

# Built in Safety For Urban and Rural Roads



By

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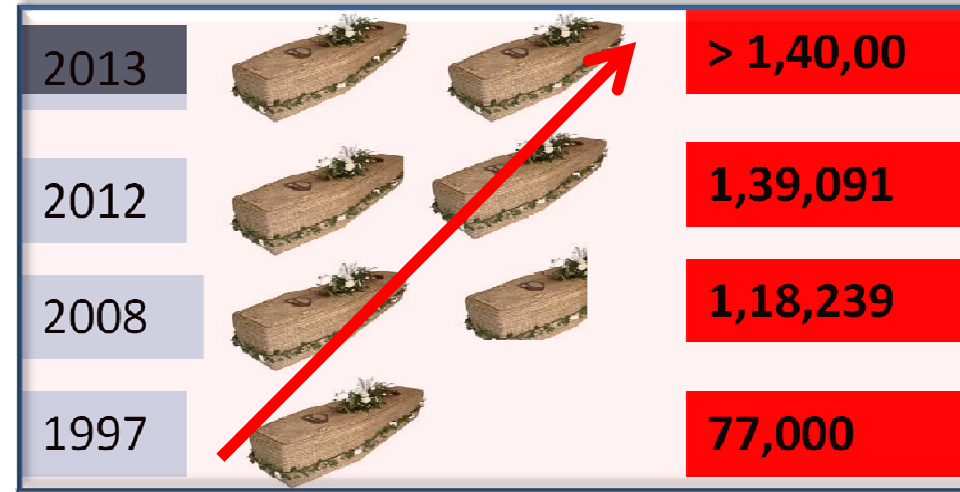
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# Need To Recognise

- **Developing countries account for 85% of annual road traffic fatalities**
- **In India**
  - **> 1,40,000 fatalities on roads**
  - **highest fatalities amongst countries in transitions**
  - **Not getting Value for Money on huge investments in road development**
  - **Road Traffic Injuries (RTIs) affect mainly males of 15 and 44 years**
- **Road safety is now a public health issue and needs immediate attention**
- **Road Traffic Injuries are predictable and preventable**



# Need To Recognise

- **Mistakes, errors of judgment and poor decisions are intrinsic to humans. The road system needs to be designed and operated to account for these shortcomings and failings.**
- **Humans are fragile. Unprotected, cannot survive impacts of greater than around 30km/h.**
- **Safety can be built into the road system by**
  - **Prevention through safety audit**
  - **Reduction through design and provision of safety features**
- **Evidence from developed countries shows that targeted road safety projects generated crash cost savings of up to 60 times the cost of construction (OECD, 2008). That is, for each \$1 invested, there was a return of up to \$60 in terms of crash costs avoided.**

# Way Forward

- **Recognise that Road Safety is a public health and economic issue**
- **Tackling problem in a mission mode as for other public health concerns such as TB, AIDS, Malaria and Cancer**
- **A paradigm shift in the approach for planning, designing and operating highways, urban and rural roads with focus on VRUs.**
- **Professionals to enhance their skills and commit themselves to plan and design roads that are safe (and not cheap) and 'forgiving' and meet the needs of all categories of users.**

# Elements for Built in Safety

- Hierarchical road network planning
- System approach in road design for 4- dimensions (length, width, depth/ height and time)
- Planning and Designing 'forgiving' roads
- Planning and design for all categories of road users
- Design for needs of road hierarchy
- Segregation of Vulnerable Road Users (visual/ physical)
- Well designed Intersections (staggered) for safe movement
- Treatment for hazardous locations
- Well Designed Bus Bays and Shelters
- Well planned parking facilities on urban roads
- Standard, uniform and detailed system of traffic signs and markings
- Efficient illumination system

# Network Planning

- Hierarchical system of Network planning
- Land use control
  - minimum conflicts for pedestrians
  - travel needs minimized
- Access control
  - road intersection with same category or immediately below / above

