Urban Mobility India, 2011
6th Environmental Sustainability Forum

4TH DEC 2011

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Road safety worldwide: An alarming concern

Worldwide:

- 90% of road fatalities occur in low & middle income countries, which account for only 48% of vehicles.
- In many countries, road accidents are the most common cause of death in the age group of 15-45.
- If this trend continues, road accidents will be the 5th highest cause of death by 2030.

1.2 million
Number of road accident deaths per year worldwide

50 million
Number of road accident injuries per year worldwide

Source: World Health Organisation (2004). "World report on road traffic injury prevention".

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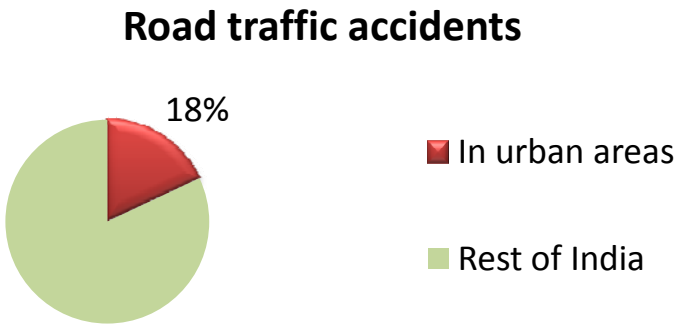
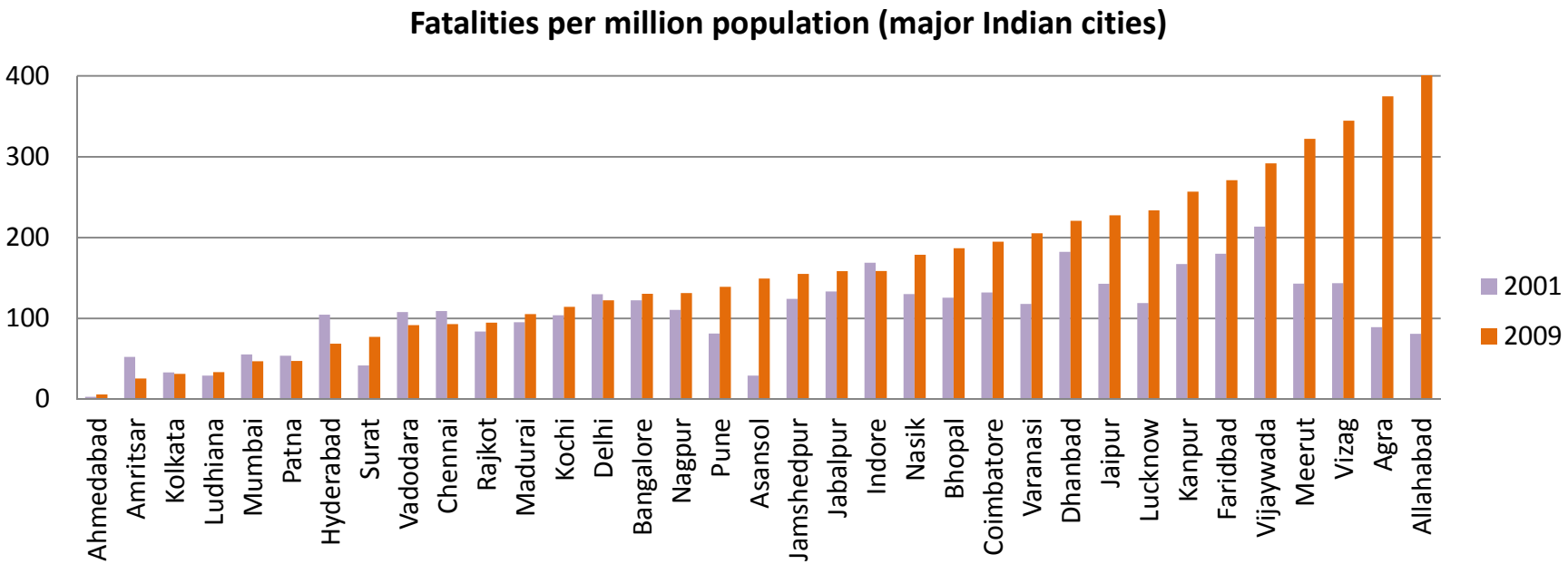
Road traffic accidents in Indian cities



- As urban population increases, road fatality scenario will potentially worsen.



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Source: National Crime Records Bureau (2009) "Accidental Deaths & Suicides in India – 2007". New Delhi, National Crime Records Bureau, Ministry of Home Affairs.

Traditional approach to road safety

India

Traditional focus: Making fast travel safe for passengers inside the motor-vehicle

But who is really vulnerable on urban roads

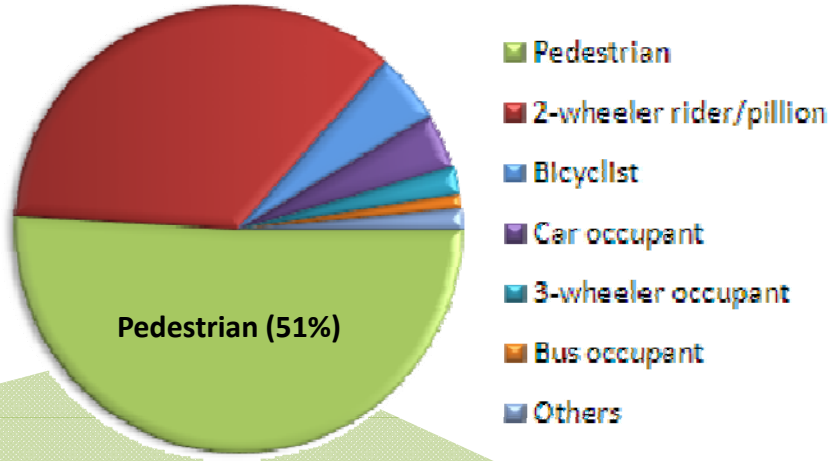
In Delhi, 63% of road fatalities are of pedestrians & bicyclists

- Traditional focus is more applicable for highways
- Within cities, the focus should be on reducing vehicle speed, to make them safer for pedestrians & bicyclists

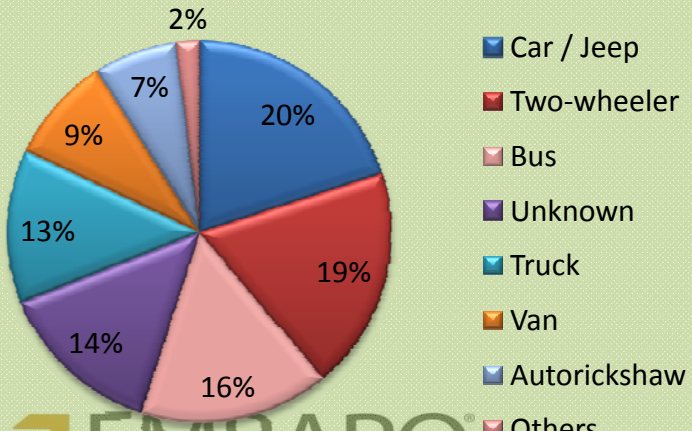
Further evidence from Bangalore

Source:
Bengaluru Road Safety & Injury Prevention Programme:
Injury snapshots and activity profile – 2009
National Institute of Mental Health & Neuro Sciences

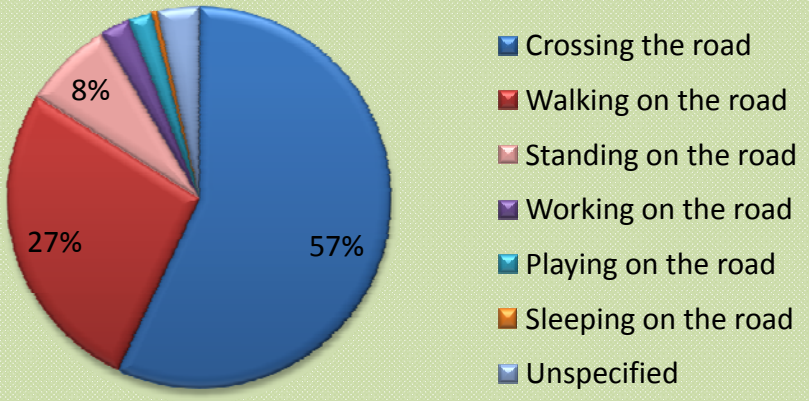
Road traffic fatalities: by mode of victim



Pedestrian fatalities: Pedestrian hit by



Pedestrian activity at the time of fatality



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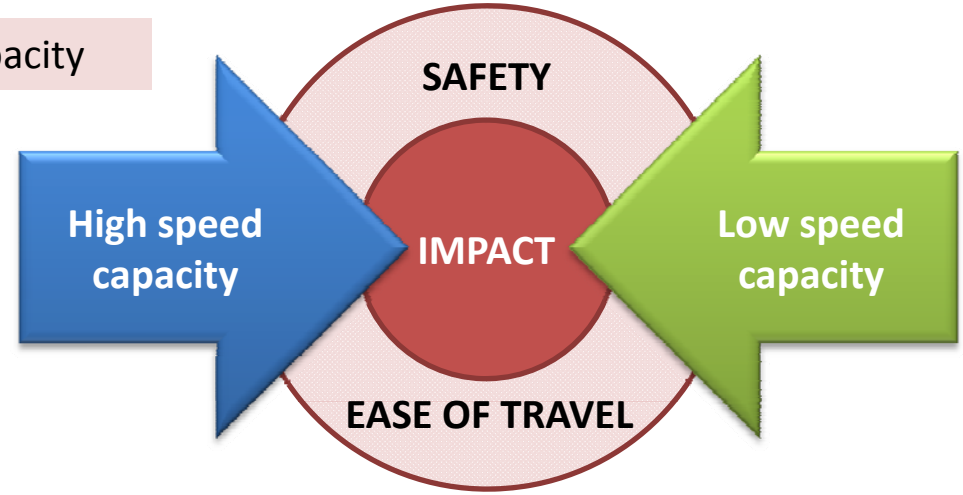
The urban road conflict

