

VEB1072 Traffic Engineering



UNIVERSITI TEKNOLOGI PETRONAS

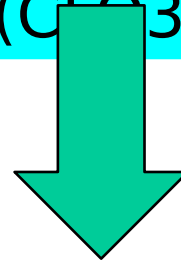
Lecture 7 : Traffic Management System



Traffic Management Systems

Propose an effective mitigation measures to address complex traffic issues and challenges.

(CLO3)



Design solutions for complex engineering problems and design systems, components or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.

(PLO3)



Lecture 7 : Traffic Management System (Unit Outcomes)

- Able to define traffic management (C)
- Able to explain the purposes of traffic management (C)
- Able to suggest different type of traffic management tools. (E)



Lecture 7 : Traffic Management System

Outcomes:

- Able to define traffic management
- Able to explain the purposes of traffic management
- Able to suggest different type of traffic management tools.

Topics:

- The definition of traffic management
- The objectives of traffic management
- Types of traffic management



Traffic Management Definition

The process of adjusting or adapting the use of an existing road system to meet specified objectives without resorting to substantial new road construction

(Roads and Traffic in Urban Areas, 1987)





Traffic Management Objectives

- 1. EFFICIENCY***
- 2. SAFETY***
- 3. FINANCIAL
CONSERVATION***
- 4. EQUITY***
- 5. LAND USE PLANNING***





Traffic Management Types

1. CAPACITY IMPROVEMENT

- Improving Traffic Flow

2. PRIORITY SYSTEMS

- *Bus Priority*
- *Protecting the Pedestrian*
- *Cycling Schemes*
- *Environmental Priority Schemes*

3. RESTRAINT MEASURES

- *Parking Control*
- *Road Pricing*
- *Controlled Physical Restraints*

- *Controlling Vehicle Speed*
- *Pedestrian Facilities*
- *Road Lightings and*



CAPACITY IMPROVEMENT (Improving Traffic Flow)

- a) One-Way Systems***
- b) Tidal-Flow Systems***
- c) Restriction on Turning Movements***
- d) Closing Side Streets***
- e) Traffic Signals***





a. One-Way Systems

Advantages

- ***Increased Capacity***
- ***Increased Speeds***
- ***Increased Safety***
- ***Economic Saving***
- ***Improved Parking***

Disadvantages

- ***Increased travel distance***
- ***Loss of amenity***
- ***Loss of business***
- ***Increased severity of accidents***
- ***Possible confusion***



b. Tidal-Flow Operations

- ***Introduction requirements***
- ***Controlling the reversible lanes***
 - ***signing***
 - ***overhead traffic signal***
 - ***moveable barriers***



c. Turning Restrictions

- ***Minor to Major***
- ***Major to Minor (G-turn)***
- ***Major to Major (Q-turn)***



d. Closing Side Streets

Advantages

- ***Improved journey time and speed***
- ***Reduced number of accidents***
- ***Usage of linked signals***
- ***Usage of parking***
- ***Usage of pedestrian precincts***

Disadvantages

- ***Congestion at intersections***
- ***Increased parking on main roads***
- ***Interference with other measures***
- ***Reduced availability of alternative route***



e. Traffic Signals

Advantages

- ***Provide orderly movements***
- ***Reduced number of accidents***
- ***Progressive movement in UTC***
- ***Economical***
- ***Clear and impartial***

Disadvantages

- ***Increased total vehicle delay***
- ***May cause unnecessary delay***
- ***Increased rear-end collisions***
- ***Not normally capable of granting right-of-way to emergency vehicle***
- ***Failure may cause havoc***



PRIORITY SYSTEMS

- 1. *Bus Priority***
- 2. *Protecting the Pedestrian***
- 3. *Cycling Schemes***
- 4. *Environmental Priority Schemes***





1. Bus Priority

- a) Bus lanes (with flow)***
- b) Bus lanes (contraflow)***
- c) Bus only streets***
- d) Purpose built busways***
- e) Priority at junctions***
- f) Protection of bus stops***





a. With Flow Bus Lanes

Advantages

- *Act as queue jumping devices*
- *Minimal traffic pattern disruptions*
- *Can be restricted to peak period only*
- *Improve public transport status*
- *Implementation cost very low*





a. With Flow Bus Lanes

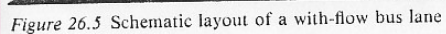
Disadvantages (kerbside)

