



**XXIVth World
Road Congress
Mexico 2011**
Mexico City 2011.

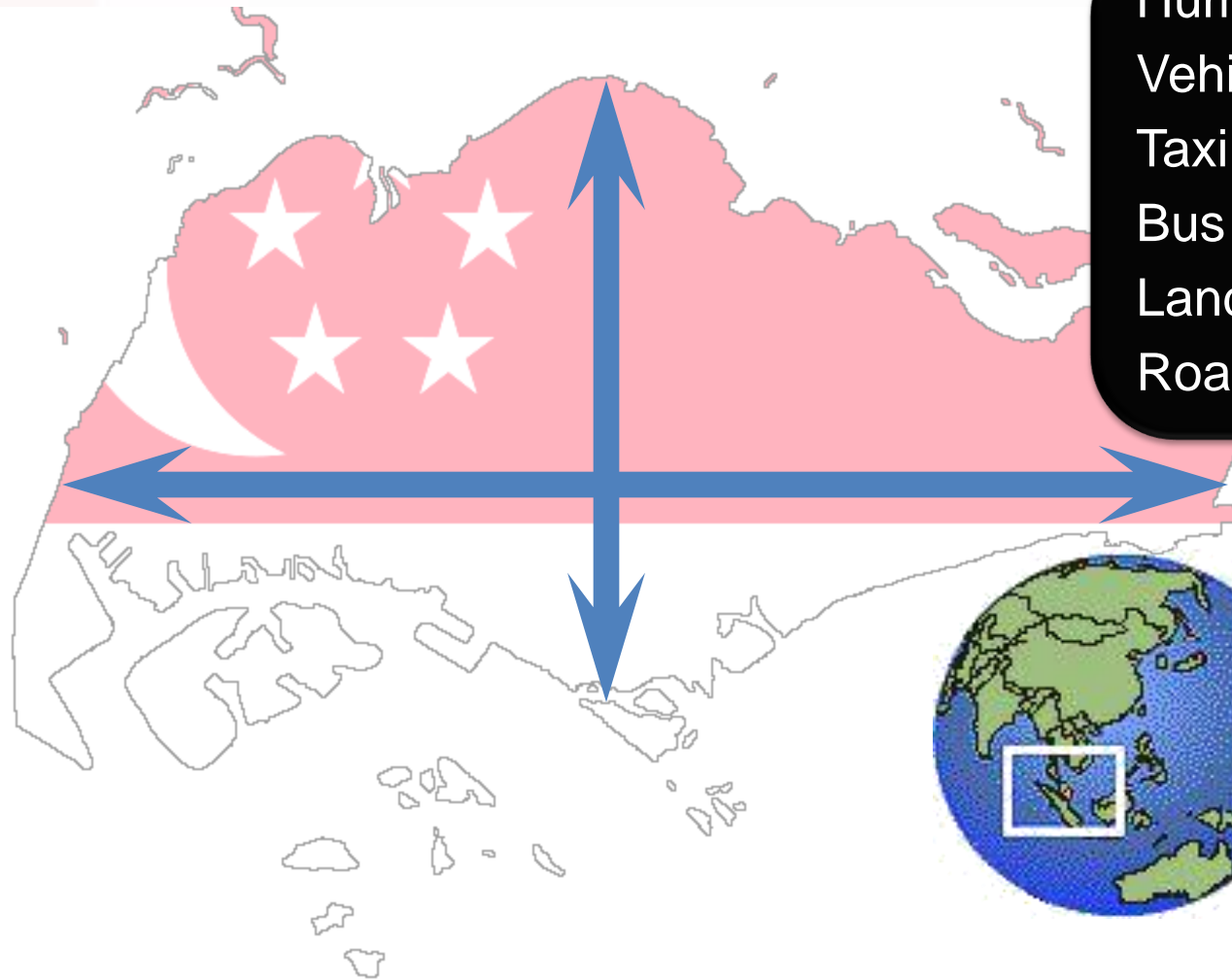
SUSTAINABLE DEVELOPMENT OF A ROAD SAFETY FRAMEWORK

Chandrasekar s/o Palanisamy

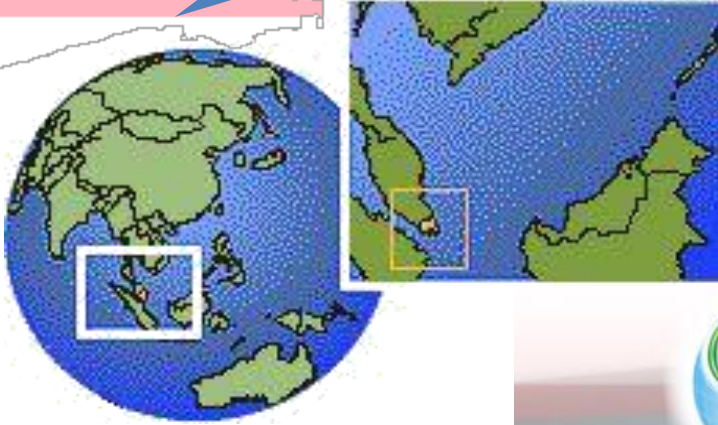
- Land Transport Authority
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Land Transport  Authority

