



3rd Regional Forum on Environmentally Sustainable
Transport (EST)

Initiatives on EST

Singapore's Experience

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Introduction

- MOT/LTA plans the long-term transport needs of Singapore, taking care of those who drive as well as those who take public transport.
- 4.5 millions people & 10.3 millions visitors on the move
- Transport statistics
 - RTS Length: 138 km
 - Road Length: 3,262 km
 - Total vehicle population: 835 409



Introduction

- UITP Charter on Sustainable Development
- Environmental Policy
- Launch of Land Transport Review 2008
- Publication of National Energy Policy Report & National Climate Change Strategy Report
- Formation of Inter-Ministerial Committee on Sustainable Development

ENVIRONMENTAL POLICY STATEMENT

LTA is committed to protecting our environment. We incorporate environmental protection in our strategic decisions and conduct our business in a manner that balances the environmental and economic needs of the communities in which we operate.

We will:

- Comply fully with all relevant environmental legislation and good environmental practices;

port operators, contractors, ment agencies in a concerted ntally responsible manner.

Date: 1 June 2005



Overall Strategies for EST



Making Public Transport the Choice Mode

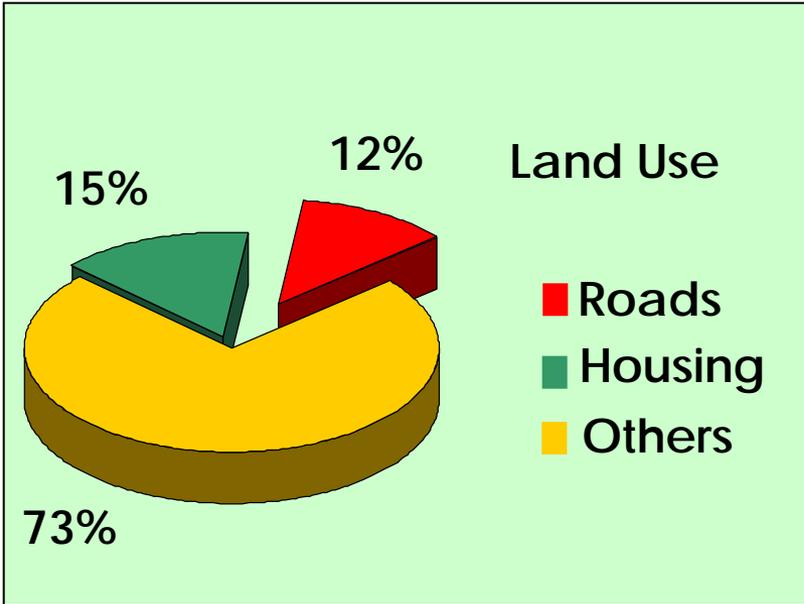
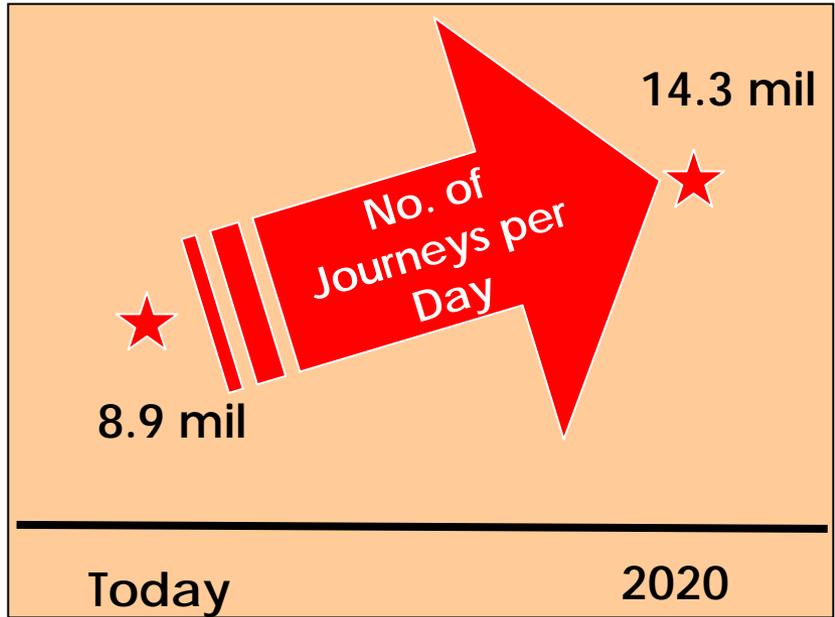


