INDIA
CYCLES 4 CHANGE
CHALLENGE

DESIGN GUIDELINES 2.0

Making neighbourhoods safe for cycling

Dec 2020

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

Contents

PREPARING THE BASE PLAN

Before we begin the planning of the safe-cycling neighbourhood, here are 3 steps we must do to gather the base data and pain points

1. CREATE A BASE PLAN
2. CONDUCT A HANDLEBAR SURVEY

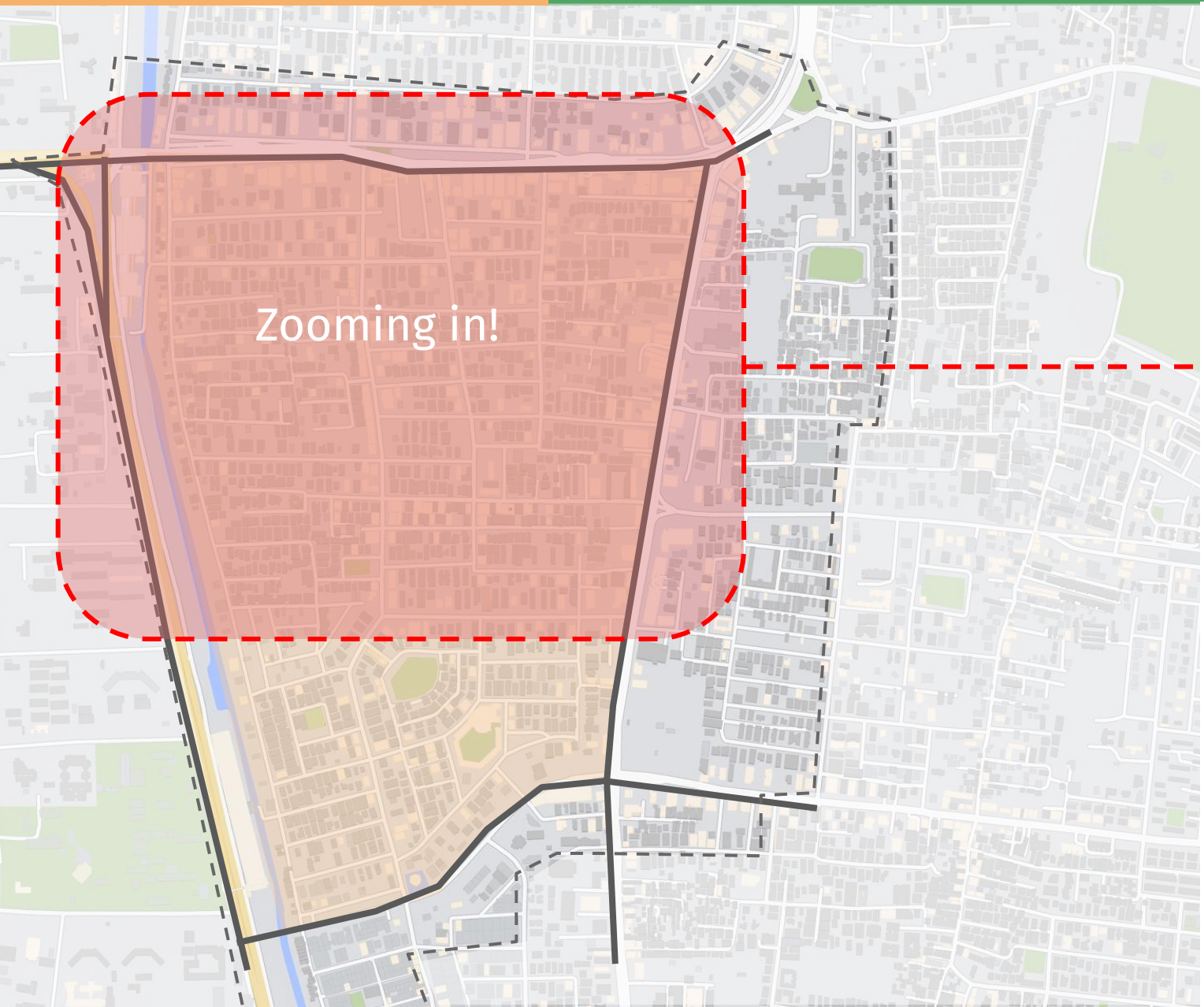
1. CREATE THE BASE PLAN

Mark the **boundary** of the neighbourhood

1. Identify the **boundary of the neighbourhood** by:
   - **Arterial roads** that surround the neighbourhood
   - **Natural barriers** around the neighbourhood
2. **Demarcate all streets** within the boundary
3. **Consider the other side of major roads** to ensure safe connections/crossings to cyclists between different neighbourhoods.
4. Consider a total **area of 3-5 kmsq**

1. CREATE THE BASE PLAN

Let’s zoom in...



Let’s zoom in to a 1 km sq area to see how to make it safe for cycling!

This process can be repeated to scale up across the entire neighbourhood.

Street hierarchy

Source: Migratingmiss

Arterial Streets

Arterial streets provide **intra-city long distance travel.** They connect various parts of the city. They have **high traffic volume and high vehicle speeds**. They usually have **public bus transport or IPT route service.**

