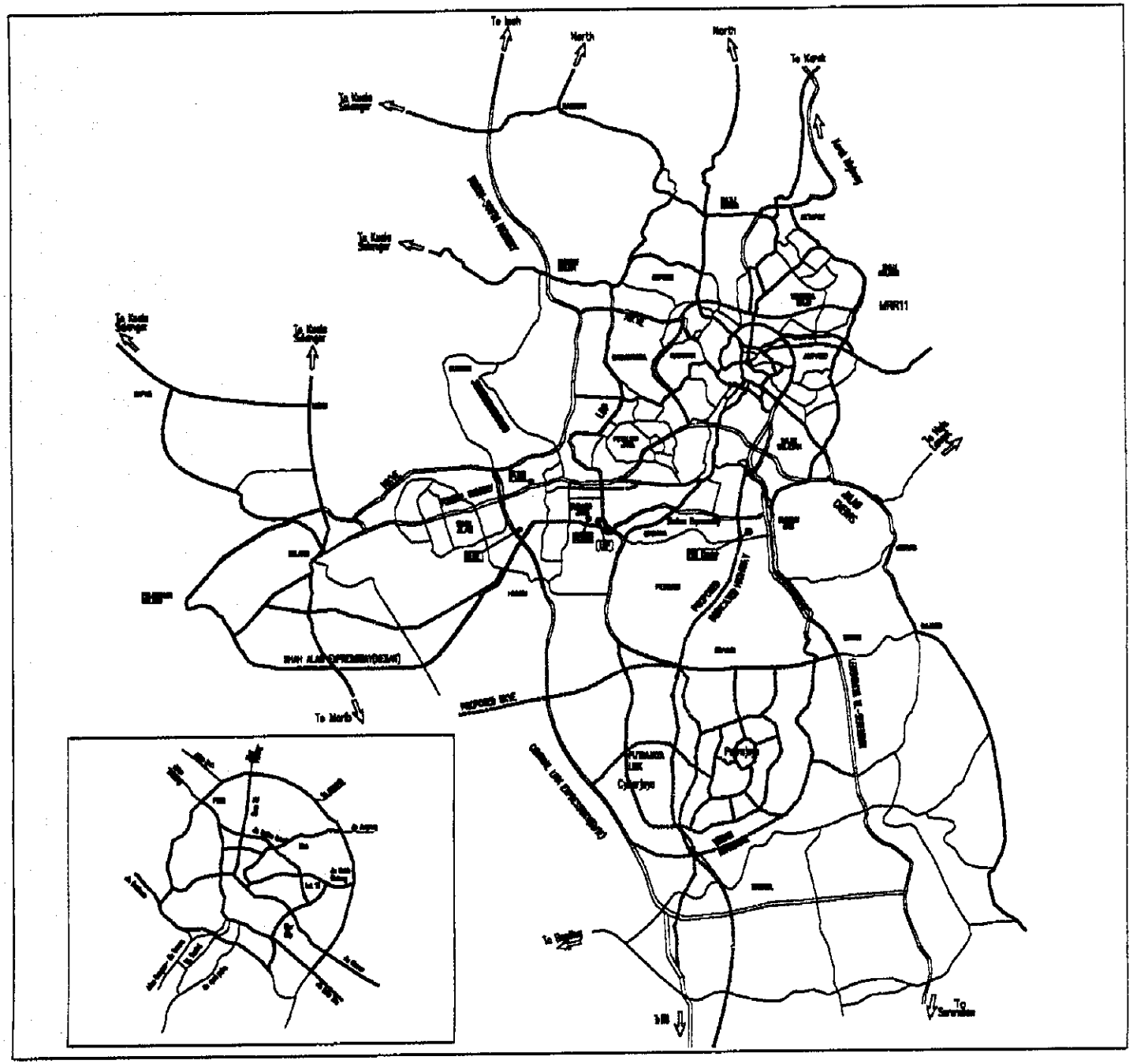
- EXPRESSWAY/HIGHWAY
- MAJOR ARTERIALS
- MAJOR DISTRIBUTORS
- FUTURE ROADS

0 5 10km

Scale :

N

Perunding Trafik Klasik Sdn Bhd



A Study on Integrated Transport Information System (ITIS) in Klang Valley And The MSC in Malaysia

Figure : 8.3

Phase 2 Road Network

LEGEND :

- EXPRESSWAY/HIGHWAY
- MAJOR ARTERIALS
- MAJOR DISTRIBUTORS
- FUTURE ROADS

0 5 10km

Scale :

N

Perunding Trafik Klasik Sdn Bhd

Table 8.3 Details of Road Network

		Phase 1	Phase 2	Total
Network	No. of road sections	260	143	403
	No. of links	520	286	806
Distance by road type	Total (km)	564.2	414.4	978.6
	Highway	290.8	69.6	360.4
	Arterial	180.8	55.9	236.7
	Distributor	92.6	288.9	381.5
By Toll & Non-Toll	Toll (km)	276.5	59.7	336.2
	Non-toll	287.7	354.7	642.4
By Traffic volume	Heavy volume (km)	332.7	112.4	445.1
	Medium/light volume	231.5	302.0	544.5

The ITIS Centre is a nucleus of the proposed integrated traffic information system where data are gathered and processed, communications directed, decisions made, information and instruction issued and traffic and operation data stored.