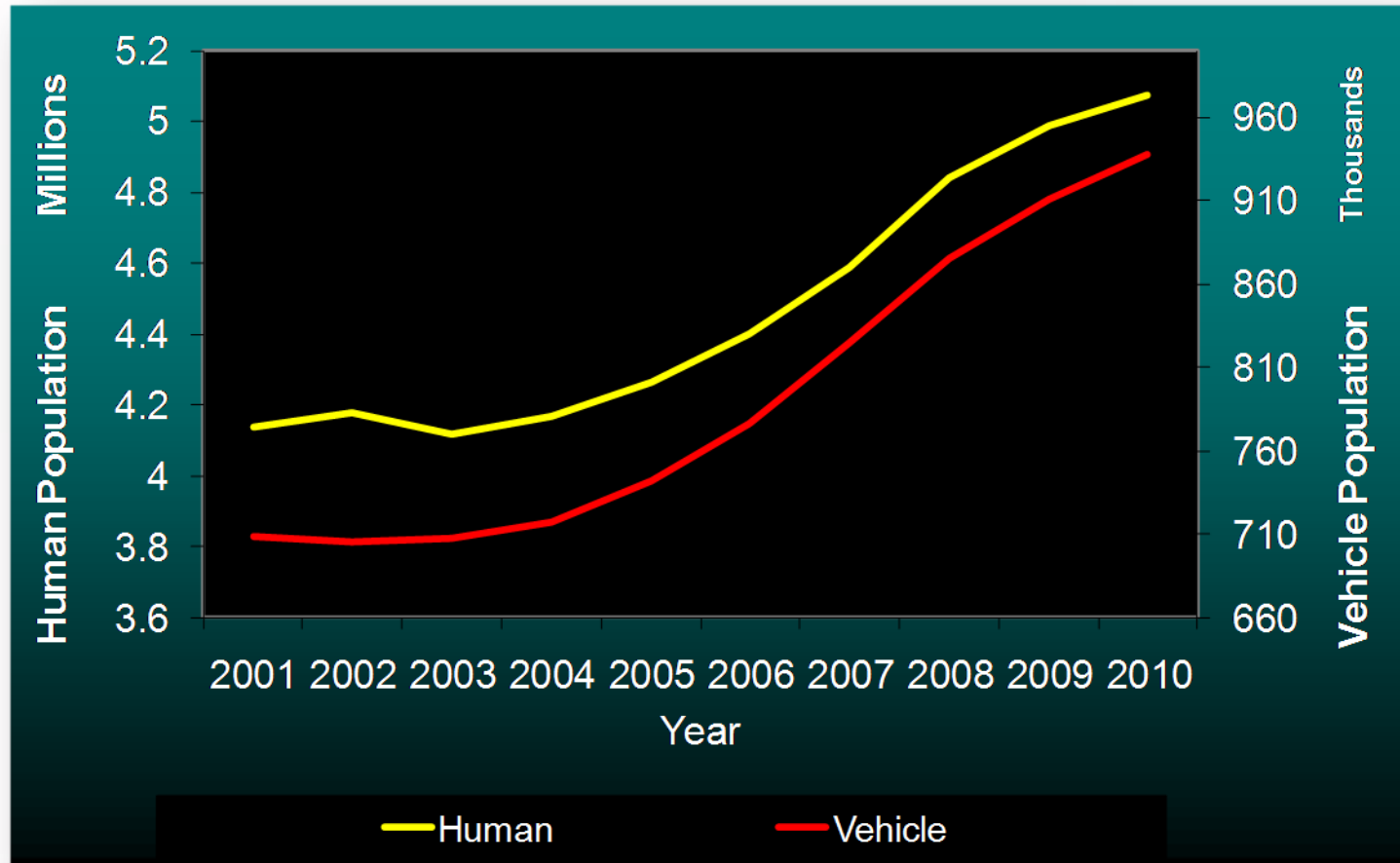
Overview of Singapore



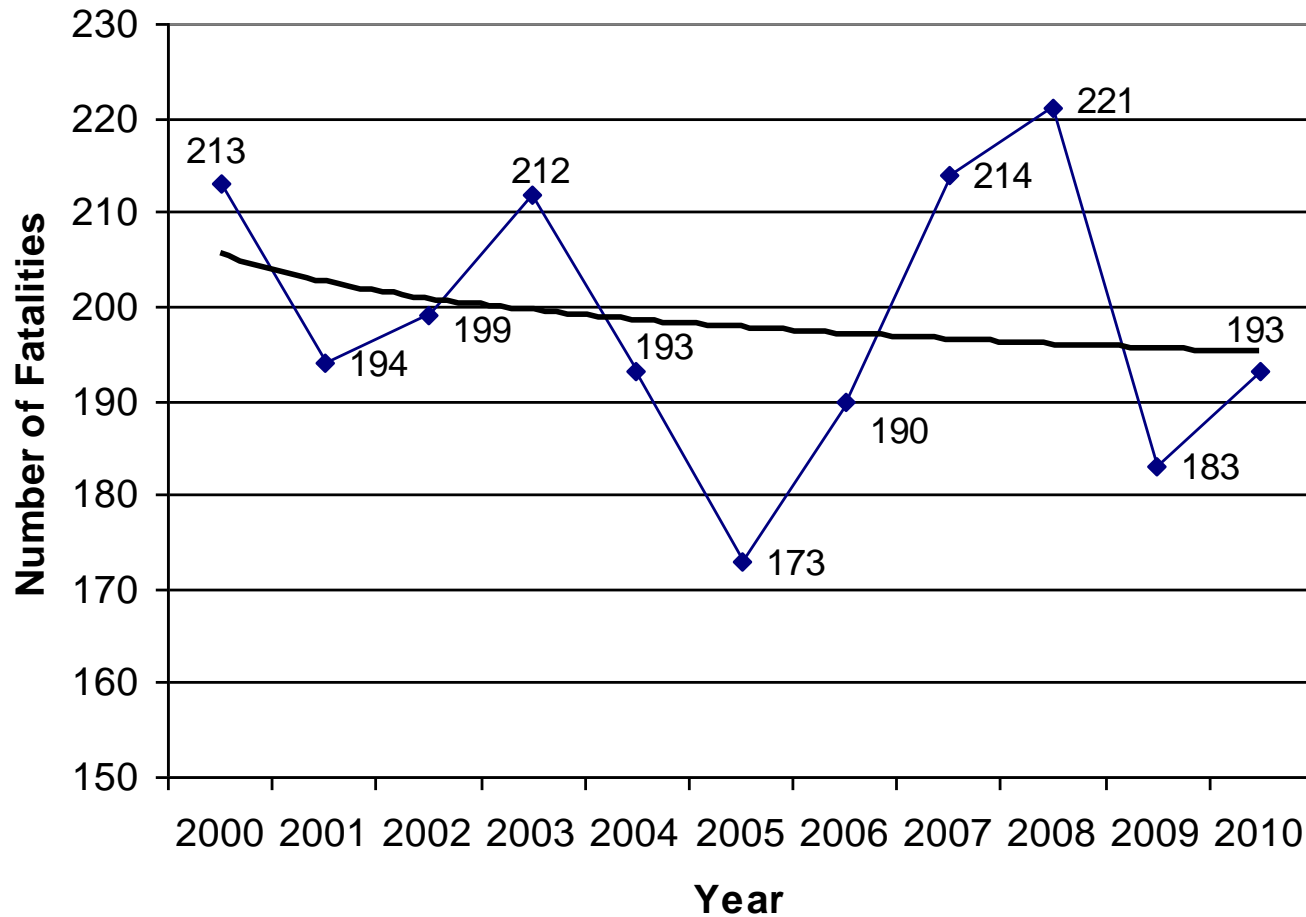
Human Population : 5.07mil
Vehicle Population : 937,860
Taxi Fleet : 26,073
Bus Fleet : 3,507
Land Area : 712.4 km²
Road Network : 3,315 km