Collector Streets

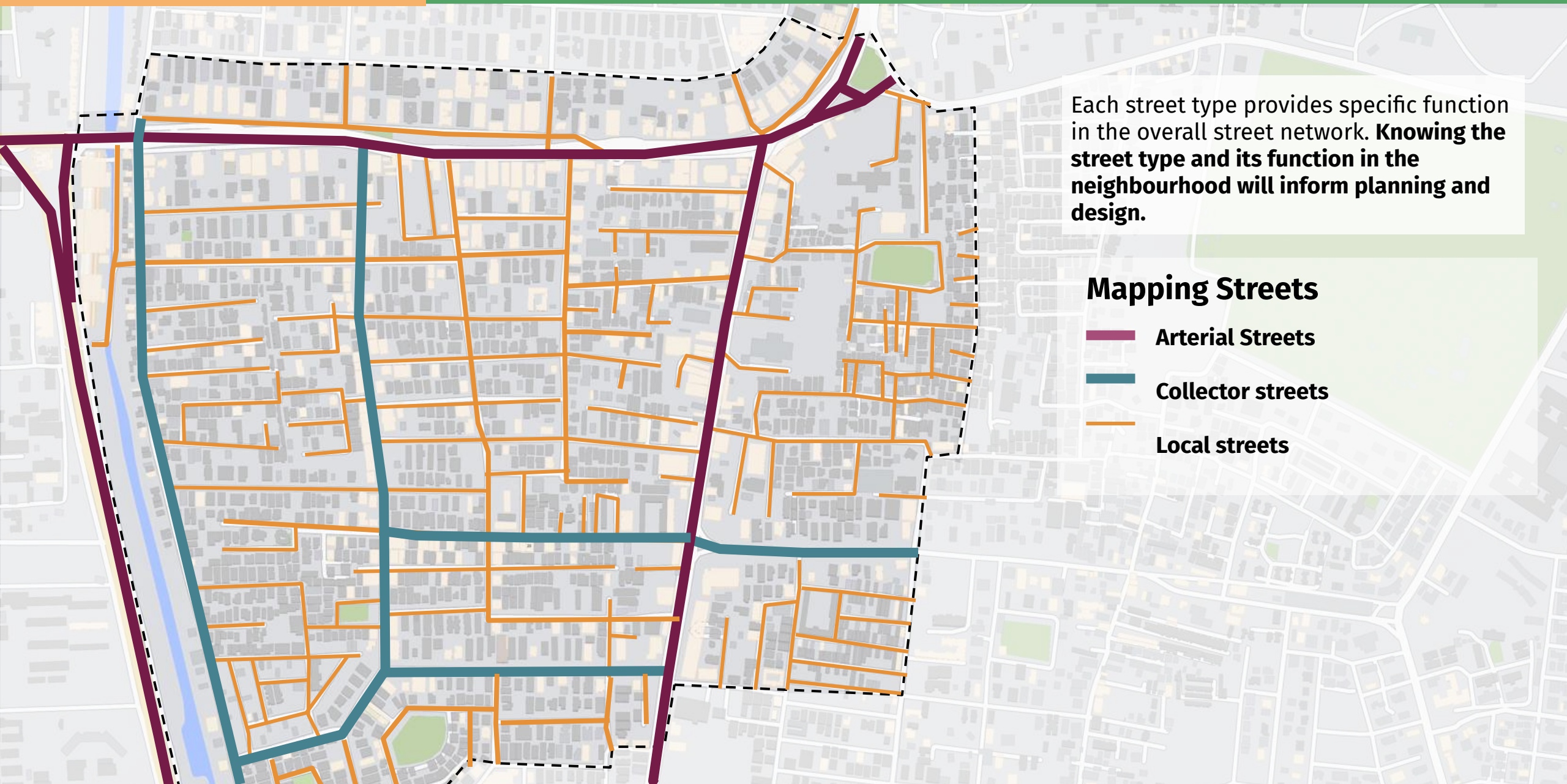
Collector streets connect **traffic from local streets to arterial streets.** They also provide connection between **different neighbourhoods within one locality.** They may or may not have public bus transport or IPT route service.

Local Streets

Local streets **provide access to private properties in a neighbourhood.** They are not meant to provide through-movement for vehicles outside the neighbourhood. As per IRC:86 the **speed on local streets should be not more than 30kmph.**

1. CREATE THE BASE PLAN

Map the street hierarchy



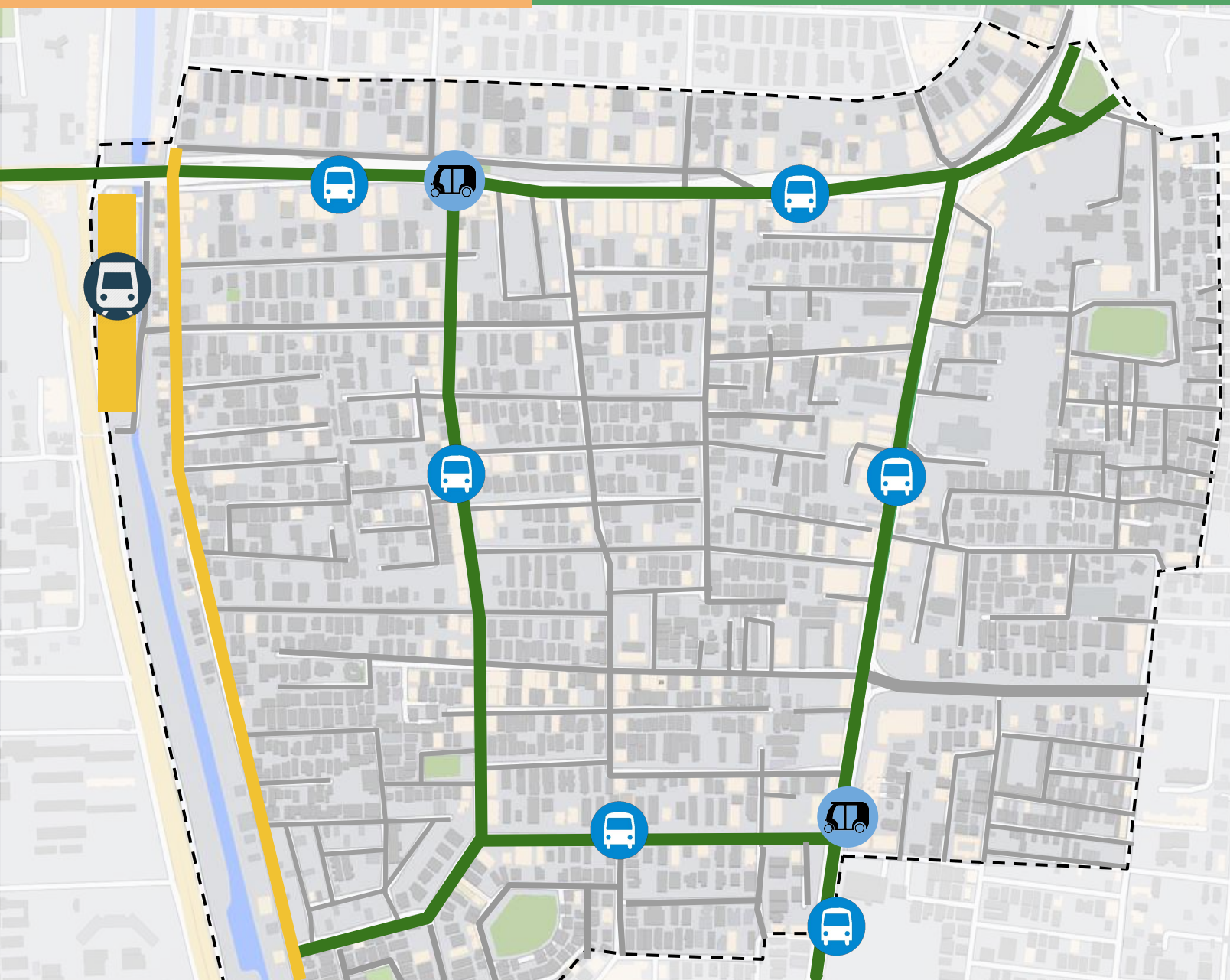
Each street type provides specific function in the overall street network. **Knowing the street type and its function in the neighbourhood will inform planning and design.**

Mapping Streets

- **Arterial Streets**
- **Collector streets**
- **Local streets**

1. CREATE THE BASE PLAN

Map the Public Transport



Mapping Public Transport

- **Bus Route Roads**
- **Metro / Suburban Rail Line**
- **Bus Stops**
- **Metro / Suburban Rail Station**
- **Auto Rickshaw Stand**

*Major IPT stops may be mapped.