A conflict of speed capacity

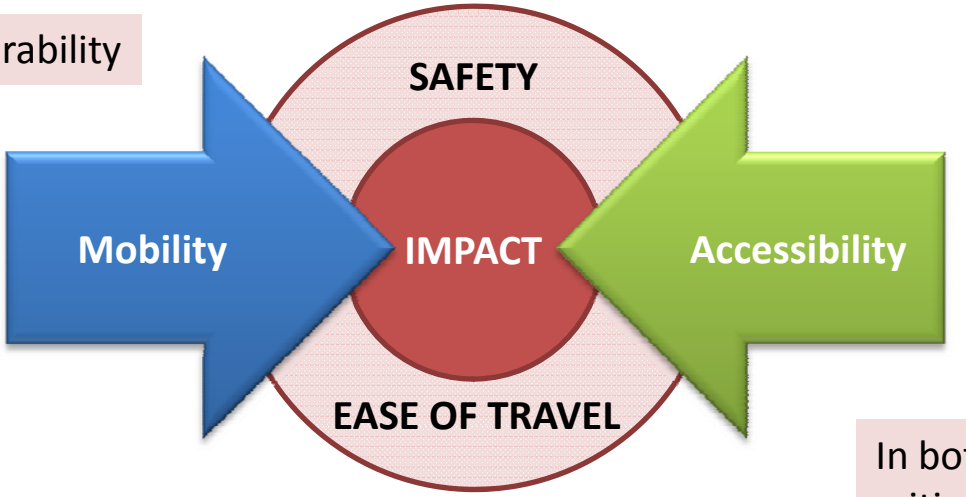
Motorised transport: Trucks, buses, cars, rickshaws, motorbikes



Non-motorised transport: Walking, cycling

A conflict of speed desirability

Fast-moving, thoroughfare traffic



Slow-moving vehicles accessing properties or local streets

In both conflicts, the critical factor is speed

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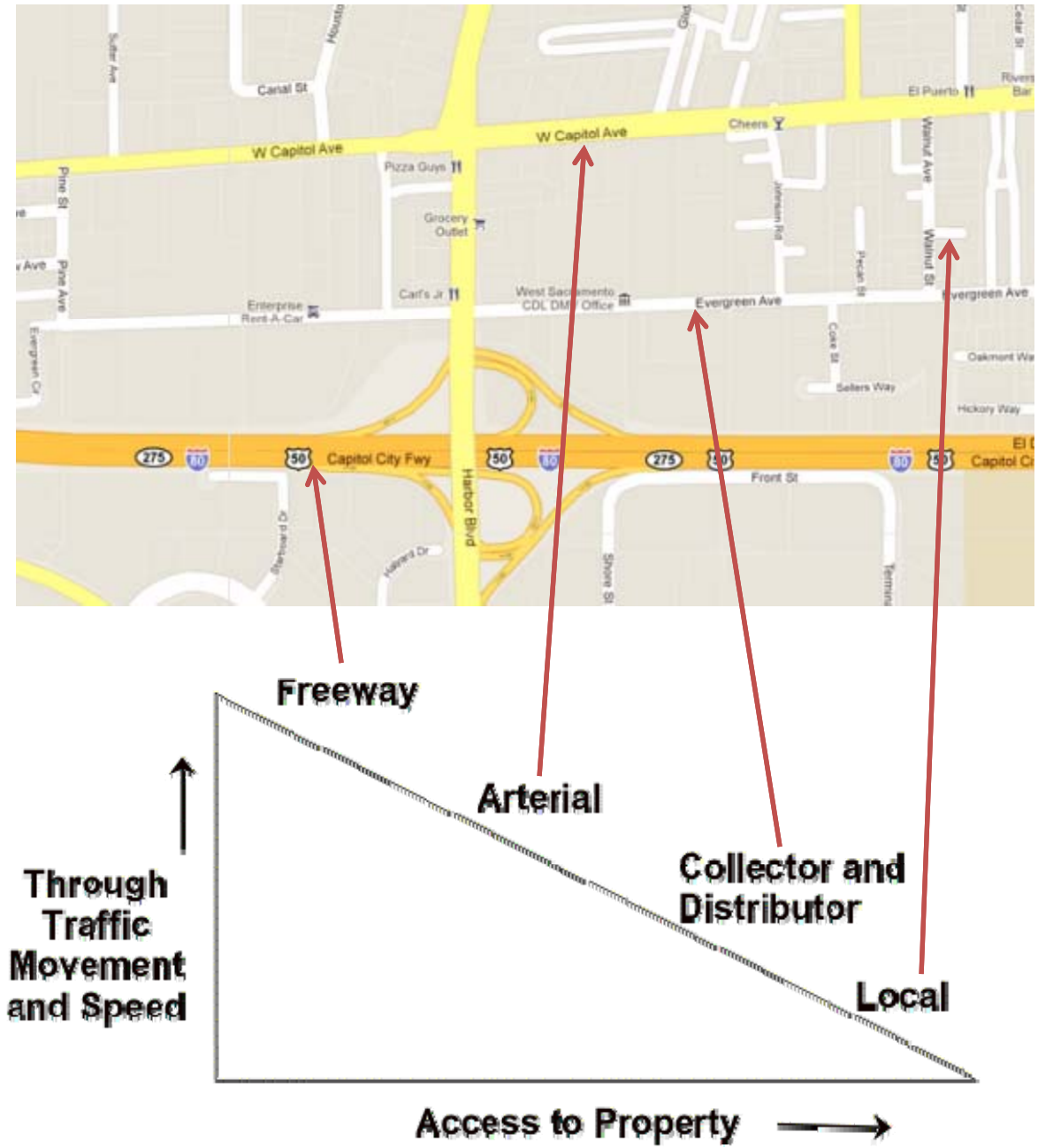
Western concept: Road hierarchy, as a means to avoid speed conflicts

- Promotes fast movement of thoroughfare, motorized, private transport
- Discourages NMT & public transport

Neither practical, nor desirable in the Indian context



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Road safety in the urban Indian context

Mixed land use with direct plot access	Diverse modes of transport	High pedestrian volume	Informal street activity / vendors	Lack of traffic discipline

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Credit: TARU

Road design principle:

Considers how people will behave rather than how people should behave

Guiding principles

Broad objective for road design

- To design a road network that effectively balances the thoroughfare and local access needs of all road users, thereby improving their safety and ease of travel

The road safety objective

- To effectively control excessive speed of vehicles within urban areas

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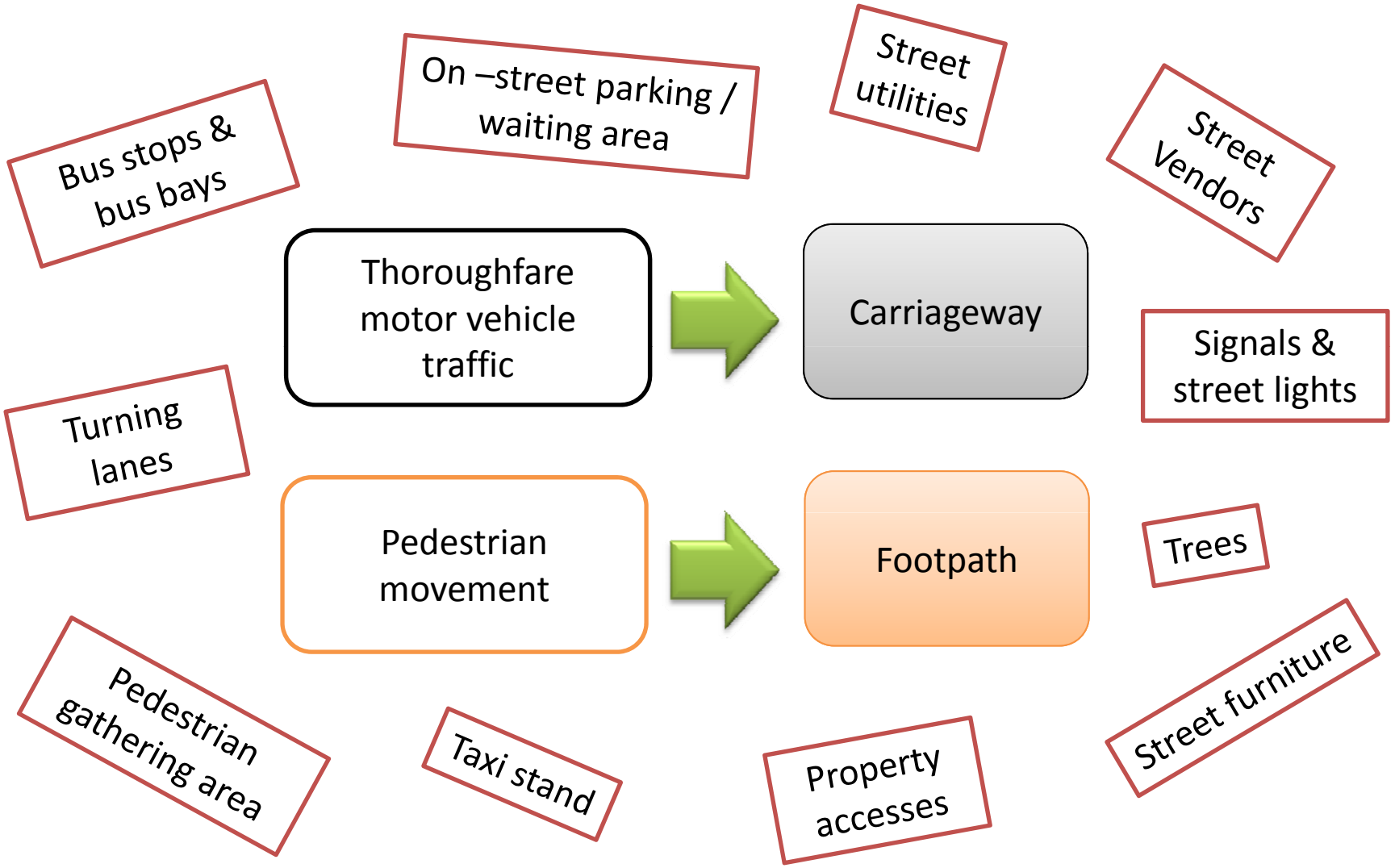
Various uses of the road