- ***Require continual policing***
- ***Cut access of commercial vehicles***
- ***May cause accident initially***
- ***Traffic congestion for others***



Disadvantages (central lane)

- ***Dangerous for bus passenger***
- ***Require very wide street***
- ***Bus needed***

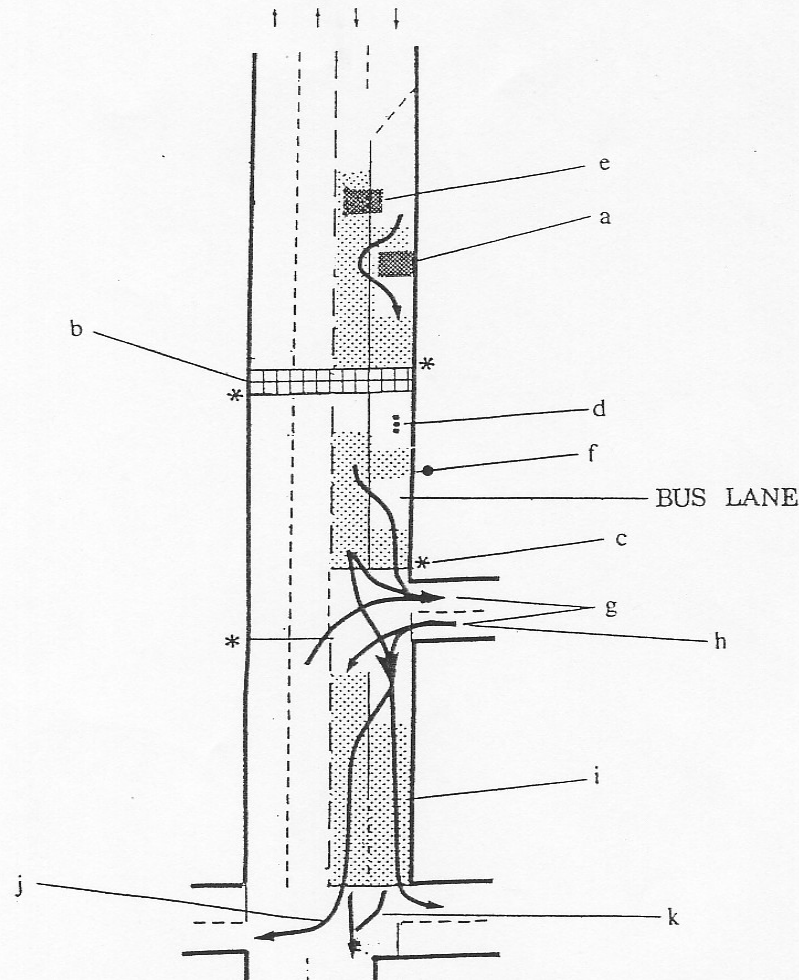


[NB. Sign numbers refer to the Traffic Signs and General Directions 1981]