Mapping of public transport can help to **integrate cycle network with public transport**, provide cycle parking and inform the design of street section.

2. CONDUCT A HANDLEBAR SURVEY

Conduct a handlebar survey across the neighbourhood to identify the key pain points such as:

- **Fast moving vehicles**
- Fear of being **eve-teased / attacked**
- Unsafe **intersections**
- Unmanaged **parking**

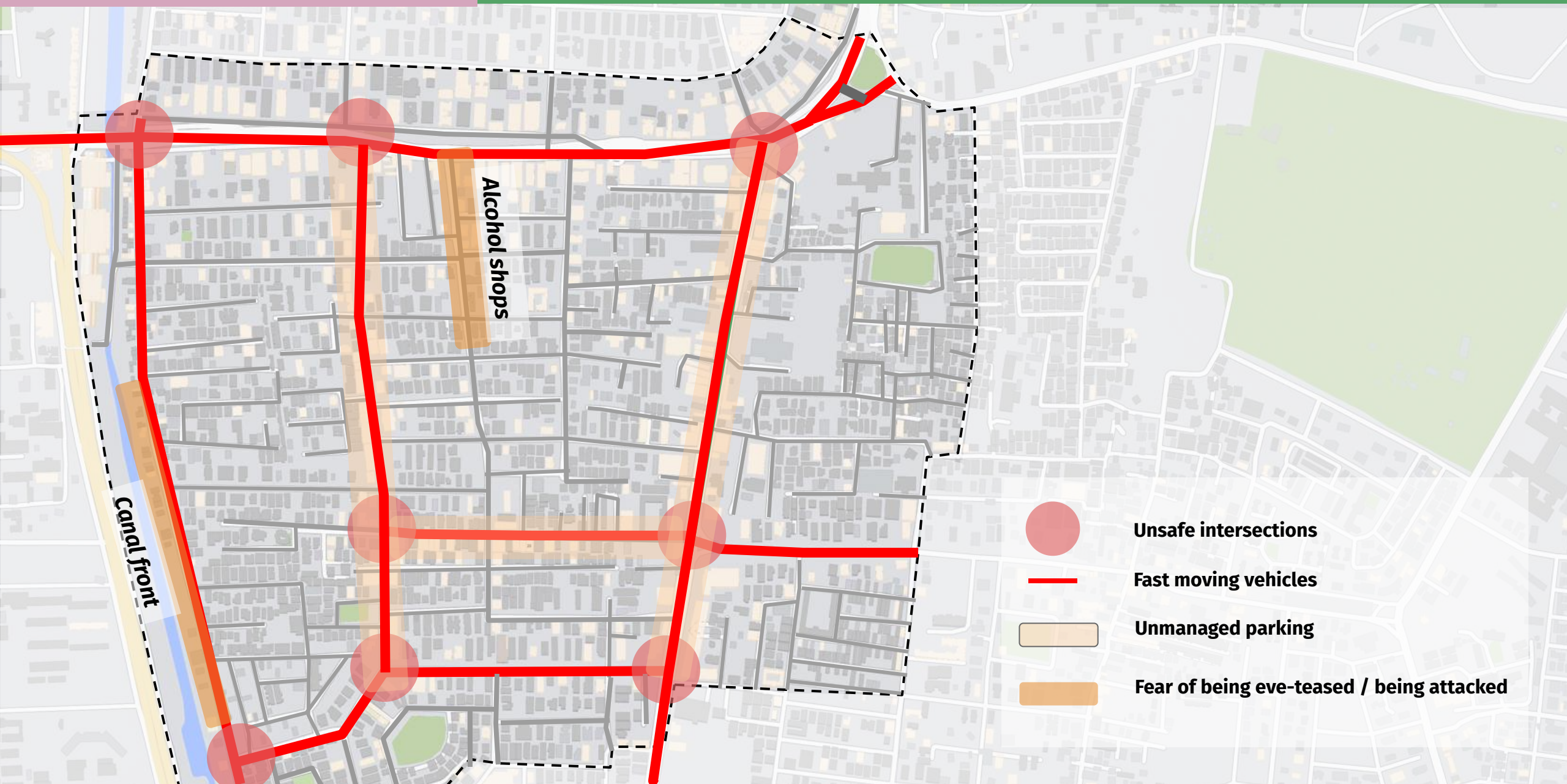
And others...

Some questions to ask on the handlebar survey:

1. *Is it safe and comfortable to walk on this street, even if it has a footpath?*
2. *Is it safe to cycle on this street, even if it has a cycle lane?*
3. *Is it safe and convenient to cycle across the intersection?*