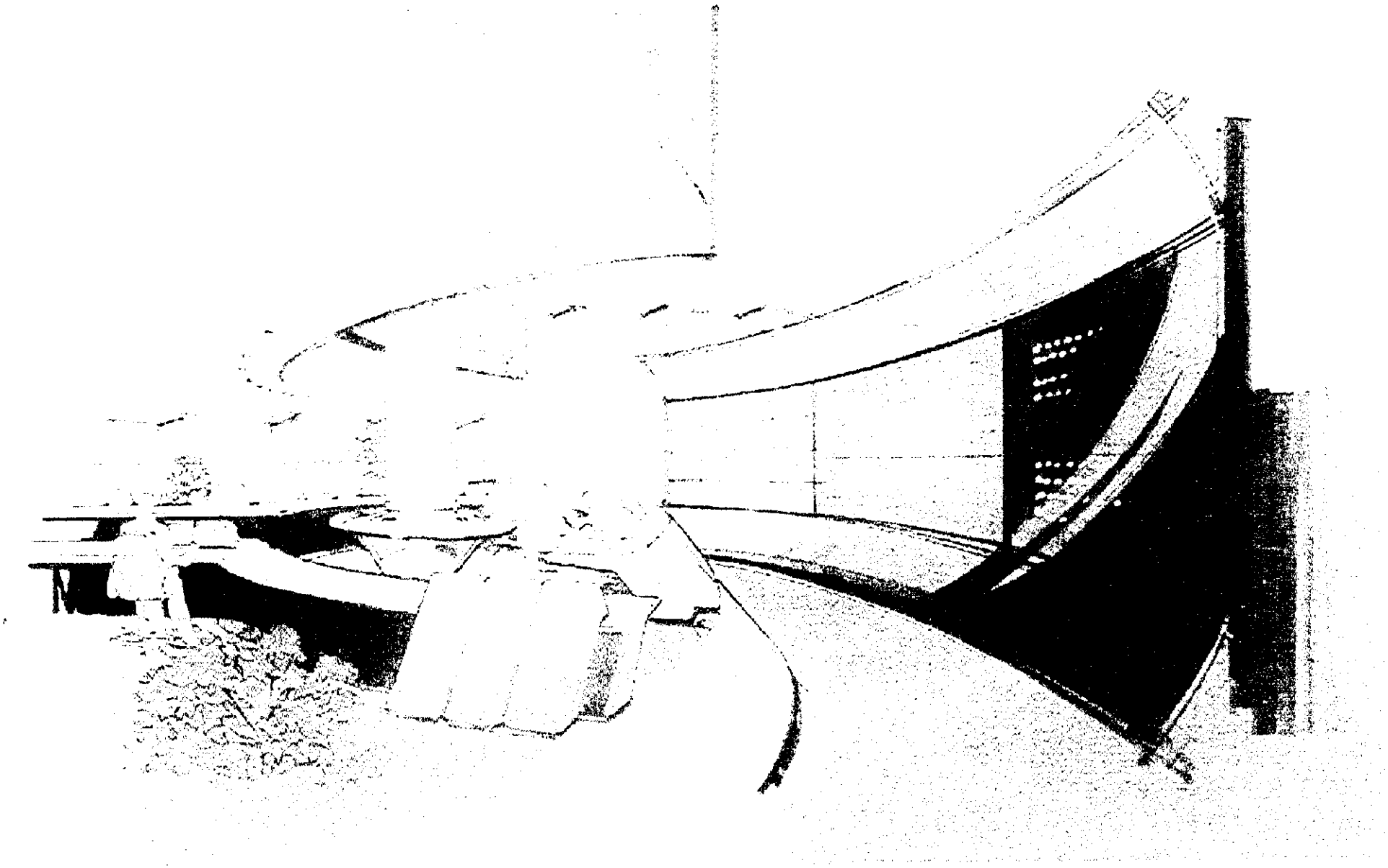
In this study, the location of the ITIS centre is set at Technology Park Malaysia (TPM) in Bukit Jalil for the basic design purpose. The proposed TPM site has the advantages of being centrally located within the coverage network, within the MSC corridor to enjoy MSC status and in the hub of high technology research activities in Malaysia. An artist impression of the proposed ITIS centre is given overleaf.

8.3 Parking Guidance System

Parking guidance system is intended to provide parking availability information to the drivers looking for a parking space so that driver can save the time spent in searching for a vacant parking slot. Parking lot availability can be expressed in two levels. At a macro level, availability is expressed as the number of remaining parking lots, while at a micro level, location of vacant lot is identified.

Table 8.4 Function of Parking Guidance System

Sub-system	Function
Information collection	• Collects information on - Open/close status of parking area - Number of parking lots available
Information processing	• Determines display contents • Monitors the operation of the equipment comprising the system • Exchanges information with ITIS Centre • Logging of system operation
Information dissemination	• Displays on signboard - Open/close status of parking area - Number of parking lots available



8.4 Public Transport Information System

Public transport information system is useful to both bus users and bus operators. For bus passengers waiting at bus stop, bus location information provides approximate waiting time until the next bus arrives thus relieves the user's stress of uncertainty.

Table 8.5 Function of Public Transport Information System

Sub-system	Function
Information collection	• Collects information on - Bus ID, route number, status - Geographical location data
Information processing	• Determines bus location along the route • Prepares display data on the signboard • Monitors the operation of the equipment comprising the system • Exchanges with ITIS Centre • Logging of system operation
Information dissemination	• Displays on the signboard at bus stop - Location of bus for the requested route - Bus routes and their destinations/timetables

The following are some of the conditions for selecting bus routes for the deployment of bus location and information system.

- Frequency
- Fluctuation of schedule due to congestion
- Passengers volume (regular and casual) and trip pattern
- Other routes on the same road
- Alternative transport

9

PRELIMINARY DESIGN FOR PRE-TRIP TRAVELER AND EN-ROUTE DRIVER INFORMATION SYSTEMS

9.0 PRELIMINARY DESIGN FOR PRE-TRIP TRAVELER AND EN-ROUTE DRIVER INFORMATION SYSTEMS

9.1 System Architecture & Functional Subsystems

The proposed integrated traffic information system which offers two main user services of pre-trip traveller information and en-route driver information systems, consists of three functional subsystems, namely information collection, information processing and information dissemination subsystems. The system architecture is shown in *Figure 9.1*.

Traffic congestion, incidents, construction work, temporary regulation, and other information that affect the traffic flow will be collected both automatically and manually.

There are a few traffic monitoring or control systems operating in the study area. By establishing communication link with these systems, information can be exchanged. Many details of the data exchange such as type and format of information, communication protocol, frequency, monitoring and management, sharing of operation cost, etc. must be studied and agreed upon, however, before the data exchange can be realised.

Acquisition of traffic information shall be primarily obtained by television cameras and vehicle detectors. The proposed location of TV camera is shown in *Figure 9.2*.

	Existing	Phase 1	Phase 2
Television (TV) Cameras	32	60	46
Vehicle Detectors	-	1,794	1,054

Information processing system at the ITIS Centre will be a computer network, in which several computers and other devices are inter-connected through a local area network (LAN).

A real-time database will be established in the control centre system. The database must be capable of coping with the requirements of the on-line real-time traffic information system and operating without manual intervention or periodic shutdown. The database will collect and store the following data:

- Traffic information
- Incident information
- System administration

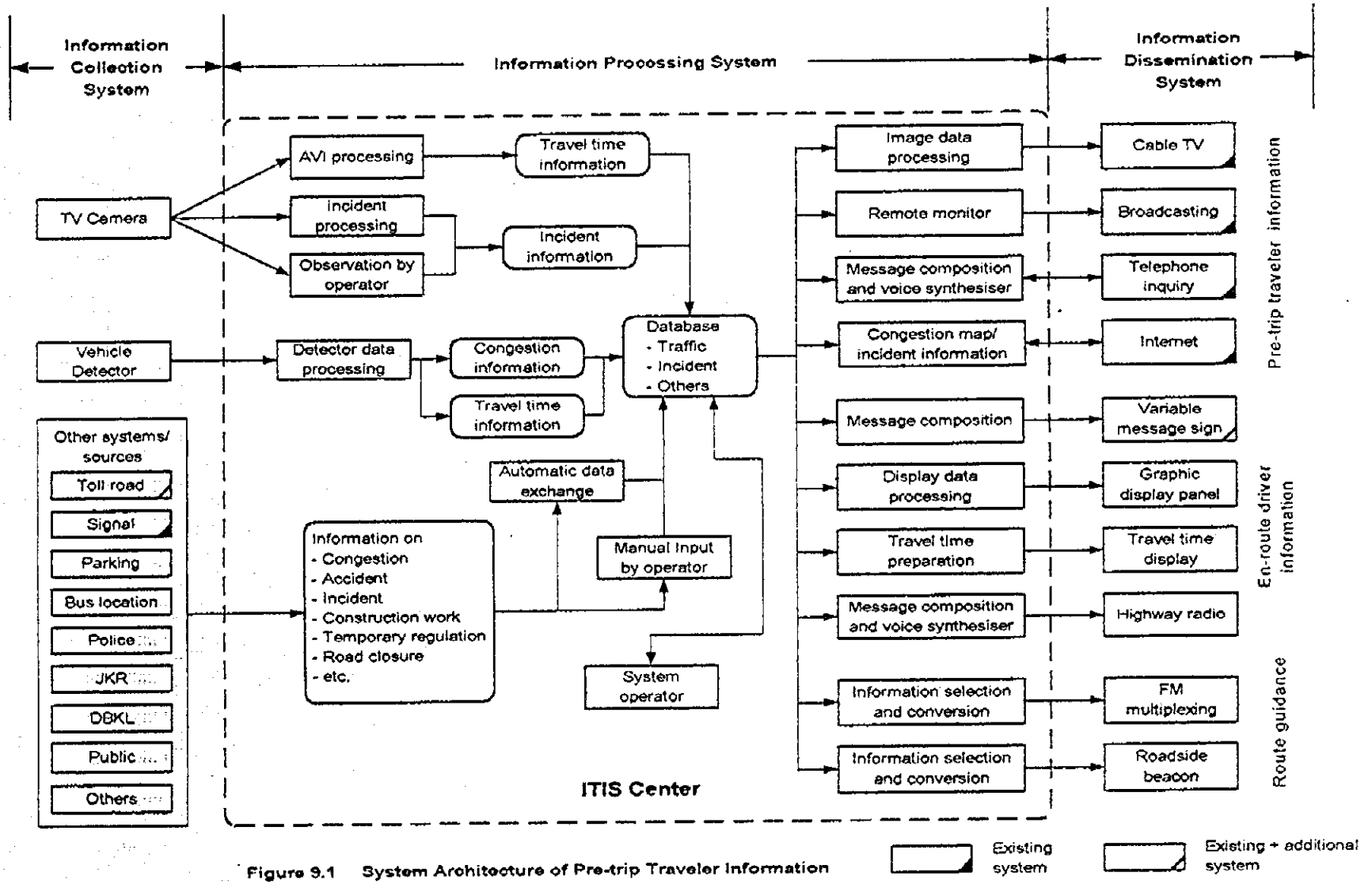
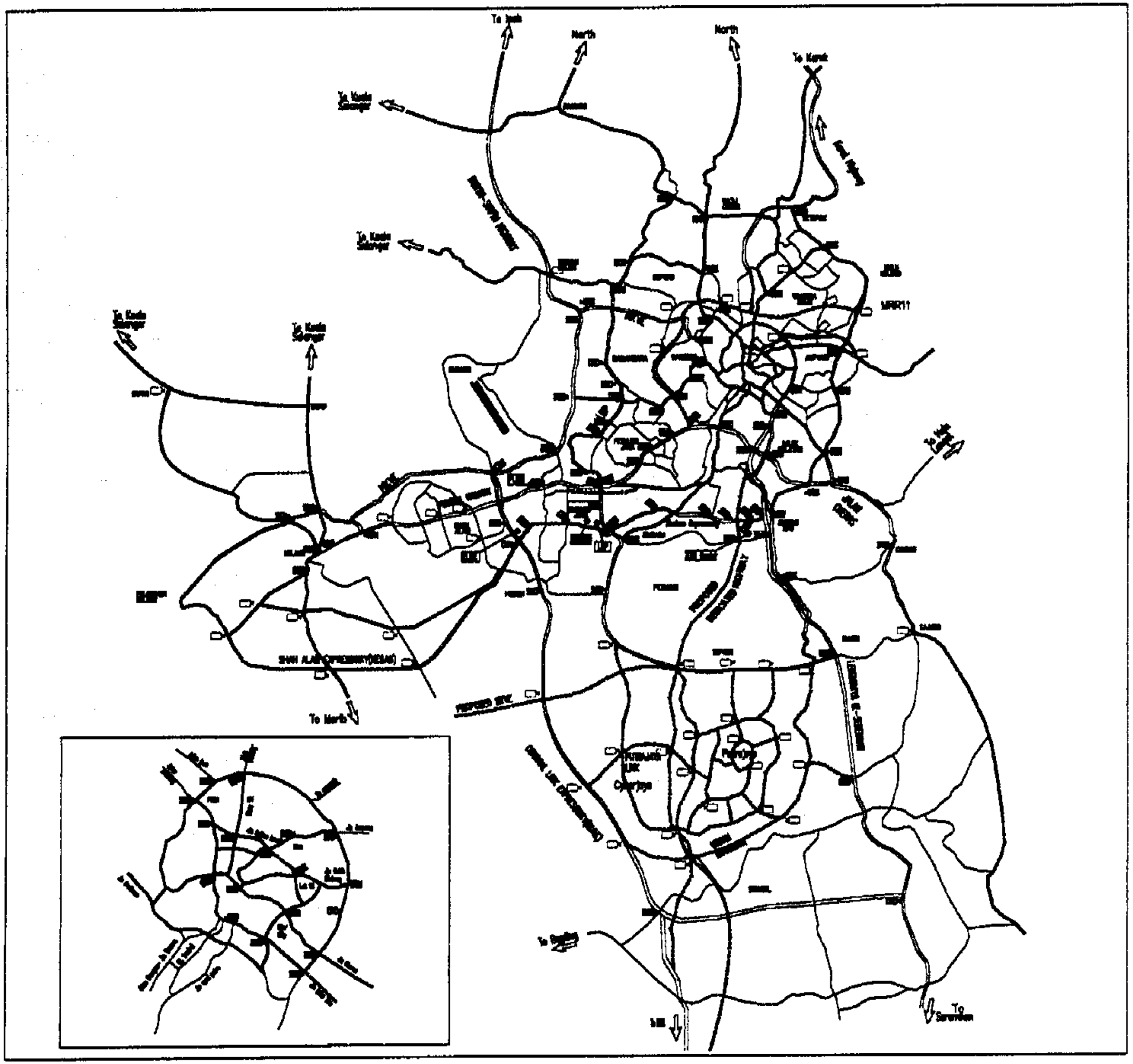


Figure 9.1 **System Architecture of Pre-trip Traveler Information and En-route Driver Information Systems**

A Study on Integrated Transport Information System (ITIS) in Klang Valley And The MSC in Malaysia

