INDIA
CYCLES 4 CHANGE
CHALLENGE

DESIGN GUIDELINES

ITDP India Programme

Smart City

Ministry of Housing and Urban Affairs
Government of India

FIT INDIA

स्वच्छ भारत
एक कदम स्वच्छता की ओर

PRINCIPLES OF A CYCLE FRIENDLY CITY

SAFETY

Source: PennDOT

Road infrastructure that ensures safe cycling

CONTINUITY

Source: Macon Connects

End-to-end connectivity without obstructions

COMFORT

Source: downtownseattle.com

Elements that enhance the cycling experience

SECURITY

Source: Barry Rueger

Elements that increase personal security

ACCESSIBILITY

Source: P. Sainath

Increasing access to cycles through public programs

CYCLES4CHANGE DESIGN GUIDELINES

A guide to designing cycling-friendly streets in your city

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A. ESSENTIAL INTERVENTIONS

Essential elements to create cycling-friendly streets for all groups of people.

PROTECTED CYCLE LANES

Source: peopleforbikes

Dedicated cycle lanes with protection

CALM STREETS

Source: smartgrowthamerica.org

Elements that calm motor vehicles

SAFE INTERSECTIONS

Source: Rachel Quednau

To reduce conflict and ease the movement of cyclists

B. DESIRABLE INTERVENTIONS : A few examples

Enhancing the convenience of cyclists and empower people to start cycling.

CYCLE RENTALS

Making cycles affordable and available to citizens

CYCLE TRAINING

Source: : New Town Kolkata

Training and building confidence to cycle

CYCLE REPAIR CLINICS

Source: : Julian Walke

Providing repairs and maintenance

ESSENTIAL CYCLING INTERVENTIONS

PROTECTED CYCLE LANES

Protected cycle lanes are physically separated pathways from the carriageway to ensure unobstructed movement of cyclists and protect them from fast moving vehicles. They also reduce encroachment by parked vehicles, pedestrians, and street vendors.

A. CYCLE LANE BASICS

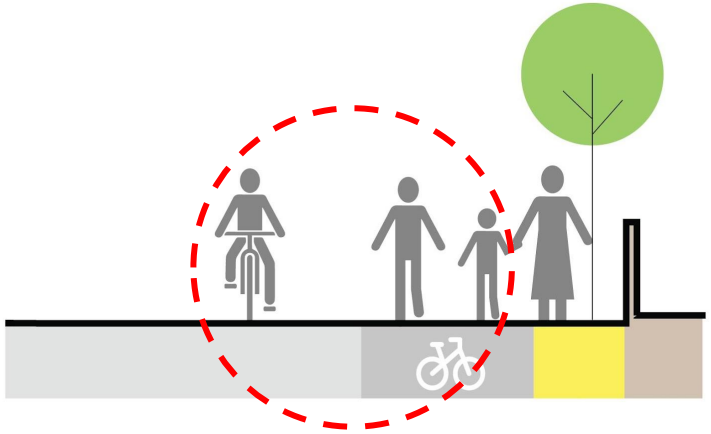
B. MANAGING THE KERB

C. CYCLE LANE PLACEMENT

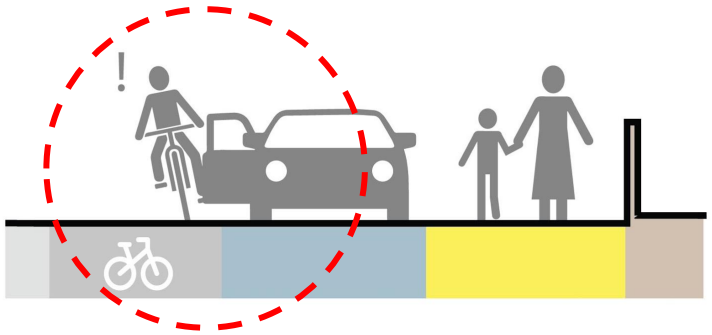
D. MIDBLOCK CROSSINGS

E. UNIFORM CARRIAGEWAY WIDTH

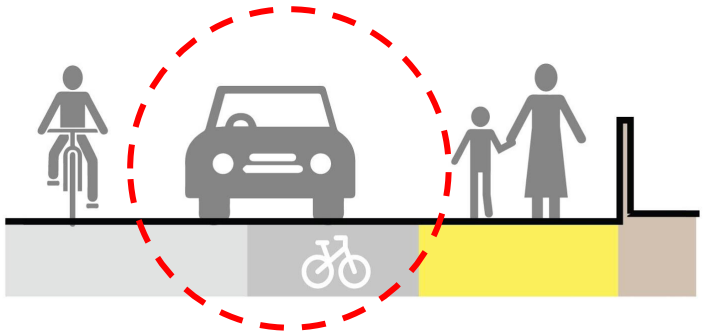
Typical flaws in cycle lane design



Narrow or encroached footpaths push pedestrians onto the cycle track and cyclists onto the carriageway



Cycle lanes between the carriageway and motor vehicle parking is unsafe for cyclists.



No physical separation between carriageway and cycle lane invites motor vehicles to encroach the lane

A. CYCLE LANE BASICS

Designing cycle lanes right

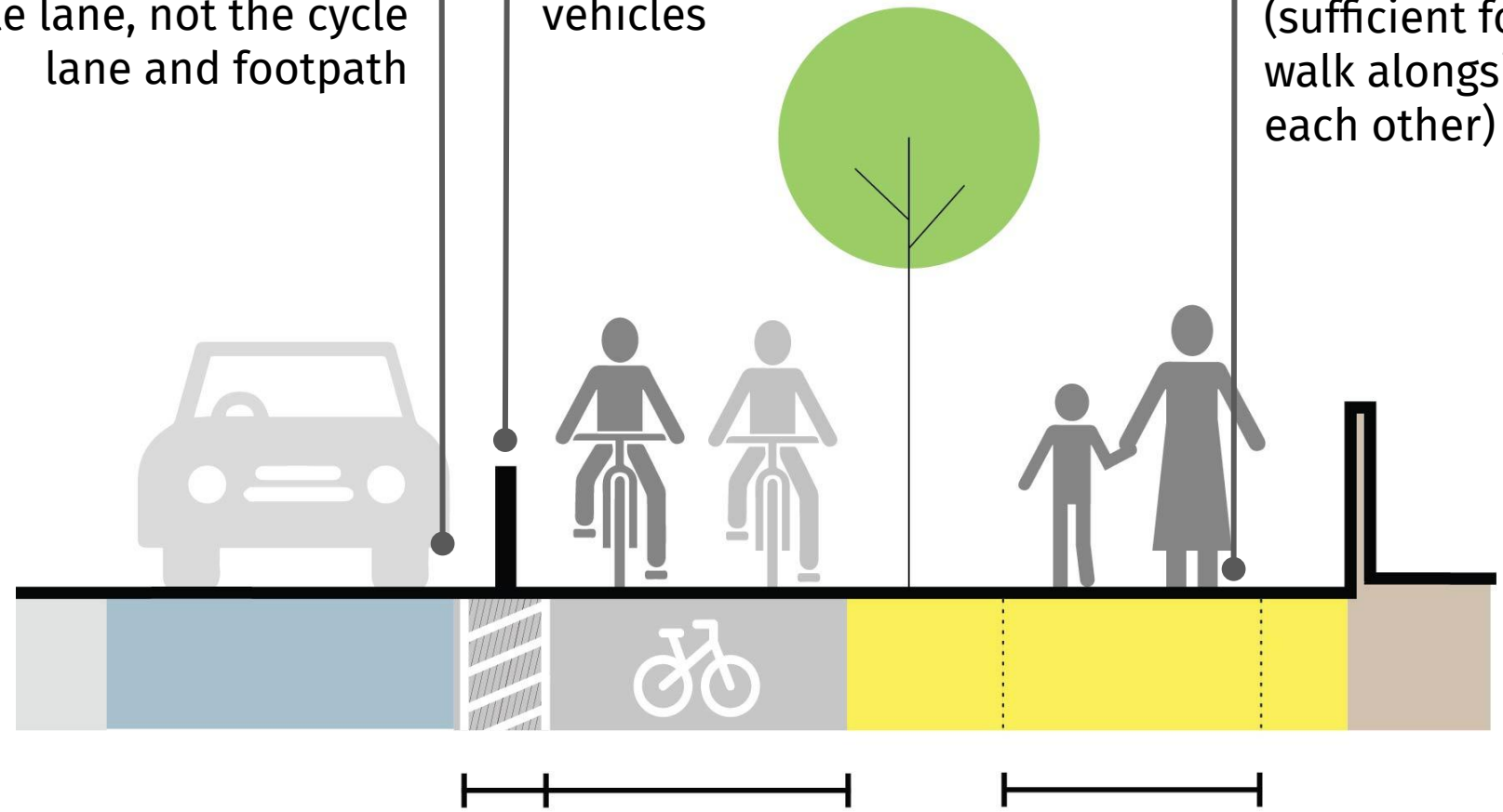
A. CYCLE LANE BASICS

Design of protected cycle lane

Place motor vehicle parking between the carriageway and the cycle lane, not the cycle lane and footpath

Protect the cycle lane physically from motor vehicles

Provide adequate space for walking (sufficient for people to walk alongside or cross each other)



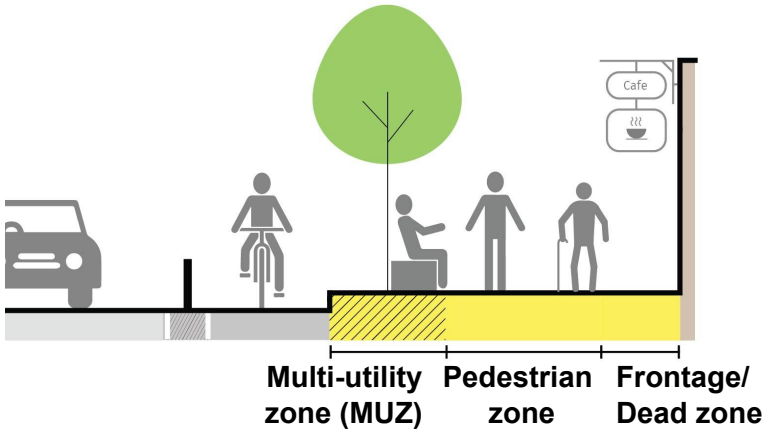
BUFFER
Min 0.3 m on both sides of the cycle lane.
Min 0.6 m if there is moving traffic.

CYCLE LANE
Min 2 m One-Way
Min 3 m Two-Way

WALKING SPACE
Min 1.8 m
Buffer spaces are required on both edges of the walking space

Footpath Basics

Footpath design

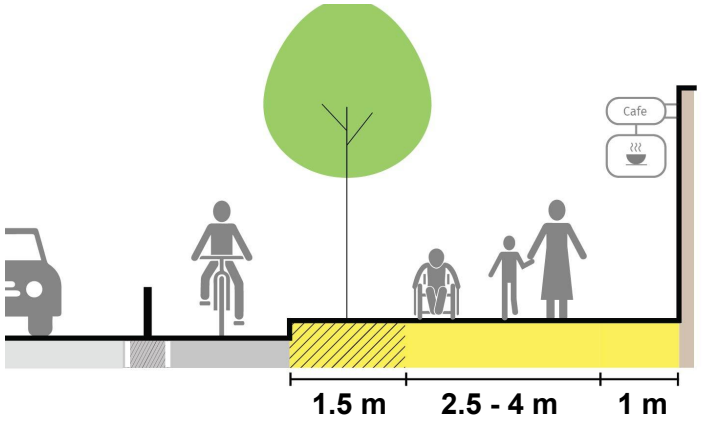


Pedestrian/Walking zone: Continuous walking space for pedestrians, clear of any obstructions.

Frontage/dead zone: Provides a buffer between the pedestrian zone and the property edge.

Multi-utility zone (MUZ): Space for vending, street furniture, landscape, bus stops, and property access ramps, on-street parking.

Footpath in commercial areas

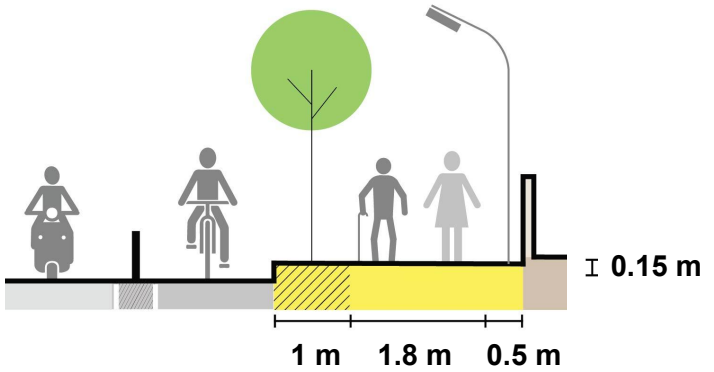


Clear width of the pedestrian zone in a commercial area should be at least **2.5 m.**

In case of high intensity commercial areas the pedestrian zone width should be at least **4 m** to accommodate high pedestrian footfall.

1 m frontage zone along shops ensures shoppers do not hinder the pedestrian movement.

Footpath in residential areas



Clear width of the pedestrian zone in a residential area should be at least **1.8 m** for two wheelchairs to pass each other.

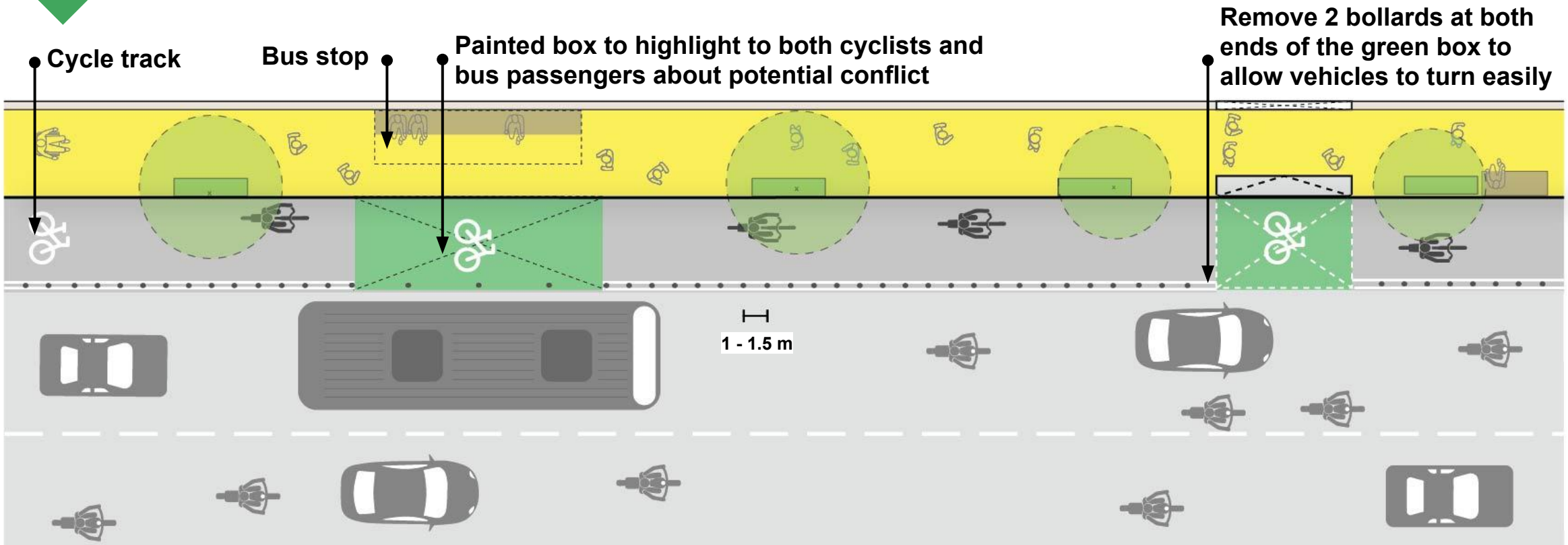
On narrow streets, MUZ can be reduced to 0.5m.