2. CONDUCT A HANDLEBAR SURVEY

Map the pain points



Goals for a cycling safe neighbourhood

IMPROVE NEIGHBOURHOOD CONNECTIONS

Source: Aviewfromcyclepath.com

TRAFFIC CALM STREETS

Source: NACTO

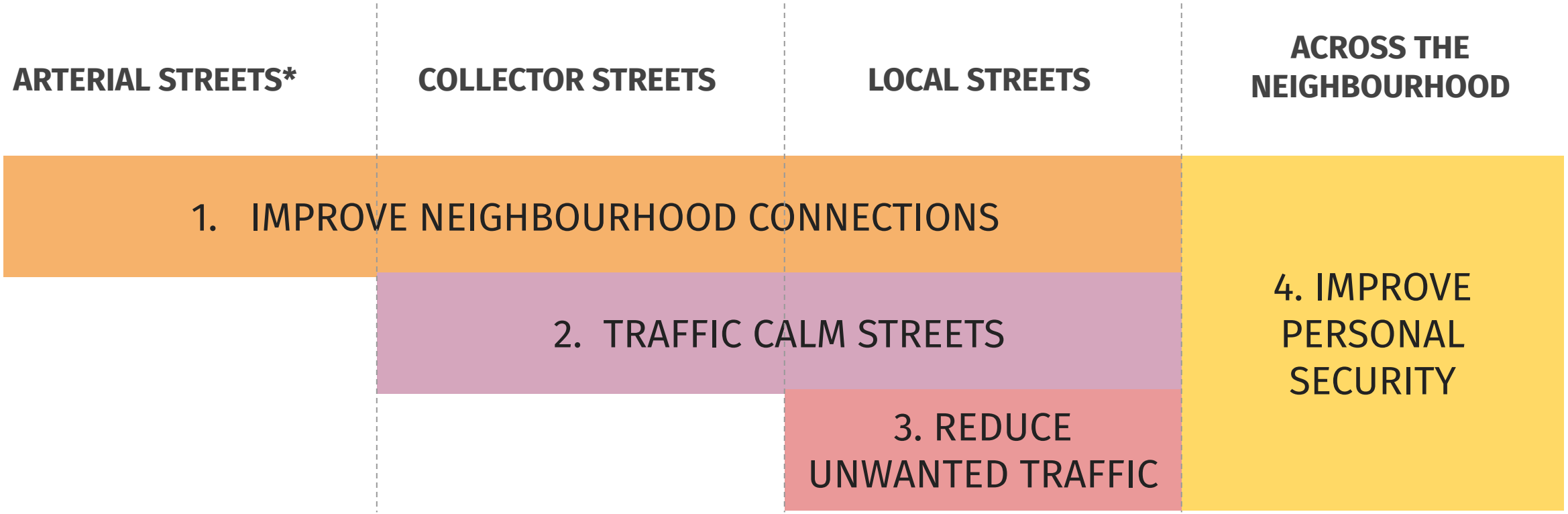
REDUCE UNWANTED TRAFFIC

Source: NACTO

IMPROVE PERSONAL SECURITY

Source: I love cycling SF

On which streets do these goals apply?



*Protected cycle lanes must be provided on arterial streets. Please refer Design Guidebook 1 for more details on protected cycle lanes. In case your city has arterial streets with limited right of way width, traffic calming can be considered.

1. IMPROVE NEIGHBOURHOOD CONNECTIONS

Cyclists are most unsafe at intersections between arterial streets. Calming these intersections is vital to make the overall neighbourhood safe for cycling. Further, connections between collector streets and within local streets must also be made safe for cycling.

A. SAFE INTERSECTIONS

B. SAFE MID-BLOCK CROSSINGS

C. GRADE SEPARATED CROSSINGS

D. ADD NEW LINKAGES

A. SAFE INTERSECTIONS

For safe connections within and across neighbourhoods

For more details on making an intersection safe for cycling, please refer Design Guidebook 1

Source: The trentorian

B. SAFE MIDBLOCK CROSSINGS

Frequent and safe crossing opportunities

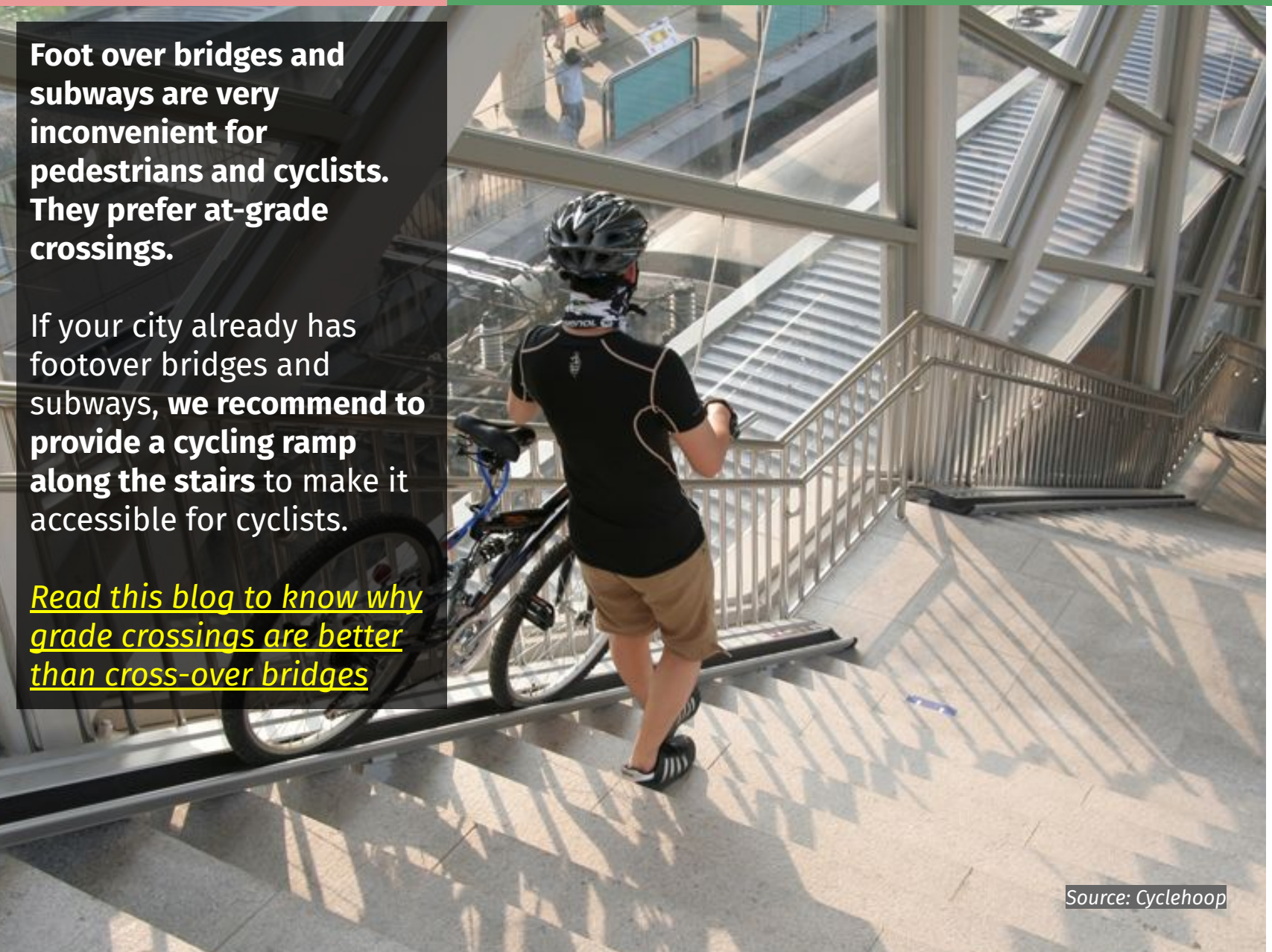
C. GRADE SEPARATED CROSSINGS

Connecting **different levels** for cyclists

Foot over bridges and subways are very inconvenient for pedestrians and cyclists. They prefer at-grade crossings.