Meeting Diverse Needs



Managing Road Usage

Making Public Transport the Choice Mode

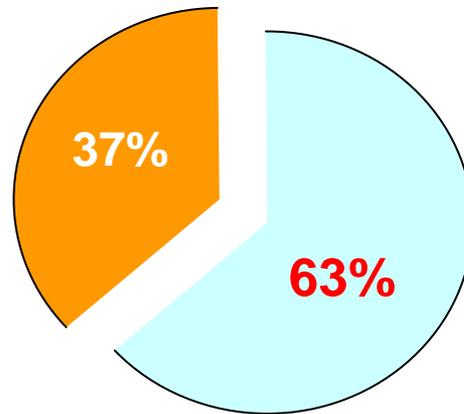


Increase in travel demand must be met largely by public transport

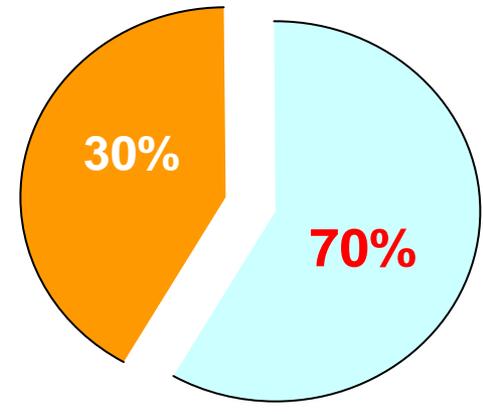
Making Public Transport the Choice Mode

-  - Private Transport
-  - Public Transport

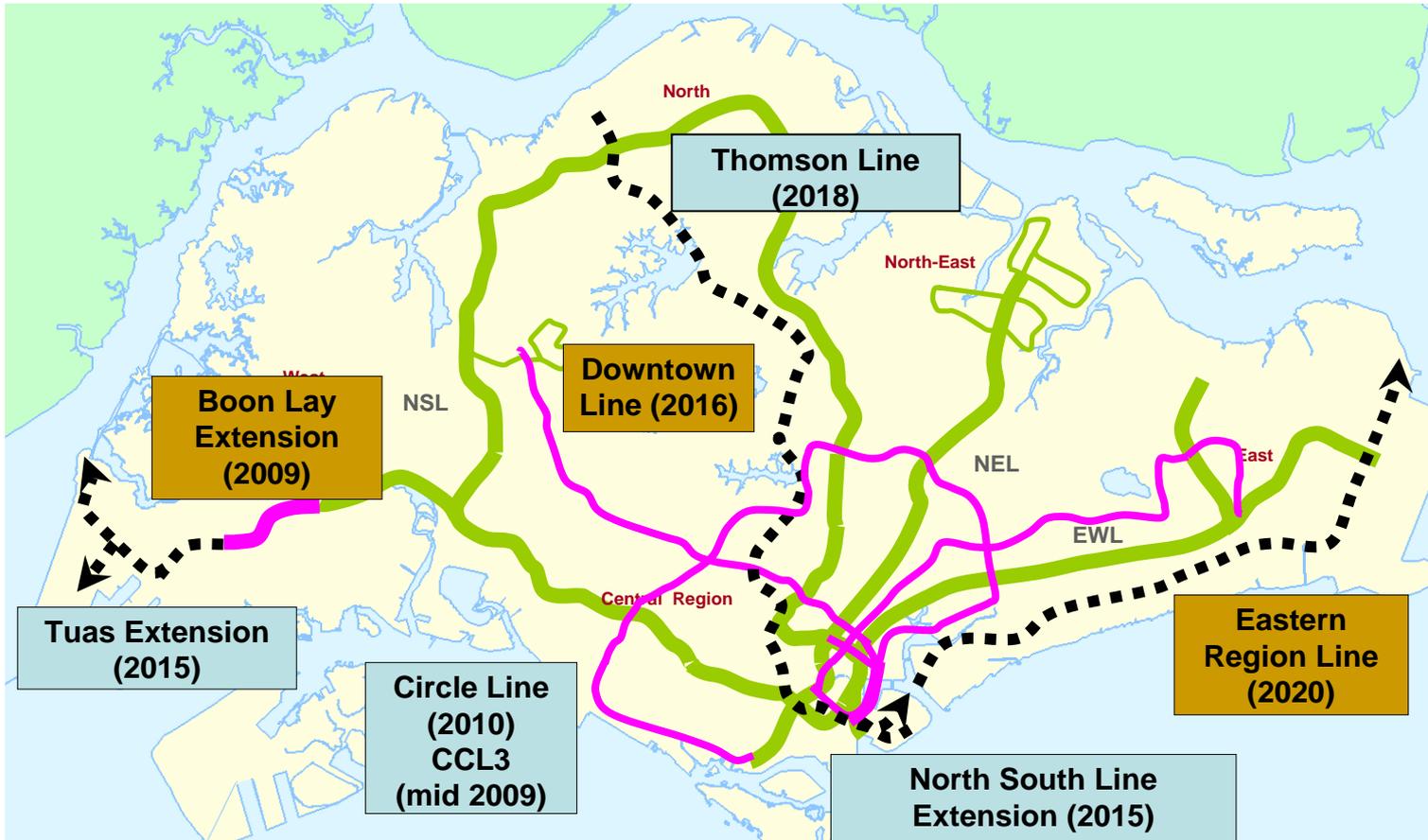
2004 Mode Share
(am peak)