# Hierarchical Road Network



# Pedestrians Priority for Road Categories

High Vehicle Speed/ Priority

Low Pedestrian Priority

Low Vehicle Speed/ Priority

High Pedestrian Priority

**Expressways**

Pedestrians excluded, only Vehicles



**Arterial Roads**

Pedestrians Use Formal Crossing Facilities



**Local Roads**

Pedestrians cross by waiting for on coming traffic



**Access Roads**

Pedestrians and Vehicles give way to each other



**Traffic Calming**



**Pedestrian Streets**

Only Emergency Vehicles and buses at slow speed





# Design Elements



# Pedestrian Facilities - Footpaths

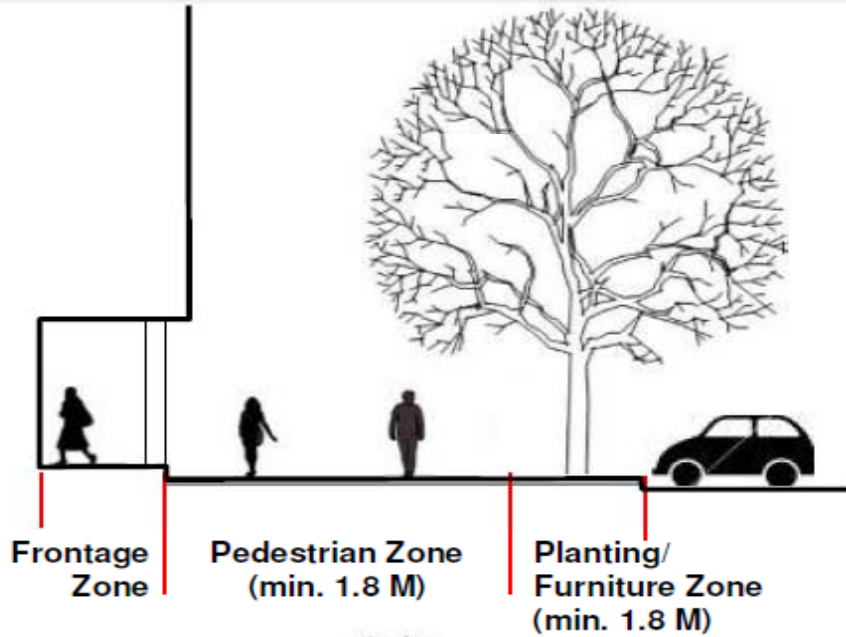
Normal Unsafe Practices



Safe Practice



# Safe Design Practice



*Commercial:*

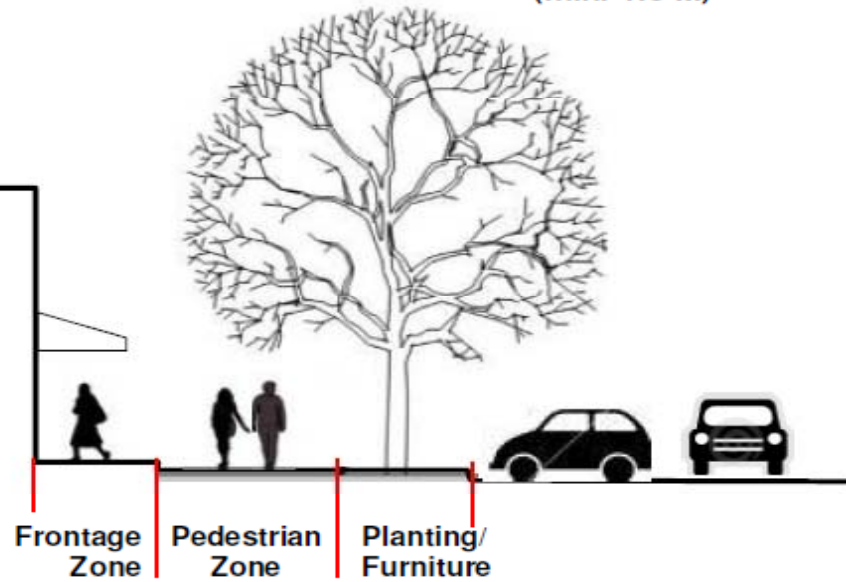


Frontage Zone

Pedestrian Zone

New Delhi

Planting/  
Furniture Zone



*Residential:*



Frontage Zone

Pedestrian Zone

Vancouver

Planting/  
Furniture Zone

# Pedestrian Facilities



# Pedestrian Crossing Facilities



# Pedestrian Crossing Facilities



Foot Over Bridges



2009/05/20



Subway



Ramps

2009/05/20

# Cycling Facilities



Visual Separation