Figure : 9.2

CCTV Camera Locations



LEGEND :

- EXPRESSWAY/HIGHWAY
- MAJOR ARTERIALS
- MAJOR DISTRIBUTORS
- FUTURE ROADS
- Existing Camera (32)
  - DBKL (10)
  - Elite (6)
  - Kesas (8)
  - LDP (8)
- New Camera (Phase 1) (60)
- New Camera (Phase 2) (46)

0 5 10km

Scale :

N

Perunding Trafik Klasik Sdn Bhd

Information is disseminated to drivers and potential road users through various means. The following media will be used for the information dissemination:

For pre-trip traveller information:

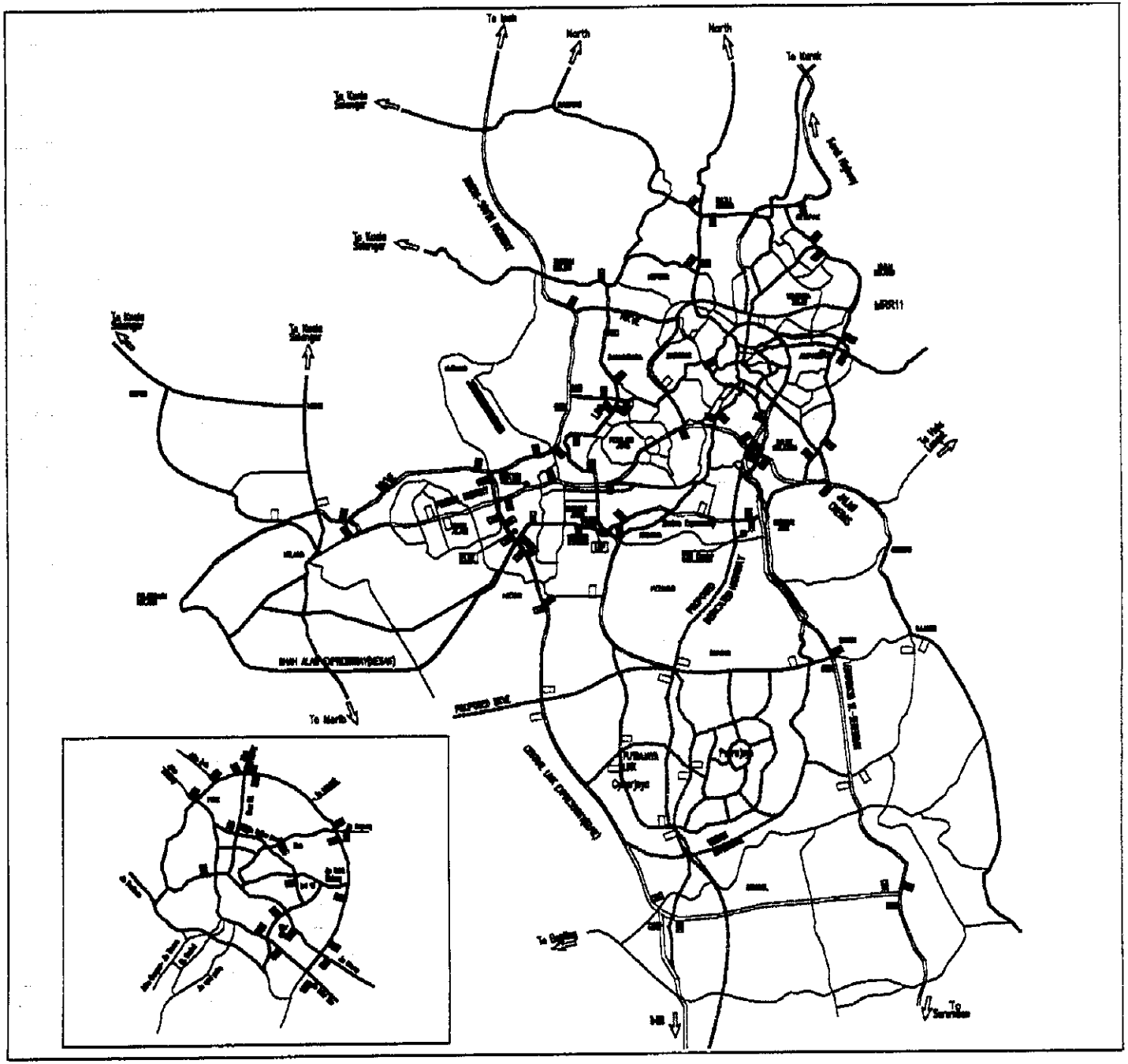
- Telephone inquiry
- Internet
- Radio broadcasting
- TV broadcasting
- Cable TV

For en-route driver information:

	Existing	Phase 1	Phase 2
Variable message sign	20	68	23
Graphic display board	-	8	2
Travel time display	-	3	0
Highway radio	-	9	5

The proposed location of these facilities is shown in *Figures* 9.3 and 9.4.

The proposed ITIS network will utilise a mix of digital and analogue leased circuits from telecommunication operators. Use of the existing transmission system facilities owned by the toll road operator and installing self-owned cable network may be exploited to find out the most suitable transmission system. In this basic design, however, leased line in a star network is assumed for simplicity and time constraint.



A Study on Integrated Transport Information System (ITIS) in Klang Valley And The MSC in Malaysia

Figure : 9.3

Variable Message Sign Locations

LEGEND :