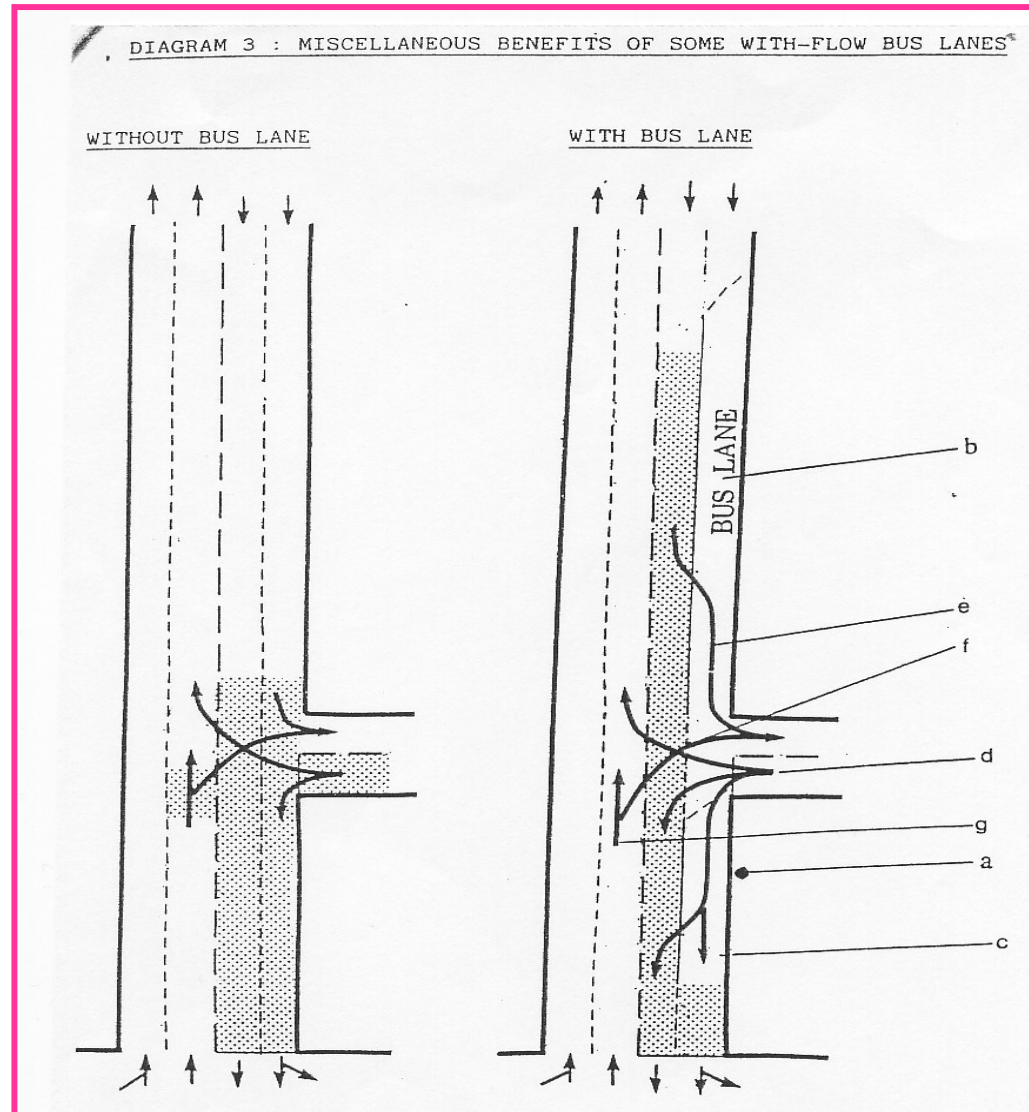
a. With Flow Bus Lanes

DIAGRAM 2 : FACTORS REDUCING THE EFFECTIVENESS OF SOME BUS LANES COMPARED WITH OTHERS OF SIMILAR LENGTH AND VEHICLE FLOWS