Physical Separation



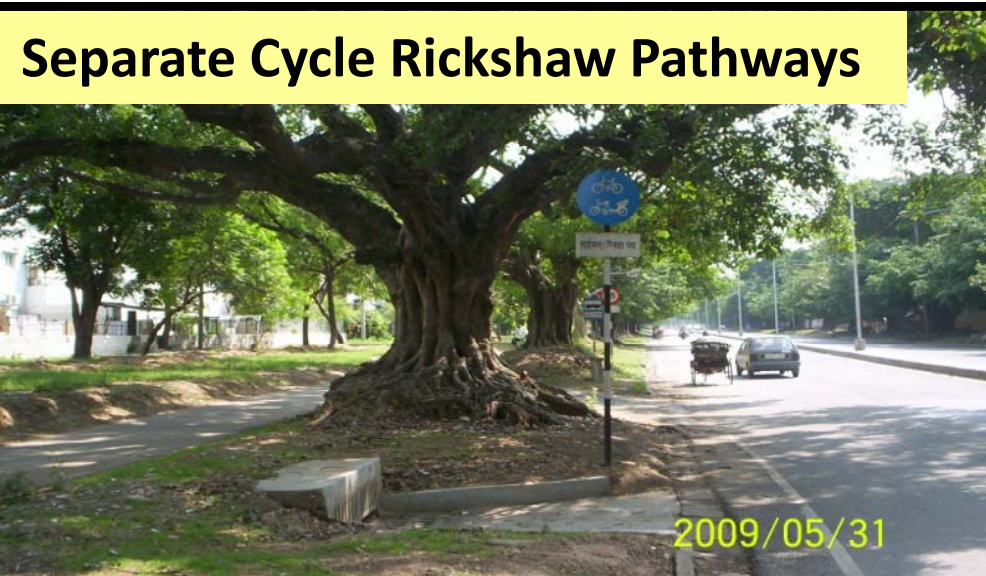
Cycle Stand



Cycle Box at Intersections

# Facilities for Cycle Rickshaws

## Separate Cycle Rickshaw Pathways



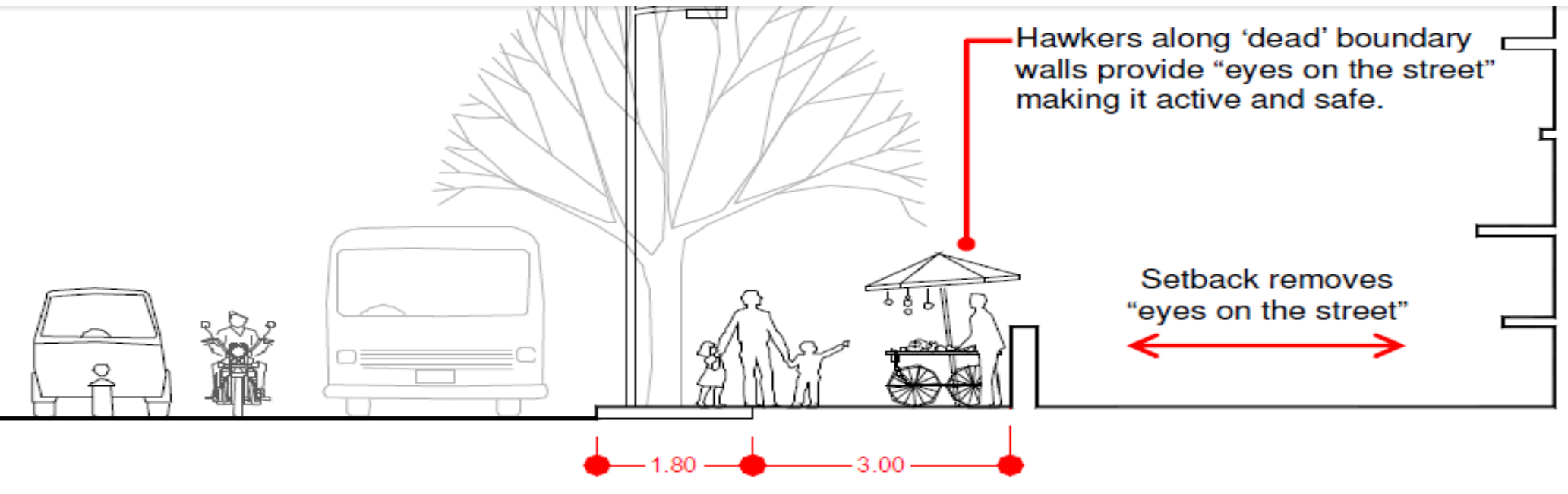
Parking/ halting stands near bus shelters/ terminals; railway stations and taxi/ auto-rickshaw stands



## Cycle Stands



# Designated Hawkers Zone



# Well Designed Intersections



# Roundabout

## Why They Work

Here's a look at one of the 50 roundabouts in Carmel, Ind.:

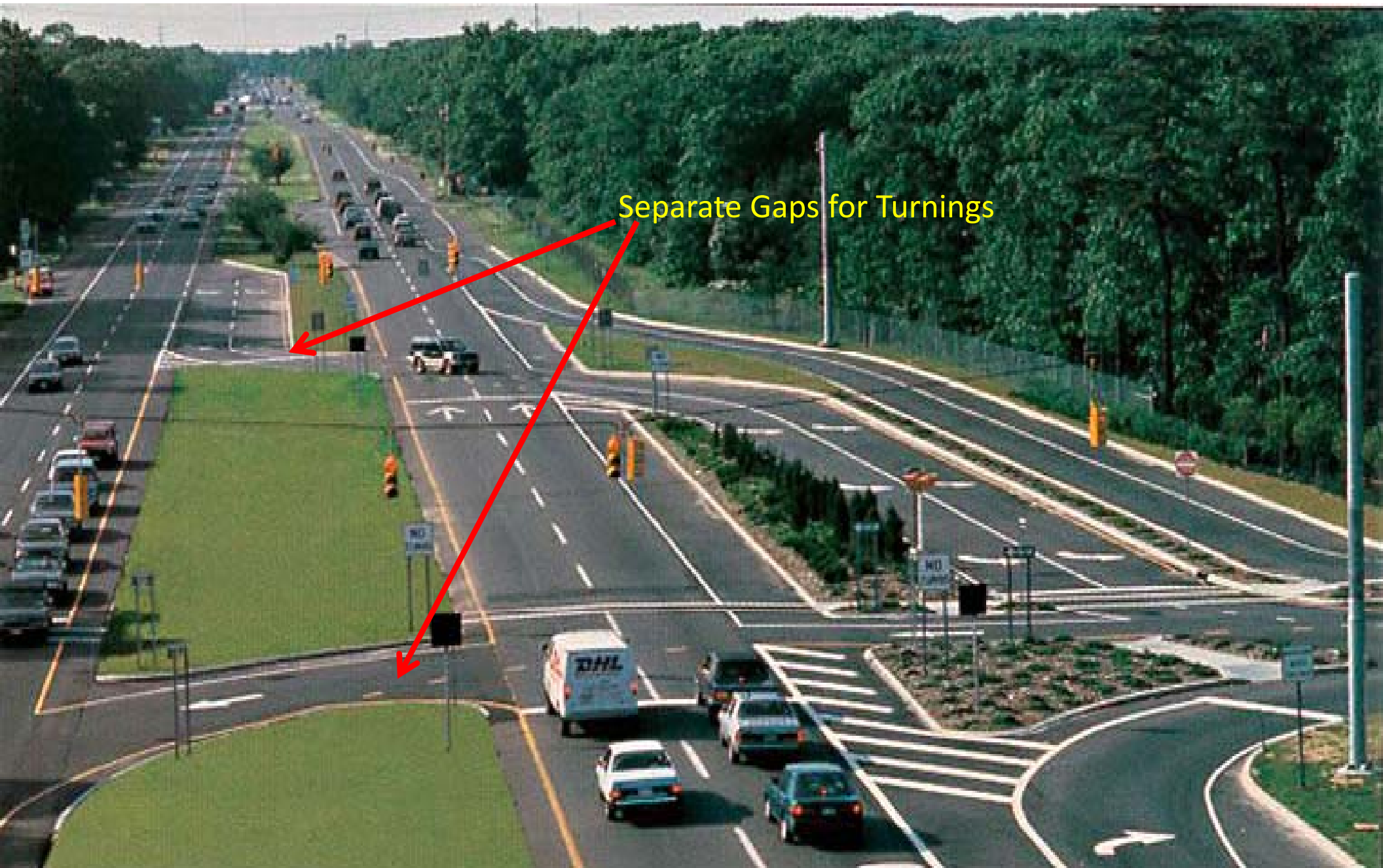
- 1** Cars entering a roundabout must yield to those already in the circle
- 2** With all cars traveling in the same direction, roundabouts eliminate head-on collisions, as well as left turns, one of the most dangerous moves in an intersection
- 3** Because drivers are anxious about merging with roundabout traffic, they slow down, which helps reduce accidents
- 4** With no traffic lights to divert drivers' attention upward, roundabouts keep motorists focused on the cars and pedestrians around them
- 5** In addition to improving traffic flow, roundabouts are often easy on the eye, with elegant landscaping