Target 2020 Mode Share
(am peak)

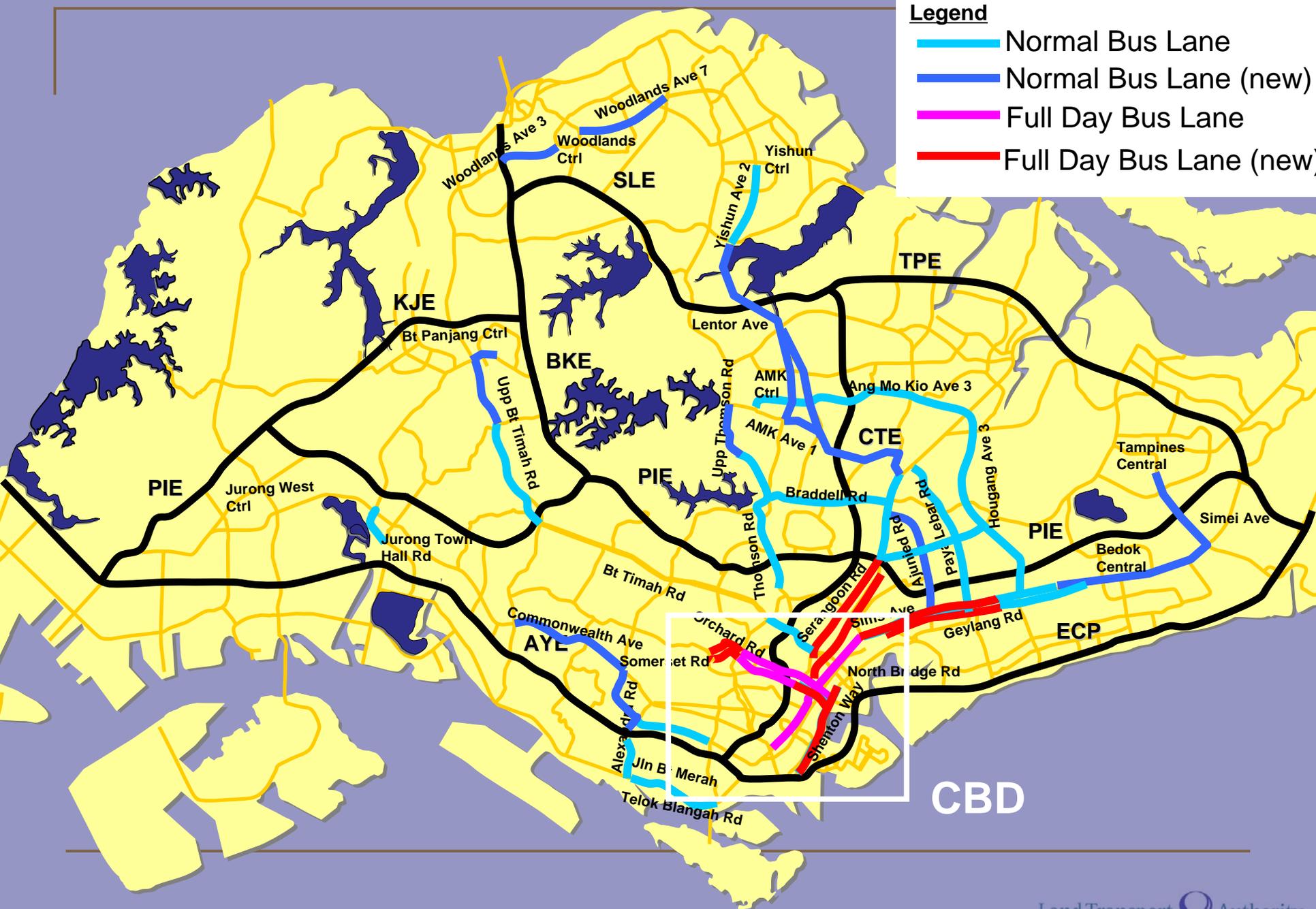


Making Public Transport the Choice Mode



Legend

- Normal Bus Lane
- Normal Bus Lane (new)
- Full Day Bus Lane
- Full Day Bus Lane (new)



Making Public Transport the Choice Mode

- Real time bus arrival info panels at another 20 bus stops

May 08

- Integrated real time bus arrival info via SMS at 50 bus stops with info panels
- Integrated PT Journey Planner

July 08

- Integrated real time bus arrival info at bus stops islandwide via various mobile platforms

March 2010

- Integrated Multi-Modal Travel Information System
- Integrated island-wide PT Map
- PT Travel Advisor