Footpaths should be raised but no more than **0.15 m**.

Source: IRC:103-2012

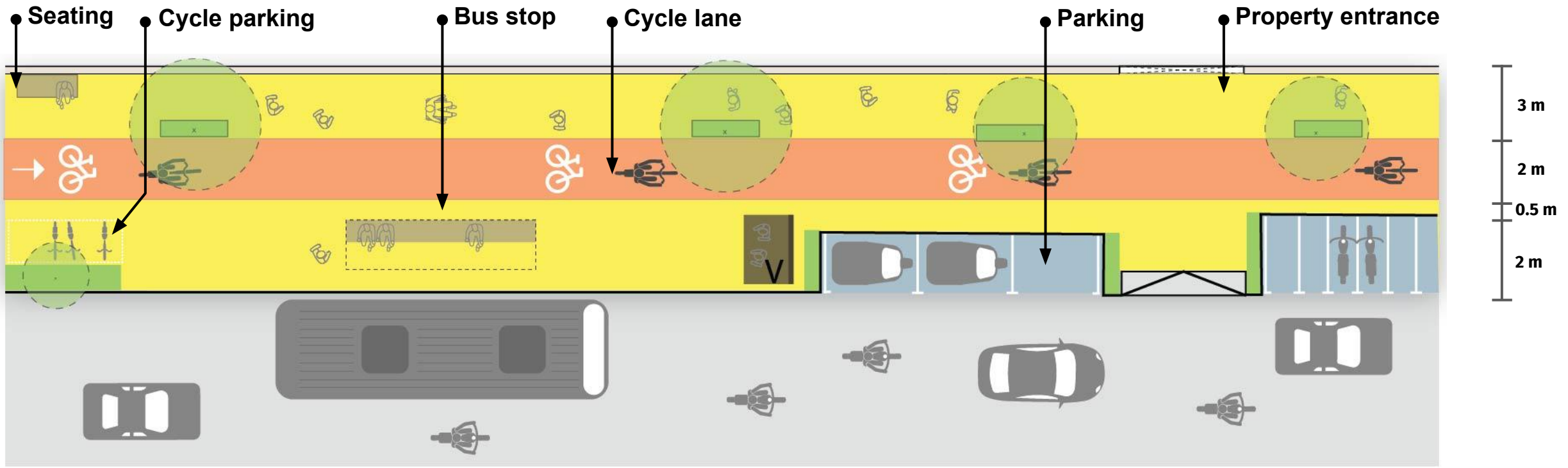
Cycle lanes at bus stops (Temporary design)

Typical plan to manage elements such as bus stop for temporary cycle lane interventions.



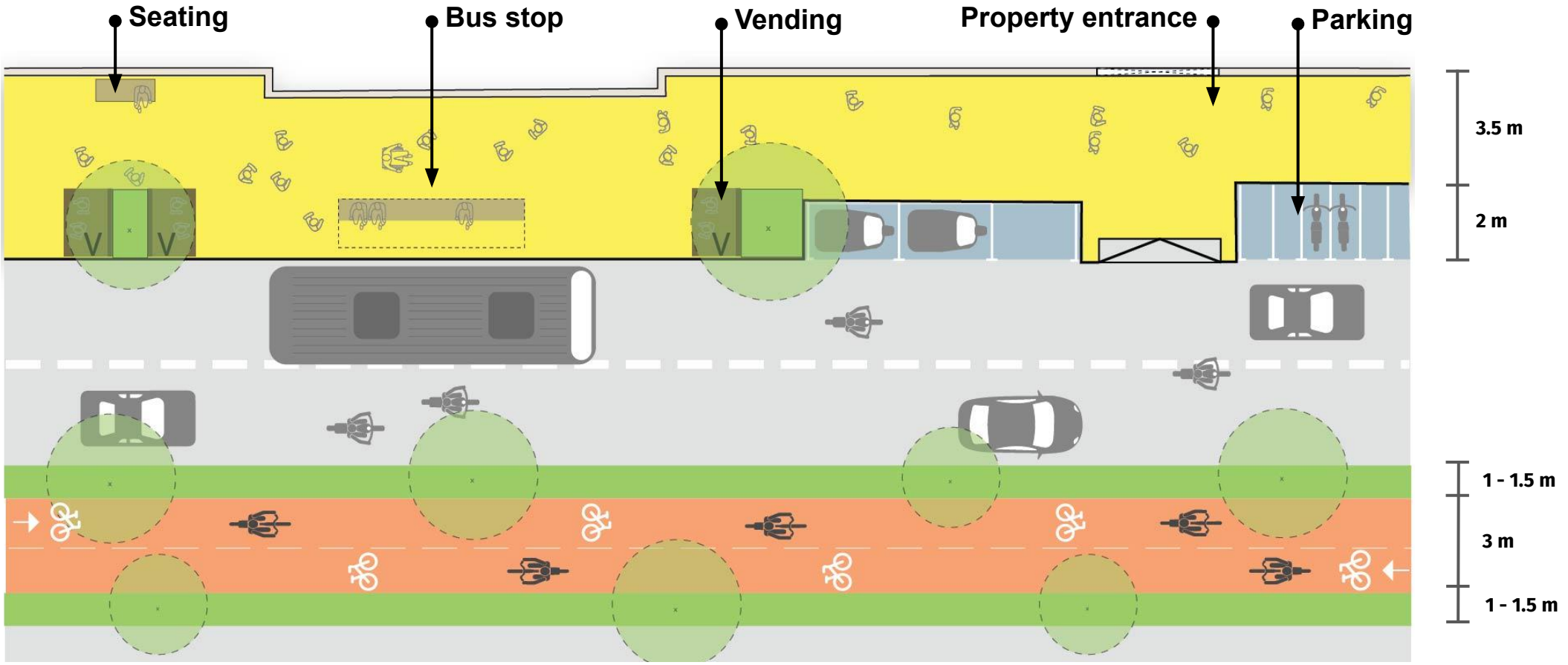
Cycle lane at bus stops (Permanent design)

Typical plan to manage elements such as a bus stop, seating, vending, cycle parking and vehicle parking for permanent cycle lane interventions.



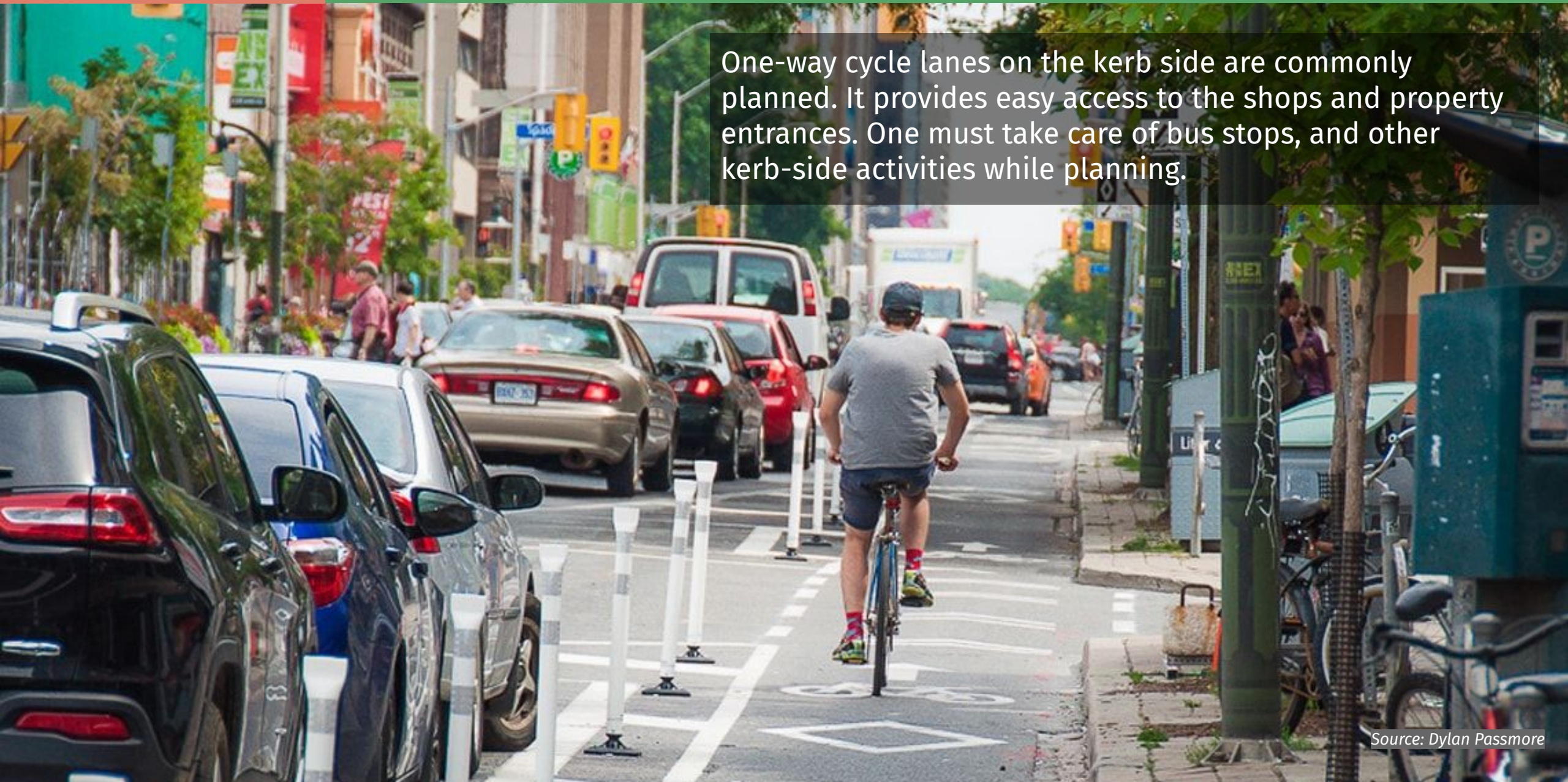
Cycle lane at median (Permanent design)

Typical plan to manage elements such as a bus stop, vending, and vehicle parking along with median cycle lane



C. CYCLE LANE PLACEMENT

One-way cycle lanes on the kerb side



One-way cycle lanes on the kerb side are commonly planned. It provides easy access to the shops and property entrances. One must take care of bus stops, and other kerb-side activities while planning.

Source: Dylan Passmore

C. CYCLE LANE PLACEMENT

Two-way cycle lanes on the kerb side

Kerbside two-way cycle lane can be considered on one-way street with high speed motor vehicle traffic.

Source: flickr.com

C. CYCLE LANE PLACEMENT

Two-way cycle lanes in the median

Median two-way cycle lanes can be considered on streets with constrained RoW width, and high intense kerb-side activities. Frequent entry/exits at every 150-200 m to the median cycle track should be provided.

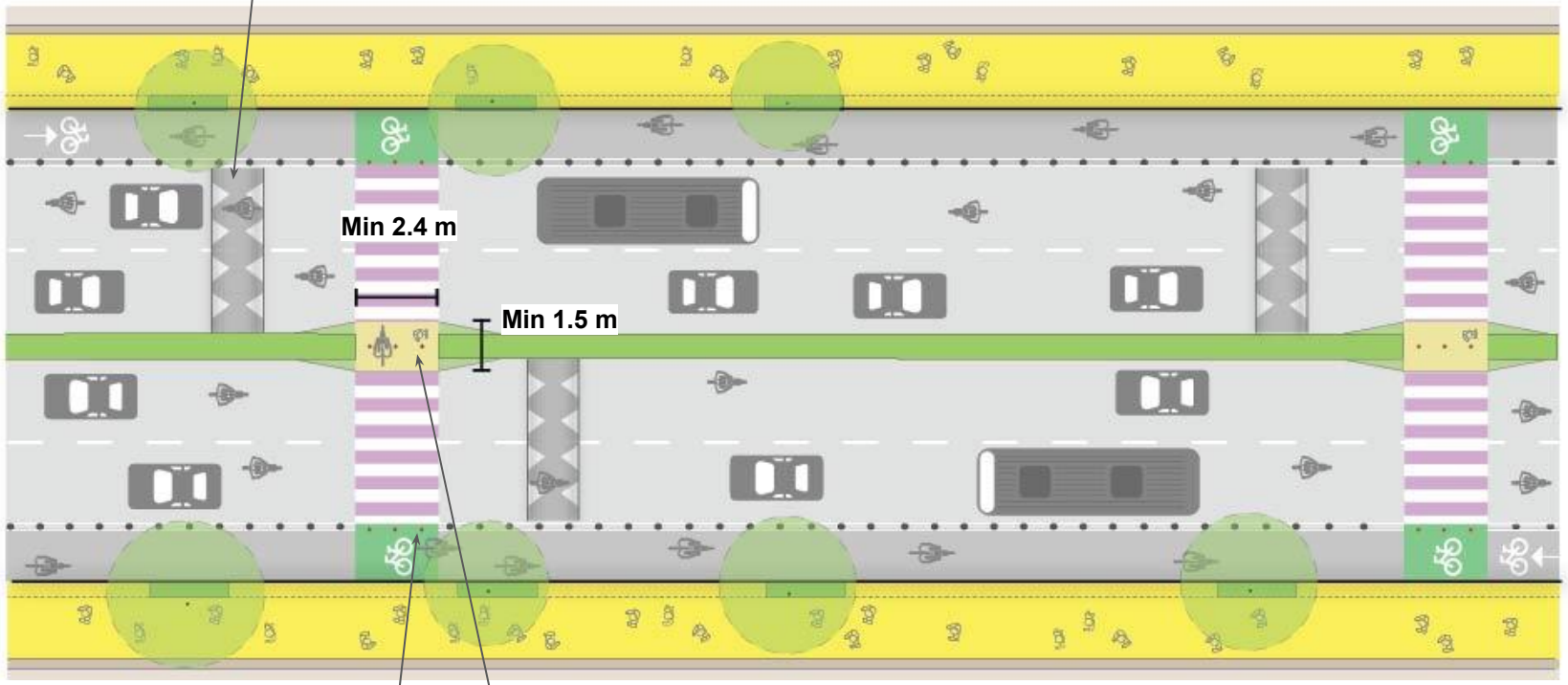
Median cycle track in Barcelona, Spain
Source: timeout.com

D. MIDBLOCK CROSSINGS

Frequent and safe crossing opportunities

Speed hump before zebra crossing **to reduce traffic speed**

Create zebra crossings every 150-200 m



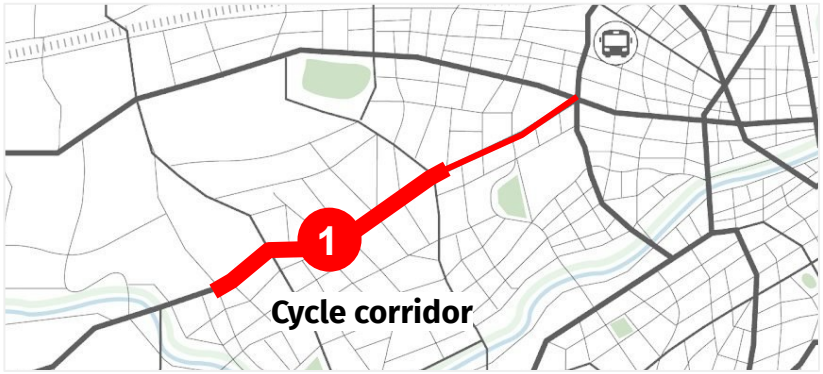
Keep cycle track at the same level as zebra crossing

Widen median to at least 1.5 m to create a safe refuge for pedestrians and cyclists.