Image Courtesy of Ingham County Road Commission

# Safer Design for Median Gaps



# Potential Reduction (%) in Various Injury Crash Types

Treatment		Head on Crashes	Run off Road	Intersection Crashes	Relative Cost
Road Signs and Markings		25 - 40	25 - 40	25 - 40	\$
Rumble Strips		10 - 25	10 - 25		\$ - \$ \$
Central Median Hatching		10 - 25		25 - 40	\$ - \$ \$
Paved Shoulders		25 - 40	25 - 40		\$ \$
Dedicated Lanes for Turning Traffic				25 - 40	\$ - \$ \$
Divided Carriageway or Median Barrier		40 - 60	40 - 60		\$ \$ \$
Road side Barriers			25 - 40		\$ \$

# On and Off Street Parking



# Bus Bays



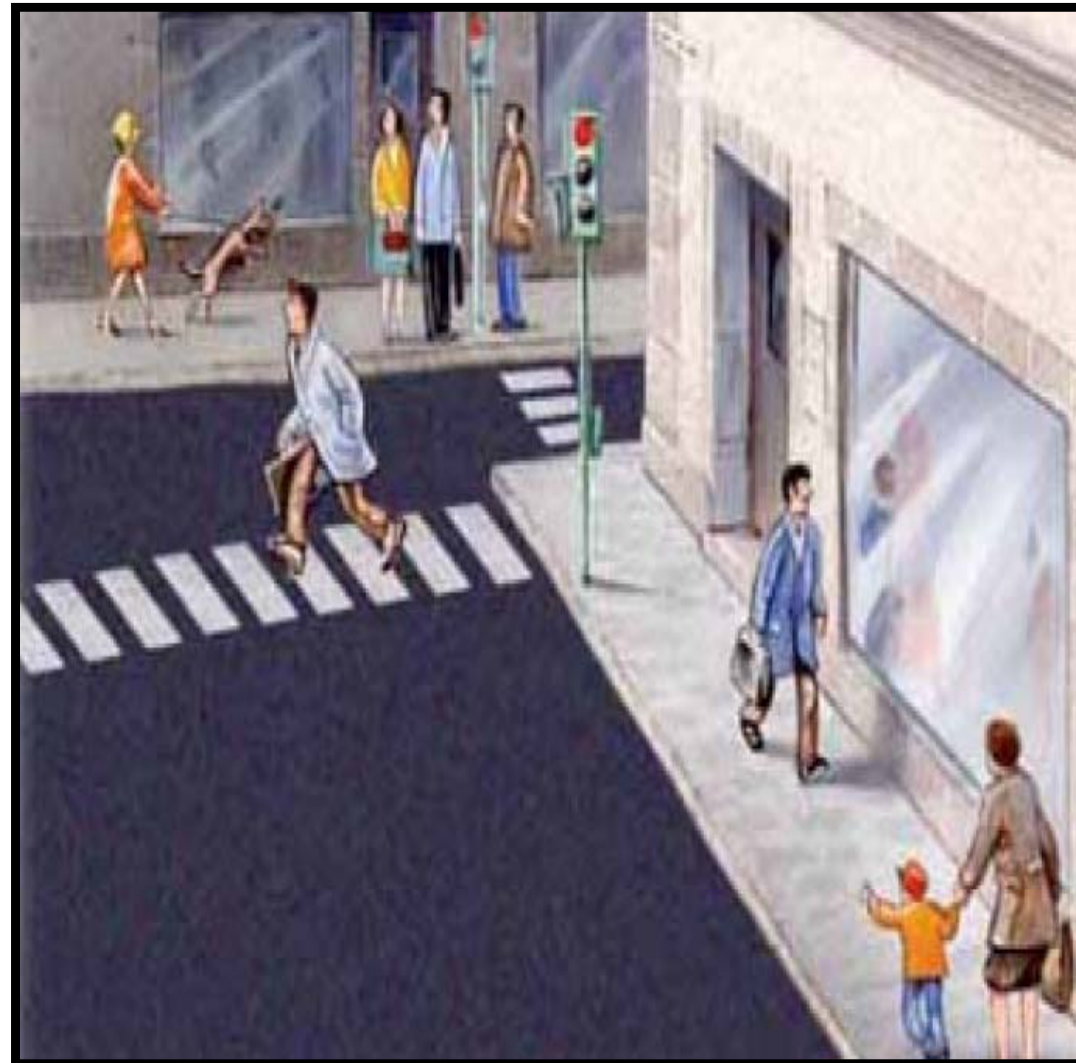
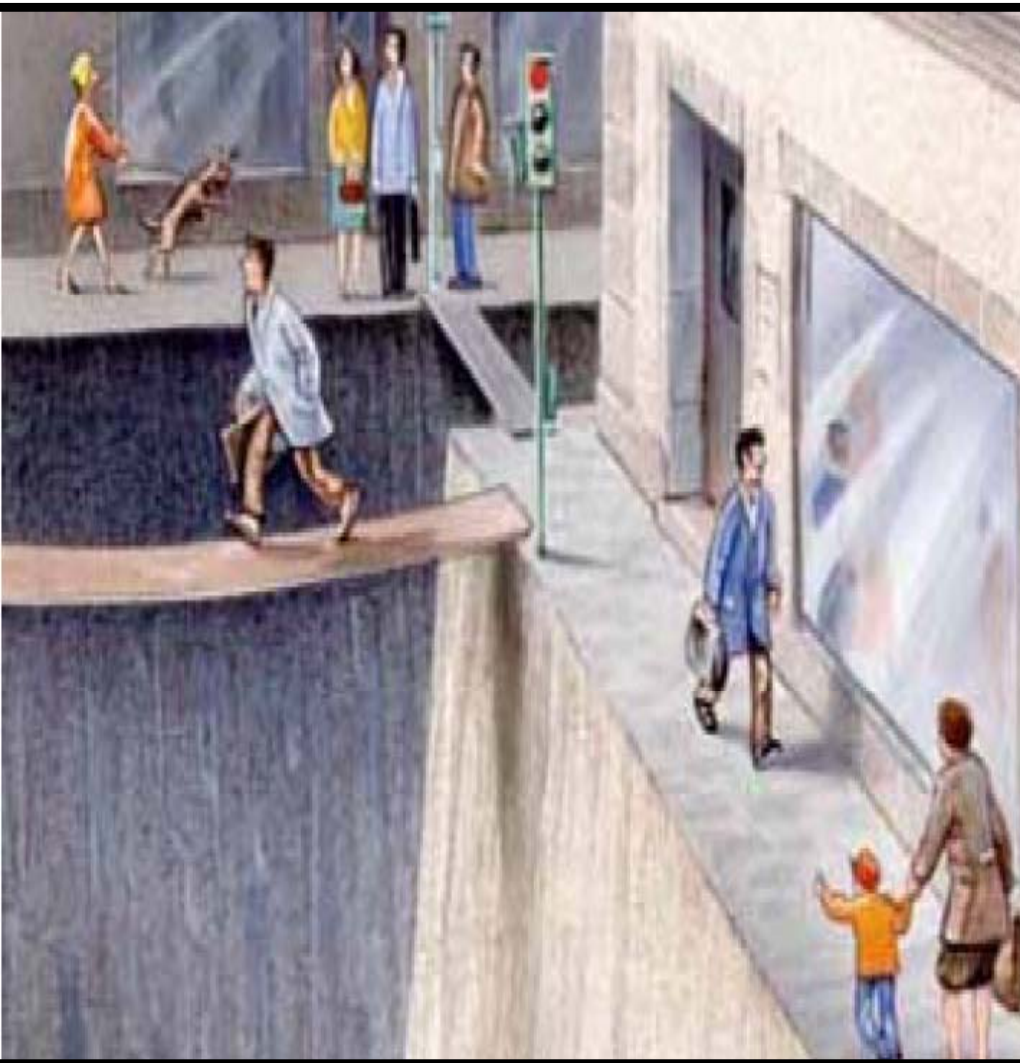
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# Bus Shelters