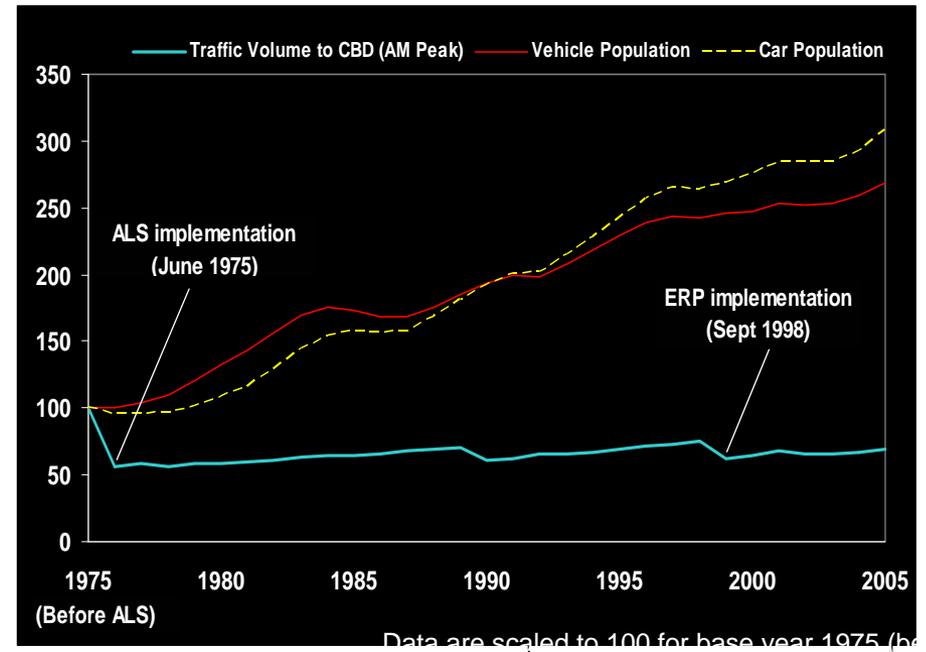
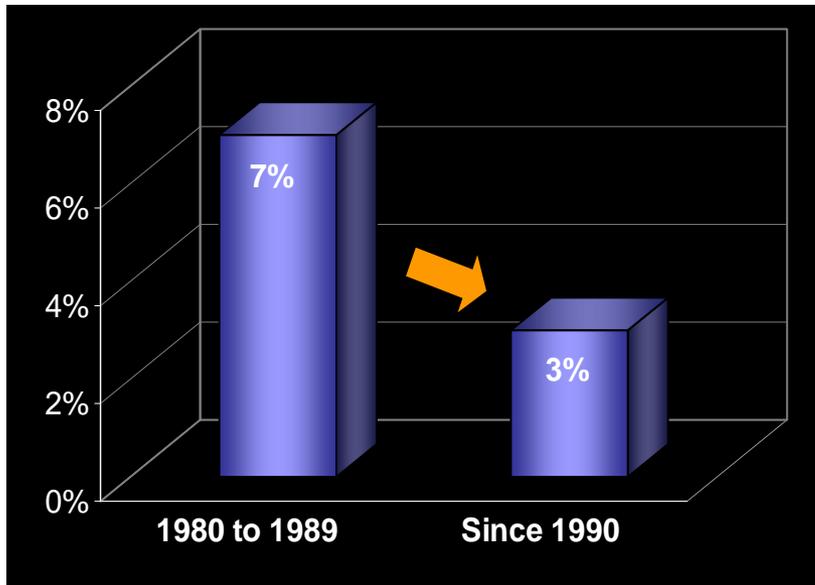
Longer term



Managing Road Usage

■ Ownership Measures:

- Vehicle Quota System (VQS)
- Electronic Road Pricing (ERP)



Managing Road Usage

Lower vehicle population growth rate from
3% to 1.5%
from May 2009

	Growth Rate
Quota Year 2009, 2010, 2011	1.5%
To review after Quota Year 2011	

Managing Road Usage

Enhancing effectiveness of ERP

- Refining measurement of traffic speeds
- Revising ERP rate structure
- Managing congestion in city area