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Determination of the space utilisation of the Right of Way (ROW)

Footpath	Buffer area	Traffic lanes
Consistent width Continuous length No obstructions	To vary depending upon residual width of the road To accommodate all other road elements	Consistent width Continuous length No obstructions

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The design principles for urban roads

Continuity	• Continuous length of footpath and traffic lanes
Consistency	• Consistent width of footpath and traffic thoroughfare lanes
Clear	• No obstructions in the footpath and traffic lanes. All other road elements to be incorporated in the buffer area
Clarity	• Clarity to the road users of the right path, priority area, transfer area, conflict zones for all modes
Control	• Control of dangerous speed of vehicles

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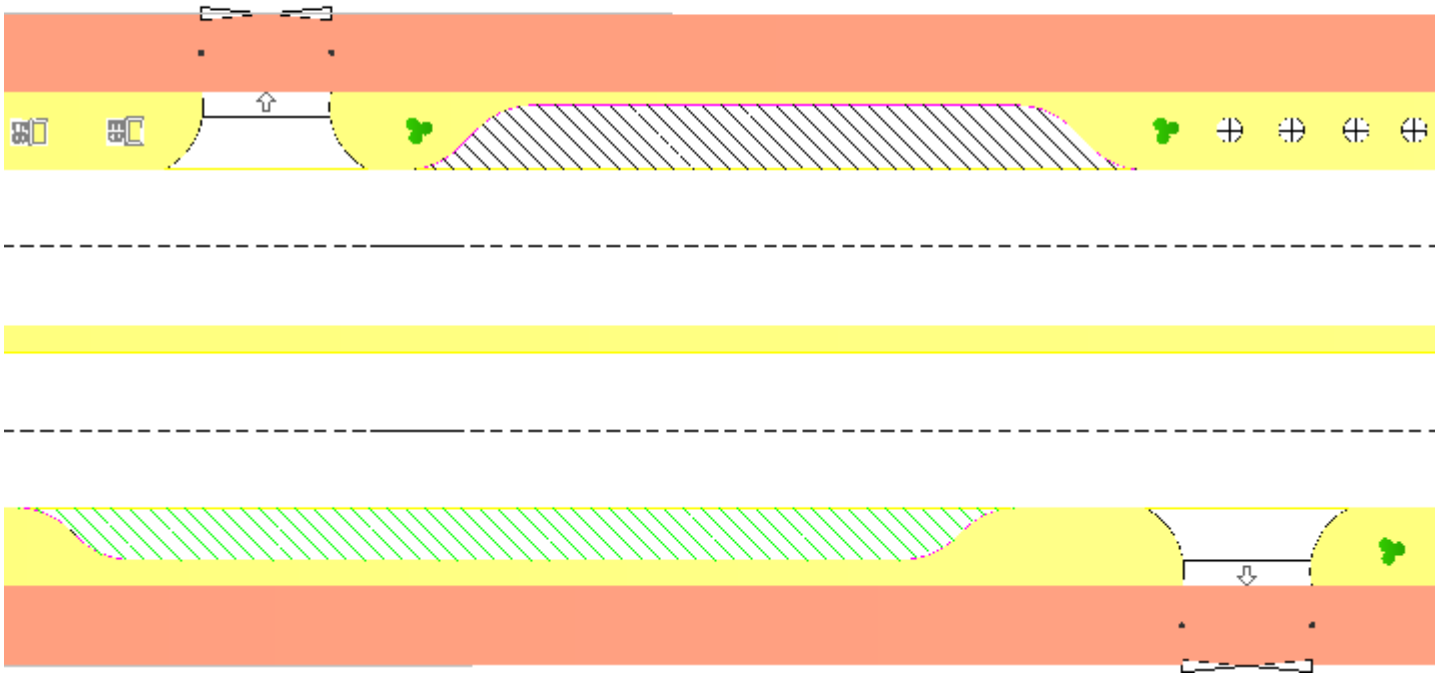
The concept

Continuous and consistent footpath

Continuous and consistent carriageway



Buffer area to accommodate all other street elements

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Utility boxes and other street elements

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Buffer area design principle

Problem

- Presently this is a wasted area, neither needed for thoroughfare traffic, nor by pedestrians
- Left unused, it is prone to encroachment, silt accumulation, etc

Recommendation

- Can be used to accommodate essential street elements, like bus stops, auto-rickshaw stand, parking/waiting area, utility boxes, etc

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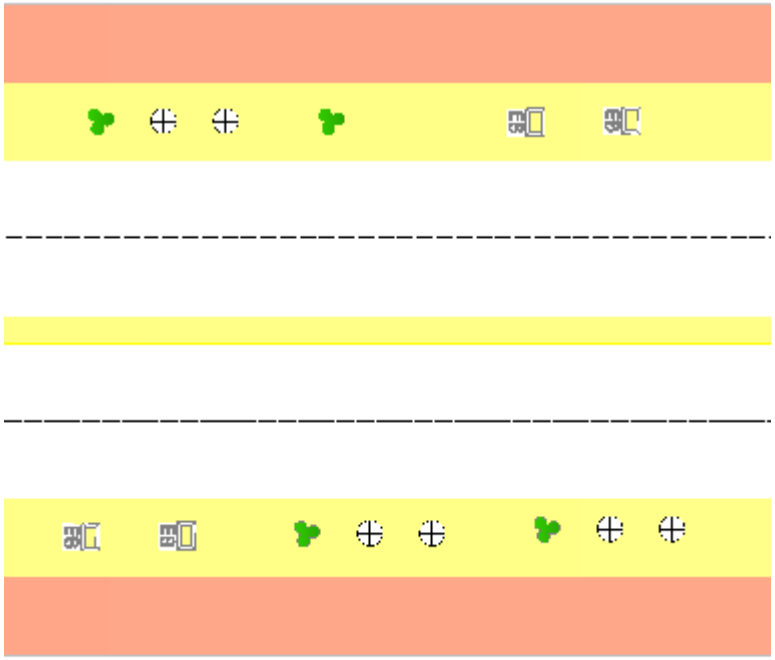
All street elements

To be accommodated in the buffer area



Footpath and carriageway to be kept free of obstacles

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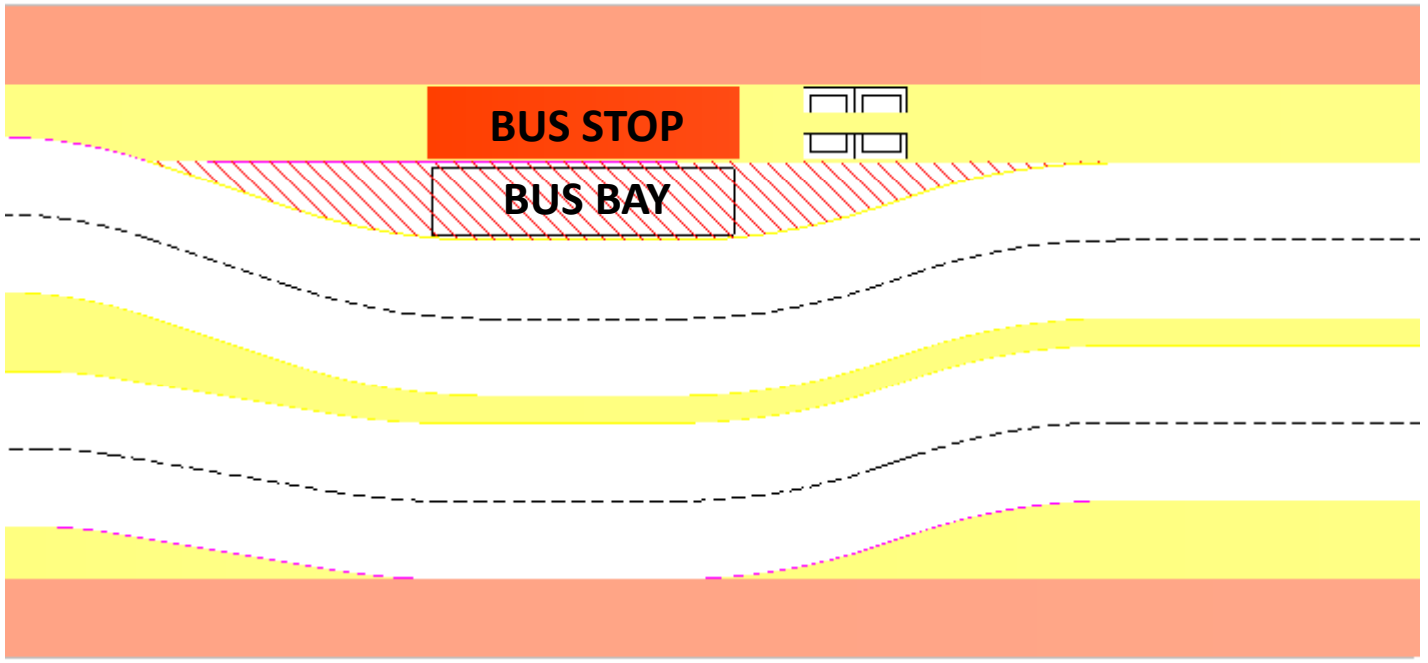
The treatment of bus stops

Bus-stop not obstructing the footpath

Bus-bay not obstructing the carriageway



Instead of bus-bay curving into buffer area, carriageway curves into the opposite buffer area. Therefore, curvature can be lesser

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A poor pedestrian crossing

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Is this really disabled friendly??