# Road Without and With Markings



# Markings for Safety

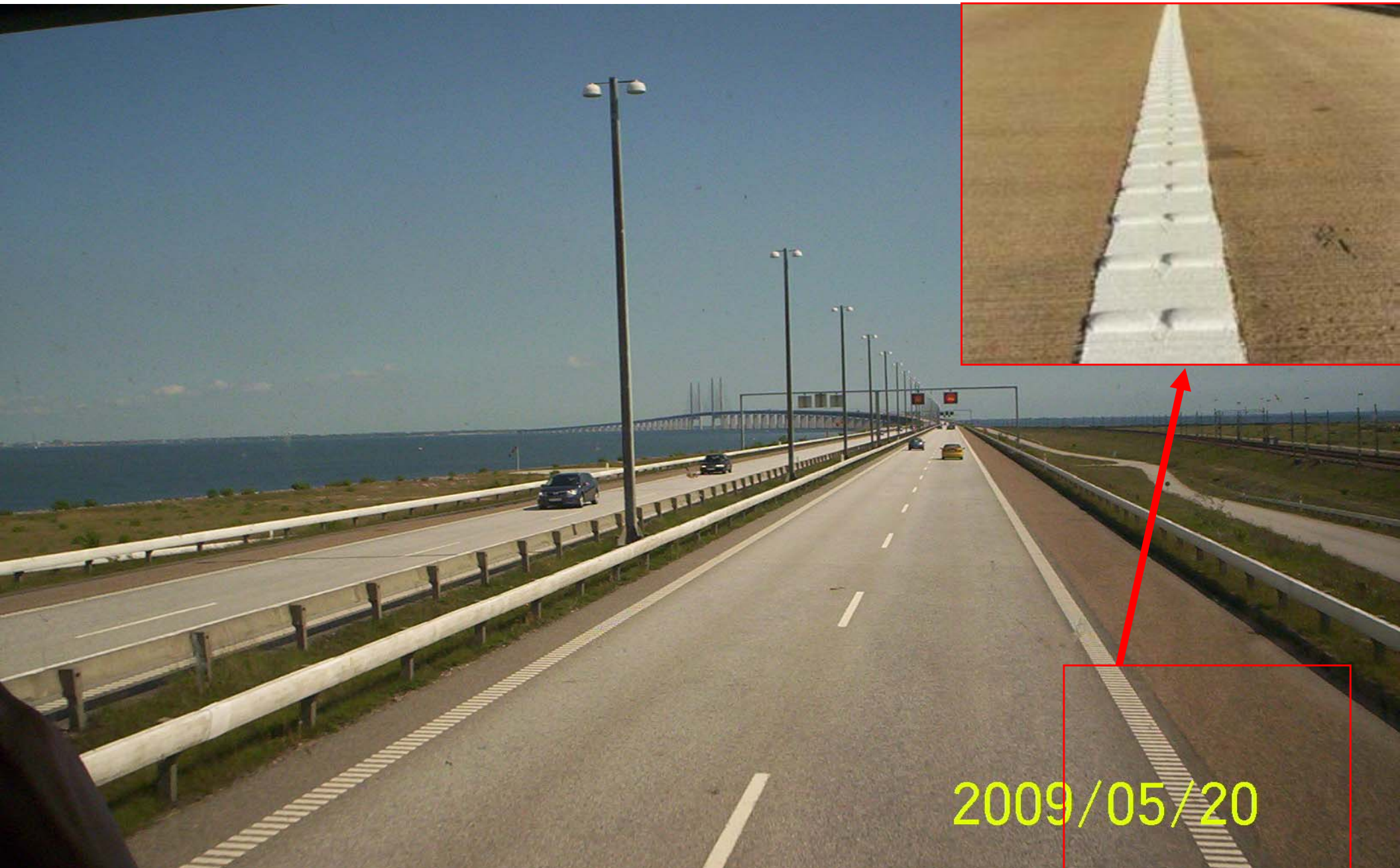


# Markings at Roundabout



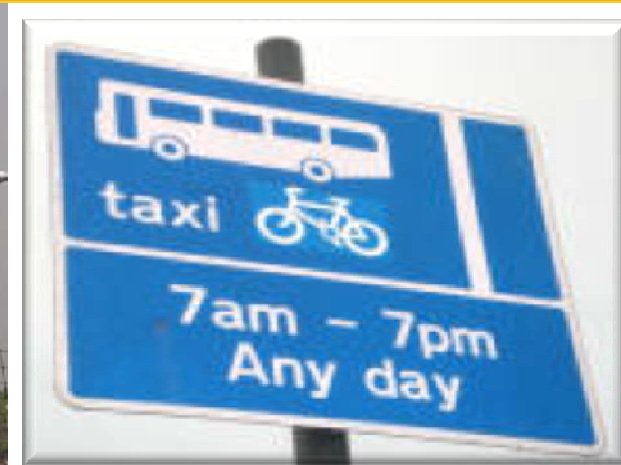