Managing Road Usage

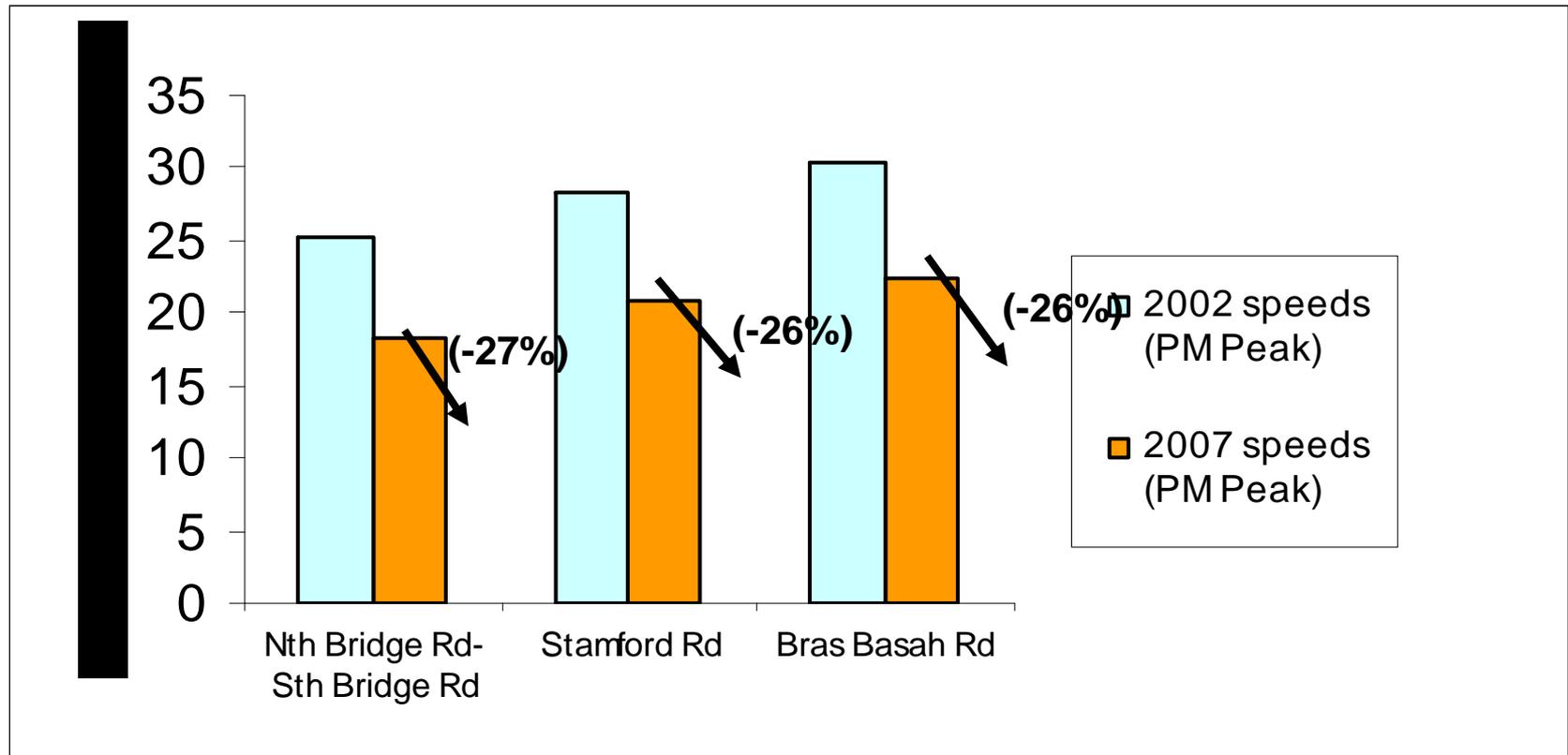
- Optimal speed threshold – 45 kph (expressway), 20 kph (arterial road) set 10 years ago
- Threshold speeds are near “unstable” zone where “stop-start” traffic can occur
- Need to create a buffer to avoid “stop-start” situation
 - Use international practice of 85th percentile method to ensure at least 85% of motorists will enjoy smooth traffic on priced roads