If your city already has footover bridges and subways, **we recommend to provide a cycling ramp along the stairs** to make it accessible for cyclists.

Read this blog to know why grade crossings are better than cross-over bridges



Source: Cyclehoop

Source: Pimpakarn Rattanathumawat

D. ADDING NEW LINKAGES

Creating **shortcut routes** for cyclists

Cyclists and pedestrians prefer shortest routes. Large urban blocks increase cycling and walking distance, and can discourage one to cycle or walk.

Identify only cycle and walk thoroughfares through large campuses, institutions, office complex, parks etc.

1. **Talk to the relevant owners to seek permissions for such thoroughfares**
2. **Speak to the residents** to understand the implications of making new linkages accessible
3. **Close both ends** with bollards to ensure the linkage is only for walking and cycling
4. **Ensure** women and children feel secure in the new linkage *(refer to section 4 for more details)*

NMT link through Park (Conceptual), Erode, India

2. TRAFFIC-CALMED STREETS

Well-designed traffic-calmed streets provide a safe environment to cyclists when they share road space with motorized vehicles. The goal is to ensure that traffic speeds remain below 30 kmph through traffic-calming design elements.

1. VERTICAL DISPLACEMENT ELEMENTS

Elements that act as vertical additions to the street to calm traffic:

- **Speed humps**
- **Speed bumps**
- **Speed tables**
- **Speed cushions**

2. HORIZONTAL DISPLACEMENT ELEMENTS

Elements that adjust the horizontal ROW of the street to calm traffic:

- **Chicanes**

Key guidelines on traffic calming elements

- When cycles and motor vehicles share road space, **ensure that vehicle move at under 30 kmph**.
- When pedestrians also share the space, **ensure that vehicle move at under 15 kmph.**
- Add traffic calming elements **once every 50-150m based on adjoining land-use.** Close spacing will ensure more safer speeds especially around schools, markets, hospitals etc.
- **All intersections should be calmed** (refer Design Guidebook 1).
- Provide traffic calming element **before all pedestrian midblock crossing**
- Traffic calming elements can be avoided at mid-blocks **on streets with intersection within every 100m**
- Avoid traffic calming elements **in front of property entrances**
- Ensure traffic calming elements are **clearly visible through road markings as per IRC:35 to avoid road mishap.**

Source: Aviewfromcyclepath.com

1. TYPES OF VERTICAL DISPLACEMENT ELEMENTS

Speed humps

- **Speed humps slow provide smoother transition** along with slowing down speeds.
- Suitable **for all street types**, however the geometry will vary based on desired speeds. (For more details refer next page).

See how speed humps help traffic calm streets. here

Speed bumps

- Speed bumps are commonly used. They are more steeper than speed humps that helps to further calm speeds below 20kmph.
- Suitable for **streets with high pedestrian footfall or streets where pedestrians share the space with motorists.**
- **Not suitable for streets with public bus transport route, as it will be discomfort to the passengers.**

Speed table

- These are trapezoidal traffic calming elements that slow down vehicles. They can also double as crossings and provide comfortable pedestrian and wheelchair access at the same level as footpath.
- Suitable for **any street type, especially streets with footpaths for barrier-free movement.**

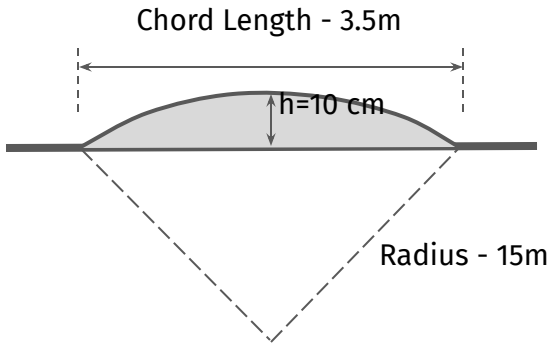
Speed cushions

- They allow cycles and emergency vehicles/bus to pass unaffected through gaps, while reducing vehicle speeds physically. It will psychologically reduce the speeds of heavy vehicles and 2-wheelers.
- Suitable for streets with **public bus transport route.**

See how speed cushions help reduce speed of vehicles, here

1. TYPES OF VERTICAL DISPLACEMENT ELEMENTS

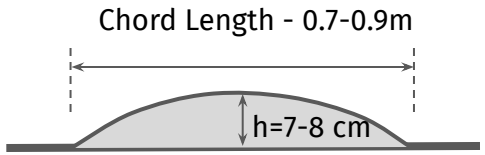
Speed humps



Cross Section

- The **center height of the speed hump to be 10cm.** Height less than 10cm will mean faster speeds.
- Provide hump with **chord length of 3.5m** and **radius of 15m** for speeds of about **25-30kmph.** (Refer IRC:99-2018, Table 3.1)

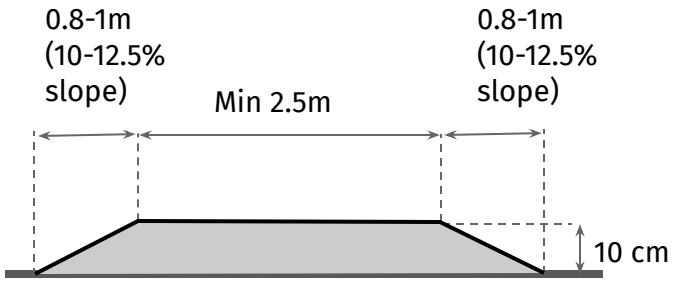
Speed bumps



Cross Section

- Speed bumps are usually **around 7-8cm high** and **0.7-0.9m wide.**
- They can be uncomfortable for the cyclists, hence it is recommended to **provide parabolic speed bumps or provide gap of about 0.9-1m** at the kerb side to allow cyclists to pass.