Keep **refuge at the same level as crossing**.

E. UNIFORM CARRIAGEWAY WIDTH

Dealing with inconsistent Right of Way

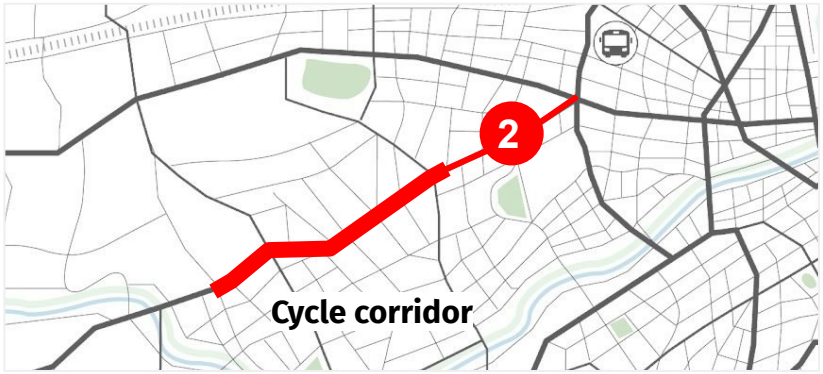


Ensure **uniform carriageway width** to prevent bottlenecks.

Carriageway width should not increase in portions where a wider RoW is available. Additional RoW can be used for walking, cycling and public spaces for people to sit, eat, meet, and socialize.

E. UNIFORM CARRIAGEWAY WIDTH

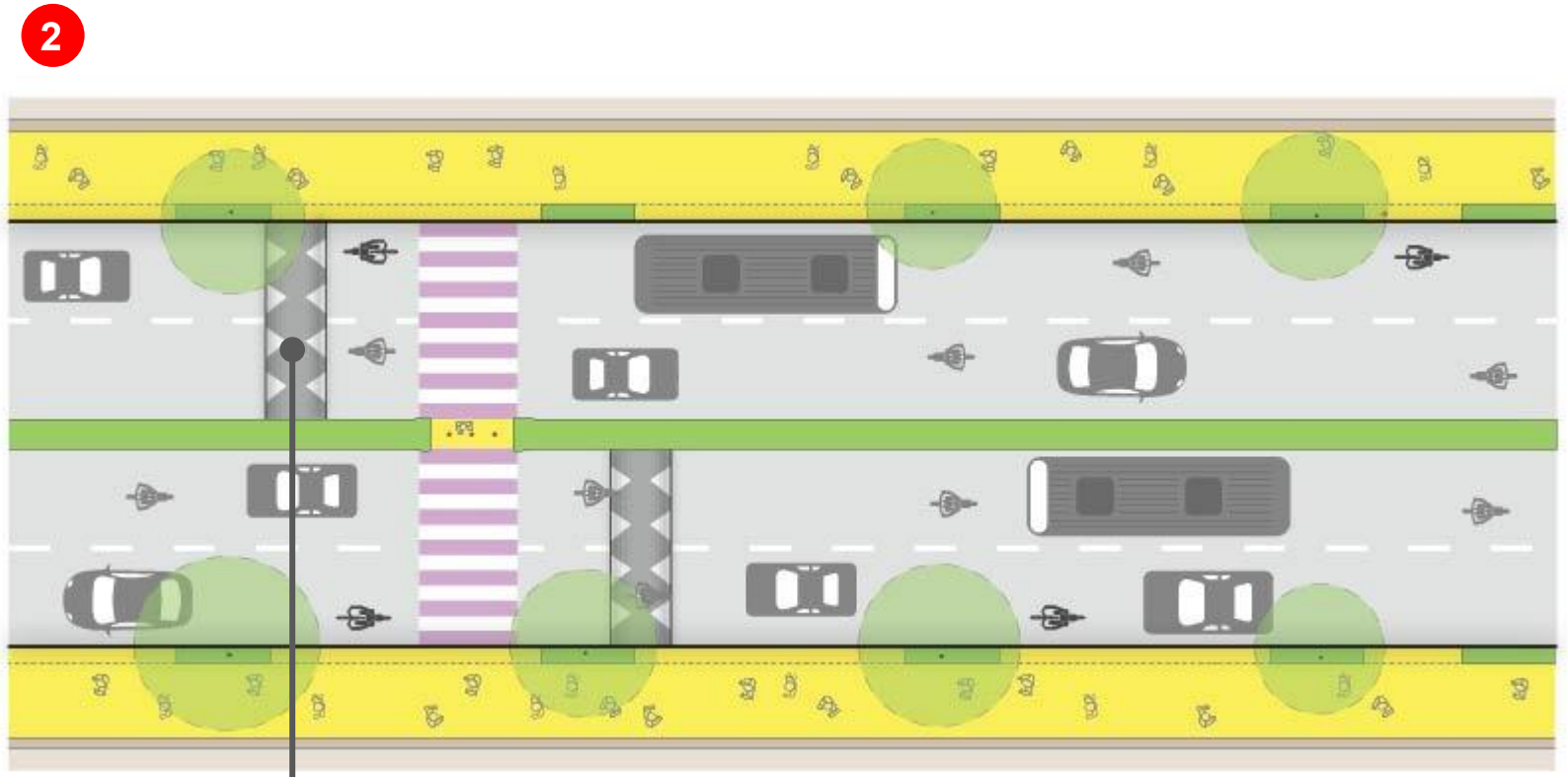
Dealing with inconsistent Right of Way



In the following example, the overall corridor stretch is 15 km. The right of way width is largely 30 m for the first 8 km starting from the periphery, and then gradually reduces to 18 m (section 2) as it approaches the city center.

The point to note here is that we should maintain the same carriageway lanes to avoid bottlenecks. The carriageway can be **narrower than 3.5 m** (code of practice-1 by MoUD, 2008)

The street section at 18 m RoW is designed as a calm street to ensure speeds are below 30 kmph and safe for cyclists to be in mixed traffic.



Speed humps or other traffic calming elements should be used to reduce vehicular speeds

INTERSECTIONS

Intersections are points in the street where different road users converge. A well-designed intersection is safe for pedestrians, cyclists and offers public space opportunities.

A. STEPS TO CREATE A SAFE INTERSECTION

B. DESIGNING A COMPLEX INTERSECTION

Step 1 - **Create a basemap**

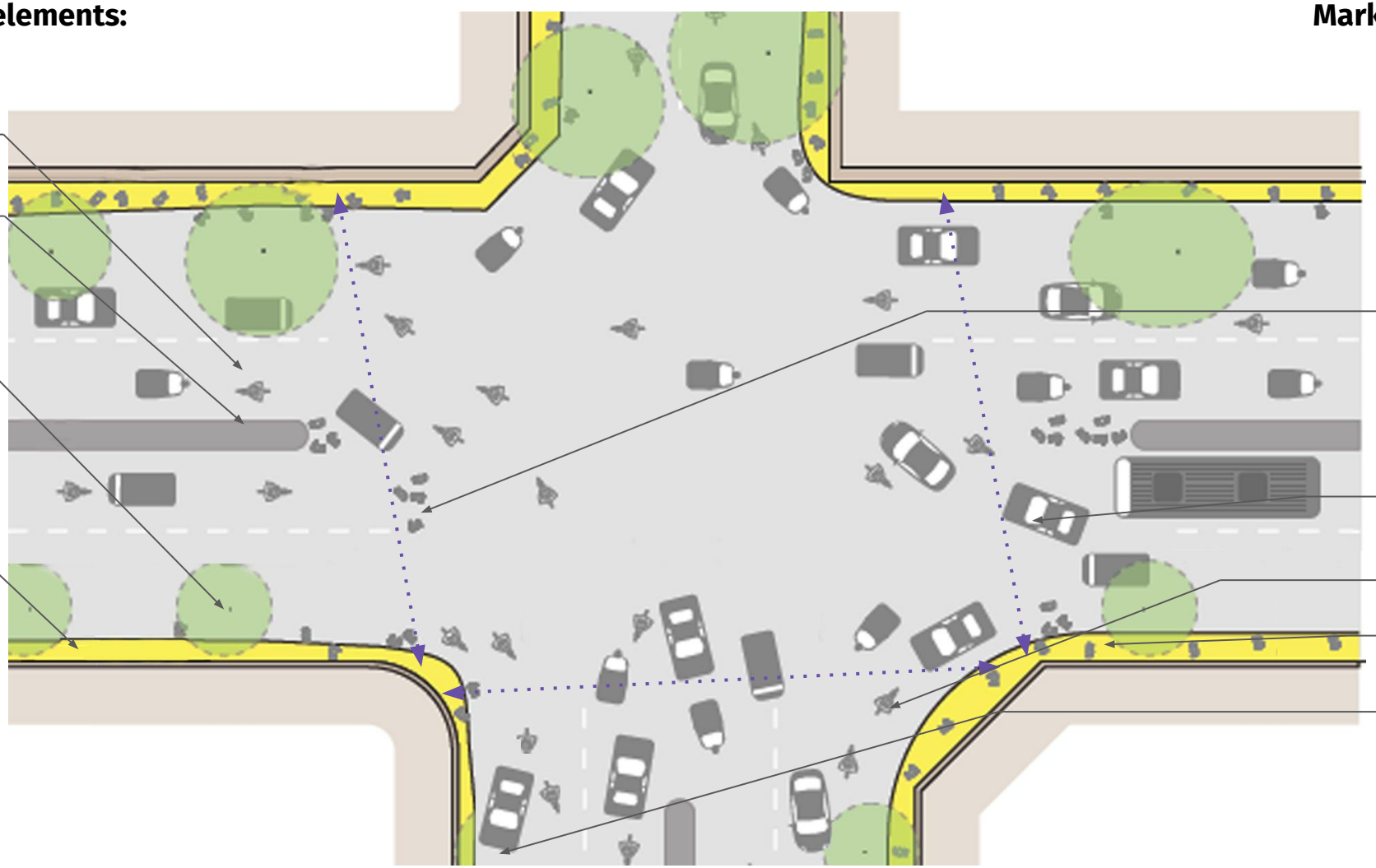
Mark existing physical elements:

Existing **carriageway**

Existing **median**

Existing **trees**

Existing **footpath**



Mark existing activities:

Pedestrian movement and counts

Vehicular traffic movement and PCU* counts (15 minute on peak hours)

Cyclist movement and counts

Vending

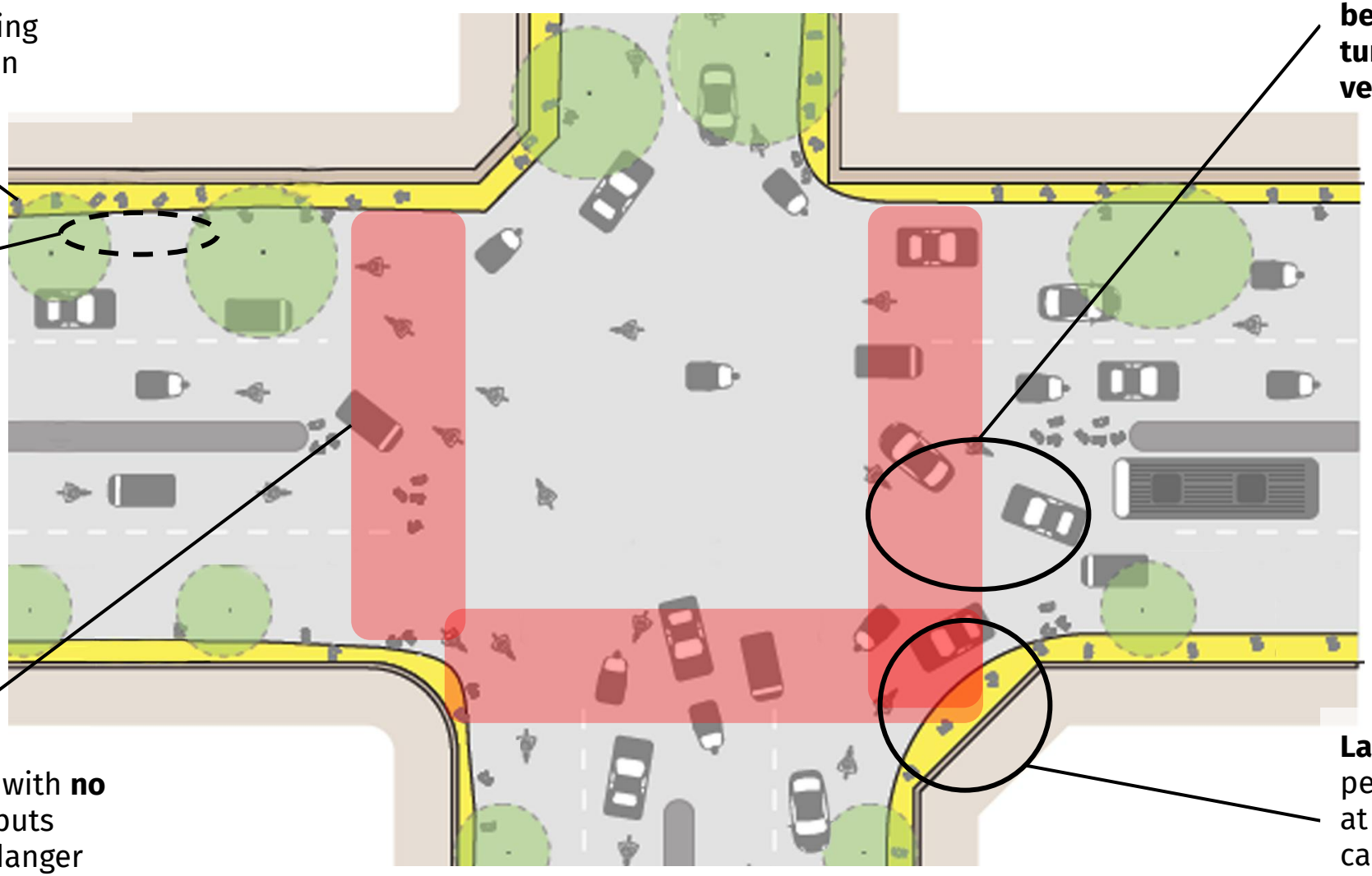
Parking

*PCU: Passenger car units

Step 2 - Conduct a handlebar survey to **identify pain points**

Narrow footpath forcing pedestrians to walk on carriageway

Area between the trees may used as **haphazard parking**



Possible **conflict points between cyclists turning right and vehicles going straight**

Unprotected crossing with **no refuge in the median** puts pedestrians in grave danger

Large turning radii that permit vehicles to turn at high speeds and cause danger to pedestrians and cyclists.