Managing Road Usage

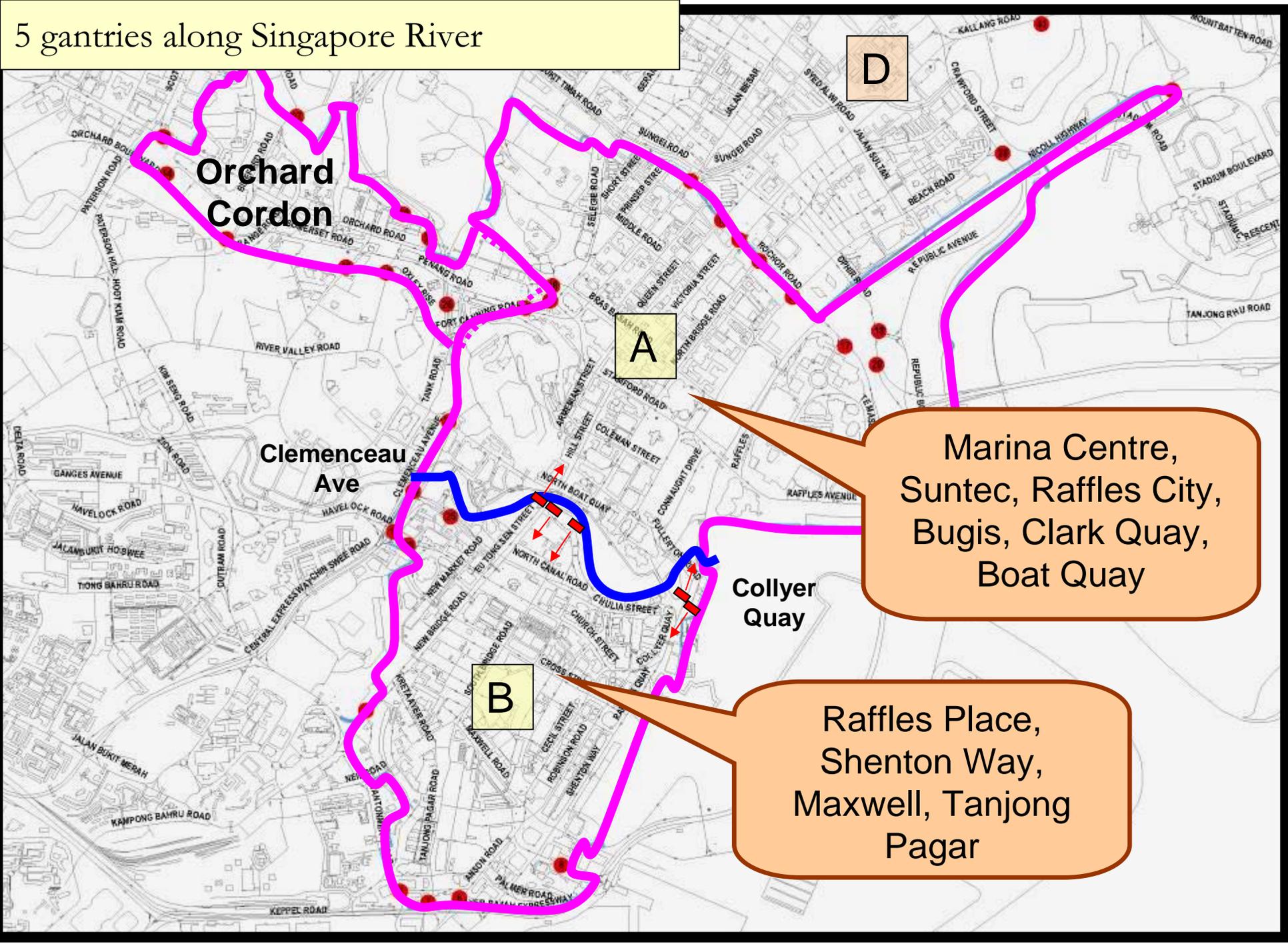
Changes required for ERP to remain effective in influencing motorists' behavior

	Current	Revised
Based on initial rate per Passenger Car Unit (PCU)	\$1	\$2
Rate adjustment per PCU (Increase/reduction in rates when traffic speeds warrant)	\$0.50	\$1

Managing Road Usage



5 gantries along Singapore River



**Orchard
Cordon**

**Clemenceau
Ave**

**Collyer
Quay**

Marina Centre,
Suntec, Raffles City,
Bugis, Clark Quay,
Boat Quay

Raffles Place,
Shenton Way,
Maxwell, Tanjong
Pagar

D

A

B

Meeting Diverse Needs: People-friendly Urban Transport

By 2010

All access to transport nodes, and all public roads will be barrier free

40% of public bus fleet will be wheelchair-accessible; 100% by 2020

By 2011, 17 additional lifts at 16 MRT stations



Meeting Diverse Needs: People-Friendly Urban Transport

- Land Transport Community Partnership Division
- Community Outreach Programme



Meeting Diverse Needs: Social Equity

20

- The Affordability Indicator, which tracks public transport expenditure as a percentage of household income of a typical family using public transport, has been decreasing over the years.
- Fares are regulated by Public Transport Council using a fare cap formula
- Provide targeted help for the lower-income groups
 - Workfare Income Supplement Scheme, transport vouchers

Meeting Diverse Needs: Public Health

- Met USEPA yardsticks for pollutants including SO₂, CO and NO₂,
 - except PM_{2.5}
 - Annual average (23µg/m³) exceed USEPA standard (15µg/m³)
- Vehicle inspection regime to meet emission standards
- Diesel vehicles account for 50% for PM_{2.5}
 - Ultra low sulphur fuel
 - New diesel vehicles must comply with Euro IV standards
 - 100% taxis will be Euro IV compliant by 2014
 - 40% of buses will be Euro IV compliant by 2010
 - Work towards 100% by 2020



Meeting Diverse Needs: Environmental Friendly Transport

Key CO₂ Contributors (2005) (kilo tonnes)