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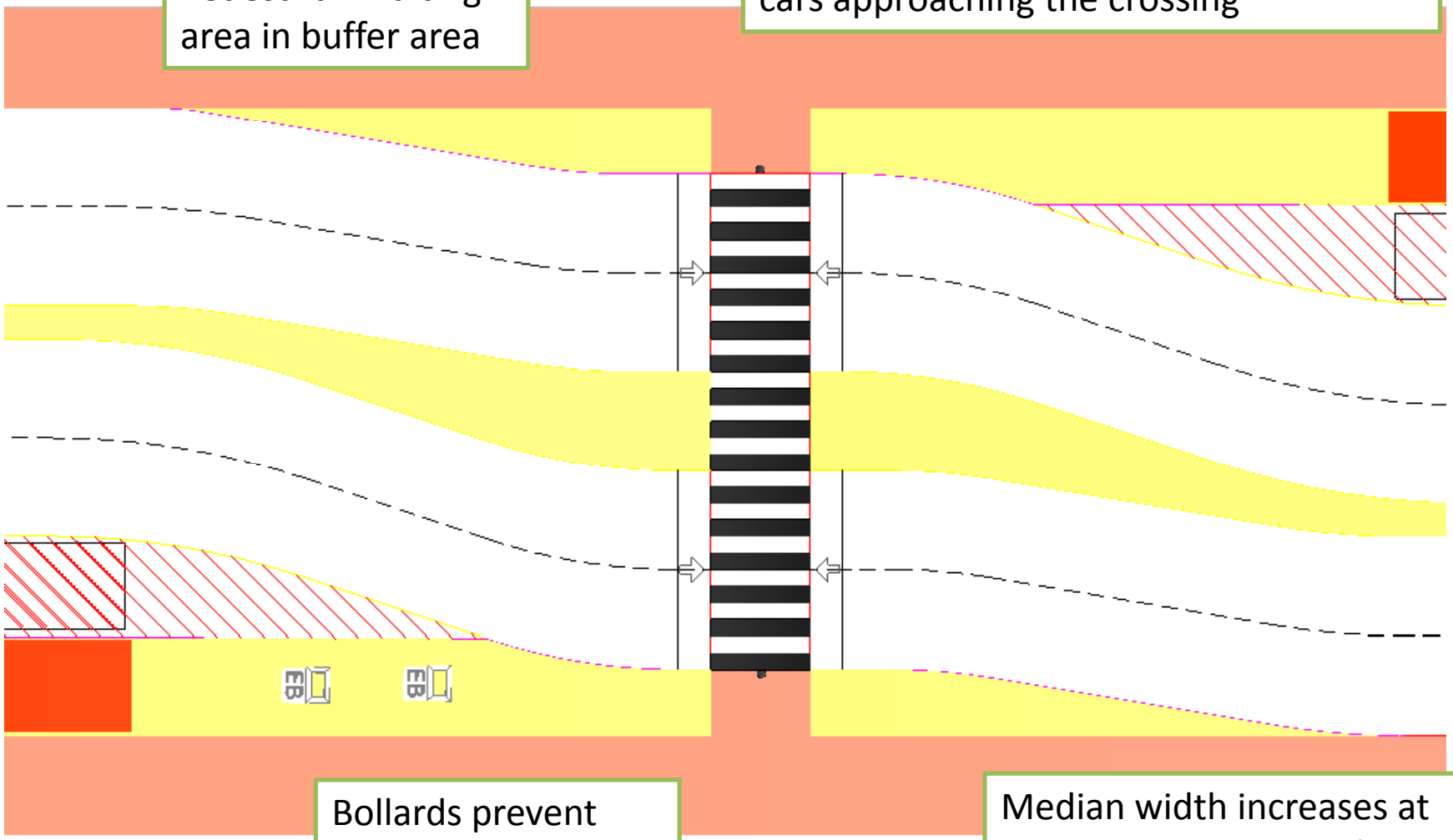
Raised zebra crossing

Zebra crossing raised to footpath height by sloping the carriageway, to make it disabled friendly, and also to slow down cars approaching the crossing

Pedestrian waiting area in buffer area



Bollards prevent vehicles from entering footpath

Median width increases at crossing to accommodate stranded pedestrians

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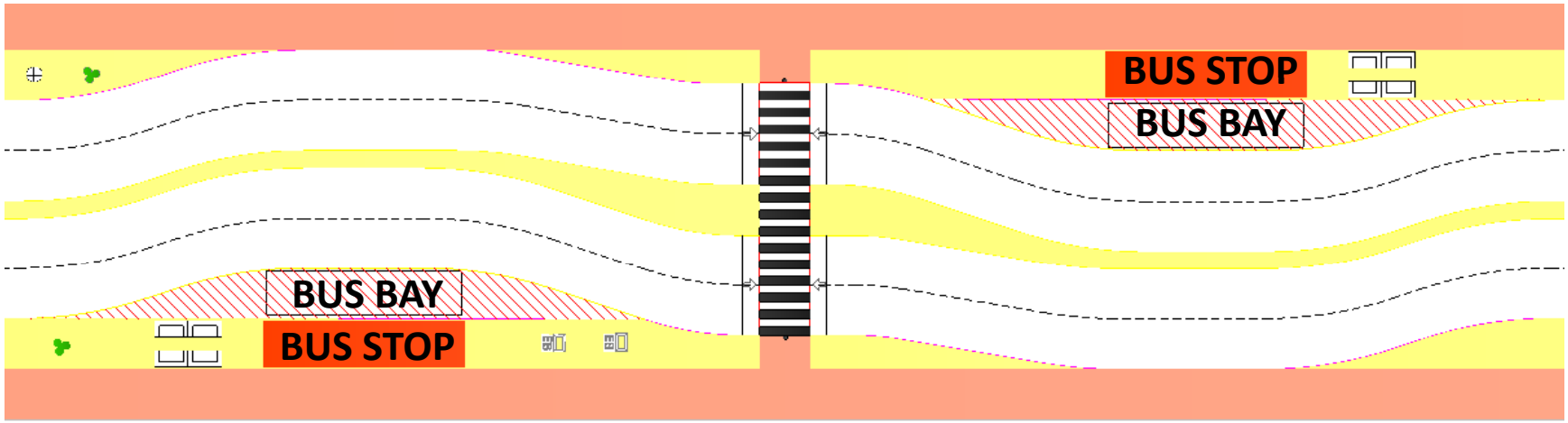
Alternating bus stops on either side of zebra crossing

Opposite side bus stops share one zebra crossing



Zebra crossing behind bus-bay for better visibility to motorists of crossing pedestrians

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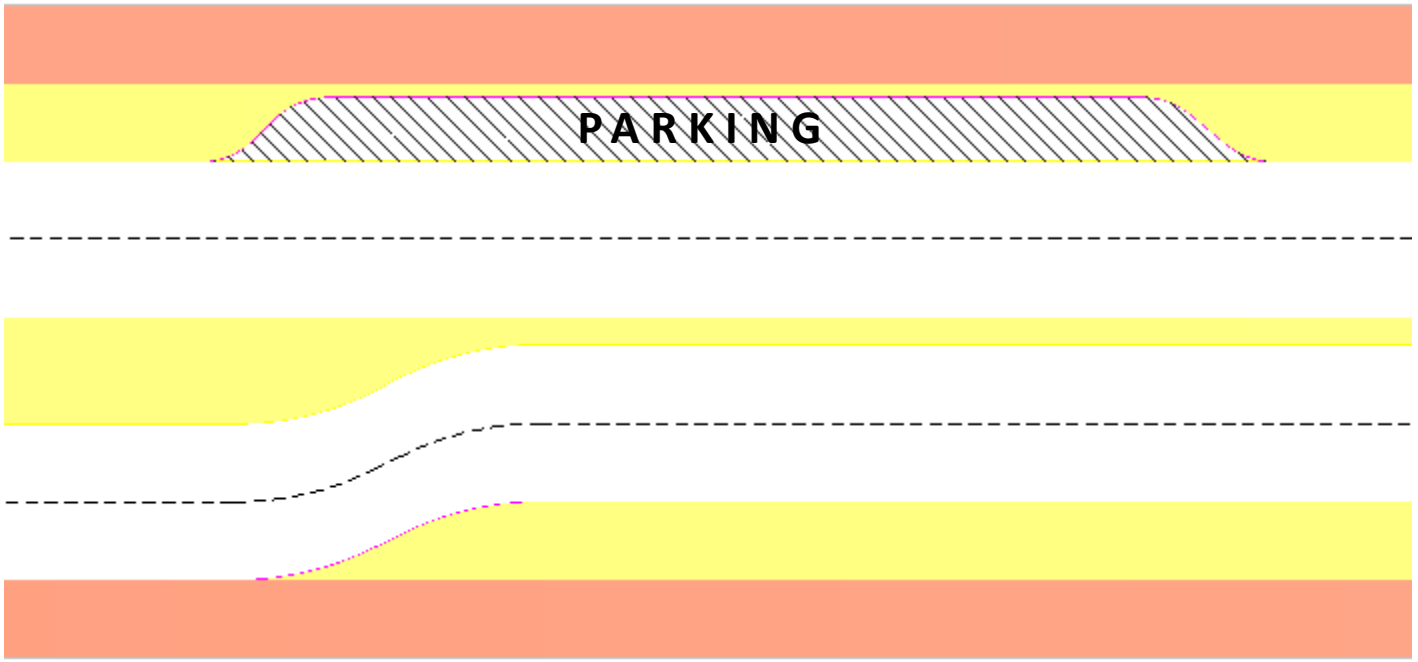
On-street parking / waiting area