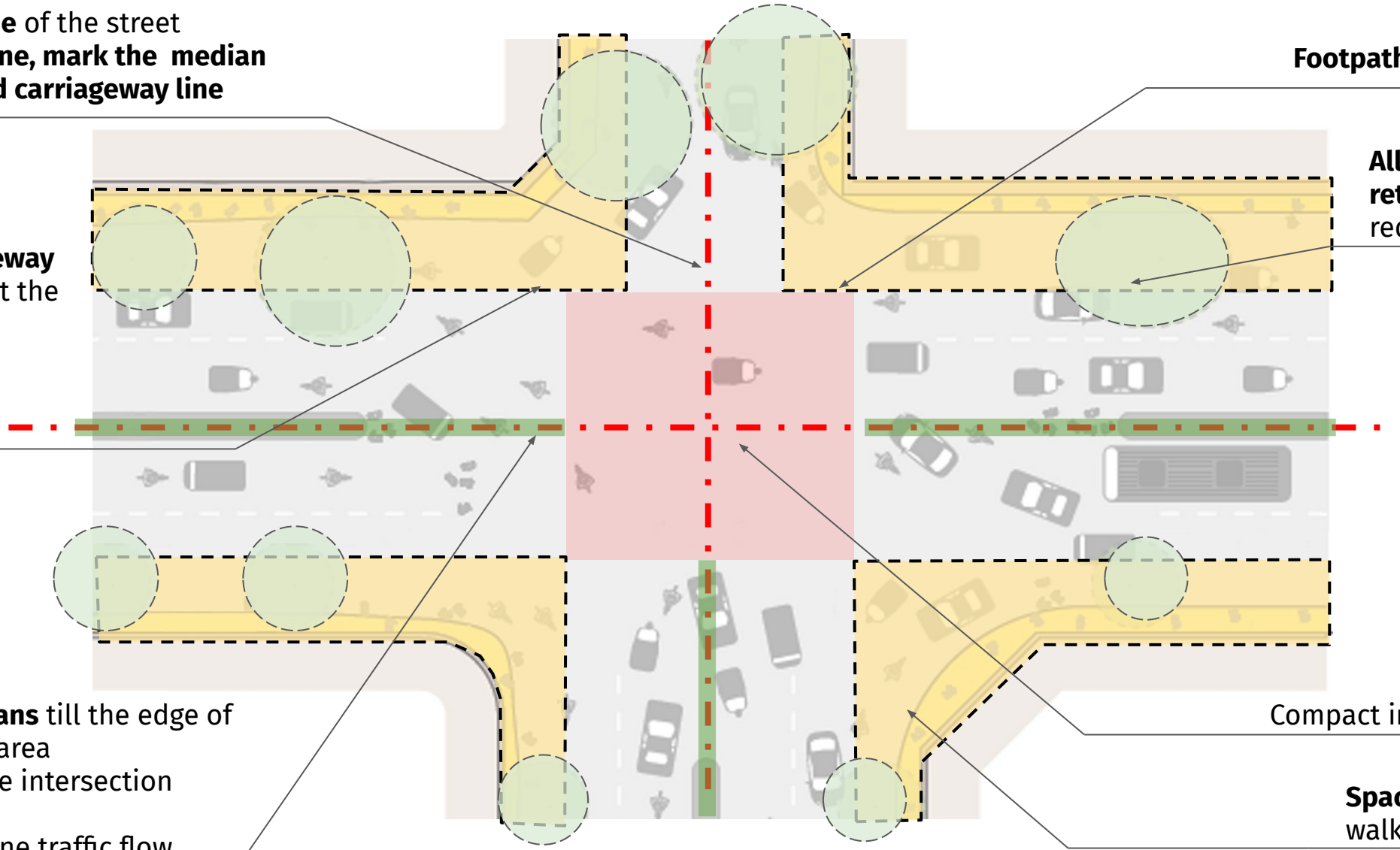
Step 3 - **Make the intersection compact**

Identify centre line of the street
From the center line, mark the median and the optimised carriageway line

Optimise carriageway width. Ensure that the carriageway has **consistent** width across the intersection.

Extend the medians till the edge of the intersection area

- To make the intersection compact
- To streamline traffic flow



Footpath lines extended

All trees should be retained while redesigning

Compact intersection area

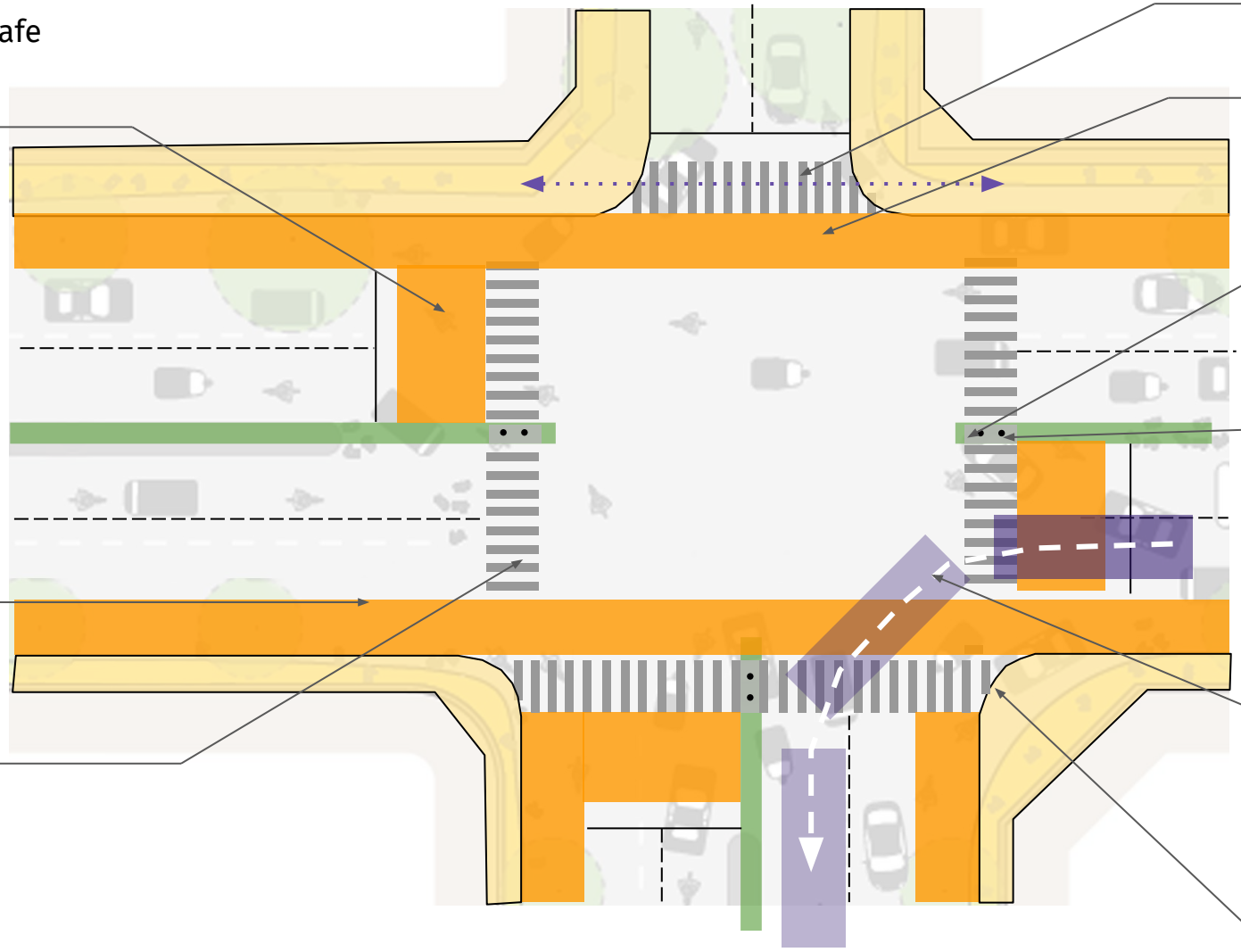
Space reclaimed for walking and cycling

Step 4 - **Detail the intersection**

Bicycle box allows cyclists to queue in front of motor vehicle traffic and make safe right turns
Bicycle box width : 3-5 m

For details on **protected cycle lane and buffer**, refer to section 1

Pedestrian crossing width: minimum **2.4 m**



Stop line: **300 mm** from pedestrian crossing for vehicles to maintain a buffer

Mark crossing where pedestrians would naturally desire to cross

Median refuge
Create protected refuge islands for pedestrians to wait safely at the median

Bollards in median refuge.
The spacing between bollards should be 1 m to allow disabled access

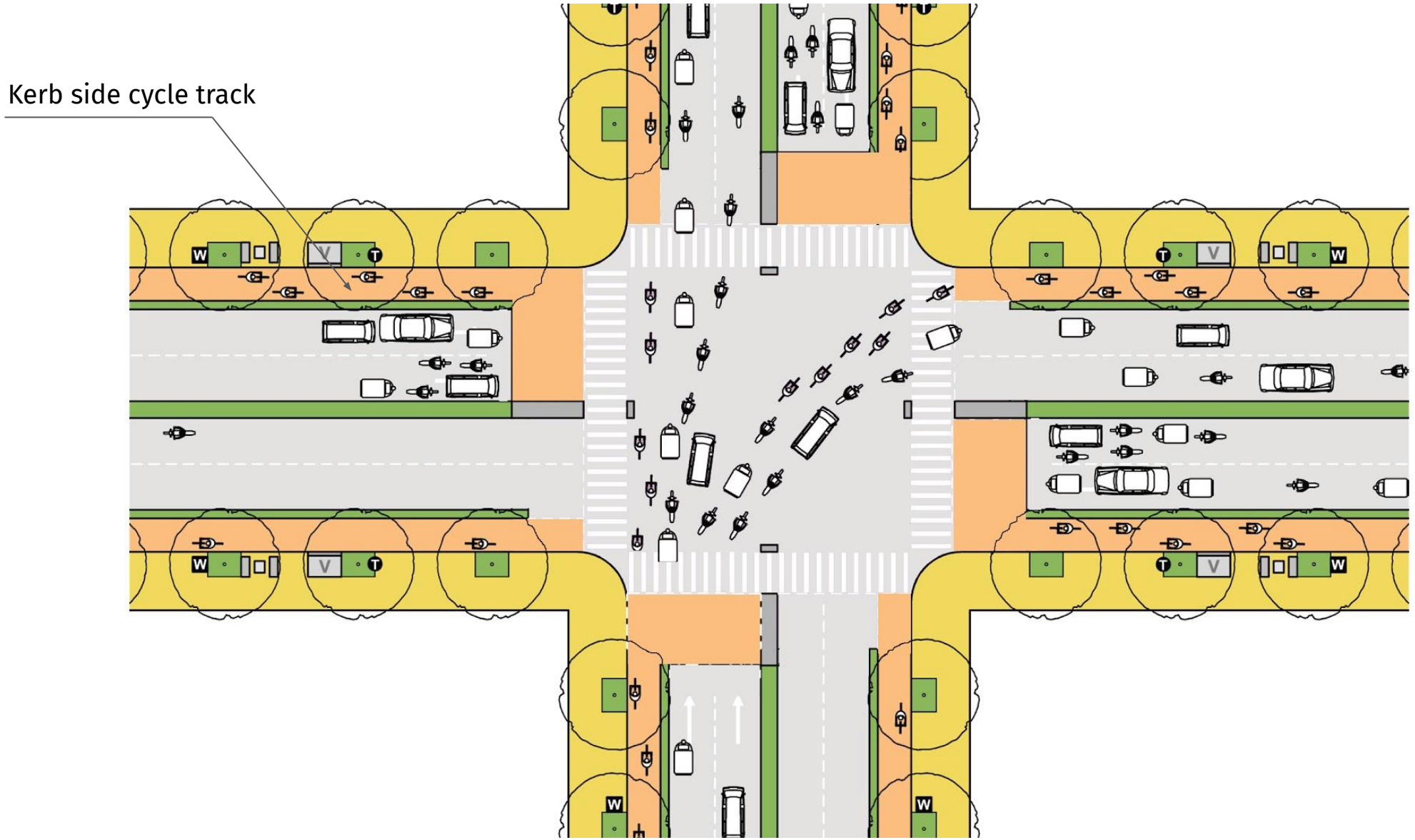
Due to the addition of the cycle lane, the **path travelled by the vehicles** while turning at the intersection would be **larger than** the provided **turning radius of the footpath.**

Hence, turning radius at the footpath should be 6 m or less. When the radius is smaller, vehicles slow down, making it safer for cyclists and pedestrians to cross.