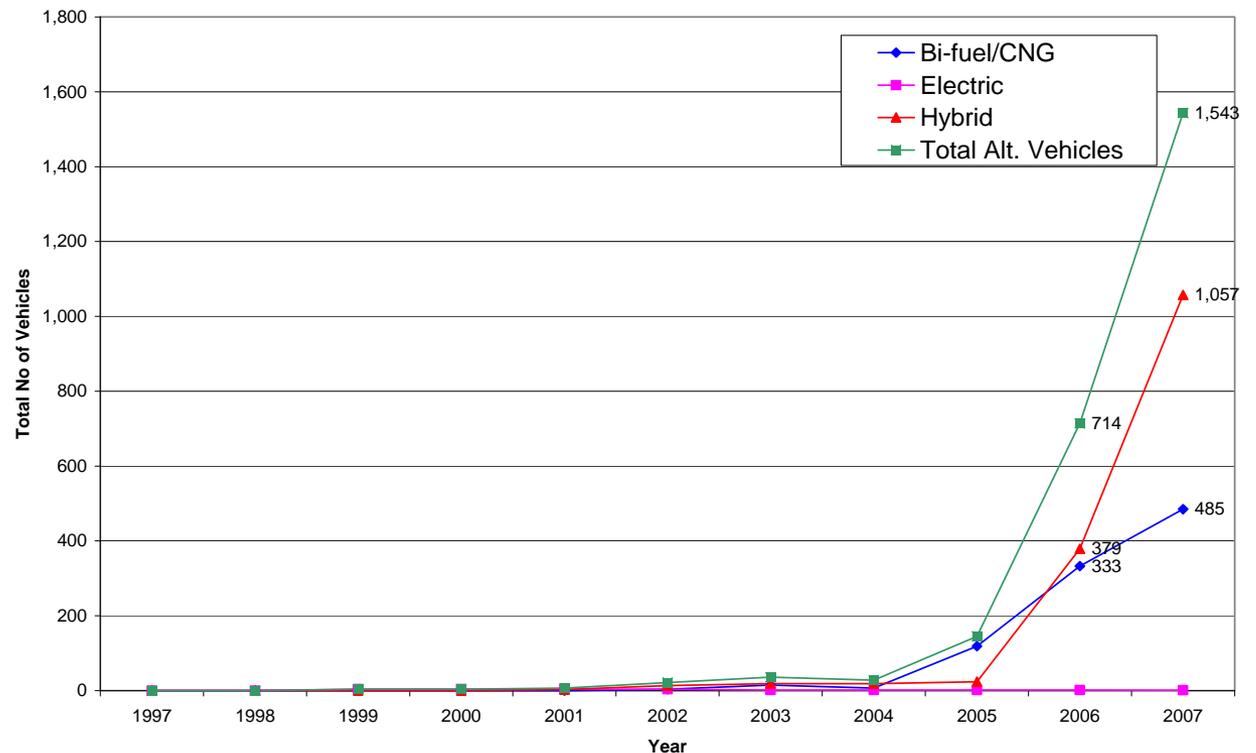
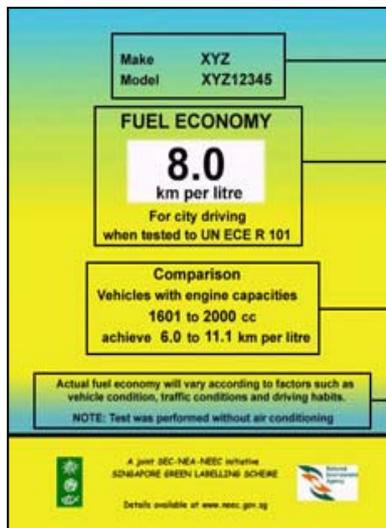
	 Electricity Generation	 Industry	 Transport	 Buildings	 Consumers/ Households	 Others
Primary Consumption (combust fuel)	19,315 (48%)	13,465 (33%)	7,056 (17%)	325 (1%)	216 (1%)	-
Secondary Consumption (use electricity)		8,328 (21%)	930 (2%)	5,910 (15%)	3,415 (8%)	732 (2%)
Overall		21,793 (54%)	7,986 (19%)	6,235 (16%)	3,631 (9%)	732 (2%)

TOTAL CO₂ = 40,377 kilo tonnes

Target: 7% improvement in energy consumption and CO₂ per capita for transport sector by 2020

Meeting Diverse Needs: Environmental Friendly Transport

- Fuel Economy Labeling Scheme
- Green Vehicle Rebates



Meeting Diverse Needs: Environmental Friendly Transport



Construction methodology, station footprints and alignments of projects are planned to minimize impact on environmentally sensitive areas.

MINERS AT WORK

Tunnel mining will be used for the first time in road construction here to build a 165m stretch of the Fort Canning tunnel, which will run from Stamford Road, under the present National Library site and Fort Canning Hill, to Penang Road near Park Mall.