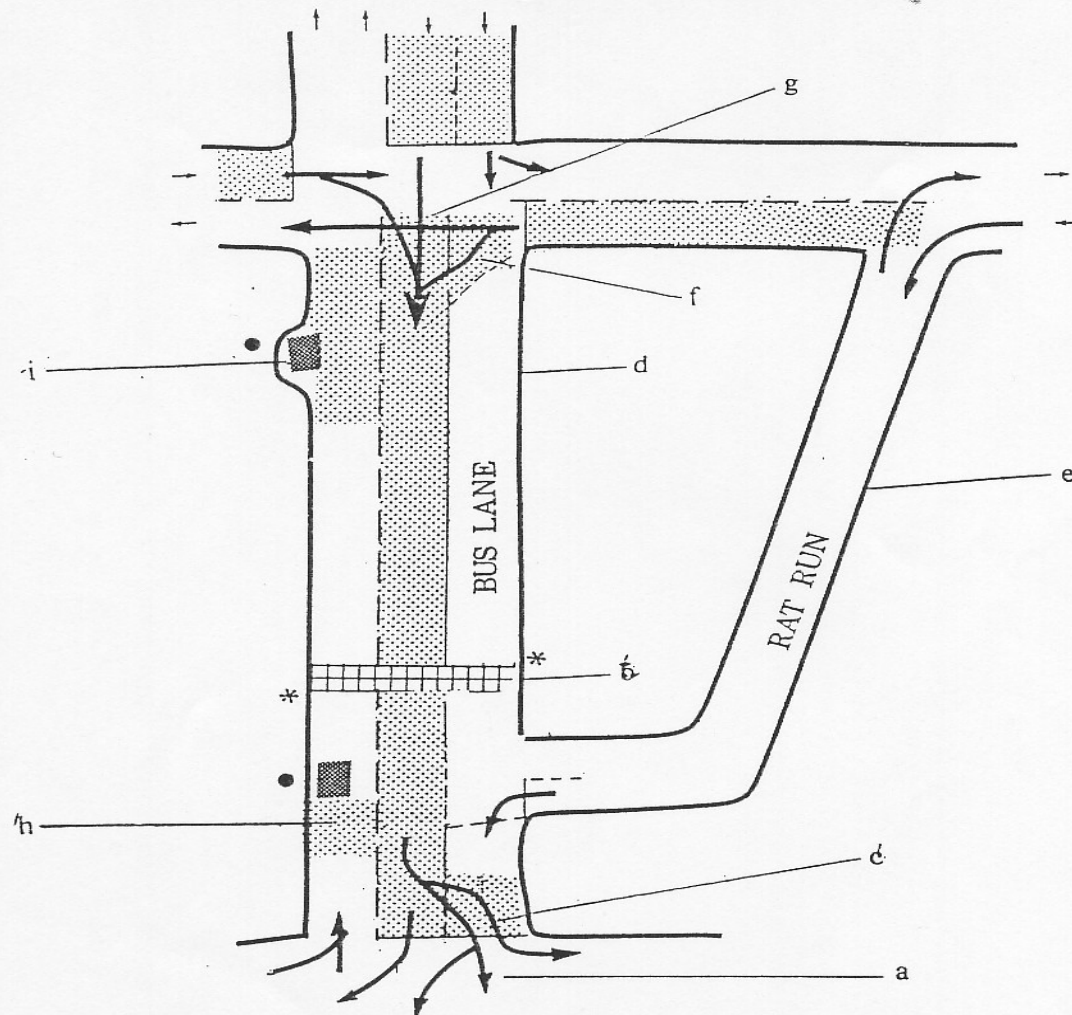
a. With Flow Bus Lanes





a. With Flow Bus Lanes

DIAGRAM 4 : POSSIBLE ADVERSE EFFECTS OF SOME WITH-FLOW BUS LANES





b. Contraflow Bus Lanes

Advantages

- ***Shorter bus route***

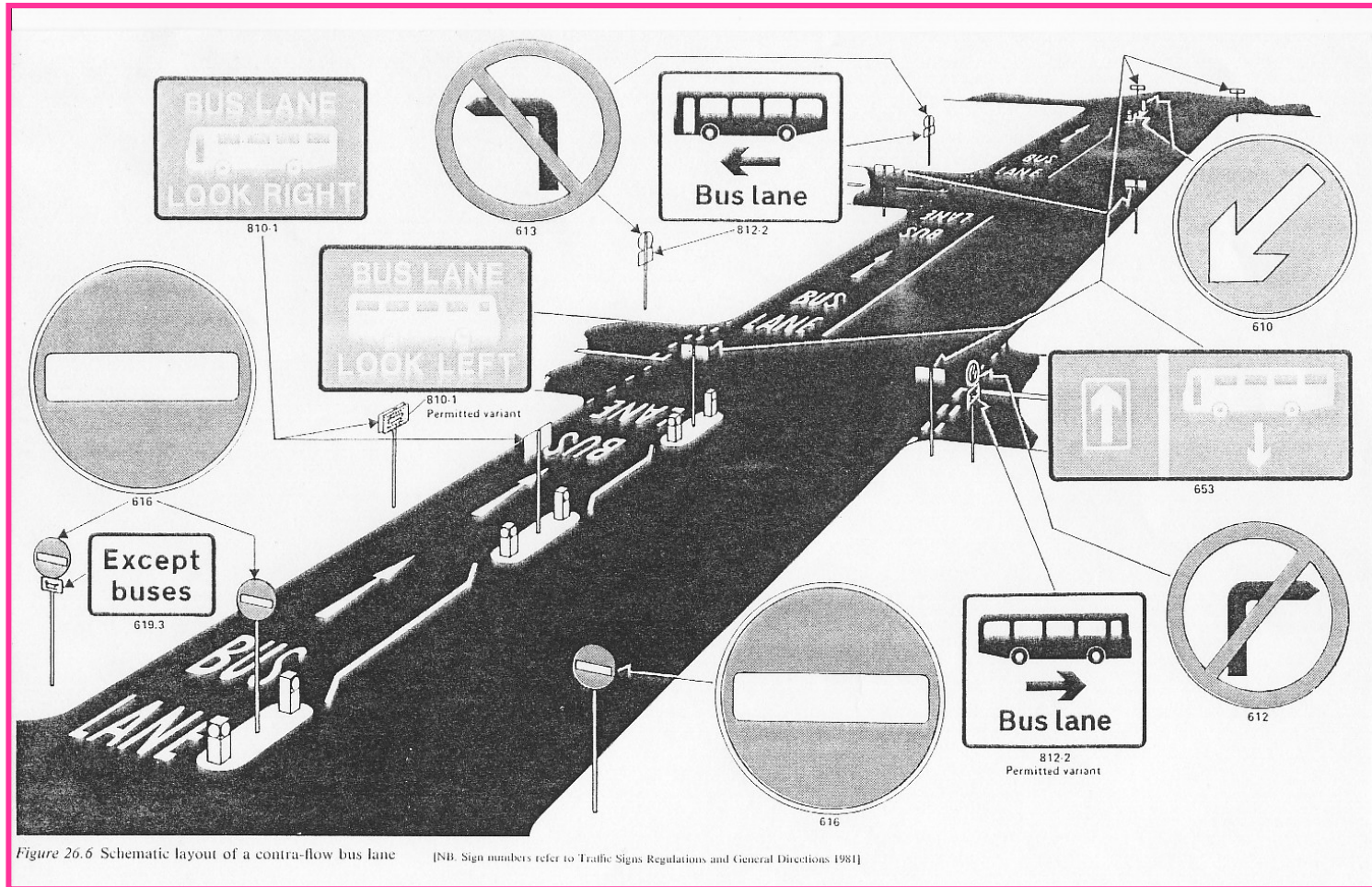
Disadvantages

- ***Reintroduce traffic conflicts at intersection eliminated by one-way-street***





b. Contraflow Bus Lanes





c. Bus Only Streets

Objectives

- ***To speed up buses***
- ***To create sufficient carriageway space***
- ***To assist pedestrian to cross street more easily***
- ***To improve the environment***





d. Busways

- ***Not for existing urban but new town***
- ***Minimum one-way operation...***
 - ***4 m no overtaking***
 - ***6 m with overtaking***
- ***Both ways - 6.75 m***
- ***Grade separated***