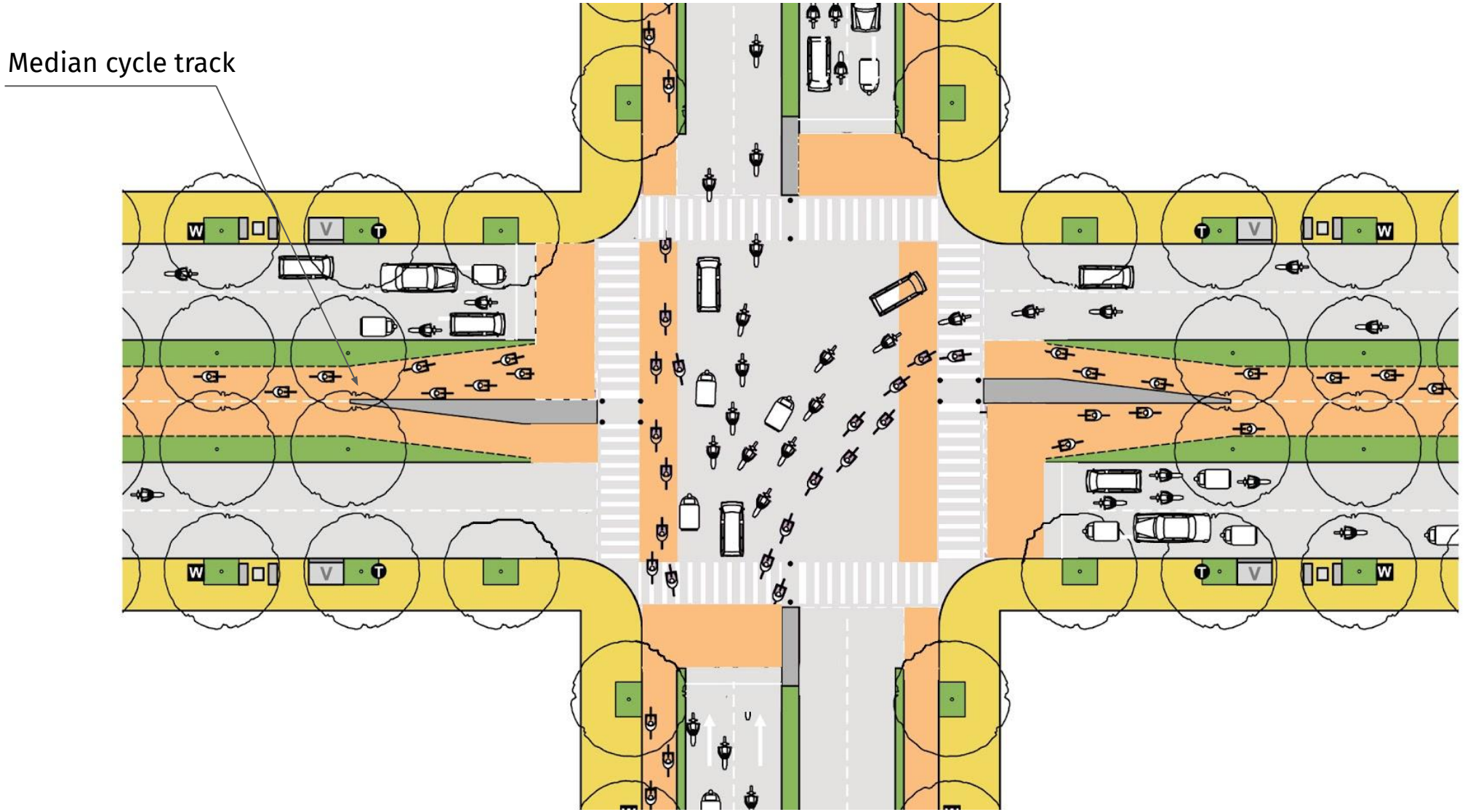
Bicycle box at intersection

Source: Ayres Associates

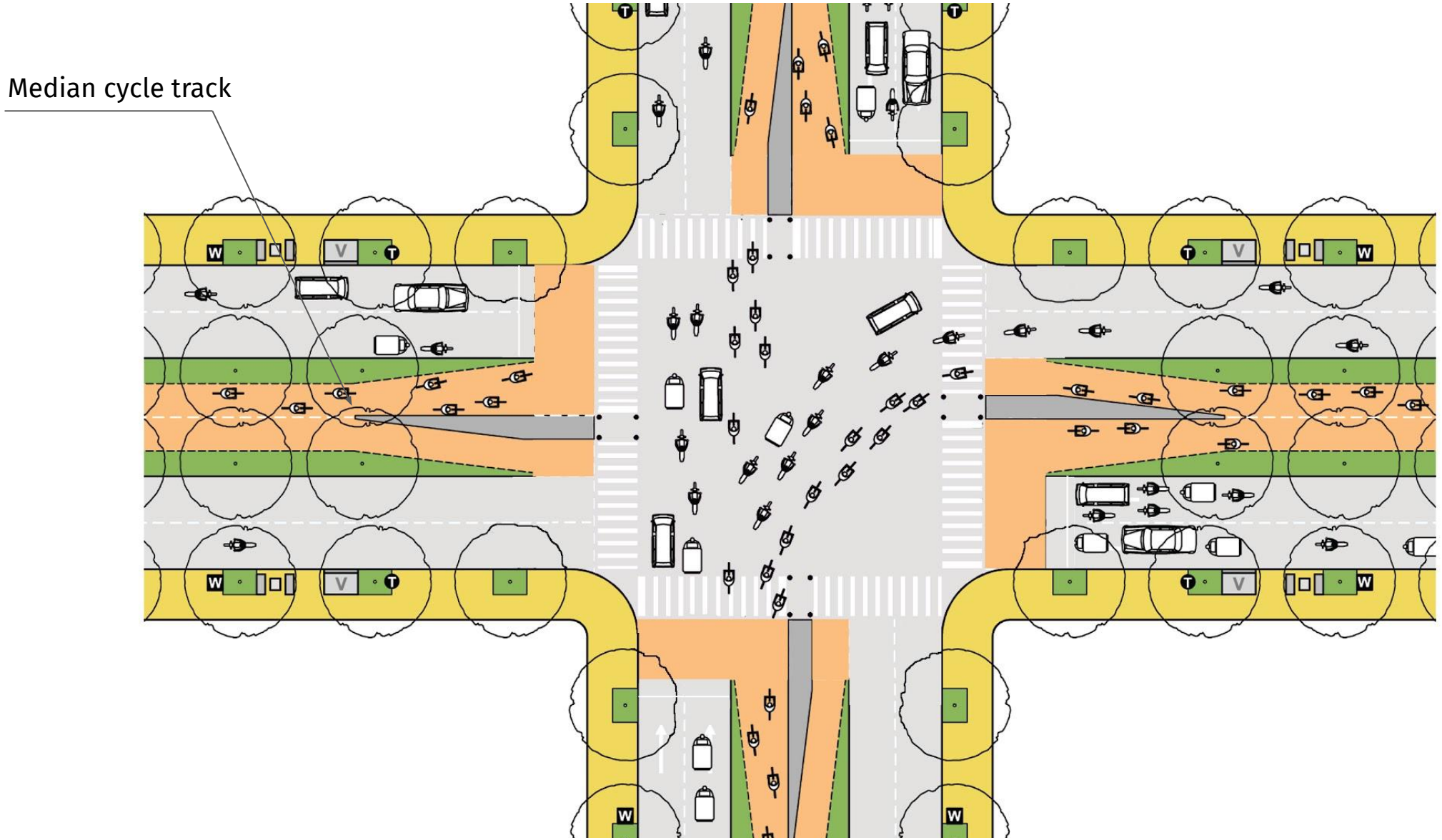
Intersection between streets with kerb side cycle tracks



Intersection between streets with kerb side and median cycle tracks



Intersection between streets with median cycle lanes

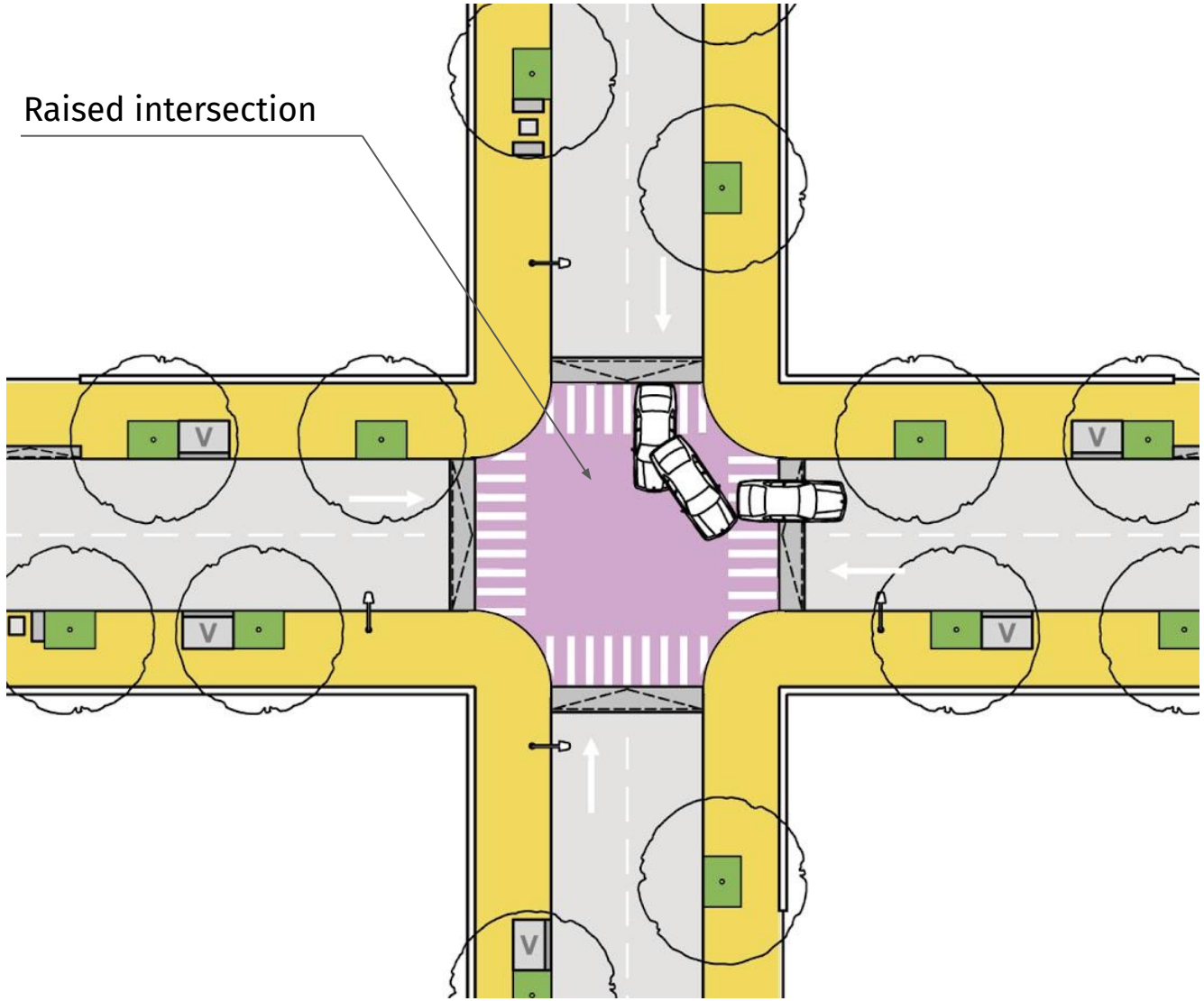


Design for small intersections

Raised intersection in neighbourhood streets

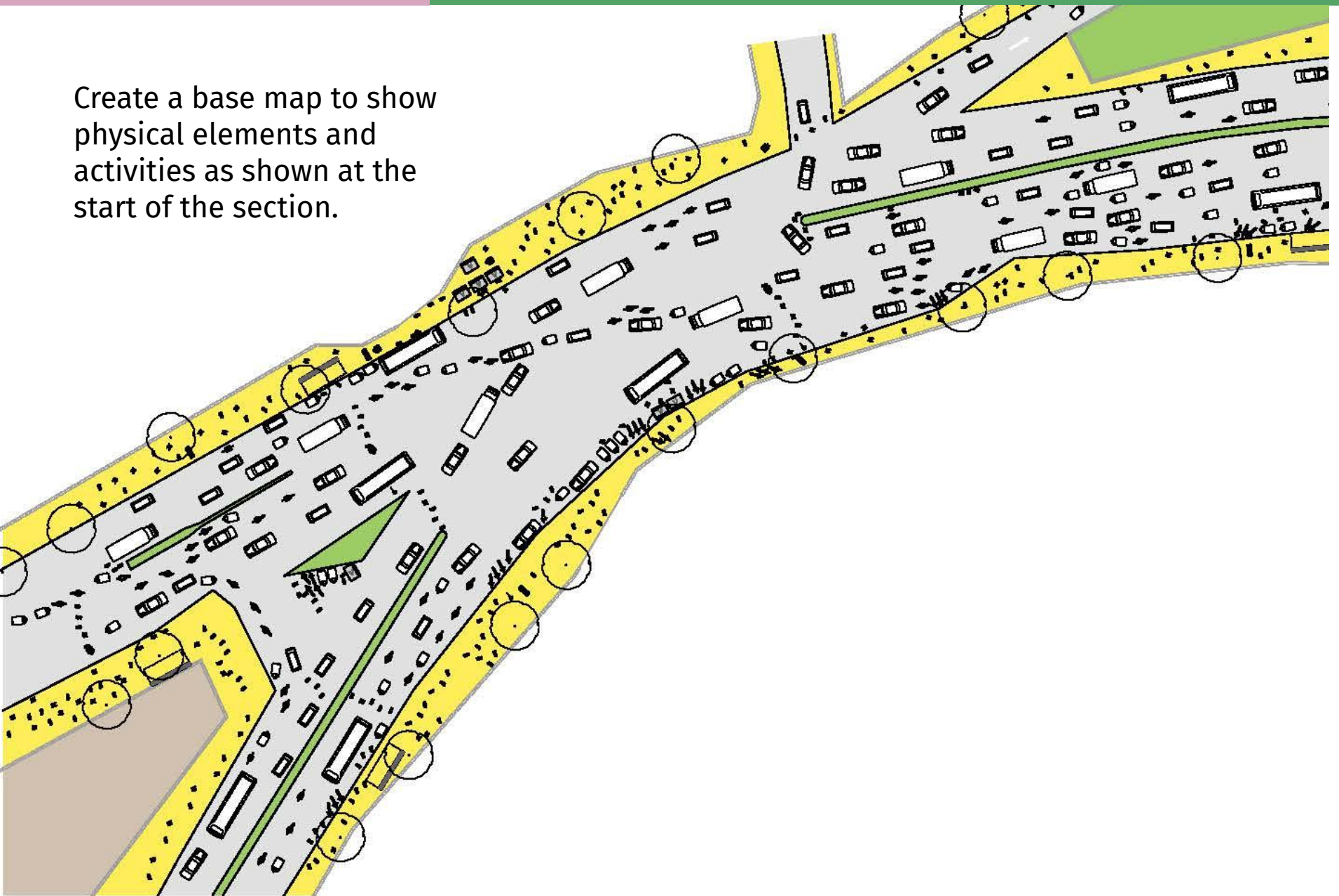
In case of narrow streets where protected cycle lanes cannot be provided, the intersection can be raised to **calm the traffic and enhance safety for cyclists.**

Intersection can be **raised to the level of the footpath** (+150 mm). However, **bollards and variation in paving material/colour** should be employed to demarcate and protect the footpath.