Accommodated in buffer area

Gap is kept between parking / waiting area and footpath, so that car door opening does not hamper pedestrian movement



Clearly demarcated from traffic lanes

Not too long to discourage motorists from using it as a traffic lane

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Existing informal rickshaw queuing area

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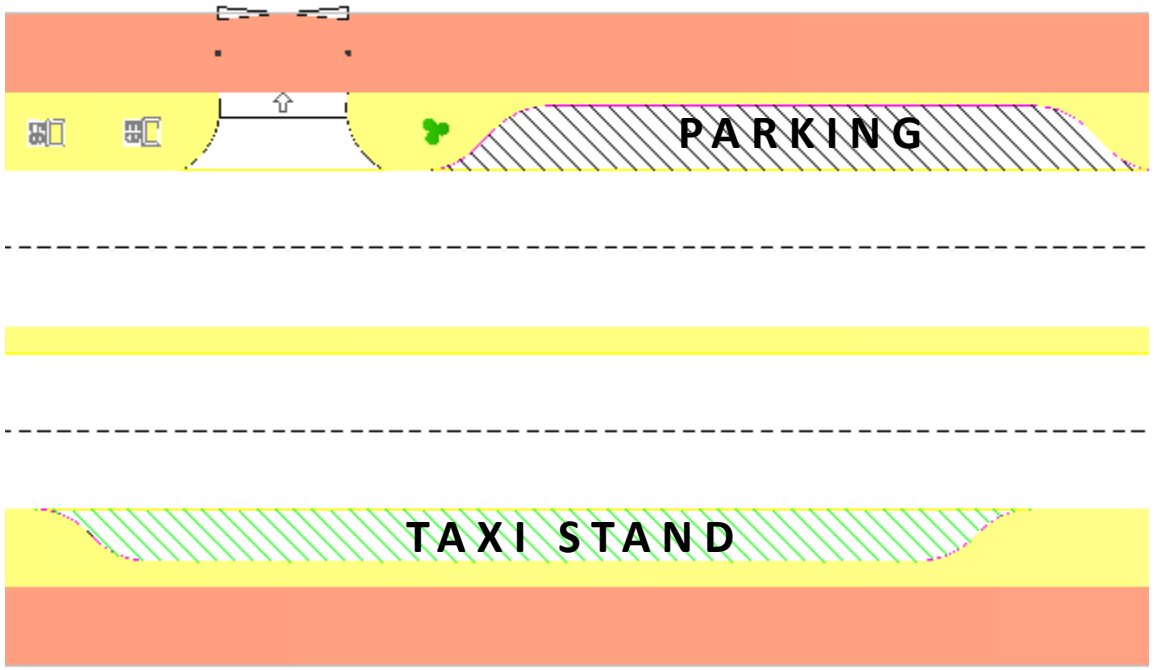
Taxi stand

Clearly demarcated from general parking area



Wide gap between taxi stand and footpath to accommodate commuter queue

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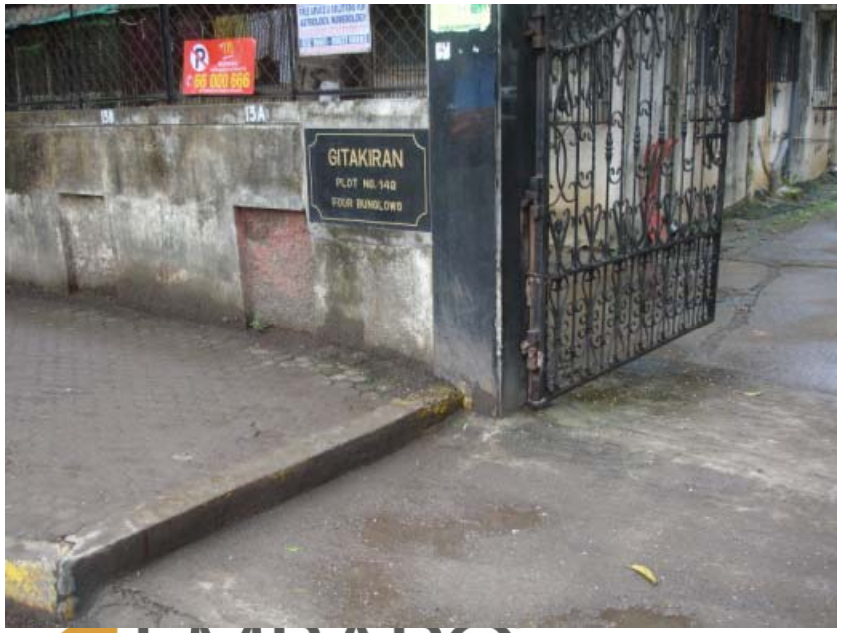
Existing property accesses

Problem

- Slopes to access property gates are present on the footpath, creating a tripping hazard, and also hampering ease of walking
- Alternatively, the footpath is dropped at property gates, creating the same kind of hazards and difficulties, but to a lesser extent



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Property gates

Problem

- Property gates that open outward obstruct the footpath

Recommendation

- These gates must be made to open inward, or replaced with sliding gates

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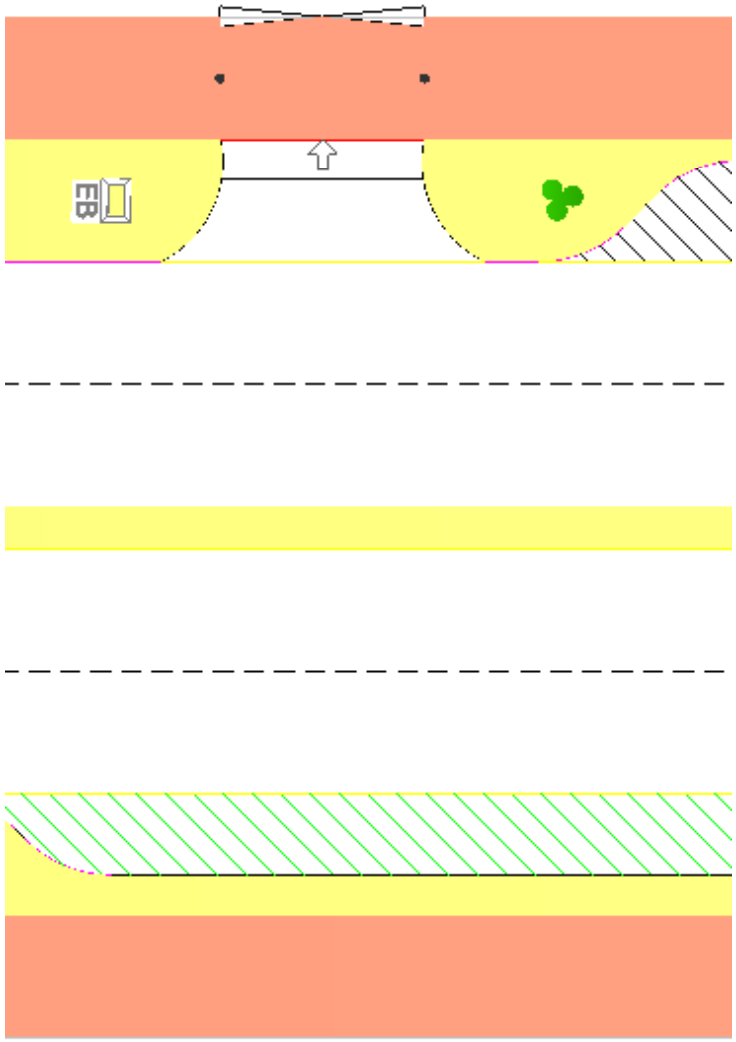
Property access

Footpath does not drop at property gate

Access is through slope accommodated in the buffer area



Bollards on footpath to prevent vehicles from entering footpath

Property gates to be made to open inward or have sliding gates

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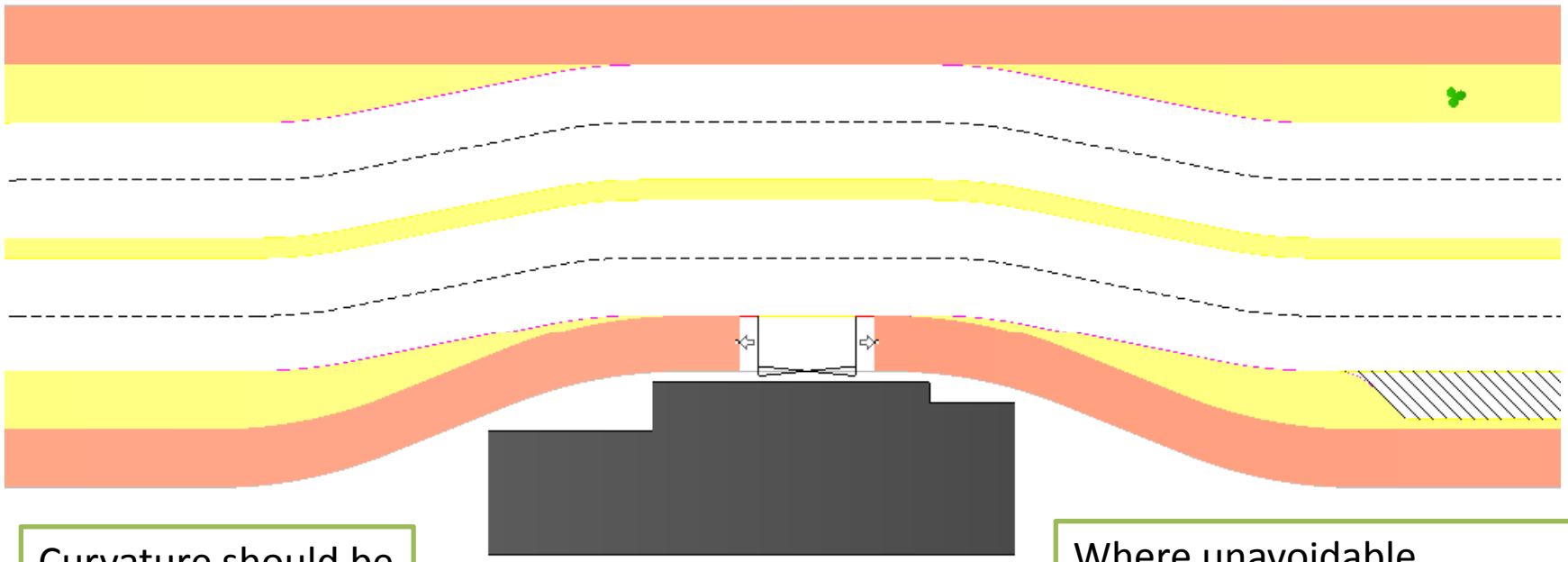
Compromised road width