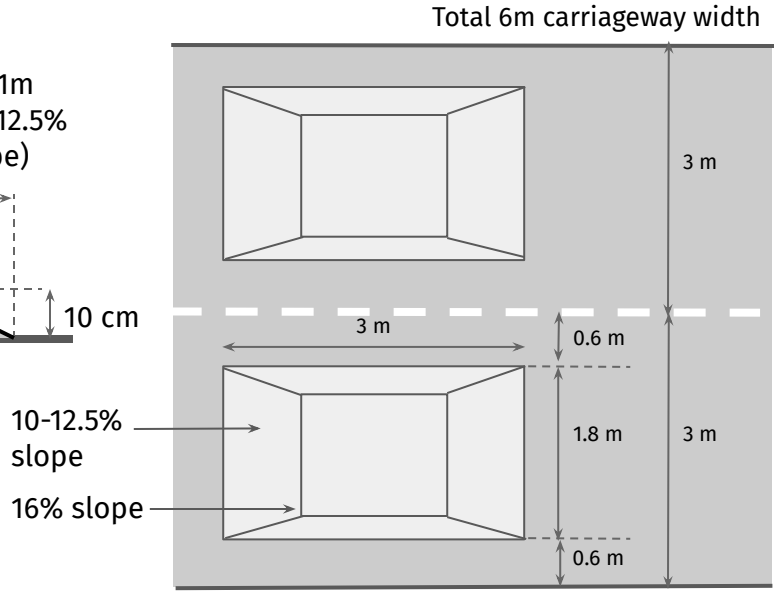
Speed table



Cross Section

- The center height of the **speed table to be 0.1m.** The approach slope to be **10-12.5%**. (Refer IRC:99, Table 3.2)
- When designed as pedestrian crossing, ensure the **top level is at the same level as footpath at 15 cm.** The approach slope to be 10%.

Speed cushions



Plan

- The center height of the **speed cushion to be 7cm high.**
- The **width of speed cushion to be 1.8-2m.**
- The **approach slope to be 10-12.5%.** The **side slopes of the cushion to be around 16%.**
- The gap from the kerb to be 0.6 - 0.75m.

2. TYPES OF HORIZONTAL DISPLACEMENT ELEMENTS - **CHICANES**

*Chicanes are **angular deflections** created in streets. This can be created by **strategically placing diversions** in the form of bollards, planters, traffic cones, parking etc.*

- Suitable for **local streets**, should be **avoided on streets with public transport**
- Chicane are also suitable to locations that **do not have access to public open space within walking distance**.
- On narrow streets, **consider shared streets** where cyclists and pedestrians can use the same space safely along with motorists. **Provide speed humps at every 50-75m, to ensure speeds are within 15 kmph.**

- Angular parking here **breaks the linear travel movement** of vehicles.
- An **angle of 45 deg** ensures a zig-zag movement of vehicles
- Ensure **walking space** is available
- **On-street public spaces** can be carved out and provided with seating and play elements.

Please refer **IRC 099 (2018)** for technical details

See how chicanes work in a neighbourhood, **here**

3. REDUCE UNWANTED TRAFFIC

Reducing unwanted traffic is an invisible method to make cycling safe. **Not all streets are meant to allow through-movement of motorized vehicular traffic.** Collector streets in neighbourhood can provide vehicle-through movement, whereas inner streets can limit vehicle movement only to access properties. However, all streets allow through-movement of cyclists and pedestrians. This helps to make neighbourhood safe, peaceful and liveable. It is especially safe for children and elderly.

A. CHOOSE THE RIGHT STREET TO CLOSE

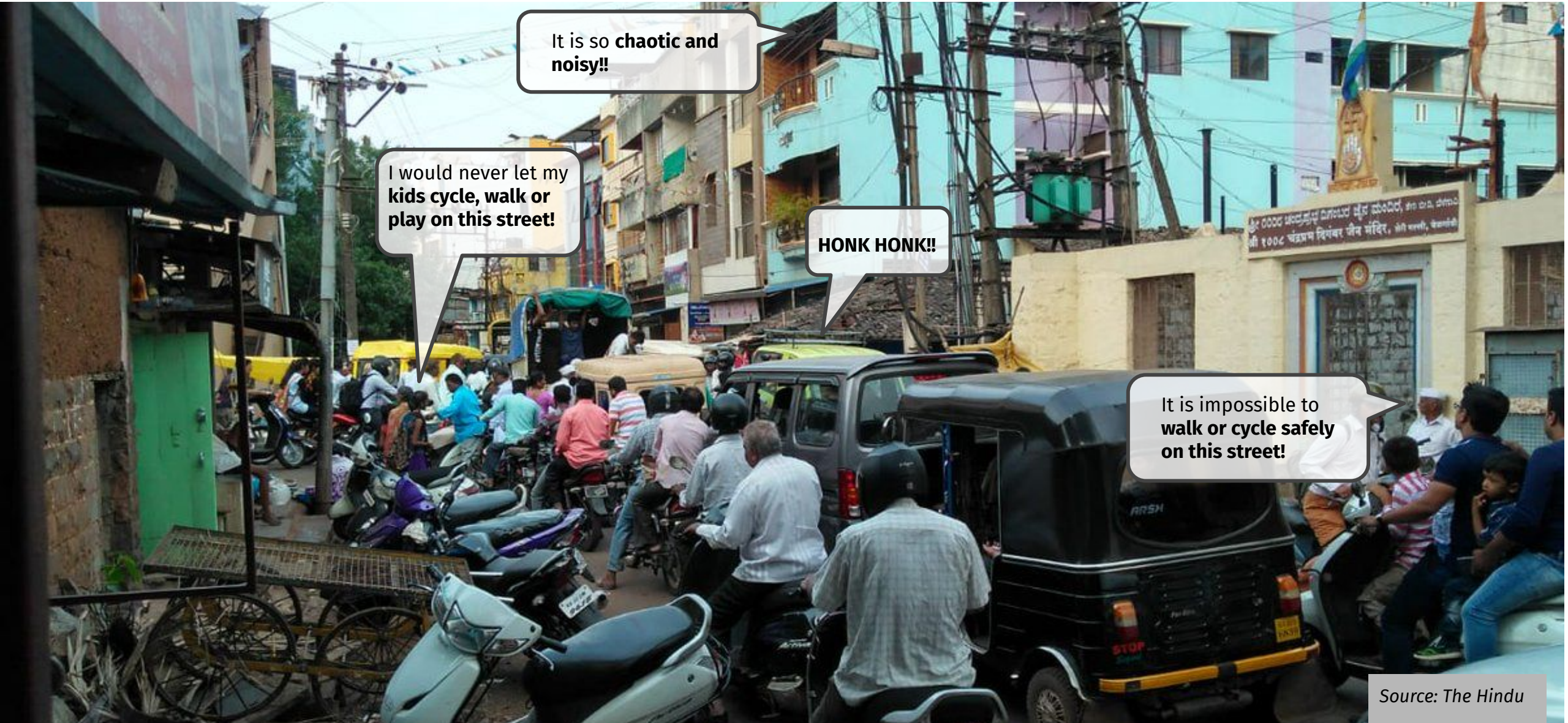
B. CHOOSE THE RIGHT POINT ON THE STREET

C. CHOOSE THE RIGHT MATERIALS

D. REDESIGN RECLAIMED SPACE

A. CHOOSE THE RIGHT STREET TO CLOSE

Streets that allow **unwanted traffic to cut across** the neighbourhood creating **traffic chaos which is unsafe for cyclists!**