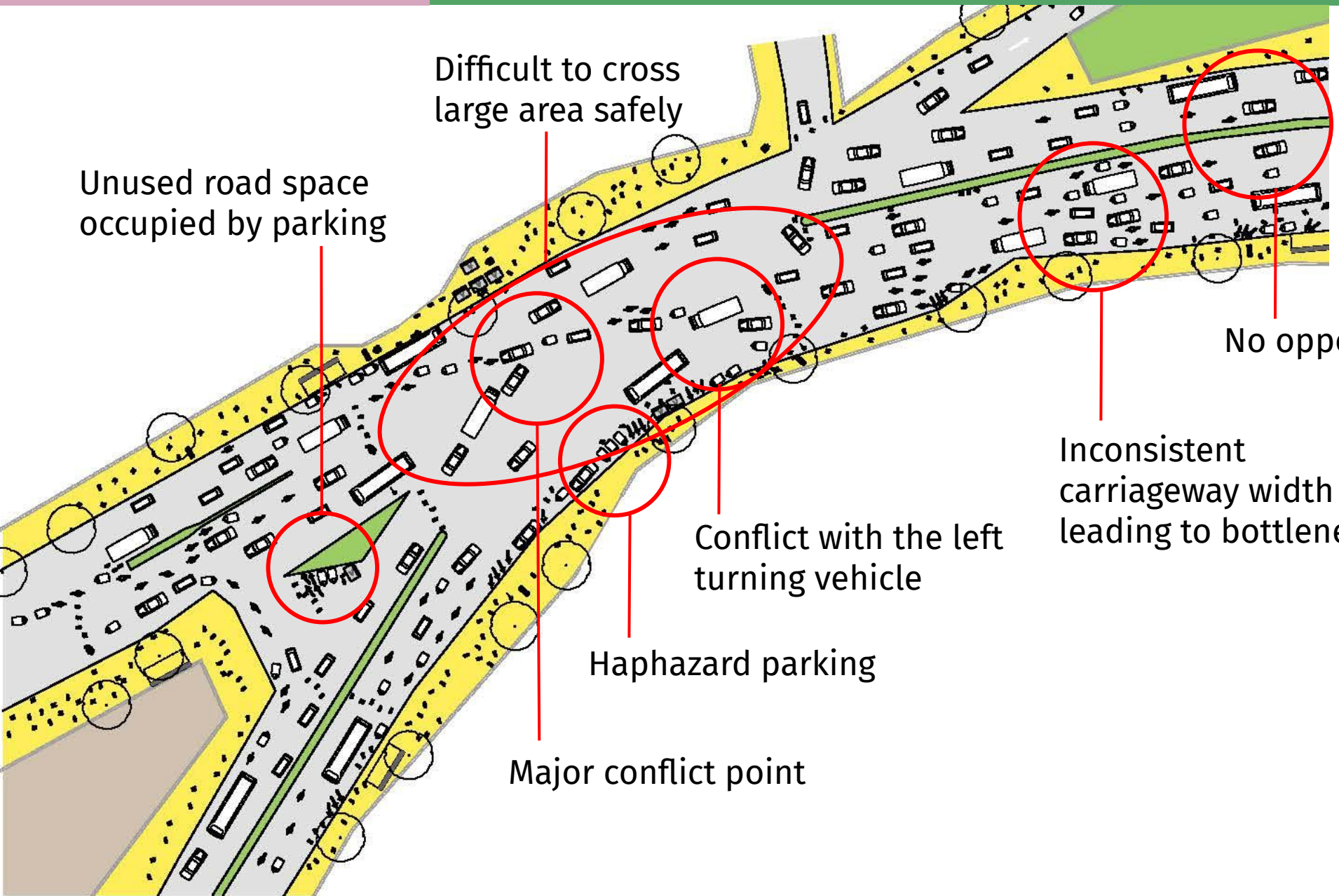


Step 1: **Create a base map**

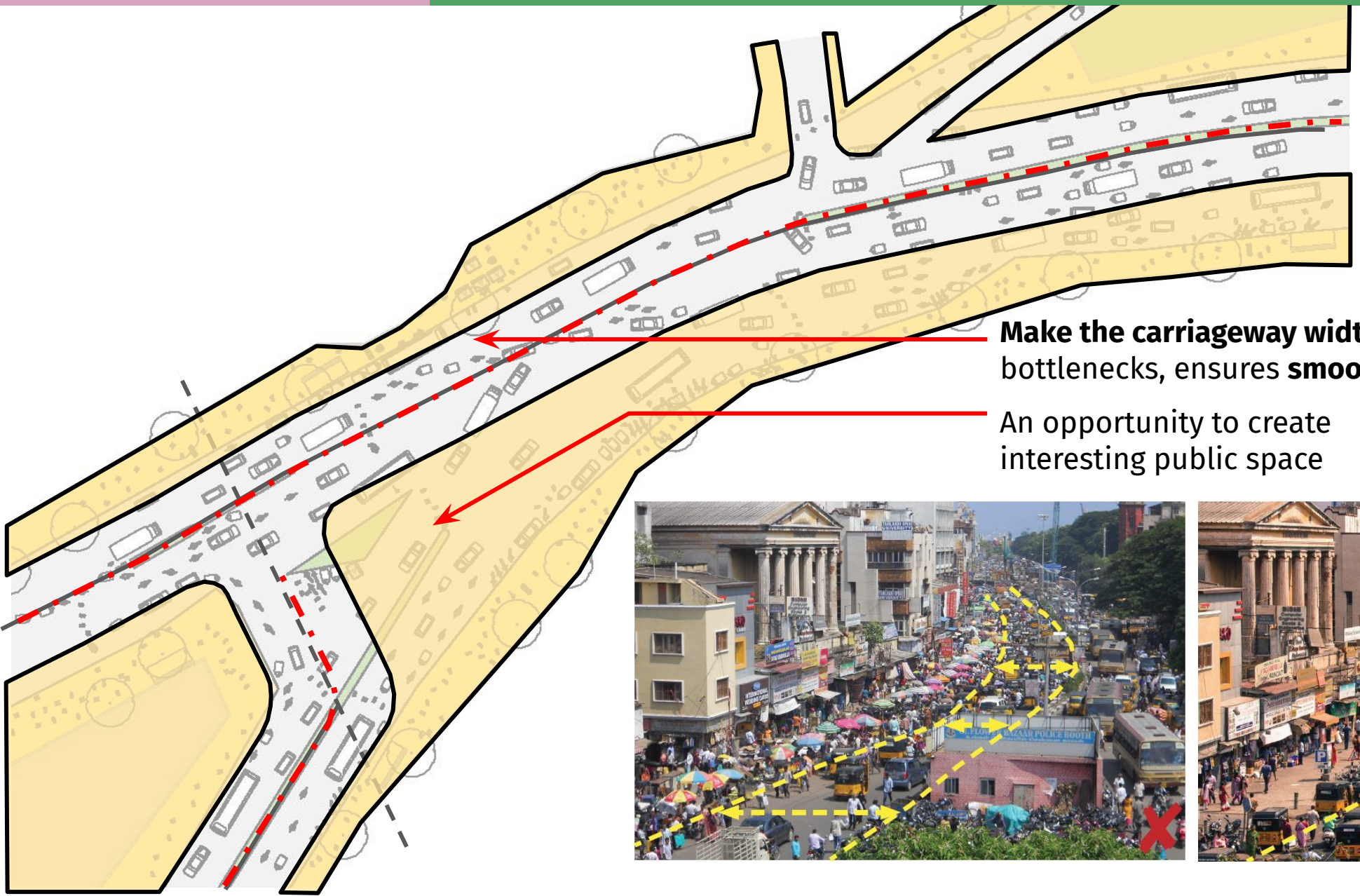
Create a base map to show physical elements and activities as shown at the start of the section.



Step 2: Identify the **pain points**



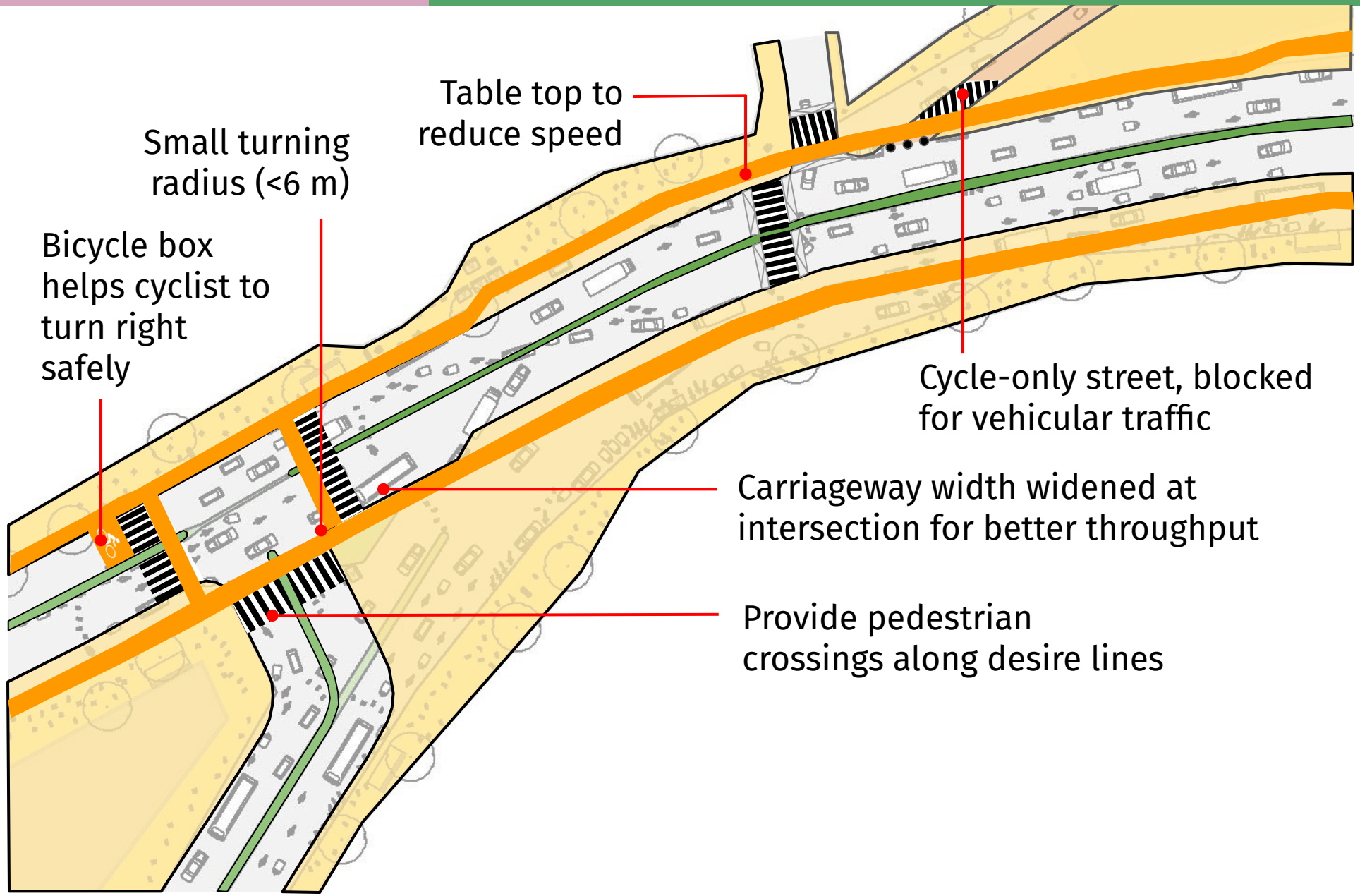
Step 3: **Make the intersection compact**



Make the carriageway width consistent to prevent bottlenecks, ensures **smooth traffic movement.**

An opportunity to create interesting public space

Step 4: **Detail the intersection**



CYCLE INFRASTRUCTURE ELEMENTS

These are street elements which are critical to the proper functioning of essential cycle interventions and to ensure the safety of cyclists and other road users.

A. ROAD MARKINGS

B. SIGNAGE

C. CYCLE PARKING

D. STREET LIGHTING

E. RIDING SURFACE

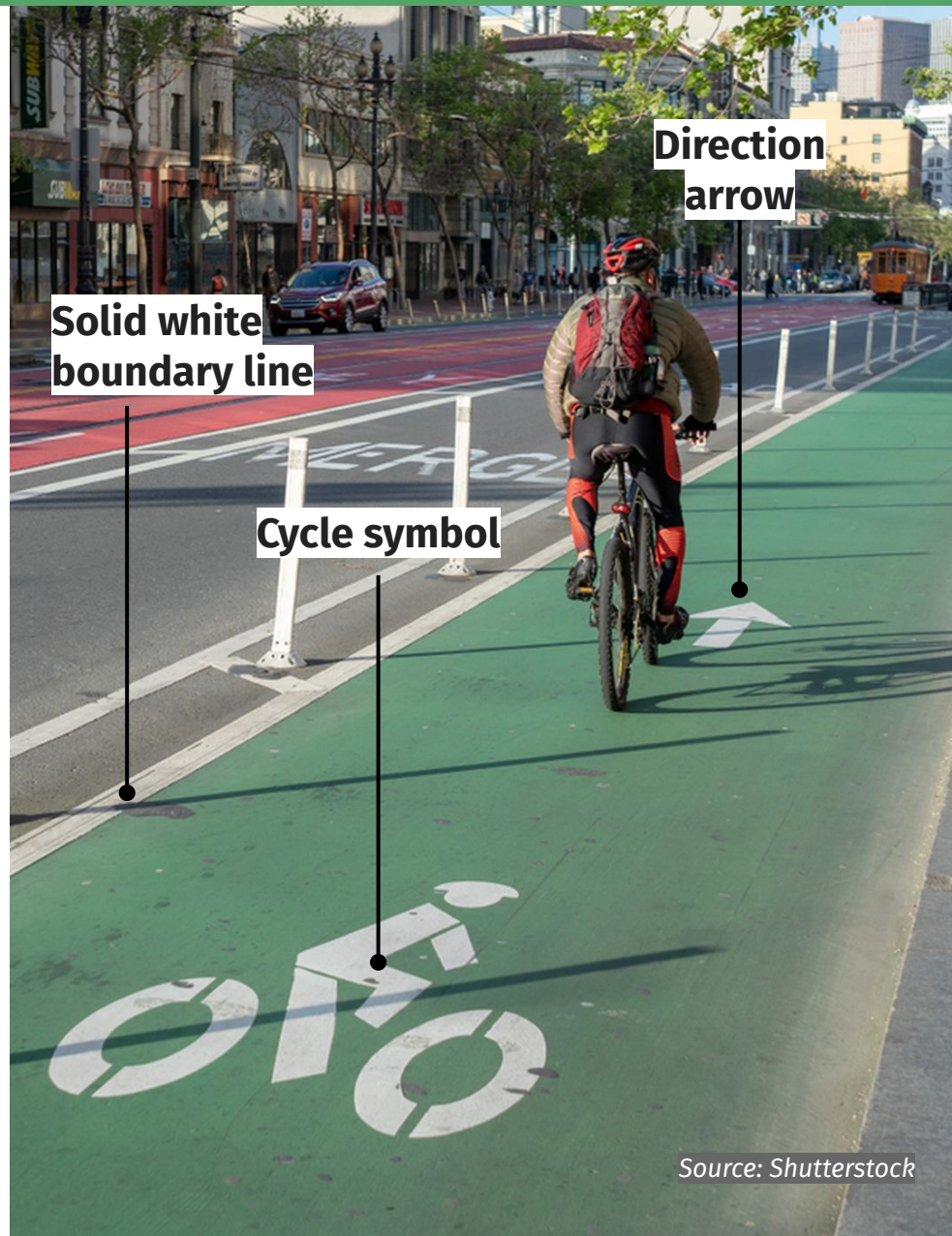
A. ROAD MARKINGS

To delineate the carriageway for multiple users

- Protected cycle lanes should be distinguished by lane markings - a 1**50mm wide solid white boundary line. Cycle symbol** should be marked in white on cycle lanes.

- **Green colour** can be used used to distinguish the cycle lane and points of conflict with motorists, at bus stops, intersections, midblock crossings, property entrances etc.

- **Use arrows** to indicate the direction of the traffic within the cycle lane.