Vehicle and Human Population in Singapore



Road Fatalities in Singapore



Authorities involved in Road Safety in Singapore



LAND TRANSPORT AUTHORITY

- Road Engineering
- Vehicle Engineering



TRAFFIC POLICE

- Enforcing Traffic Regulations
- Road Safety Education



SINGAPORE ROAD SAFETY COUNCIL

- Public Education
- Research
- Partnerships with stakeholders



Framework of Road Safety Measures in Singapore



Accident Prevention Measures

Road Safety Assessment

- Day and night assessment
- Identify potential safety hazards for road users



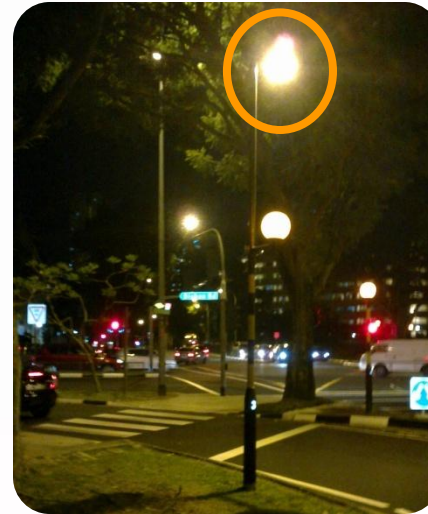
Installed crash cushion at hard gore area to save lives



Provided proper transition of guardrail to parapet wall

Hazardous Road Locations

- Treat locations that are potentially dangerous to road users



Floodlight installed to increase illumination at zebra crossing



Covered drains to eliminate hazards

Accident Prevention Measures

Road Safety Initiatives

- Information collected from the various programs
- Research and formulate new initiatives



Resurfacing roads with high skid-resistance materials



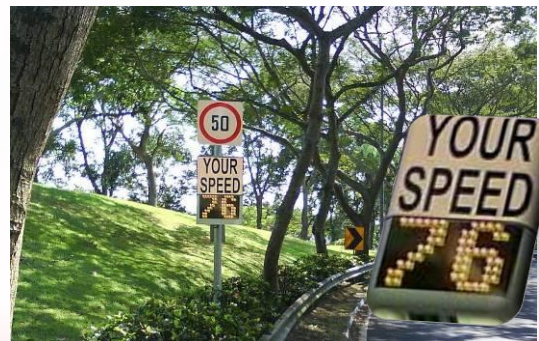
Providing dedicated cycling paths



Safety bollards at bus stops



Pedestrian Crossing Ahead Markings



Drivers' feedback sign



Enhanced school zone scheme



Accident Prevention Measures

Road Safety Initiatives

Enhancing Safety for Pedestrians Pedestrian Crossing Ahead Markings

To enhance the safety of pedestrians at zebra crossings, the Land Transport Authority (LTA) will be implementing new pedestrian crossing ahead markings for a trial period at selected zebra crossings in April 2008.

Currently, there are a number of safety measures implemented at zebra crossings. These include flashing beacons, white zigzag lines by the side of the road, "SLOW" markings and pedestrian crossing ahead signs.

What are the new pedestrian crossing ahead markings at zebra crossings?

These are inverted white triangular signs painted on the road. They are placed before zebra crossings that are used by motorists, e.g. crossings where some motorists are needed more attention from motorists, not to give way to pedestrians.

What should motorists do?

The additional triangular markings further provide early warning to motorists when approaching zebra crossings to give way to pedestrians. Be ready to slow down or stop to let pedestrians cross.

What should pedestrians do?

Slow down and stop before you cross, always giving the drivers plenty of time to see you. Look out for vehicles that might be overtaking those that have already stopped at the crossing.

Trial locations:

- Bedok Reservoir slip road turning into Jelapang Expressway (towards Tuas)
- Clementi slip road turning into Ayer Rajah Expressway (towards Tuas)
- Tampines Expressway (towards Seletar Expressway) slip road turning into Pasir Ris Drive 8 crossing

Together, let us make our roads safer for every user!

If you have any feedback, please call our Customer Service Line: 1800-CALL LTA (1800-2255 582) or visit <http://www.lta.gov.sg>

Red-Amber-Green (RAG) at the Junction of Bishan Road, 4 and Bishan Street 22

LTA will be implementing Red-Amber-Green (RAG) traffic signals at the junction of Bishan Road, Bishan Street 14 and Bishan Street 22.