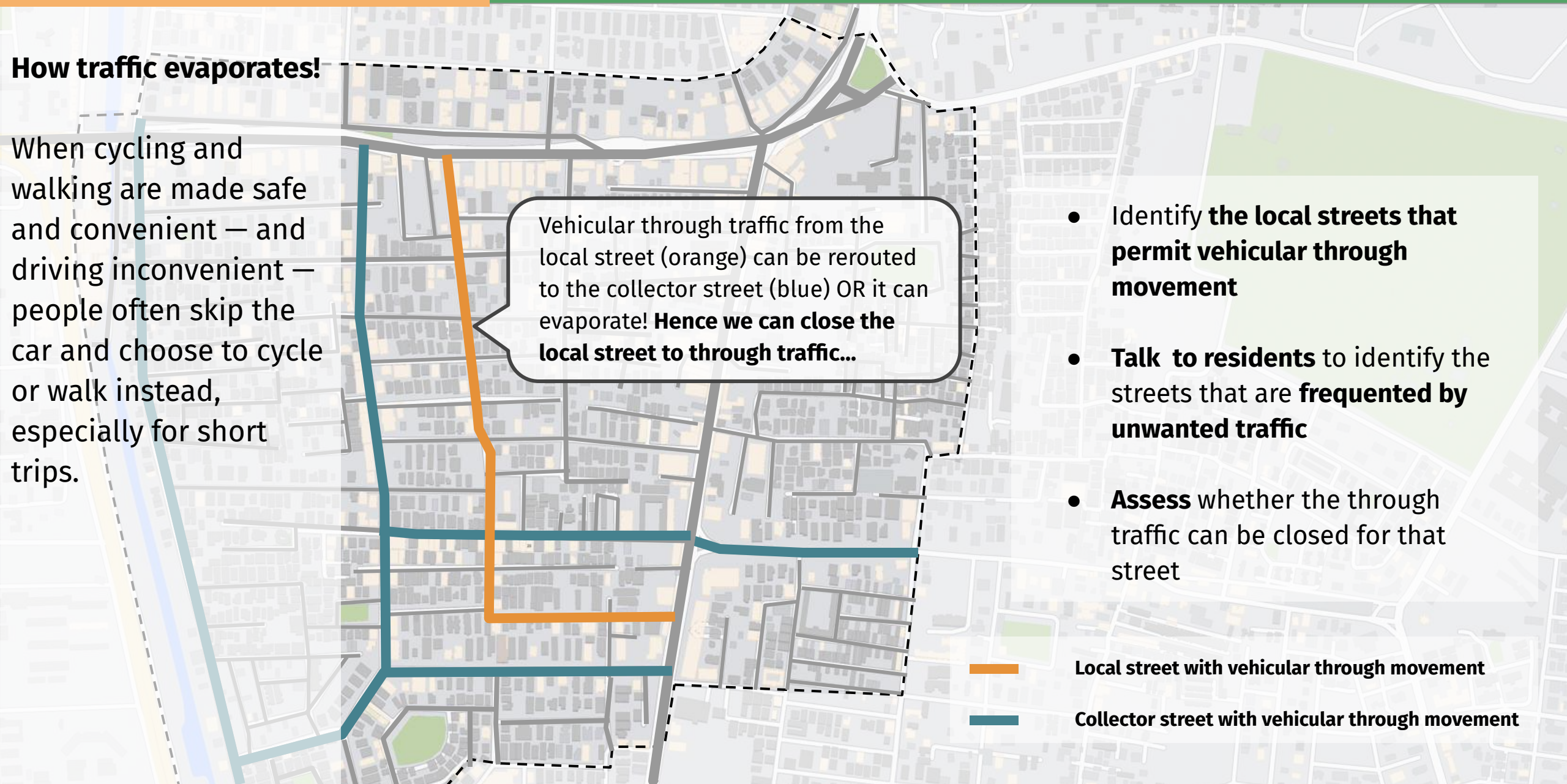


Source: The Hindu

A. CHOOSE THE RIGHT STREET TO CLOSE

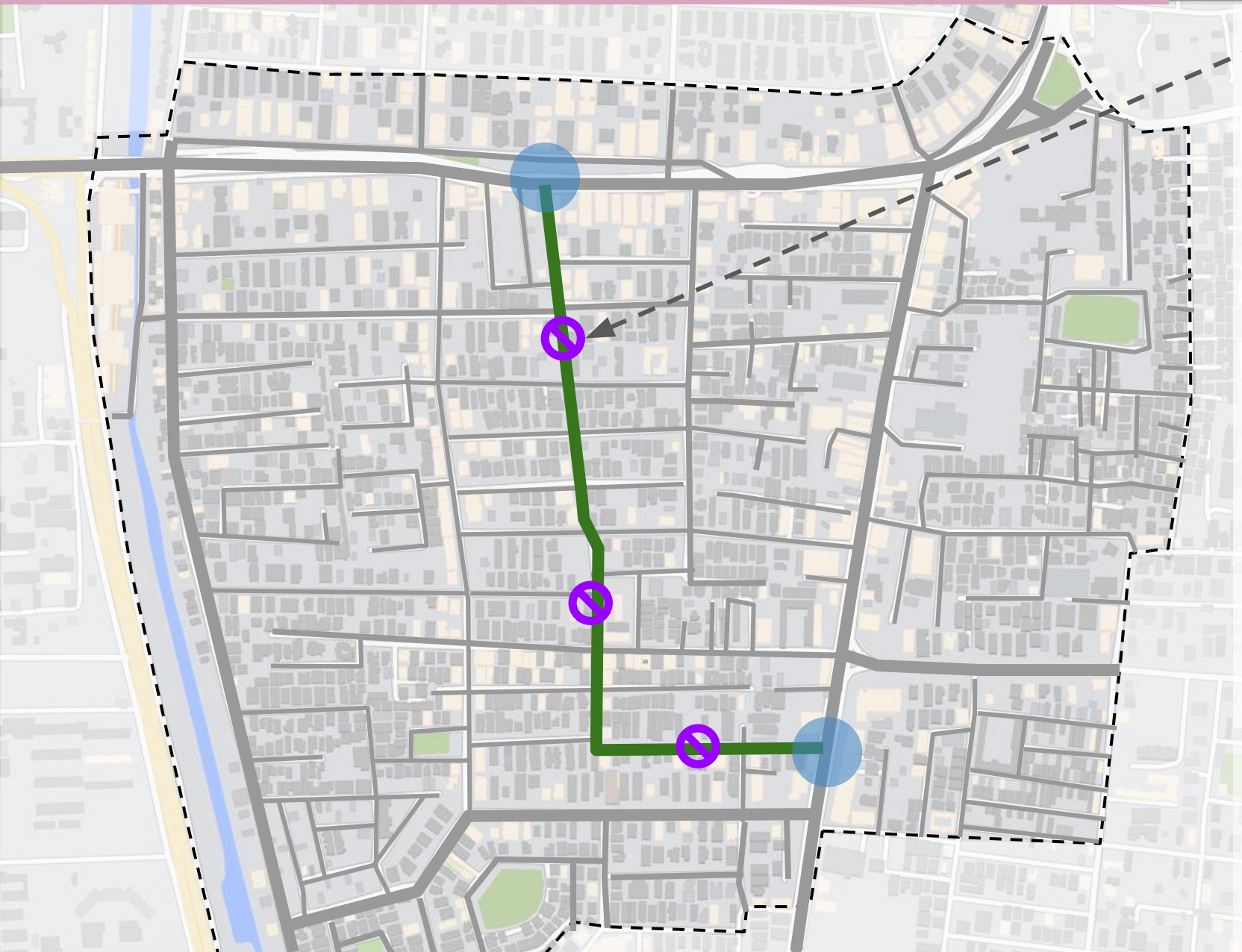
How traffic evaporates!