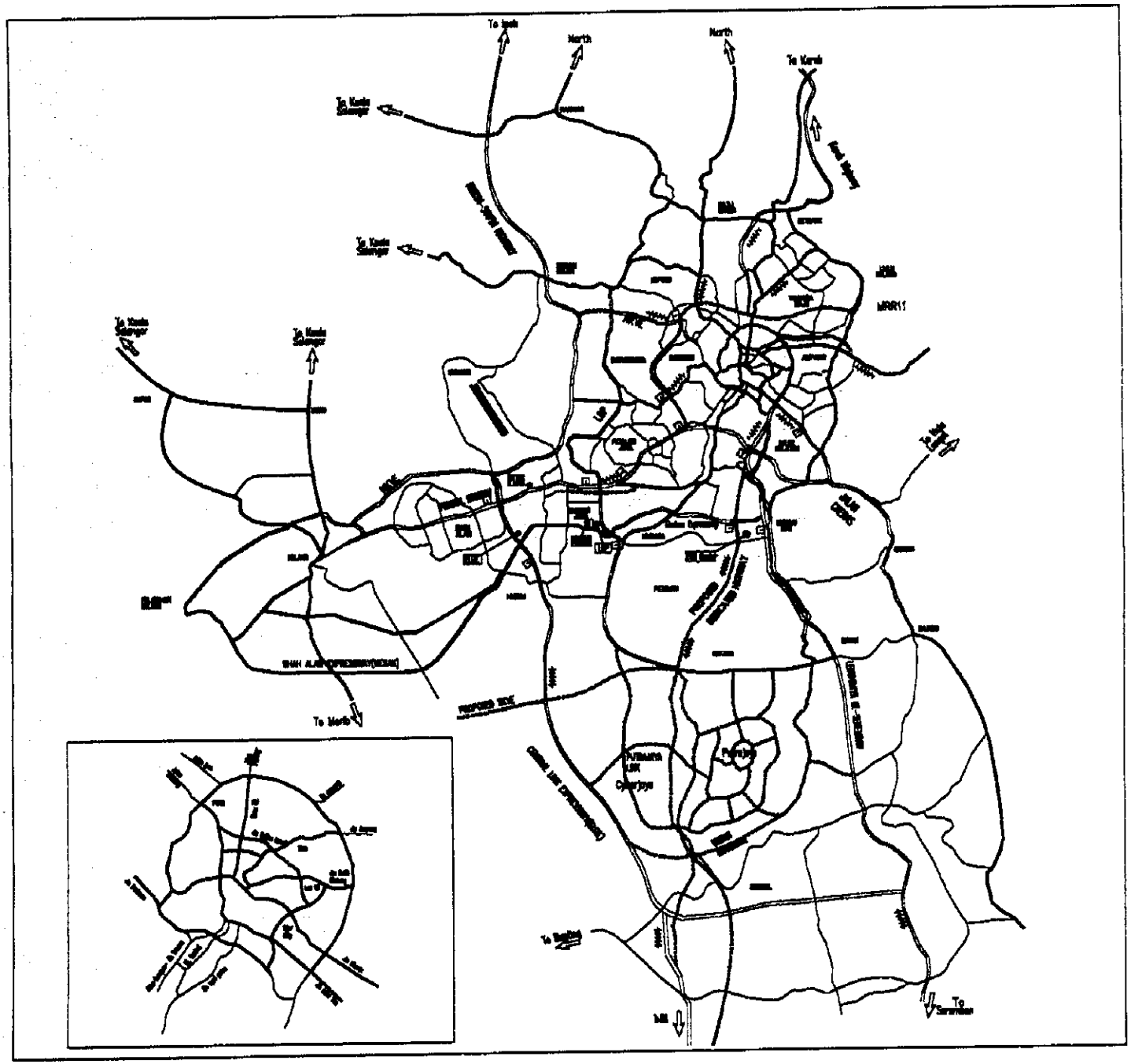
- EXPRESSWAY/HIGHWAY
- MAJOR ARTERIALS
- MAJOR DISTRIBUTORS
- FUTURE ROADS
- Existing Variable Message Sign (20)
  - Elite (12)
  - Kesas (4)
  - LDP (4)
- New Variable Message Sign (Phase 1) (68)
- New Variable Message Sign (Phase 2) (23)

0 5 10km

Scale :

N

Perunding Trafik Klasik Sdn Bhd



A Study on Integrated Transport Information System (ITIS) in Klang Valley And The MSC in Malaysia

Figure : 9.4

Graphic Display, Travel Time Display and Highway Radio Locations

LEGEND :

- EXPRESSWAY/HIGHWAY
- MAJOR ARTERIALS
- MAJOR DISTRIBUTORS
- FUTURE ROADS
- Graphic Display Panel (10)
  - (Phase 1: 8)
  - (Phase 2: 2)
- Travel Time Display (3)
- Highway Radio (14)
  - (Phase 1: 9)
  - (Phase 2: 5)

0 5 10km

Scale :

N

Perunding Trafik Klasik Sdn Bhd

9.2 Cost Estimates & Expected Benefits

Cost of the proposed integrated traffic information system project is estimated by examining the costs for three different components of the project; namely engineering services, system construction, and operation and maintenance. It must be noted that the project cost presented here is only a rough estimate meant to be an indication on the size of project. The estimated costs are shown below:

Table 9.1 Cost Summary

	Phase 1 (RM Million)	Phase 2 (RM Million)
Engineering service	26.7	15.9
System construction	460.4	282.8
Annual operation and maintenance	21.7	28.0

Engineering services are required throughout the project period. These services include detailed design including tender document preparation, assistance in contractor selection, and construction supervision and acceptance testing. It is assumed that a foreign consulting firm shall be invited to undertake the design work as integrated traffic information system is relatively new to this country and local consultant who is capable of the detailed design is very limited. The appointed foreign consulting firm is however required to associate with local consulting firm to avail the local resources and promote technology transfer.

The system construction cost comprises the cost of equipment, cost of installation, cost in software development and database preparation, and cost of ITIS Centre building. In addition, the cost includes project management cost, import duties and value added tax.

Operation cost consists mainly of staff (technical, administrative and others), electricity (control centre and outside equipment), lease fee of transmission circuits, communication, vehicle, consumable and other expenses. The annual operation cost shown below is relatively higher than other costs due to the fact that, 75% of the operation cost is the lease fee of transmission circuit.

The proposed integrated traffic information system in Klang Valley and MSC can be expected to produce significant benefits. Among them, time saving brought about by the efficient use of the existing road network will be the biggest benefit. Other benefits include improved traffic safety, reduced adverse environmental impacts by traffic, and enhanced comfort and reliability in vehicular travel.

An attempt is made to estimate the amount of direct benefits to road users due to improved efficiency. Only savings in vehicle operating costs and travel time costs of drivers and passengers, which can be expressed in monetary terms, are considered in this report. The amount of benefits for the first ten years is shown in Table 9.2.