Green Traffic Signals?

At the junction, the traffic flow will be controlled by the traffic lights. When the traffic light is green, you can proceed in the direction indicated (do not turn right in the opposite direction).

Motorists Do?

When the traffic light is green, you can proceed in the direction indicated (do not turn right in the opposite direction).

For every user!

Land Transport Authority

Intelligent Road Studs


The Land Transport Authority (LTA) will be implementing new intelligent road studs at selected locations.

At most signalised junctions, motorists are allowed to turn right if there is a gap in the traffic from the opposite direction, even if the traffic light is red. There is feedback that some motorists were not looking for gaps in the traffic that they did not notice along alongside.

Intelligent road studs will forewarn right-turning motorists to watch out for pedestrians at the signalised pedestrian crossings, thereby increasing the safety of pedestrians.

Intelligent Road Studs (IRS)?

Light Emitting Diode (LED) studs installed flush to the road surface at pedestrian crossings. The studs are linked to the pedestrian crossing signal. When the pedestrian crossing signal starts flashing when the push button is activated and the green traffic light starts flashing, the studs will start flashing. This will alert motorists who are turning right to also watch out for pedestrians.



Enhancing Safety for Motorists YOUR SPEED SIGN

What are the new traffic calming markings?

These are white triangles painted on both sides of a road to create a visually narrowed lane width. They are placed before you see these markings.

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Enhancing Safety for Motorists Traffic Calming Markings

As part of our ongoing efforts to enhance road safety in Singapore, the Land Transport Authority (LTA) will be implementing new traffic calming markings for a trial period at selected locations in April 2008.

Traffic calming measures are introduced to alert motorists to reduce speed, improve safety for themselves and pedestrians. Current measures include humps, speed regulating strips, lane markings and speed limit signs.

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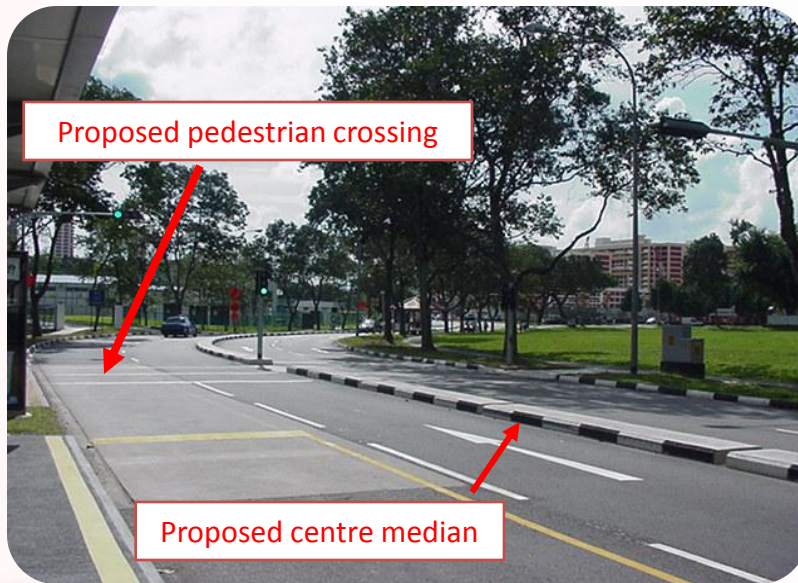
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Accident Reduction Measures

Crash Site Investigation

- Fatal accidents reviewed
- Identify deficiencies in road infrastructures



Crash data and Traffic

Accident Analysis

Management (TAAM) System

Assists in the:

- Study and execution of ARM strategy
- Exploration on APM strategy

- Analyse accident trends
- Understand contributory factors leading to accidents at specific locations
- Identify black spot locations