d. Busways

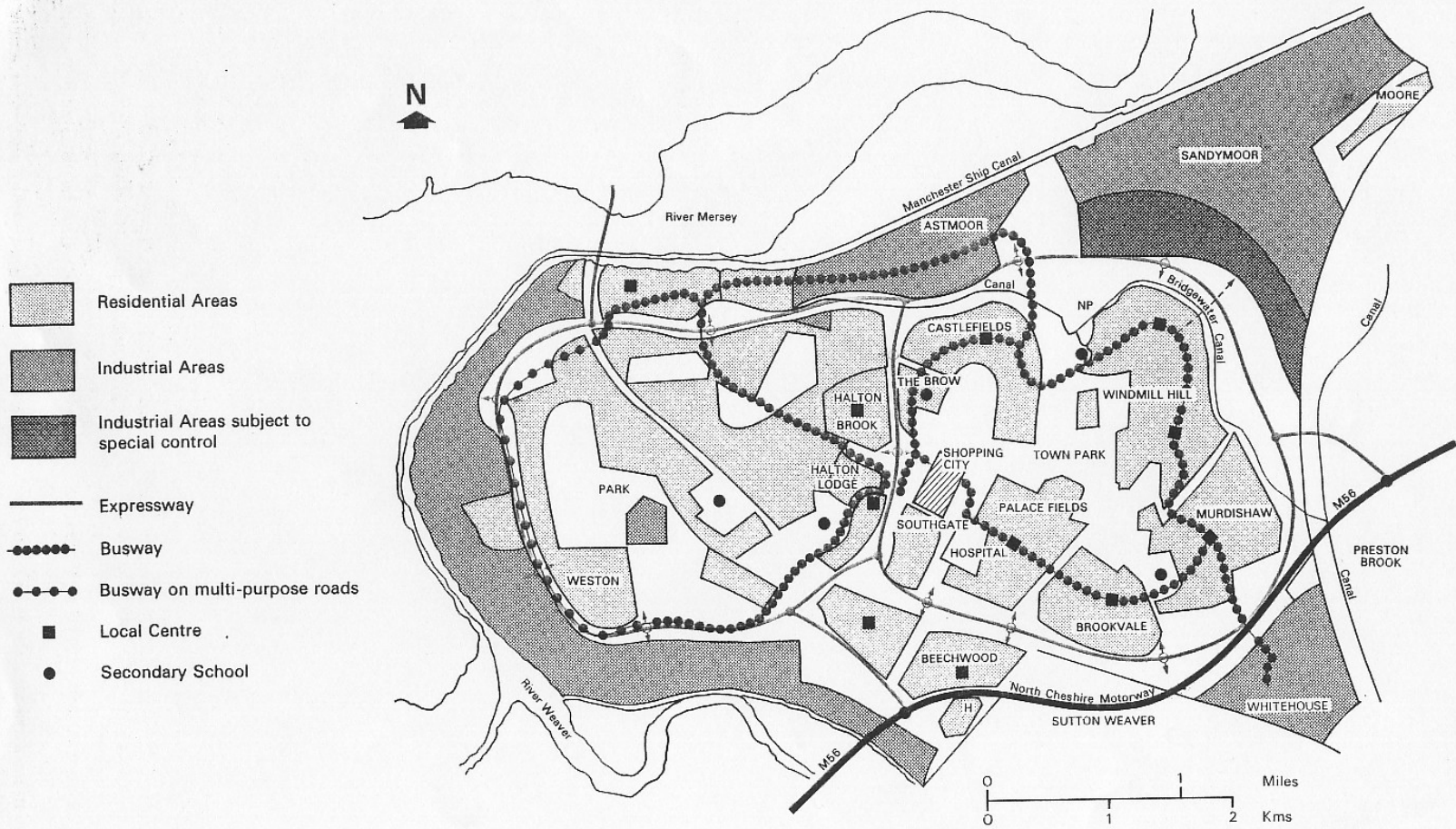


Figure 26.8 Plan showing the busway in Runcorn New Town (Cheshire)

Source: Runcorn Development Corporation



e. Priority at Junctions

- ***Exemption from prohibited turns***
- ***Extending green time on bus route approach***
- ***Allocating two stages in a cycle to bus route***
- ***Exclusive approach to a signal controlled junction***
- ***Providing selective vehicle detection devices***





f. Protection of Bus Stops

- ***Lengthened bus bay close to junction***
- ***Shallow bus bays (non-junction locations)***





2. Protecting The Pedestrian

“Because of Kuala Lumpur’s worsening traffic jams walking is often the quickest way to get anywhere, unfortunately, the road planners have forgotten the pedestrian and it can be impossible to walk from one building to another because there is nothing but expressways in front of you”

Insiders Guide to Malaysia



2. Protecting The Pedestrian

- a) Existing footways and footpaths***
- b) Pedestrian Refuges***
- c) Formal Pedestrian Crossings***
- d) Pedestrianisation***
- e) Grade separation***
- f) Guardrails***
- g) Street Lighting***
- h) Anti-skid Treatment***





a. Existing Footways & Footpaths

- ***Widening footways***
- ***Corner radii***
- ***Surface treatment at junctions***
- ***Maintenance***
- ***Footway obstructions***
- ***Routes for footways***





b. Pedestrian Refuges

- ***Most common***
- ***Least costly***
- ***1.2 - 1.8 m wide***





c. Formal Pedestrian Crossings

- ***School crossing patrol***
- ***Zebra crossing***
 - ***undivided***
 - ***divided***
- ***Pelican crossing***
- ***Pedestrian facilities at signal controlled junctions***





d. Pedestrianization

- *High levels of pedestrian activity*
- *Shopping and market areas*
- *Emergency vehicles provision*
- *Signing (minimum)*
Partial pedestrianization





e. Grade Separation

- ***The safest***
- ***Expensive***
- ***Footbridge***
- ***Underpass (subway)***
- ***Justifications***
 - ***high pedestrian and vehicle flows***
 - ***lack of alternative facilities***
 - ***favorable site topography***
 - ***poor accidents records***