Table 9.2 Annual Benefit by Travel Time Savings

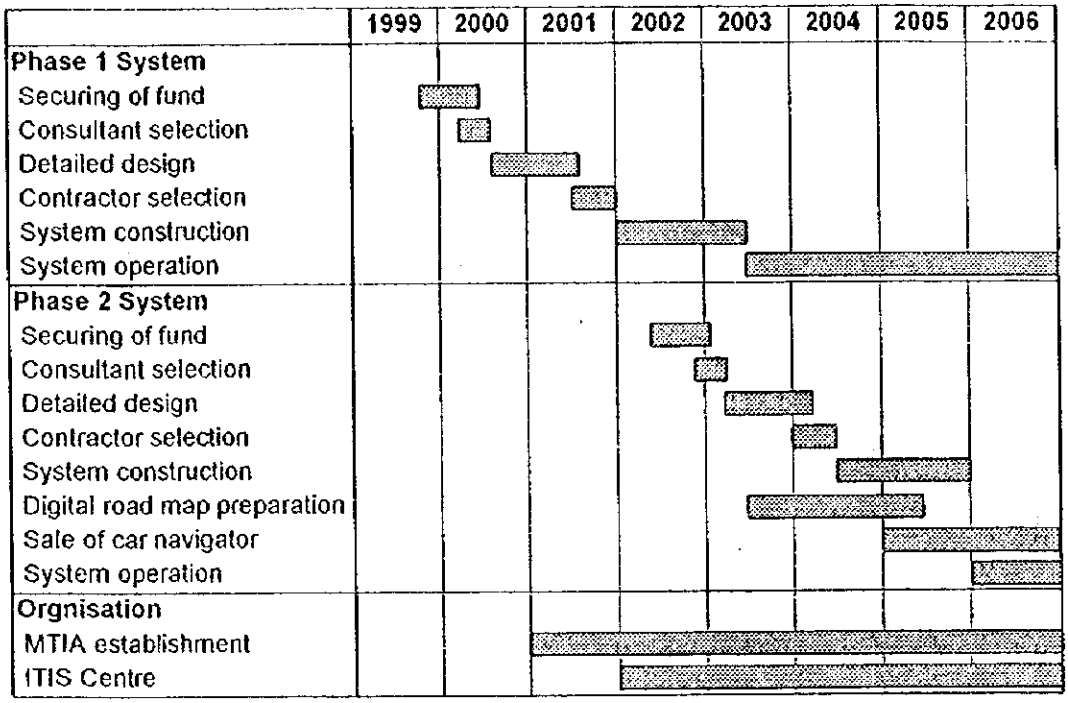
Year	Benefit from Travel Time Saving		Total Benefits (RM - Million)
	Benefits by saving in travel time cost (RM - Million)	Benefits by saving in car operating cost (RM - Million)	
0	36.92	19.52	56.44
1	82.70	43.73	126.43
2	90.97	48.11	139.08
3	138.49	73.24	211.73
4	163.98	86.72	250.70
5	193.60	102.39	295.99
6	228.30	120.73	349.03
7	265.96	140.65	406.61
8	306.00	161.83	467.83
9	345.46	182.70	528.16
10	385.47	203.85	589.32
Total	**2,237.86**	**1,183.48**	**3,421.33**

Based on the estimated cost of engineering service, system construction, operation and maintenance in Section 9.6 Cost Estimate, the amount of benefits shown above, and project implementation schedule presented in the next section, an economic internal rate of return of the project is calculated at 14.1% assuming the annual discount rate of 12%.

9.3 Implementation Schedule

The tentative implementation schedule of the project is shown in the Table below:

Table 9.3 Implementation Schedule



10

BASIC DESIGN AND CASE STUDIES ON PARKING GUIDANCE SYSTEM AND PUBLIC TRANSPORT INFORMATION SYSTEM

10.0 BASIC DESIGN AND CASE STUDIES ON PARKING GUIDANCE SYSTEM AND PUBLIC TRANSPORT INFORMATION SYSTEM

10.1 Parking Guidance System

Parking guidance system collects parking availability information from parking areas and provides it to the drivers on the roads nearby looking for a parking space. It is a closed system consisting of a group of parking areas located within a certain distance, and operates independently from other parking guidance systems.

Parking availability information based on the number of vehicles entered and exited the parking facility is obtained from the parking management. Such information from a cluster of parking facilities or buildings is individually connected to a localised parking guidance system processor located in one of the buildings itself. Each facility regularly transmits parking information to this localised processing system. The information obtained is then processed locally and relayed to designated parking guidance display panels informing motorists on the availability of car parks for a given cluster of buildings. The information is also sent back to the ITIS Centre for further dissemination to the public through the Internet.

Data communication between the equipment will be made through a self-owned cable network except for the guidance signs for which a leased line may be used if it is more economical. The connection of each parking guidance system with ITIS Centre will be made through a leased telephone line

To demonstrate this system, a case study was carried out for the shopping district in Jalan Bukit Bintang, which faces shortage of parking during weekends at times. Because of the one-way circulation traffic operation along Jalan Bukit Bintang, drivers who failed to find a parking lot at the first attempt often have to circulate for a distance before he tries again. Such unwanted traffic looking for vacant parking can be avoided if a parking guidance is implemented in an effectively way.

A simple survey of the parking facility was conducted to find out the location of parking facilities, their entry/exit points, capacity, management companies and the traffic circulation to/from parking entrances/exits. Parking facilities in office building are often not accessible to the public while parking in hotels is deemed too expensive for shoppers. These together with on-street parking are therefore not included in the case study. Parking capacity of the 6 shopping complexes in this area is about 4,320 lots.

By nature of the traffic circulation plan of the peripheral roads leading to the case study area, there are just two major approaches to the complexes from Jalan Imbi in the southwest direction and Jalan Bukit Bintang in the east. By analysing the accesses to the six parking facilities, they are clustered into two groups, namely BB Plaza/Sg. Wang Plaza/Imbi Plaza; and KL Plaza/Lot 10/Star Hill so as to simplify the manner information is given to users. There are three accesses each to both parking clusters. Signs should be of consistent type and design; and preferably of LED type. Sizes are to be carefully decided based on visibility and site requirements or constraints.

Four levels of guide signs are used to systematically provide parking information to drivers en-route to the parking facilities. Two Level 1 of parking guide signs are to be installed at the two main approaches to the shopping area indicating the number of parking lots available by cluster.

Six Level 2 signs are to be deployed just before the access road entrances to the parking facilities to guide users to a particular complex with parking availability. Two are to be deployed each along Jalan Imbi, Jalan Bukit Bintang and Jalan Sultan Ismail.

The third level of parking guidance shall be the provision of information of parking availability within the complex. This involves giving the users on the availability of parking lots on the different floors or sections of the parking facility. Six Level 3 signs are required each at the respectively parking facility, and if any of the facilities have multiple entrances in future, such sign should also be deployed at the additional entrance.

Finally, the users have to be guided to the appropriate level of the building to park his vehicle. Guide signs in the facility should be appropriately placed to guide the users up or down ramps to the floor having vacant lots. The number and location of Level 4 signs are not proposed, as they shall depend on the facility internal floor design, floor height, ramp location and other factors.

10.2 Public Transport Information System

Public transport information system is a customer service to bus passengers. It collects real time bus location information from the bus on the road and provides it to bus passengers waiting at bus stops.

GPS based method is used to detect the location of buses and differential GPS may be used to further improve the accuracy. Bus location data is then sent by an on-board transmitter to a bus operation centre, together with other data such as bus ID, operation mode and route number. The on-board device, consisting of a GPS receiver and a data transmitter will be a portable device easily transferred from one bus to another.

Two wireless method of communication between the bus and operation centre can be used, either by the trunk radio system or the cellular mobile short messaging system (SMS). The trunk radio system may be more susceptible to external wave interference and is based on a polling methodology. This method would be cheaper to implement in the short term. The SMS method offers a more "interference free" communication method and is based on exception reporting. This method requires the use of a mobile phone on the bus.

In both methods, bus location expressed in co-ordinates is processed at the bus operation centre and the bus location along its route is determined. The location information is then relayed to all relevant "Bus Location Panels" along the bus route. The panel will indicate the exact location of buses on the route map to inform passengers at any time. Data transmission from the bus operation centre to bus stops will adopt either the wireless method as used for data transmission described above, or alternatively a fixed line method using telephone lines leased from a telephone company. The ITIS Internet Web site can also disseminate the locations of buses to the public.