# Ribbed Edge Markings

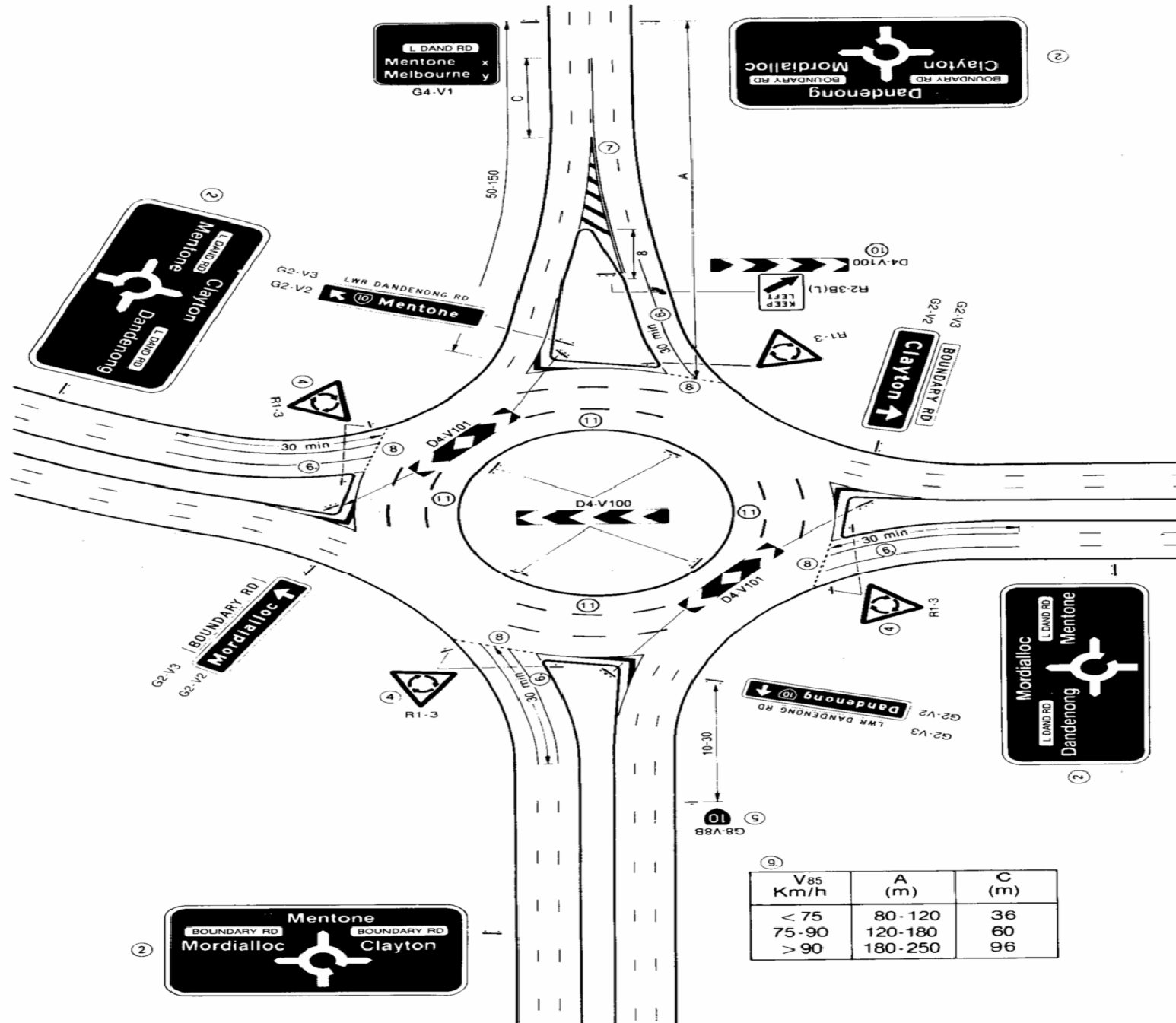


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# Road Signs - Bad Practice Example