When road width is compromised, eliminate the buffer area



Curvature should be gradual, and not at right angles

Where unavoidable, provide dropped curb access to property gates

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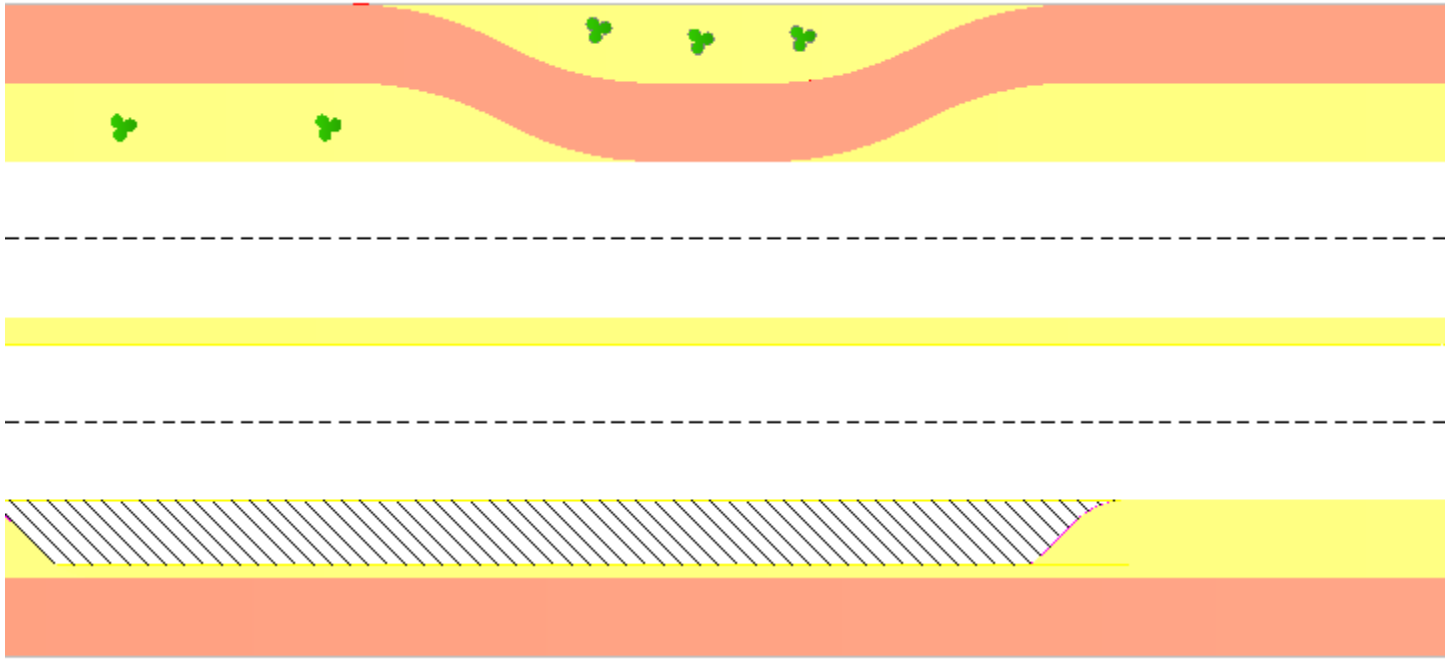
Immovable obstacles along footpath line

Curve footpath into buffer area and then back into line of footpath where obstacles end

Curve should be gradual and not at 90 degrees. It should appear natural to the pedestrian



Clear difference in treatment of footpath and buffer area: colour, surface material, height

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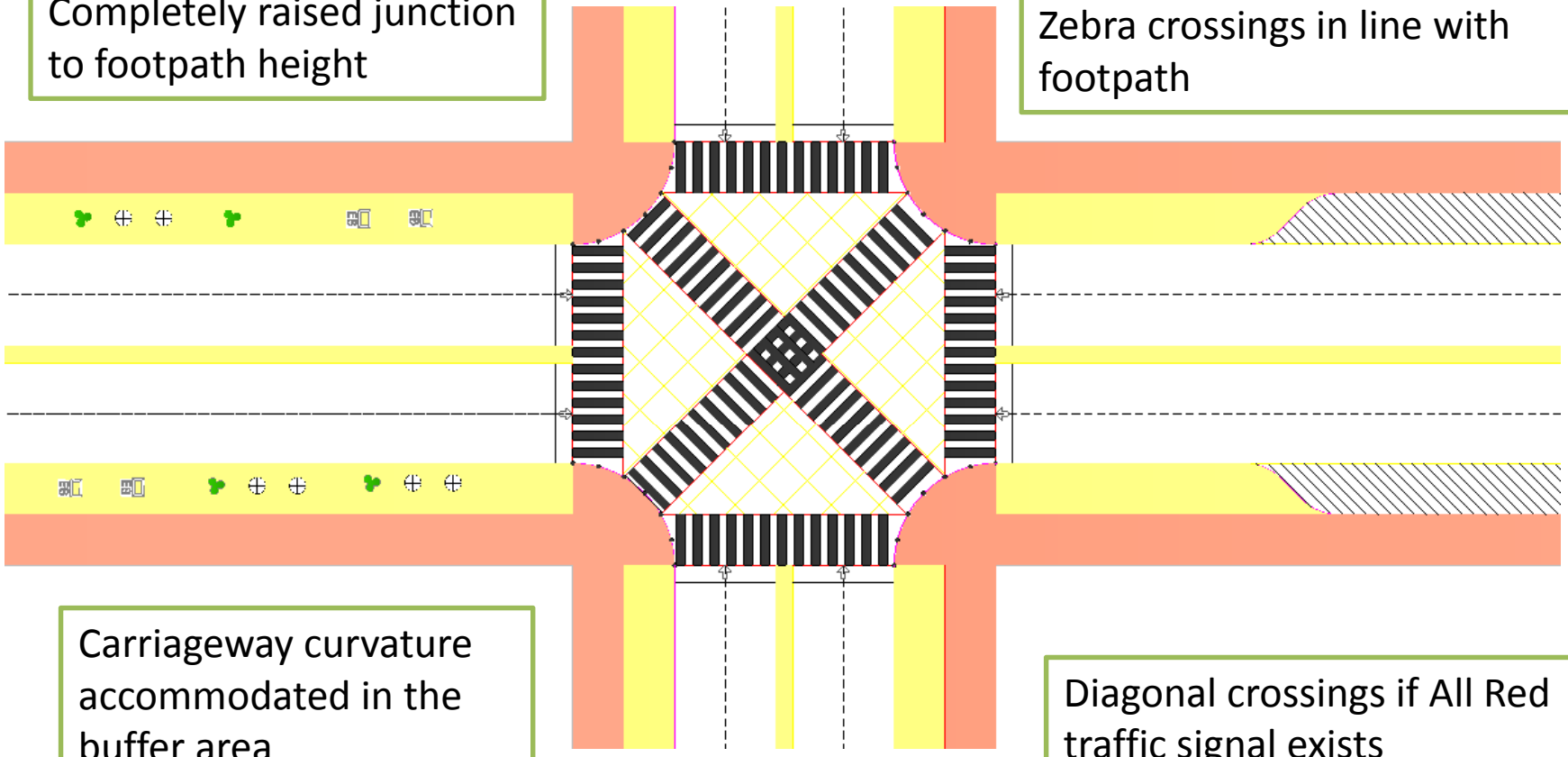
Major junction