RESTRAINT MEASURES

1. Parking Control

2. Road Pricing

***3. Controlled
Restrains***

Physical





1. Parking Controls

Types of Control

- ***Limits on number of central car parking spaces***
- ***Limits on duration of use***
- ***Limits on hours of use***
- ***Higher parking charges***

Criteria

- ***Effective***
- ***Selective***
- ***Easy to understand***
- ***Simple and inexpensive***
- ***Flexible***
- ***Fair***





2. Road Pricing

Indirect Methods

- *Differential fuel tax*
- *Differential licenses*

Direct Methods

- *Off-vehicle recording systems*
- *Vehicle metering systems*



3. Controlled Physical Restraint

Physical measure	Description	Use
Road humps	Single hump or a series extending across the carriageway at right angles to the direction of flow.	Best used as part of an area-wide scheme and especially appropriate on access roads where layout encourages speed. Should not be used on major routes. Subject to extensive criteria.
Bar markings	Standard marking is 90 yellow transverse lines applied over about 400 metres, the spacing between which progressively reduces towards the hazard.	On approaches to roundabouts on major routes. Subject to extensive criteria.
Rumble areas	Continuous length of carriageway with coarsely textured surface designed to produce a rumble which increases with speed within vehicles driving over it.	In urban areas but consider noise nuisance if adjacent to residential development.
Rumble strips Jiggle bars	A series of lateral bands of surface treatment designed to cause intermittent noise within vehicles driving over them. Variable spacing and dimensions.	For use on roads with high flow levels. More applicable to local distributors than access roads. More effective than a rumble area but consider noise nuisance if adjacent to residential development.
Road narrowing	The aim is to break up long straight sections of road by alternate extension to each side of the road and by the addition of refuges and turning bays.	Can be continuous over a long length or at a point. Check visibility, pattern of pedestrian movement, parking provision and passing bays.
Junction modifications	Reduction of kerb radii, change of junction type and change of markings.	At isolated junctions or as part of an area-wide scheme.
Shared surfaces	Elimination of a separate footway and creation of a kerbless profile. Use of different surface textures and colours, landscaping and planting.	Access roads within residential areas. City shopping centres. Use in conjunction with other measures.



Table 22.1 Physical measures for controlling vehicle speed



SAFETY MEASURES

- 1. Controlling Vehicle Speeds***
- 2. Pedestrian Facilities***
- 3. Road Lightings and Signs***



“With a few exceptions, driving a car in Malaysia is not a relaxing experience. Although the roads are generally in adequate condition and therefore technically safe, most Malaysian drivers are not, and the accident rate, especially during peak holiday seasons, is horrific”

Insider's Guide Malaysia 1998.



1. Controlling Vehicle Speeds

Speed Limits Imposed By Regulation

- ***Lowering a higher limit***
- ***Raising a lower limit***
- ***Applying limits of less than 50 km/h in particular areas***

Physical Measures

- ***Changes to the highway geometry***
 - ***road narrowing***
 - ***junction modification***
- ***Vary the carriageway surfaces***
 - ***rumble strips***
 - ***road humps***





Traffic Management System

INTEGRATION WITH ELEMENTS IN THIS CLASS MAY BE NECESSARY

IF ELEMENTS IN THIS CLASS ARE TO BE USED, THEN...

	TRIP GENERATION	MODE CHOICE	ROUTE CHOICE	STREET USAGE	JUNCTION CONTROL	PARKING CONTROL	SAFETY	ENVIRONMENT
TRIP GENERATION		●	○	●	○	●	●	●
MODE CHOICE	●		●	●	●	●	○	●
ROUTE CHOICE	●	●		●	●	○	●	●
STREET USAGE	●	●	●		●	●	●	●
JUNCTION CONTROL	○	●	●	●				●
PARKING CONTROL	●	●	○	●	●		●	●
SAFETY	○	○	●	●	●	●		○
ENVIRONMENT	○	○	●	●	○	●	○	

● - STRONG

● - MODERATE

● - WEAK

○ - ALMOST NONE



Questions?