# Detailed Signs and Markings at Roundabout

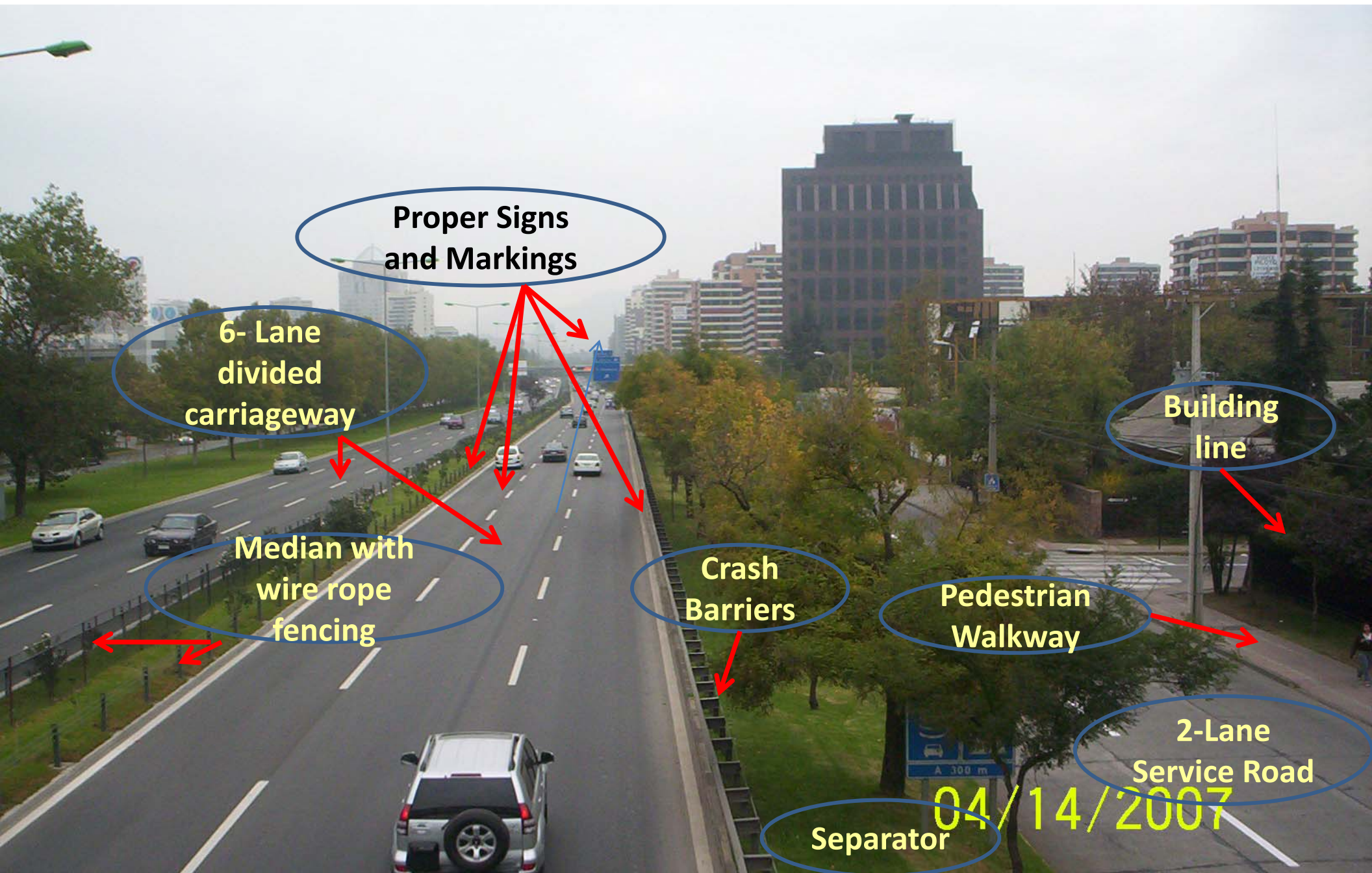




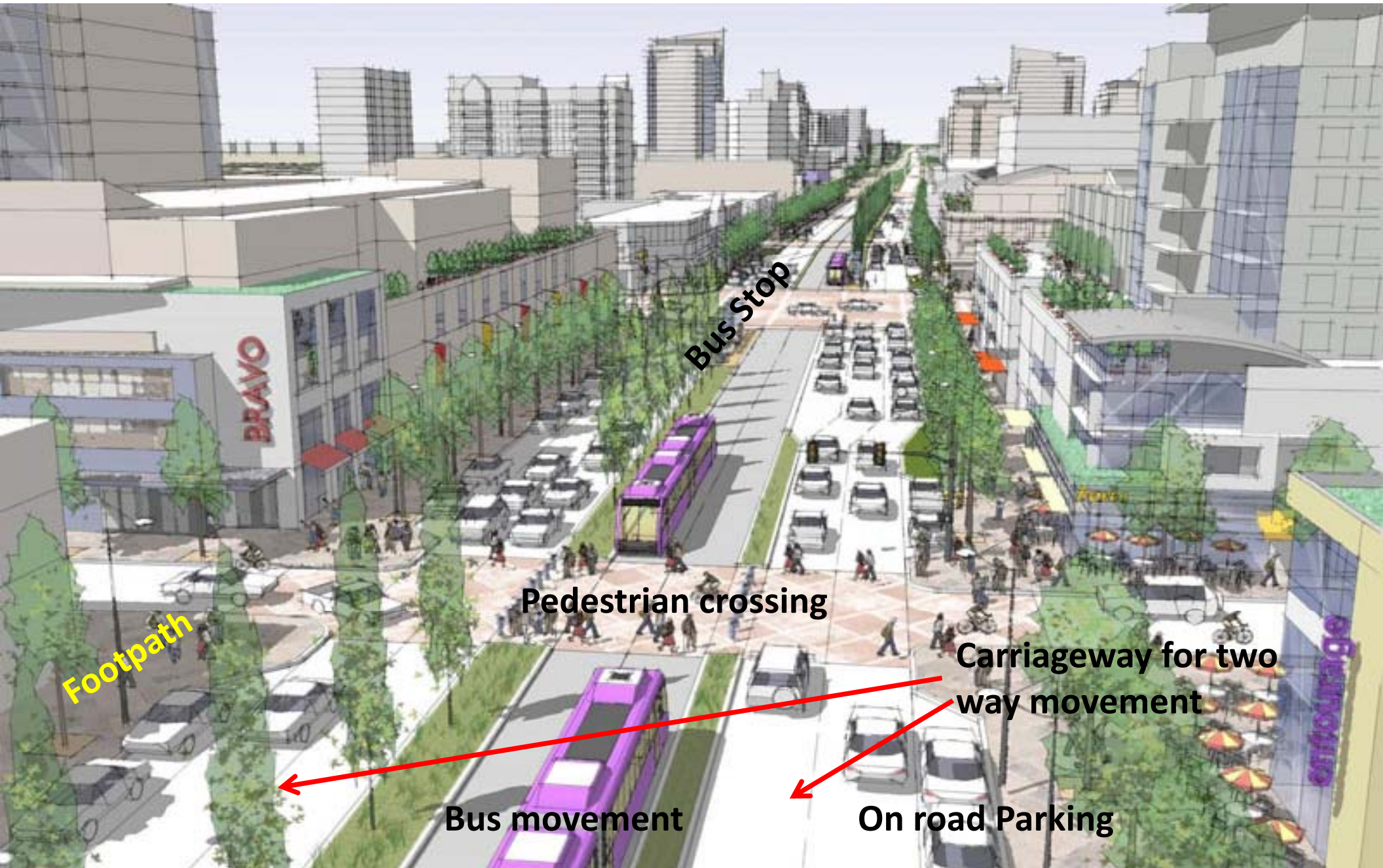
# Road Aesthetics for Urban and Rural Roads