To demonstrate such a system, a bus information system on an 11km stretch between Jalan Munshi Abdullah and Tmn Bukit Ampang along Jalan Ampang was studied. Jalan Ampang is seriously congested during the peak hours. Due to physical constraint, bus priority lane has not been implemented along Jalan Ampang. As a result, bus service level on this major arterial is poor and cannot be improved by such physical measure. The travel time survey also reveals that travel speed along Jalan Ampang during the peak hours is below 30kph. As buses have to compete with other vehicles, travel speed for buses is even lower on account of their need to stop at the bus stops.

Observation on bus route, bus arrival time, and occupancy was conducted at a selected bus stop about mid way along Jalan Ampang. There are 16 bus services by Intrakota, Cityliner, and Metro bus companies along this road. Survey also revealed that buses do not follow any fix time tables or schedules after the first run, while bus frequency varies greatly between 10 minutes to 15 minutes on some service routes and 1 hour to 2 hour on others. Buses on Jalan Ampang are also generally crowded. There are a total of 20 stops outbound and 21 stops inbound along the study road with an average interval of around 500m.

The Bus Information System proposed is a form of Bus Location System whereby buses are tracked using the DGPS and monitored by a system operator in a control centre. The location of these buses can then be displayed on a map in the centre showing where they are along a particular chosen route. Such information is then send to mimic panels at major bus stops or terminals. The mimic panel proposed consists of a route diagram of Jalan Ampang with LED indicator lights on the sides of the road. Each light represents a distance of about 200m. The signs are equipped with request buttons by bus routes. A user wishes to know the location of bus No. 'X' could simply press down the corresponding button and the locations of these buses, if they are within the road section shown on the route diagram, will be indicated by lighting up of an LED.

Such information signs are proposed to be deployed at major bus stops. Out of the total bus stops, 8 pairs are considered as major stops in terms of the catchment areas they serve. These major stops are located in front or the vicinity of major residential areas, shopping centres, LRT stations and other major office complexes.

11

PROPOSAL FOR AN ITIS MANAGEMENT AUTHORITY

11.0 PROPOSAL FOR AN ITIS MANAGEMENT AUTHORITY

Currently, traffic information in the study area is gathered by the respective transport operators. There is therefore no single authority or body that gathers, analyses and disseminates all the information in the Klang Valley. Traffic information is gathered based principally on administrative jurisdiction. Limited real time traffic information is disseminated by FM radio broadcasting twice daily. VMS on some tolled highways are not fully utilised to provide information either on the highways themselves or the city streets due to the lack of information integration or exchange system established so far in the Klang Valley area.

The present traffic information management in the Study Area or in Malaysia can be said to have suffered from shortcomings in the three areas of:

A. No Uniform Traffic Information, Management System,
B. No Integration or Sharing of Information and
C. Little Information Dissemination to the Public.

There are several government agencies responsible for gathering and managing traffic information in the Study Area namely the Malaysian Highway Authority, Highway Planning Unit and Kuala Lumpur City Hall. The others who are involved in ITIS development in Malaysia in one way or another are the Ministry of Energy, Communication and Multi-media, Ministry of Transport, Ministry of Science, Technology and Environment, Ministry of Entrepreneur Development, Multimedia Development Corporation (MDC); and the various Municipalities (Majlis Perbandaran) and Local Authorities.

As a reference to how the administrative framework can be developed in Malaysia for the implementation of ITIS Project, the study team attempted to review any available examples in other countries. Although many countries in Europe, America and Asia have been actively involved in the research and deployment of ITS in this decade Japan stands out as one that has a specific administrative set-up for the collective management of traffic information as it is the forerunner in car navigation system in the world.

In Japan, road traffic information are gathered mostly by the National Police Agency as well as road administrators such as the Japan Highway Public Corporation, Metropolitan Expressway Public Corporation and others. In Japan, the National Police Agency at the prefecture levels operates most of the Area Traffic Control Systems (ATCS).

With the rapid growth in traffic demand and consequently traffic accidents during the economic boom years of the 70s, the Japan Road Traffic Information Centre (JARTIC) was formed to integrate and collectively manage the vast traffic information in improving transport efficiency. The organisation was a foundation with the support of the Ministry of Construction and the National Police Agency of Japan. With its HQ in Tokyo, it is organised into 4 regional offices, which together operate 53 sub-centres and 89 stations throughout Japan. These sub-centres are attached to the Prefecture Police Traffic Control Centres. Stations are mostly the civil engineering department of the prefecture government offices.

Traffic information gathered from the various sub-centres and stations are compiled, edited and integrated at the regional offices which disseminate them to the users via various means, among which are telephones, facsimile, commercial radio and TV stations, digital TV, newspapers and others. Real time traffic information (updated every 5 min) was given to areas within a radius of 100 km in the Tokyo Metropolitan Area) via the digital TV broadcasting. In Year 1996, there were more than 12 million telephone inquiries on traffic situations. The information provided by JARTIC is not confined to just traffic but also traffic management measures, detours, weather alerts (snow storm, typhoon, etc). It also facilitates the exchange of traffic information between the various road administrators and users. Traffic information on city streets is therefore made available to urban expressway operators who then incorporate such information into their information dissemination system via VMS or wayside broadcasting.

JARTIC also plays an important role in vehicle navigation system in Japan. As it gathers all the available real time road traffic information, it is in the best position to provide them on a real time basis to navigational units installed in individual private vehicles. In Japan, this is done via another centre called VICS, which further processes and edits the information in the required format before giving to the users. Like JARTIC, VICS is also a foundation with support from the Government of Japan.

VICS (Vehicle Information and Communication System) Centre therefore further compliments the functions of JARTIC. Besides road traffic information from the JARTIC, it also gathers information on parking for example directly from parking operators and from service & rest areas on expressways. Estimated journey times are processed and provided by VICS. Real time traffic information is then given to drivers via three means, wayside radio wave beacon, infrared beacons and FM multiplex broadcasting. Real time traffic information broadcasting using roadside radio wave beacon is entrusted by VICS centre to the road administrators while those by infrared beacon is entrusted to the traffic management bodies.

In the case of Japan, the traffic management and surveillance system costs were borne by the various toll road operators when they were put in place. Likewise, cost of the ATC and its surveillance system is borne by the Prefecture Police. JARTIC does not implement any specific system but it collates and disseminates information it gets from other organisations.

The initial cost of establishing JARTIC and VICS as well as the operation and maintenance costs of these two foundations are harnessed from contributions from both the public and private organisations.

Information from JARTIC is given to road users free of charge. Information given by the toll road operators is considered as a service by these operators and no additional charge is levied on highway users. Likewise, traffic information given by the ATC system is free.