For temporary projects:

- Waterborne Road Marking Paint
- PU Paint

For long-term projects

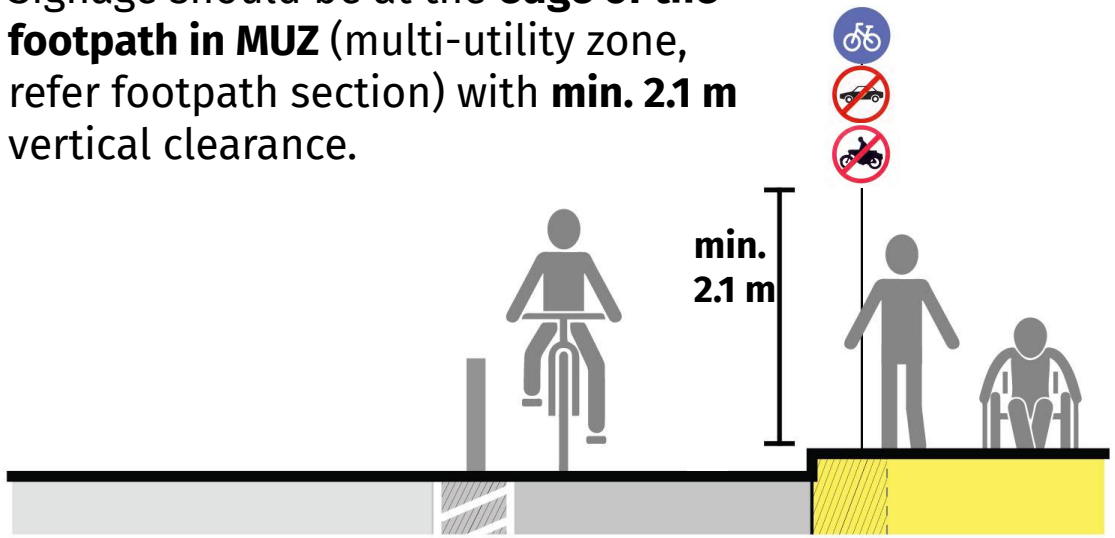
- Thermoplastic Road Marking Paint

Source: IRC: 35-2015. *Additional steps on implementation will be shared soon.*

Representative Cycle Symbol for Road Marking

B. SIGNAGES To inform users of the street regulations

Signage should be at the **edge of the footpath in MUZ** (multi-utility zone, refer footpath section) with **min. 2.1 m** vertical clearance.



Signage should be placed **perpendicular to the line of traffic,** on the left side of the road with clear visibility.

No Cars Allowed

No Parking

No Motorcycles Allowed

School Zone Ahead : Slow Down

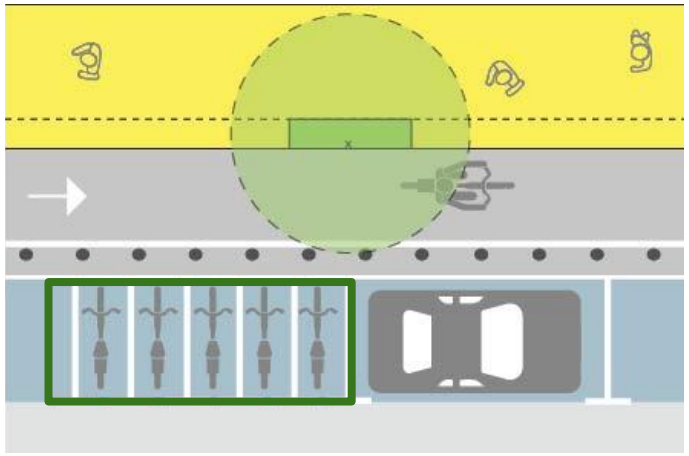
Maximum Speed Limit

Source: IRC 67-2012

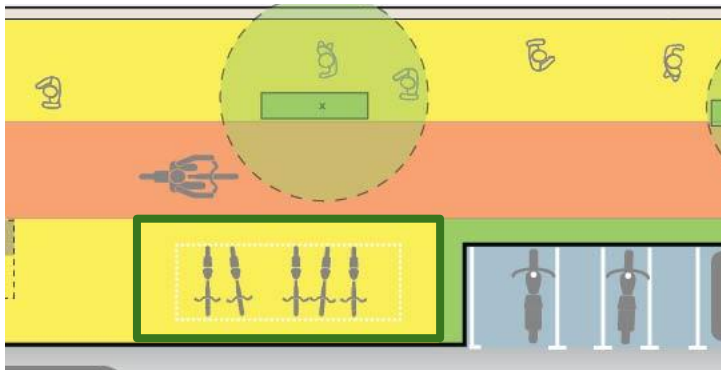
C. CYCLE PARKING

For safe, convenient, and orderly parking of cycles

- Vandal-proof cycle parking racks which require minimal maintenance should be fixed on the street at frequent intervals (every 100-150m).
- Minimum Off street Parking should be provided - In transit stations, residential, commercial, institutional, and public building premises.



Temporary Placement: In the carriageway level
1 car parking bay = parking for 5 cycles



Permanent Placement: On the footpath, in the MUZ

Source: Chevron Inc

Source: Harrogate Cycle Stand

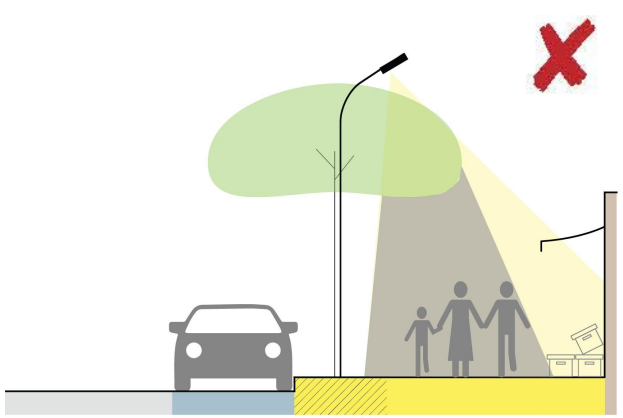
D. STREET LIGHTING

To enhance road safety and personal security

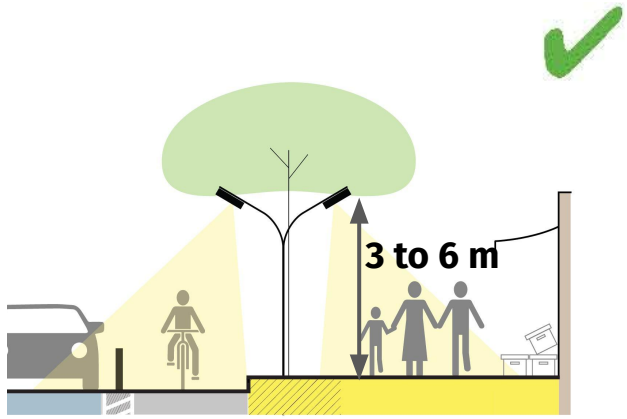
- Good street lighting ensure that all road users can see and be seen. It also increases personal safety especially for women and children.

- Street lighting should be placed such that tree foliage does not impede proper illumination.
  Standards for pedestrian and cycling lighting -

Lux	Spacing	Height
30 lux	12-16 m	3 to 6 m



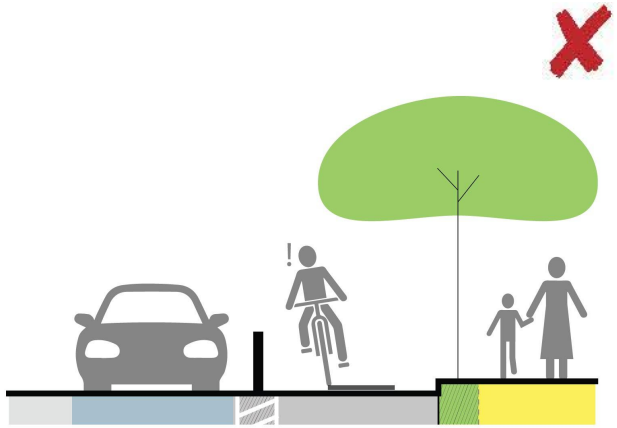
Tall lights obstructed by trees



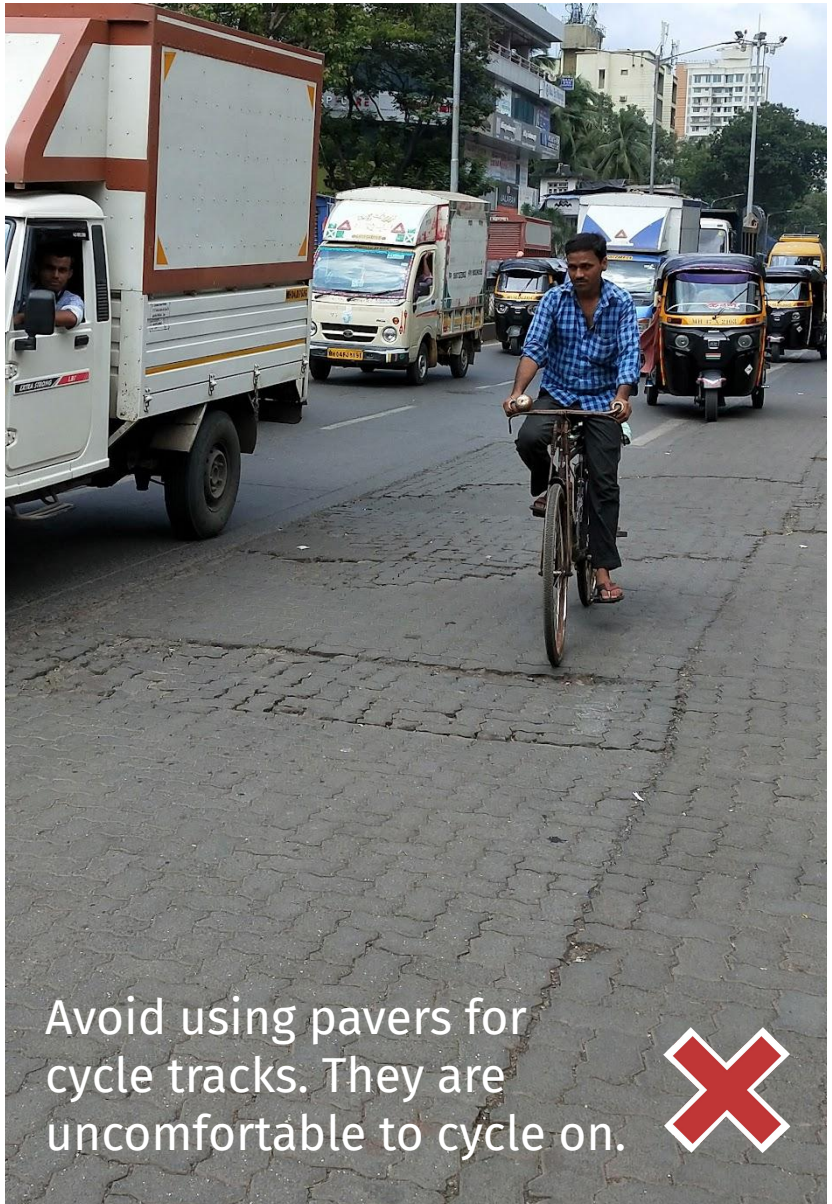
Pedestrian scale lighting

E. RIDING SURFACE

For a comfortable cycling experience



Avoid uneven surface & manholes. Ensure the surface is well-drained.



Avoid using pavers for cycle tracks. They are uncomfortable to cycle on.

Provide even surface to ride: Broom finished PCC or asphalt provides a smooth anti-skid riding surface.

PARKING MANAGEMENT

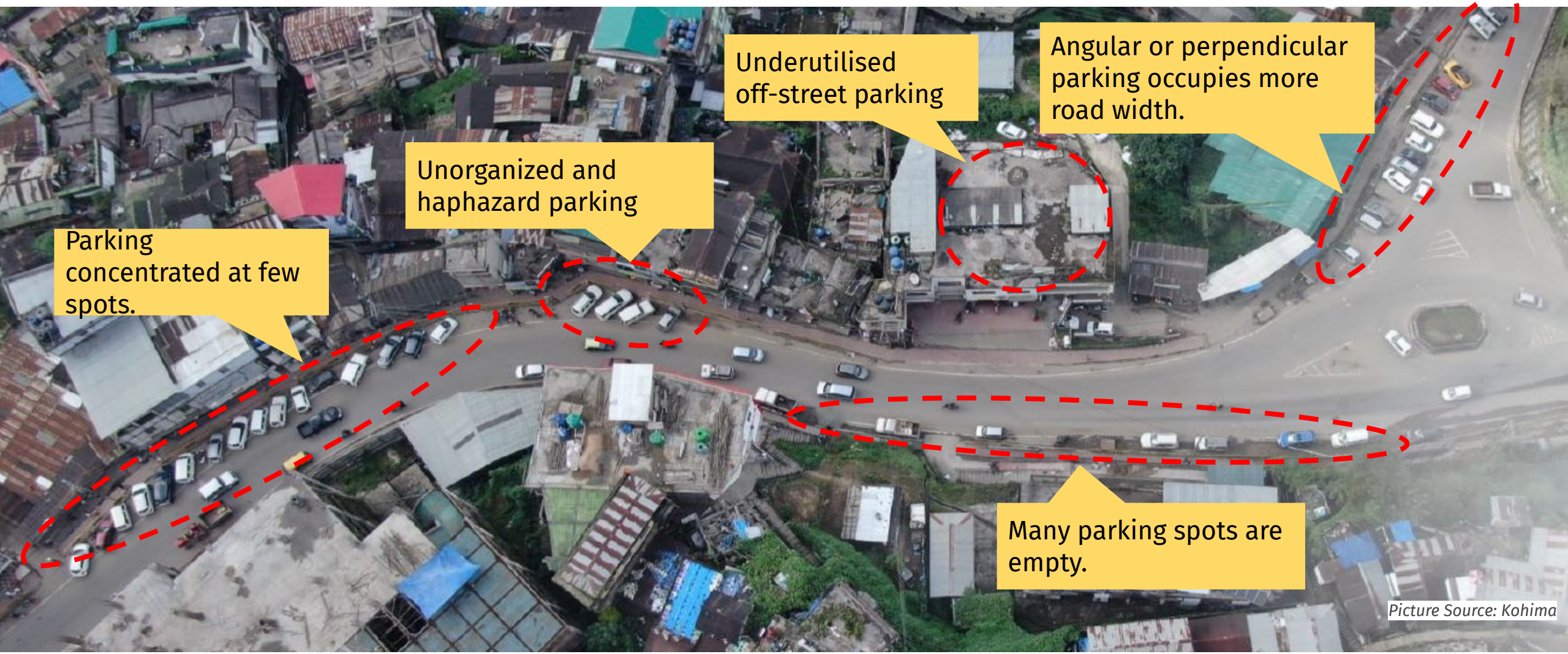
Parking management aims to make efficient use of existing parking areas and provide space for walking, cycling and public transport. Demand for parking can be managed efficiently by collecting a fee which ensures distribution of parking from high-demand location to low-demand location. Parking fees should be used to improve walking, cycling and public transport. compensate the city for the land used for parking.