# Urban Expressway in Santiago



# Urban Road with Bus Facility



# Residential Streets



**Well Maintained Buildings**

**Sensitive Lighting**

**Mature Trees**

**No Speeding Traffic**

**Attractive, Interesting Front Gardens**

**Safety for Children ?**

**Manageable amount of Parking**

**Accessible by Disabled people**

**Sub surface Drainage**

**Safe to go out At night ?**

# Street Furniture



# Noise Barriers



# Built in Safety for Rural Roads

- Well designed intersections
- Paved shoulders for Pedestrians/ Cyclists
- Passing places on hill roads.
- Crash barriers on sharp curves on hills
- Properly designed and located bus-bays
- Visual (markings)and physical (Speed humps or rumble strips)treatment at approaches to habitation or school.
- Ramps where field paths and cattle crossings intersect the road.
- Standard and uniform signs and markings with night visibility
- Hazard markers and delineators at dangerous locations.
- Submersible bridges and causeway provided with water depth gauges and guide-posts that remain above the HFL



# Approach to Habitation

Town entrance **without change** in optical appearance



Town entrance **with good change** in optical appearance





# Speed Management on Straight Sections



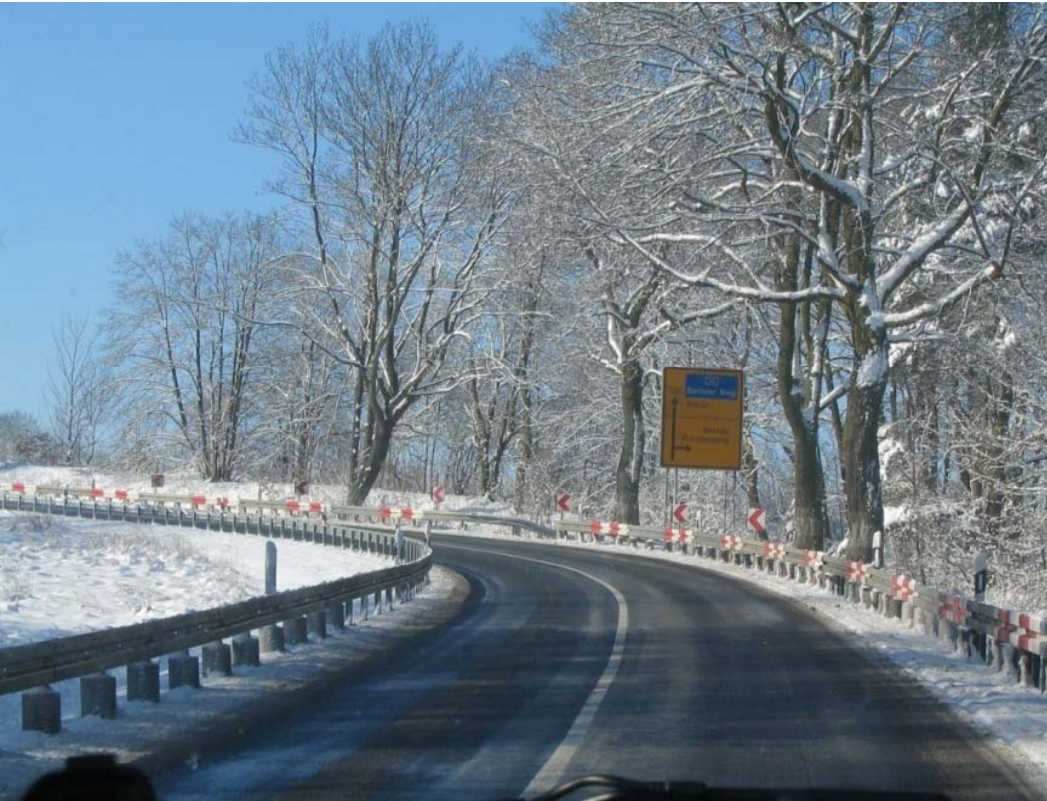
**wrong**



**reduced**

# Treatment at Sharp Bends

## Delineation for Safety Enhancement



Source : Dr. Sibylle Birth

# Simple Treatment for Safety Enhancement

Viewing direction: straight



Viewing direction: guided to right



**Thanks  
for  
Your Attention**