Bollards along footpath prevent vehicles from entering footpath

Completely raised junction to footpath height

Zebra crossings in line with footpath



Carriageway curvature accommodated in the buffer area

Diagonal crossings if All Red traffic signal exists

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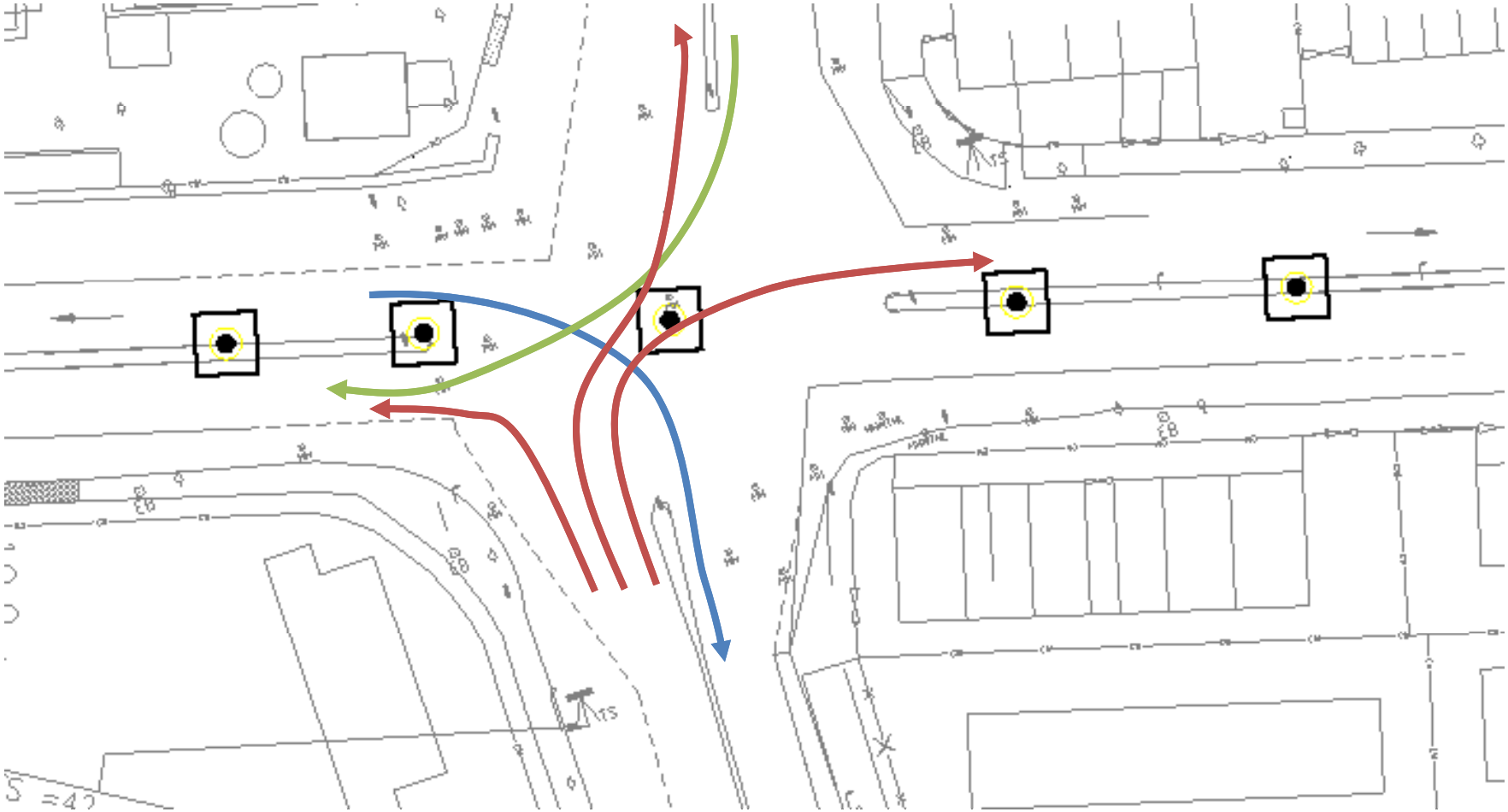
An example of an existing major junction



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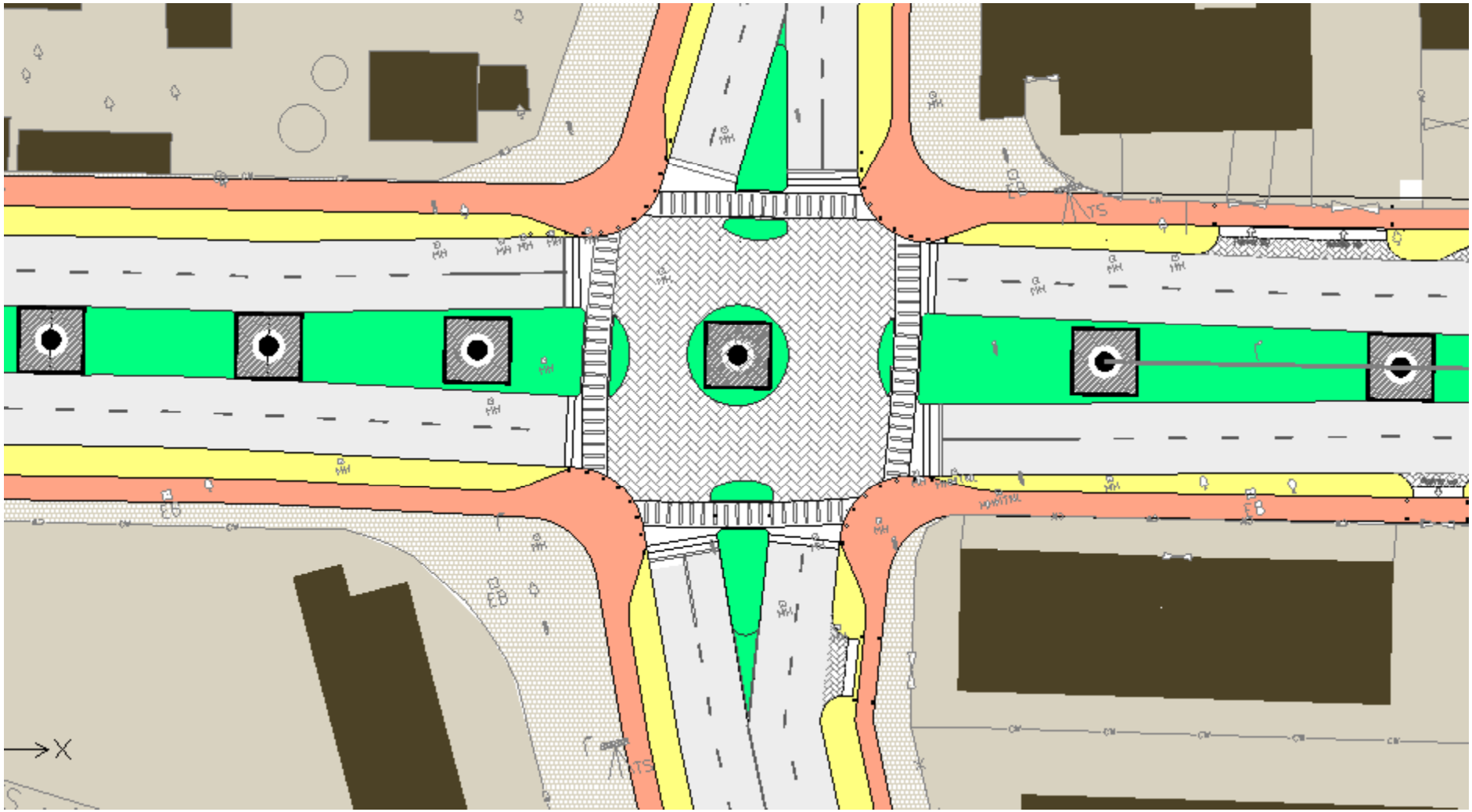
And an improved design…



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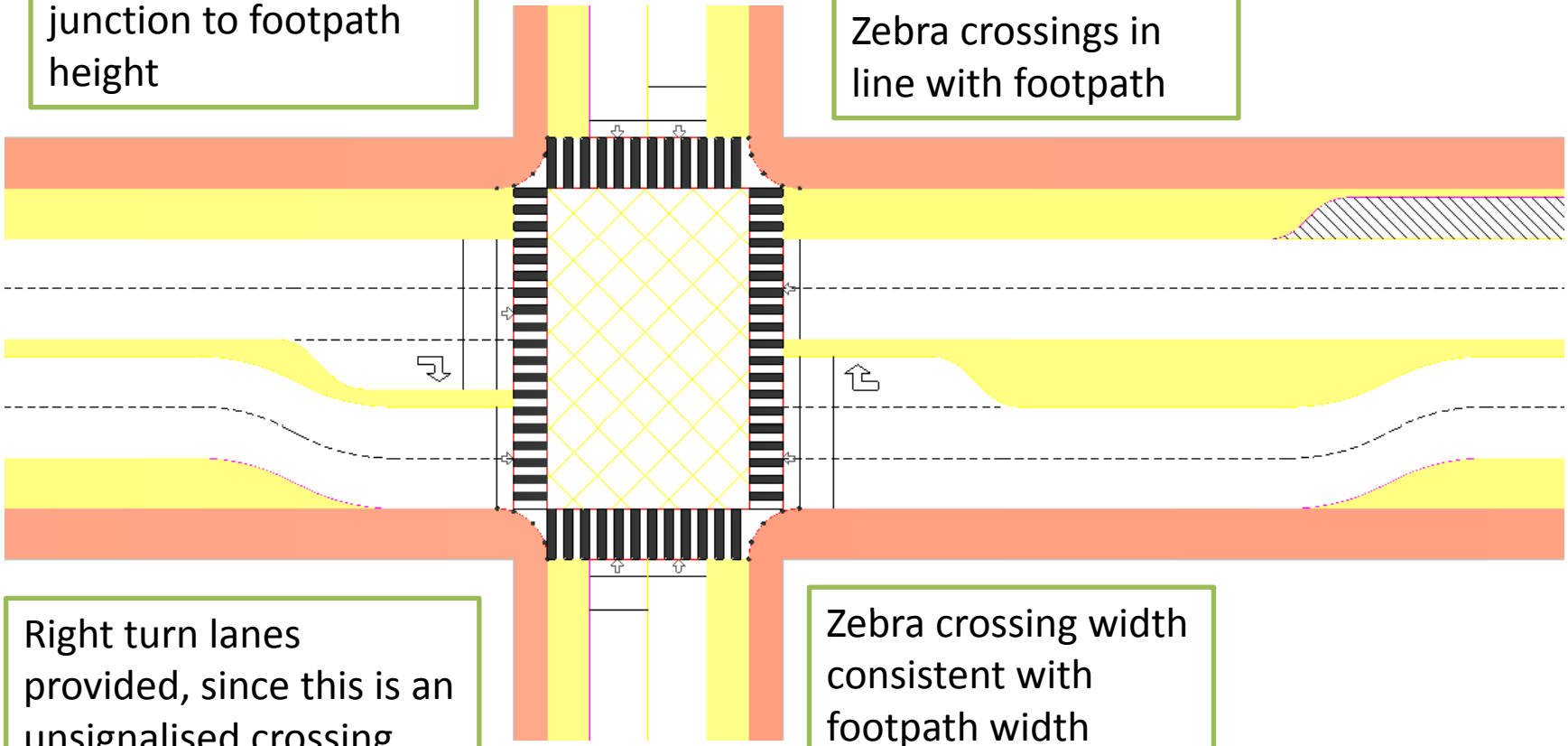
Minor junction (unsignalized)