For the car navigation system, however, the users of such service have to purchase the in-vehicle units and the necessary software in the form of a CD-Rom or DVD. Thus, the charge for such information is indirectly collected from users via sale of such gadgets. Users need only pay a small one-time initial subscription fee to use the car navigation service. Information transmission via FM carrier is done by the NHK (Japan National Broadcasting Corporation) and since it is a government agency, no additional charge is levied on users.

The implementation and operation of a successful ITIS involves many key industries notably the transport sector, telecommunication, broadcasting and so on. It also requires the active roles from both the public and private sectors. An administrative body is proposed for the implementation of ITIS in Malaysia with the following considerations.

1. The proposed ITIS will generate a large amount of social benefits that are difficult to quantify and collect from the beneficiaries. The Project should therefore be viewed as an important social infrastructure investment by the Government of Malaysia and thus should be implemented by the Government. It is not appropriate to be privatised as these information are of national security interests to the government and social in nature;

2. Many government agencies will be involved in regulating the various aspects of the ITS industry and an advisory committee or council make up of representatives from these various ministries or agencies to oversee the implementation should be formed to ensure consensus and compliance of various sectoral requirements or regulations,

3. There are various existing systems operated by different organisations both public and private, that need to be integrated into the ITIS,

4. There is a need to have a single authority to facilitate the standardisation and integration of all traffic information gathering, processing and dissemination practice and procedure in the study area.

5. With the ITS industry still in its infant development stage in most of the countries in the region, there is great opportunity for Malaysia to encourage home-grown ITS related industries through the implementation of the ITIS Project, that may see its technology being exported to neighbouring countries in the near future.

An independent quasi-government agency, similar to agencies like the MHA, and tentatively called the Malaysia Traffic Information Authority (MTIA) should be formed to implement the ITIS Project, and to operate and manage the ITIS centres.

Compared to the JARTIC and VICS of Japan, however, MTIA shall be a single agency that implements, manages and operates the ITIS and will eventually implement and manage the future car navigation system as well. The MTIA may be headed by a Director General to be appointed by the Government and who shall work closely with a council or steering committee. The council or steering committee shall be make up of representatives from the relevant agencies that include Ministry of Works (Malaysian Highway Authority and HPU), Ministry of Transport (Land Transport), Ministry of Energy, Communication and Multi-media, Ministry of Entrepreneur Development, Ministry of Science, Technology and Environment, DBKL, National Police Agency, MDC and PJC, Department of Broadcasting, Department of Mapping and Survey and the relevant Municipalities and Local Authorities.

Under these top management will be several divisions headed by technical directors. These may include Operation (system operation and ITIS centre), Planning, and Research & Development Divisions. To further strengthen the administration of MTIA, it could include the direct participation of other quasi government bodies like MHA, MIMOS and the MDC which are experienced traffic or IT related entities. The MTIA should also set up regional centres in the northern and southern regions of Peninsular Malaysia to facilitate information gathering and dissemination on a nation wide scale.

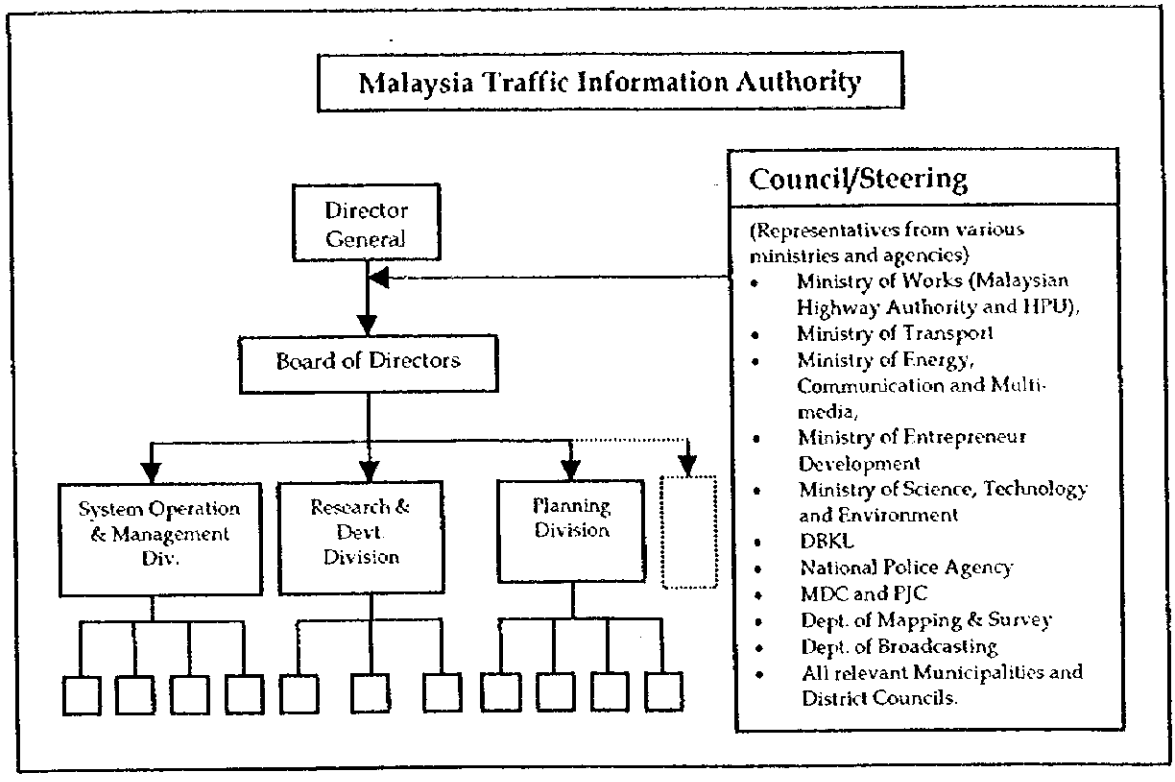


Figure 11.1 A Proposed Administrative Set-up for MTIA

The specific roles and functions of MTIA shall therefore include:

- to implement the ITIS Project in the Klang Valley and MSC and expand the system to other regions of the country,
- to operate, manage and maintain the ITIS system,
- to gather traffic information via various means as proposed in the ITIS Plan in a standardised manner and procedure,
- to integrate and utilise other information that are available from existing system with those gathered by the ITIS Project,
- to process, compile and consolidate all these traffic information at the ITIS centre,
- to disseminate these processed information to road users and public via various means as proposed in the ITIS Plan,
- to facilitate the exchange of information between ITIS centre with those of the existing systems,
- to promote the research and development of ITS related industries in the country.

REAM is currently in the process of preparing the ITS Masterplan. This masterplan when completed would provide the overall policy and legal framework including the administrative organisation for the implementation of ITS in this country. The above suggestion shall be further examined in line with these frameworks in the masterplan when it is completed and endorsed by the Government of Malaysia. The proposed ITIS Plan should be implemented by the Government using its development budget or with external soft loans.