The diagram illustrates the tunnel mining process in four steps:

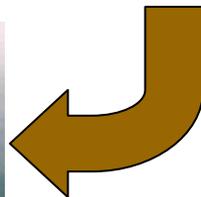
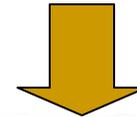
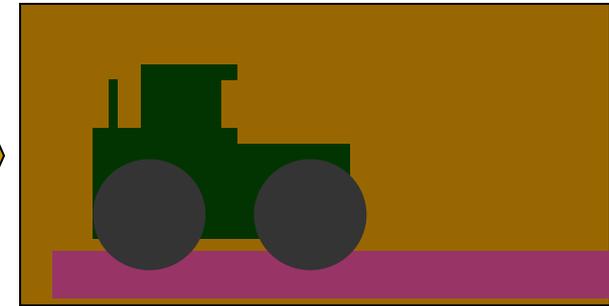
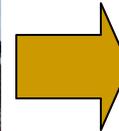
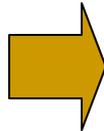
- Concrete is sprayed on the face of the soil wall to keep it from collapsing.
- Steel pipes are fitted in at the top and concrete is pumped in to support the roof of the tunnel before digging.
- One level of the tunnel is dug first and the exposed sides are strengthened with reinforced concrete.
- Digging begins on a lower level. It will proceed slowly, at a length of about 1.4m a day, to ensure that the exposed areas do not collapse.

The map shows the tunnel route from Stamford Road to Penang Road, passing under the National Library and Fort Canning Hill. Key landmarks include the National Library, Fort Canning Centre, National Library, Fort Canning Park, and Fort Canning Service Reservoir. Other roads shown include Orchard Road, Penang Road, Canning Walk, Percival Road, and Hill Street. The tunnel is shown as a cut and cover tunnel (98m) and a cut and cover tunnel (87m). The mining tunnel is 165m long. The map also shows the North-East Line and North-South Line.

Source: LTA

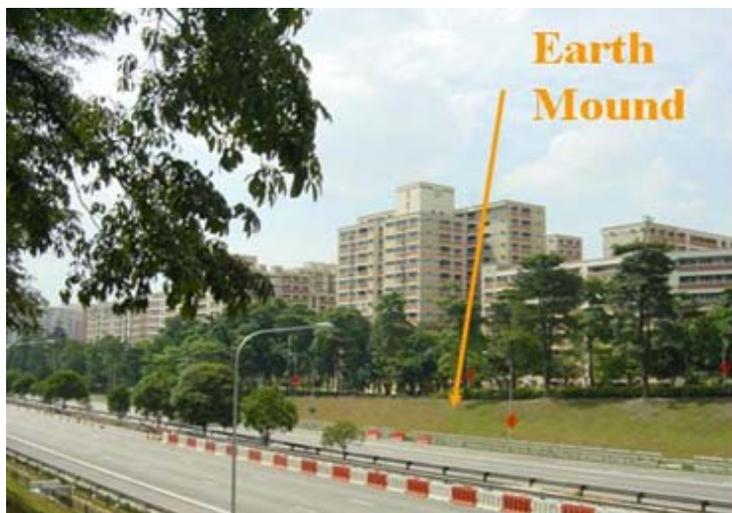
Meeting Diverse Needs : Environmental Friendly Transport

- To study the use of new alternative/recycle waste material to supplement existing construction material for road pavement



Meeting Diverse Needs: Traffic Noise Management

- Traffic noise at major expressways, arterial roads and from our rail system is able to comply with the 67 dBA limit.
- Noise from rails system: engineering designs and selection of quieter trains
- Noise from roads: planning and vehicle inspection.



Meeting Diverse Needs: Non-motorised Transport

Cycling

- 6 month trial to allow foldable bicycles on board trains and buses during off-peak periods
- Safety signs at frequently used cycling routes
- Better bicycle parking facilities at MRT stations and bus interchanges



Walking

- Enhance connectivity to transport nodes
- 86% of our Pedestrian Overhead Bridges will be sheltered by 2010



Meeting Diverse Needs: Road Safety

- Won Prince Michael International Road Safety Award in December 2007
- Set up a National Safety Council (NSC) and National Road Safety Action Plan Committee
- Initiatives
 - Enhanced School zone
 - Black Spot Program

Road safety is no accident

The Land Transport Authority and the Traffic Police have just won the prestigious Prince Michael International Road Safety Award for keeping Singapore's roads safe

Other road safety measures: Expressways

Clear roadways are placed at the junctions of expressway exits — particularly those made of solid concrete — to minimise the impact of a potentially fatal crash.

Junctions

When the traffic lights turn red, the driver must stop the vehicle in a way that the vehicle is very near the junction — for instance when driving along a roundabout — advance warning lights are put up so motorists are prepared to stop earlier. Traffic signal strings may also be modified at junctions with limited visibility to that all approaching vehicles have enough green-light time to make a turn.

Memorable win on global stage

Ballards

Short vertical posts called ballards are installed at bus stops along high-speed roads so that if a bus or other vehicle were to jump the track, the passengers would be protected.

Zebra crossings

Prominent signals such as light-emitting diodes and LED beacons that are installed at zebra crossings to warn vehicles of the pedestrian crossing ahead.

Schools

To protect the children, prominent traffic signs and red paved roads are clear signals to motorists that they are entering a school zone.

Enjoy this festive season and stay safe on the roads!

Conclusion

A high quality living environment

**Economic
Success**

Vibrant Environment

Conclusion

A place where Singapore call home



THANK YOU