A. HOW TO MANAGE PARKING

B. PARKING BASICS

Observe the common issues caused by parking

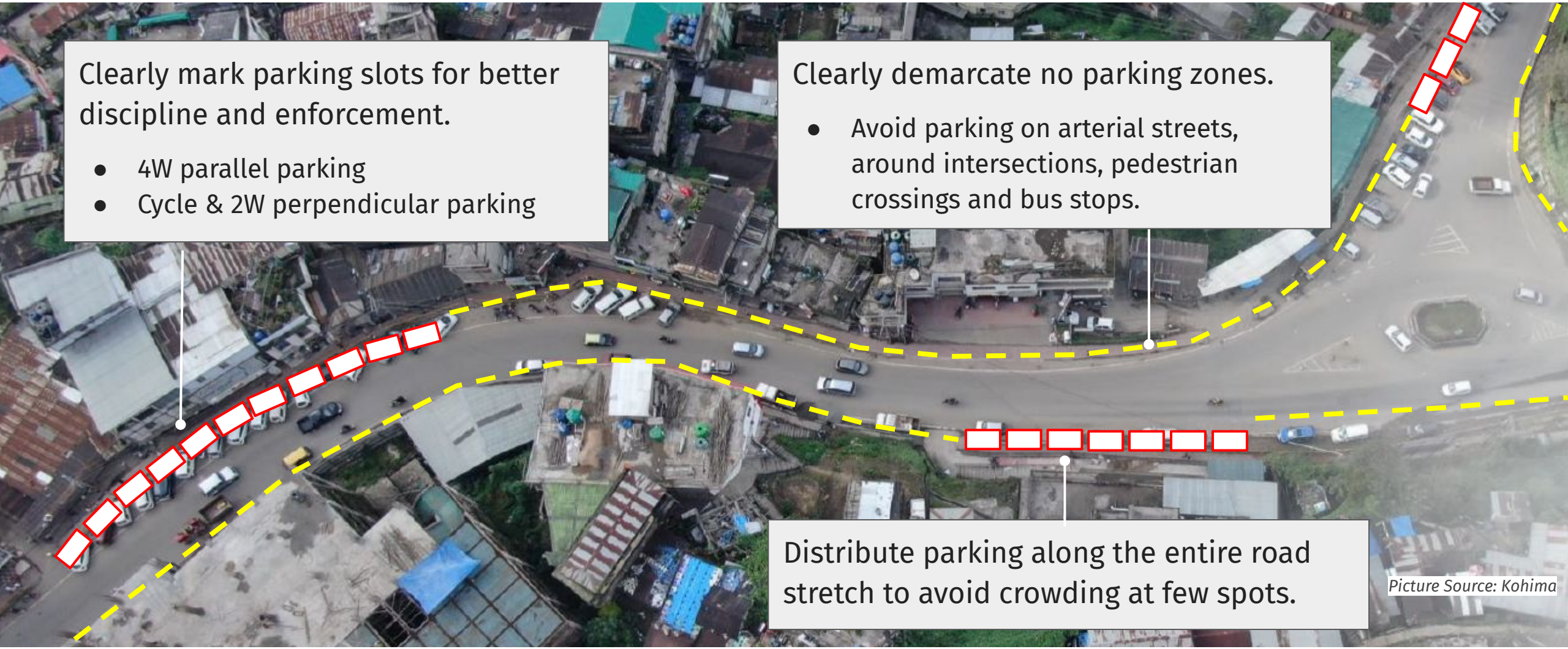
Parking is a local problem



Picture Source: Kohima

A. HOW TO MANAGE PARKING

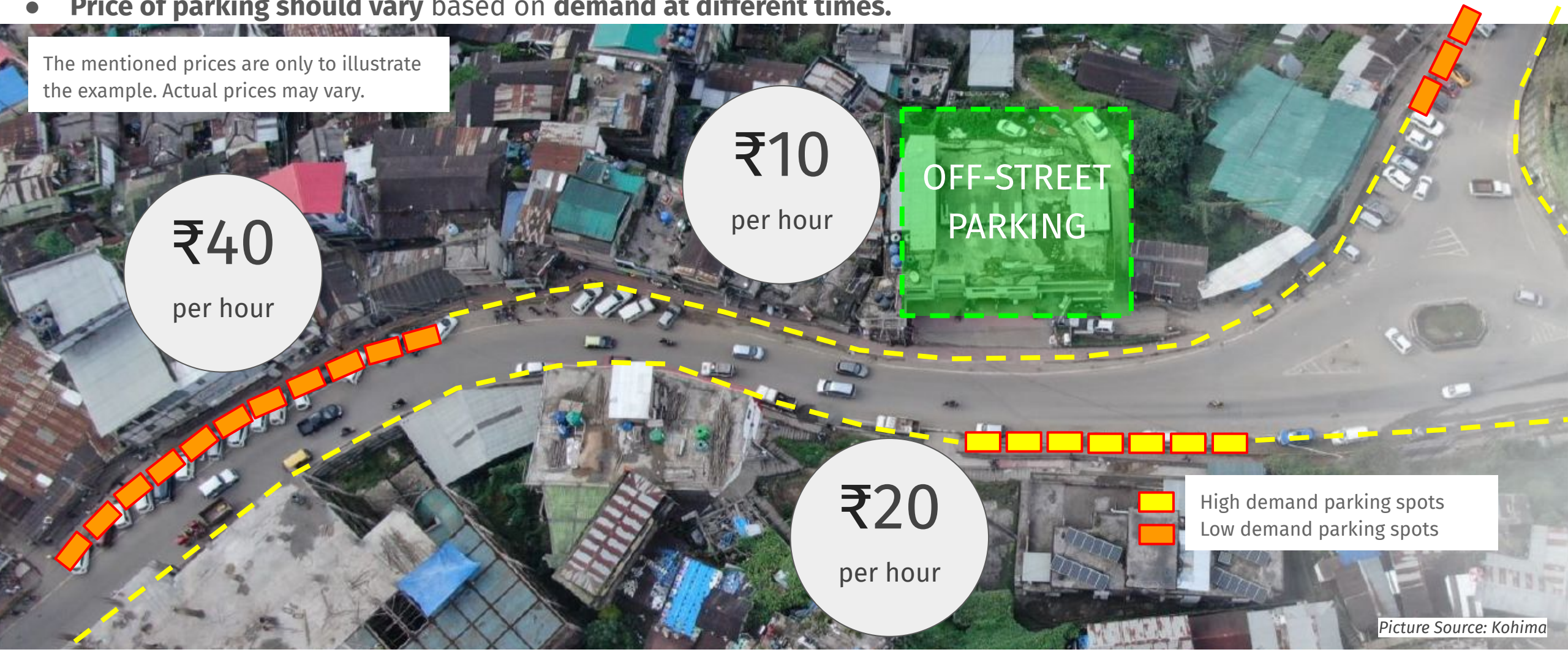
Demarcate | Distribute | Enforce



A. HOW TO MANAGE PARKING

Price it right!

- **Off-street parking prices** should cover the **cost of infrastructure, maintenance, and operator profit.**
- **On-street parking price should be higher** than that of off-street parking to induce a shift to off-street parking.
- **Price of parking should vary** based on **demand at different times.**



Steps to manage parking

First provide cycle parking & IPT stands, then private vehicle parking.

Charge parking fees based on duration.

Discourage long-term parking, frequent parking rotation will benefit commercial establishments.

Charge high where demand is high.

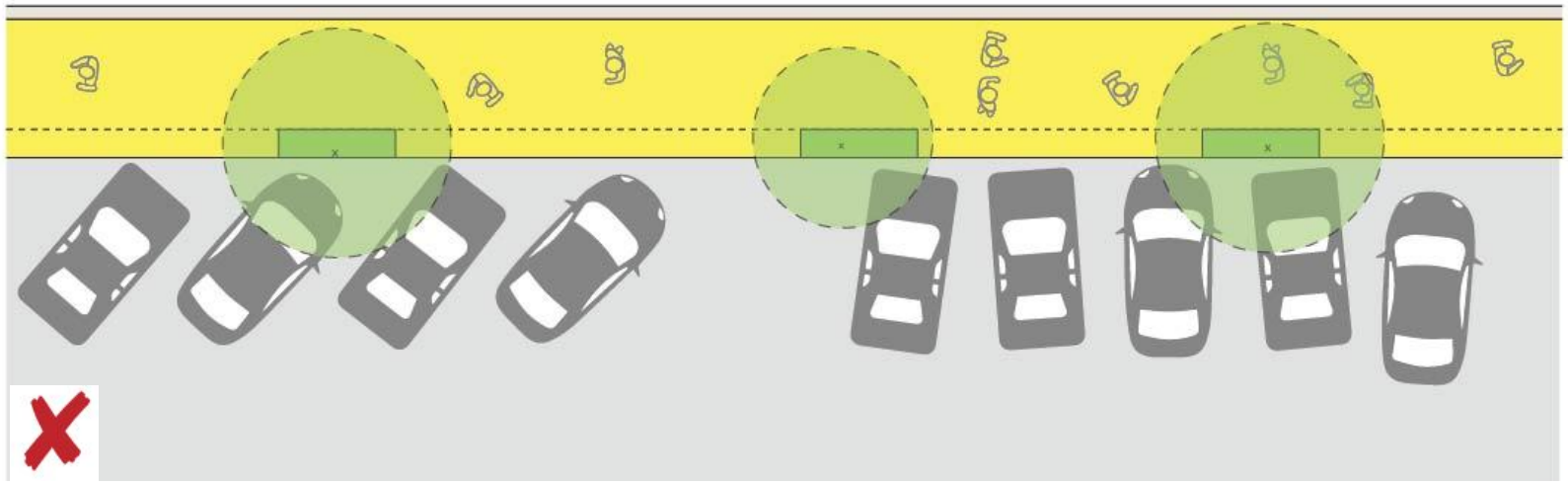
Charge enough to keep ~15% spots vacant for new visitors, and prevent them to drive unnecessarily.

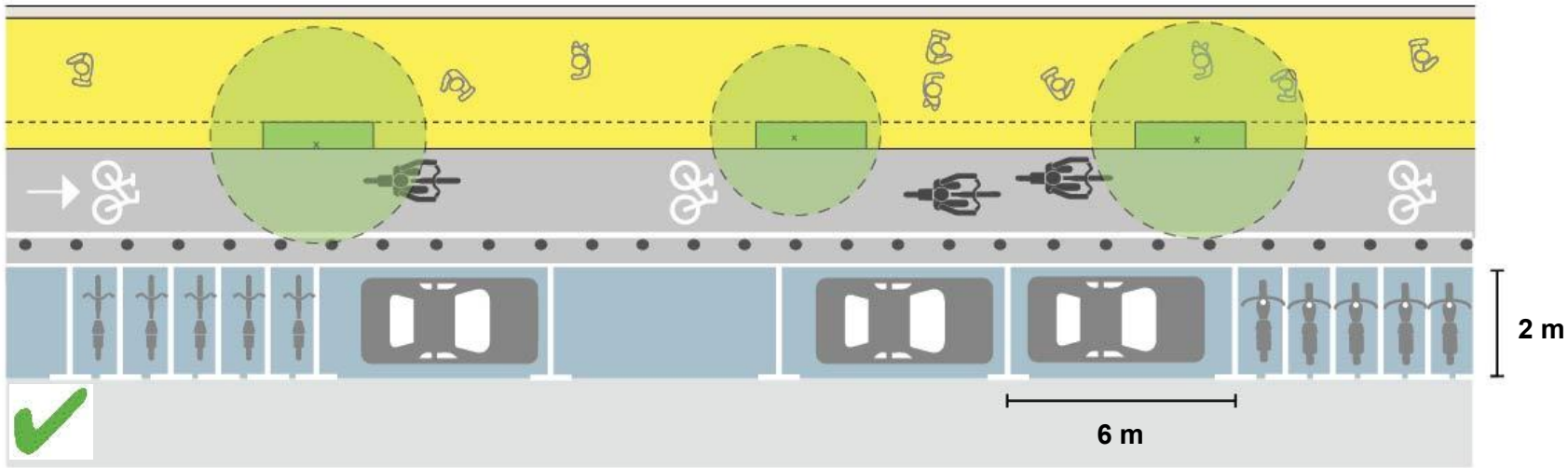
Cycle parking should be free.

Shift parking from streets to off-street spaces.

Encourage the use of parking lots, stilt and basement parking in commercial, institutional and residential buildings. Residential spaces that lie empty during day time can be rented for public parking, similarly commercial parking spaces lying empty during night time can be rented to adjoining residents.

Parallel for cars, perpendicular for two-wheelers





Vehicle type	Parking slot dimension
Cycle	1 m x 2 m
Two-wheeler	1 m x 2 m
Auto rickshaw	1.5 m x 3 m
Car	2 m x 6 m
Mini bus	2.6 m x 8 m
Bus	2.6 m x 15 m
Heavy commercial vehicle	2.4 m x 9 m
Light Commercial vehicle	2 m x 5m

Parallel parking is recommended on streets where parking is permitted.

Inclined and perpendicular on-street car parking should be avoided since these orientations create blind spots while reversing, and take up precious road space that could otherwise be used for cycling and walking facilities.

Parking is a commodity, not a right!

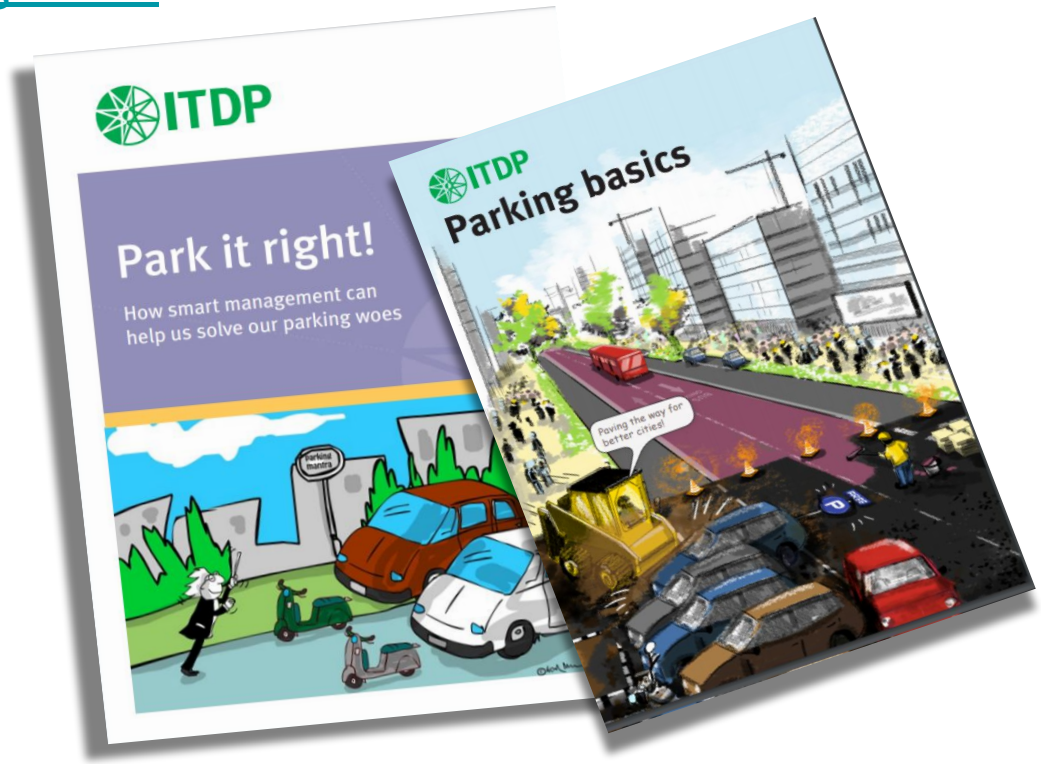
First manage on-street parking

Use parking fees for better streets

Invest parking fees to provide better walking, cycling and public transport infrastructure.

Read the below guides on Parking

- Park it right!
- Parking Basics



Use the design guidelines to **further refine the pilot intervention designs.**

Check the feasibility of the designs on site using the Site Analysis Guide.

Engage with your community to incorporate their feedback and suggestions!

Thank you

Website - https://bit.ly/3ju3ZCY
Facebook - India Cycles4Change

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