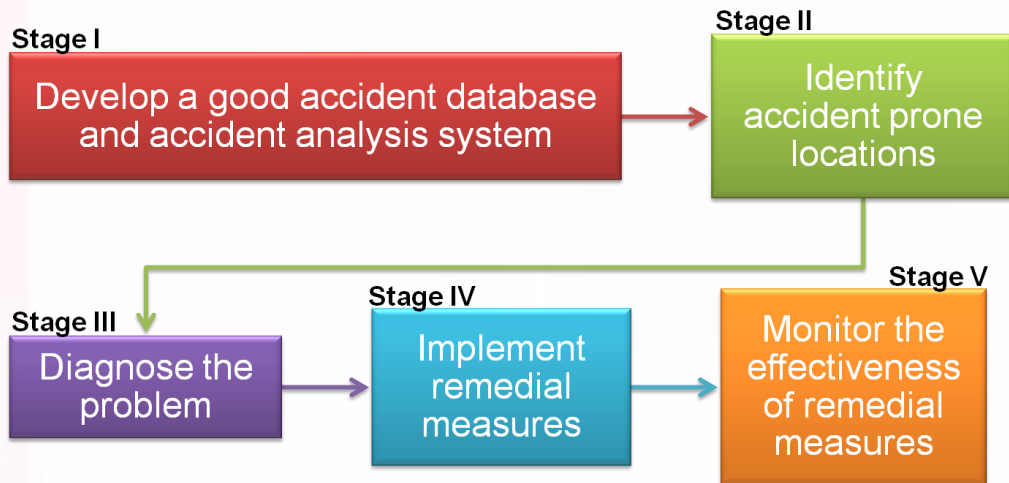
TAAM – GIS map-based tool



Accident Reduction Measures

Black Spot Programme

- Review all injury accident locations
- Criteria : > 15 accidents over 3 years
- Reduce the total number or the severity of accidents that occur at such locations



5 KEY STAGES OF BSP



Collaboration & Consultation

Collaboration

- Raise profile of road safety nationally and internationally
- Engage governments, non-government organisations and business

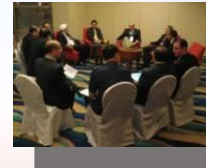
National Organisations/Bodies

- ✓ Traffic Police
- ✓ Singapore Road Safety Council
- ✓ Singapore Action Group for the Elders



International Organisations/Bodies

- ✓ Global Road Safety Partnership
- ✓ WHO – Global Status Report on Road Safety
- ✓ PIARC
- ✓ REAAA
- ✓ ADB
- ✓ ASEAN Land Transport Working Group
- ✓ APEC

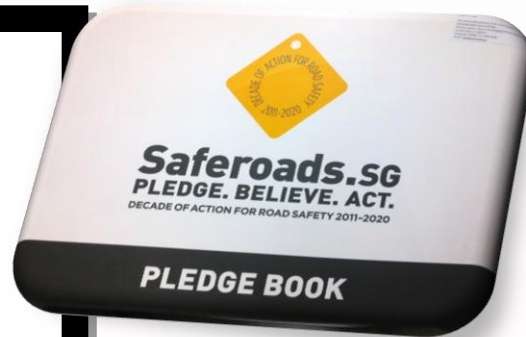


Collaboration & Consultation

Outcomes of International Collaborations



Decade of Action for Road Safety (2011)



United Nations Global Road Safety Week (2007)



GRSP Asia Road Safety Seminar (2009)

Collaboration & Consultation

- ✓ Trained delegates from more than 35 countries
- ✓ Conducted 2 to 3 training courses per year

Consultation

- Provide training to overseas delegates
- Share road safety best practices



Collaboration & Consultation

Consultation

- Provide consultancy in areas of road safety

Road Safety Engineering Consultancy

Consultancy Services:

- Road Safety Assessment**
 - Examine the safety performance of roads
 - Identify potential safety hazards for road users
 - Formulate cost-effective safety measures
- Black Spot Programme**
 - Provide solutions to mark accident locations using traffic accident data
 - Provide solutions to identify locations with high accident occurrences
 - Analyse locations with high accident occurrences
 - Recommend measures to improve road safety at these locations
- Road Safety Engineering Training**
 - Provide practical knowledge of the best practices and effective measures for enhancing road safety
 - Conduct 5-day courses on:
 - Road Safety Engineering and Management
 - Road Safety Assessment

Participants from various countries at the Road Safety Engineering and Management Course

LTA provides practical expertise to enhance road safety through consultancy and training services

Road Safety Awards

Prince Michael International Road Safety Award

- In December 2007, LTA together with Traffic Police, were awarded the *Prince Michael International Road Safety Award*



Institute of Transportation Engineer (ITE) Award

- In August 2011, LTA was awarded the *ITE's 2011 Edmund R.Ricker Transportation Safety Council Award*



Conclusion

- Challenge – Balancing road safety and traffic efficiency
- Road safety is a shared responsibility



Thank You