Stop lines sufficiently set back from zebra crossing

Completely raised junction to footpath height

Zebra crossings in line with footpath



Right turn lanes provided, since this is an unsignalised crossing

Zebra crossing width consistent with footpath width

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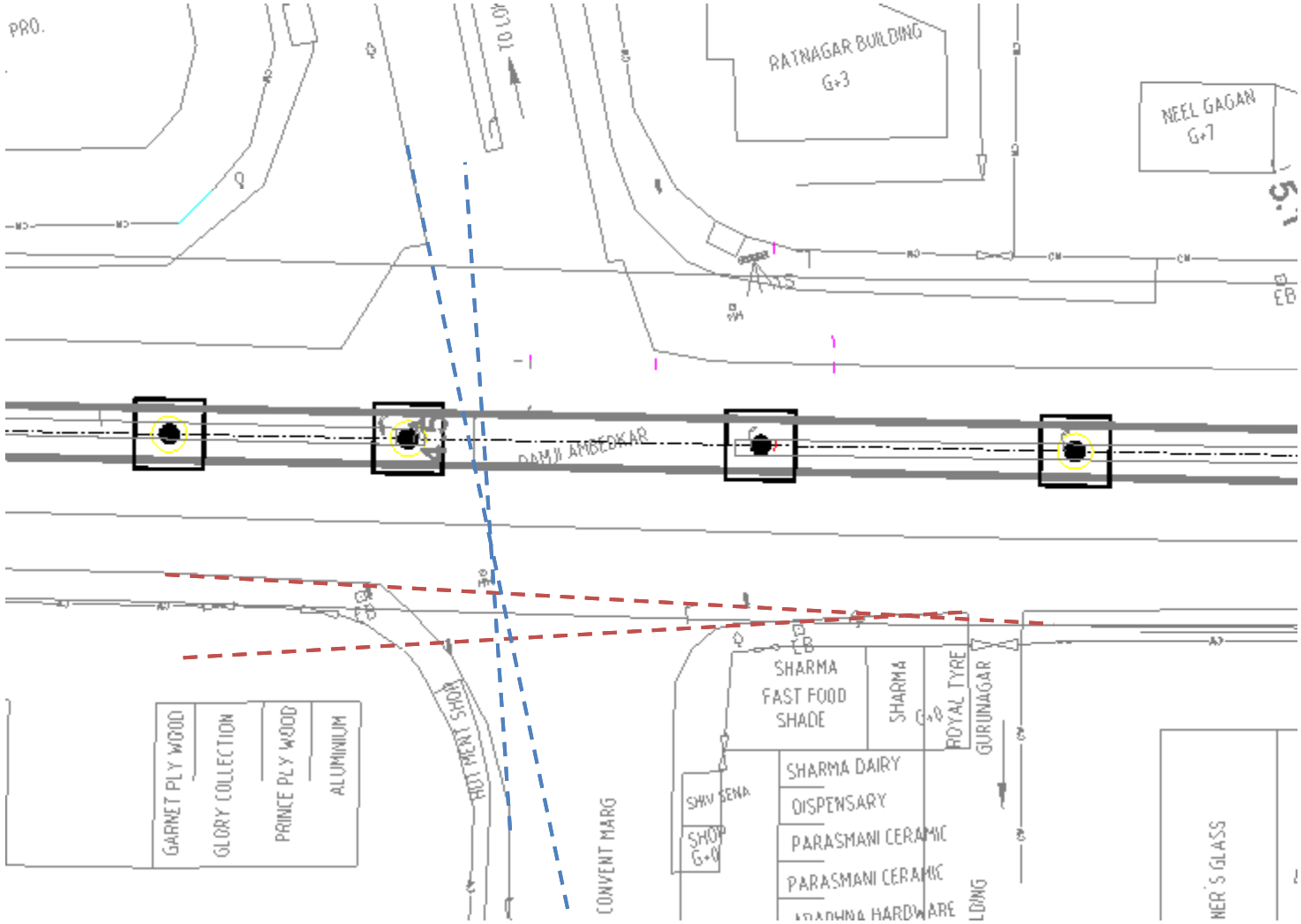
An example of an existing minor junction



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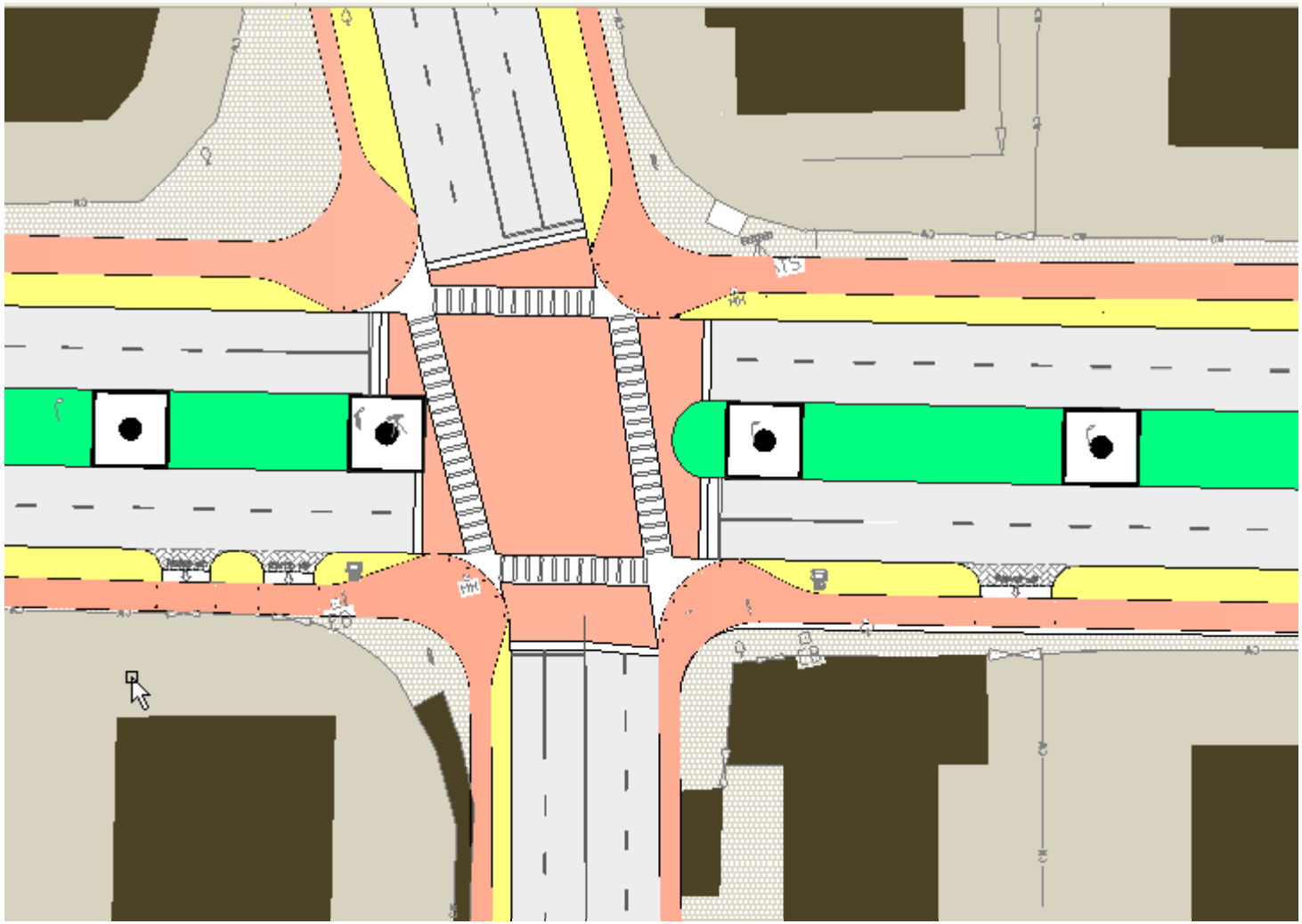
And an improved design



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The sustainable approach to urban road safety

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EMBARQ's activities in this space

- EMBARQ is partnering with City Governments to carry out road safety audits/inspections in a number of cities that have proposed/existing mass transit corridors.
- The rationale is that these corridors will generate high volumes of pedestrian traffic, thus significantly impacting the road safety and accessibility of the roads along these corridors.

No	Location	City	Time
1	Proposed BRT corridor	Indore	Jun 2011
2	Under construction elevated Metro corridor	Mumbai	Aug 2011
3	BRT corridor	New Delhi	Aug 2011
4	BRT corridor	Ahmedabad	Nov 2011
5	Elevated metro corridor	Bangalore	Dec 2011*
6	BRT corridor	Surat	2012*

*Proposed

- EMBARQ is also conducting research on road accidents along these corridors, with the intent of releasing a publication in 2012, on road safety in the context of Indian Cities.

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EMBARQ, The WRI Center for Sustainable Transport, catalyzes and helps implement sustainable transport solutions than enhance quality of life and the environment

The EMBARQ Network

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Thank you!

www.embarqindia.org