When cycling and walking are made safe and convenient — and driving inconvenient — people often skip the car and choose to cycle or walk instead, especially for short trips.



- Identify **the local streets that permit vehicular through movement**
- **Talk to residents** to identify the streets that are **frequented by unwanted traffic**
- **Assess** whether the through traffic can be closed for that street

B. CHOOSE THE RIGHT POINT ON THE STREET TO CLOSE



- **Filter the traffic a few blocks inside the neighbourhood** so residents can enter the neighbourhood but outside vehicles can not cut across it.
- Do not close **key routes used by the residents** to enter and exit the neighbourhood.
- Do not close routes used by **emergency vehicles** i.e. ambulances, fire fighting trucks etc.
- **Conduct focused group discussions with the residents** to understand the impact of closing the street on their movement and to reduce push back.

Bollards / planters to stop thoroughfare movement

Sign: No through traffic

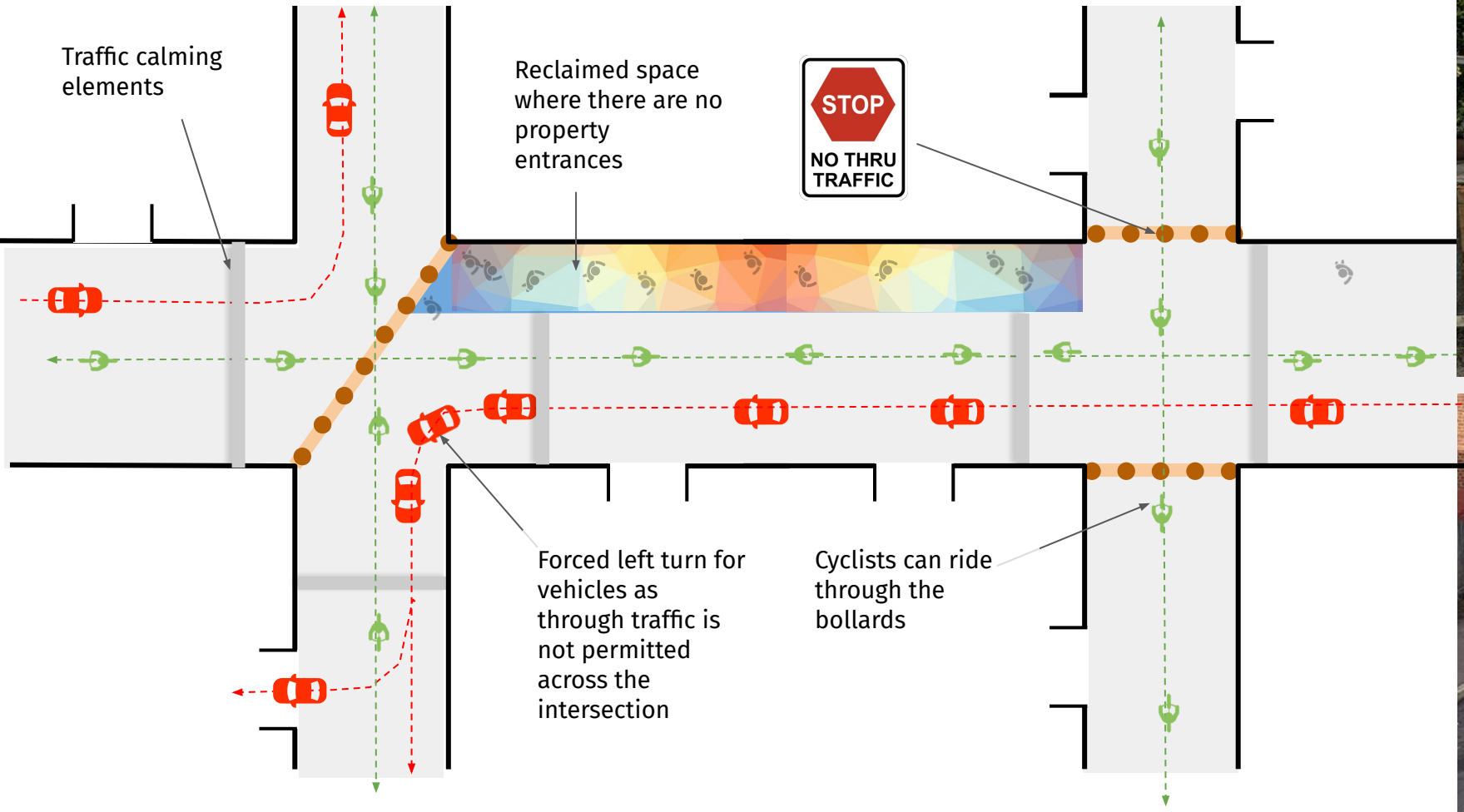
Street with filtered traffic

B. CHOOSE THE RIGHT POINT ON THE STREET TO CLOSE

Bollards can be placed in multiple ways...

Filtering traffic at intersections
Reducing unwanted through traffic
in <u>both directions</u>

Filtering traffic at intersections
Reducing unwanted through traffic
in <u>one direction</u>



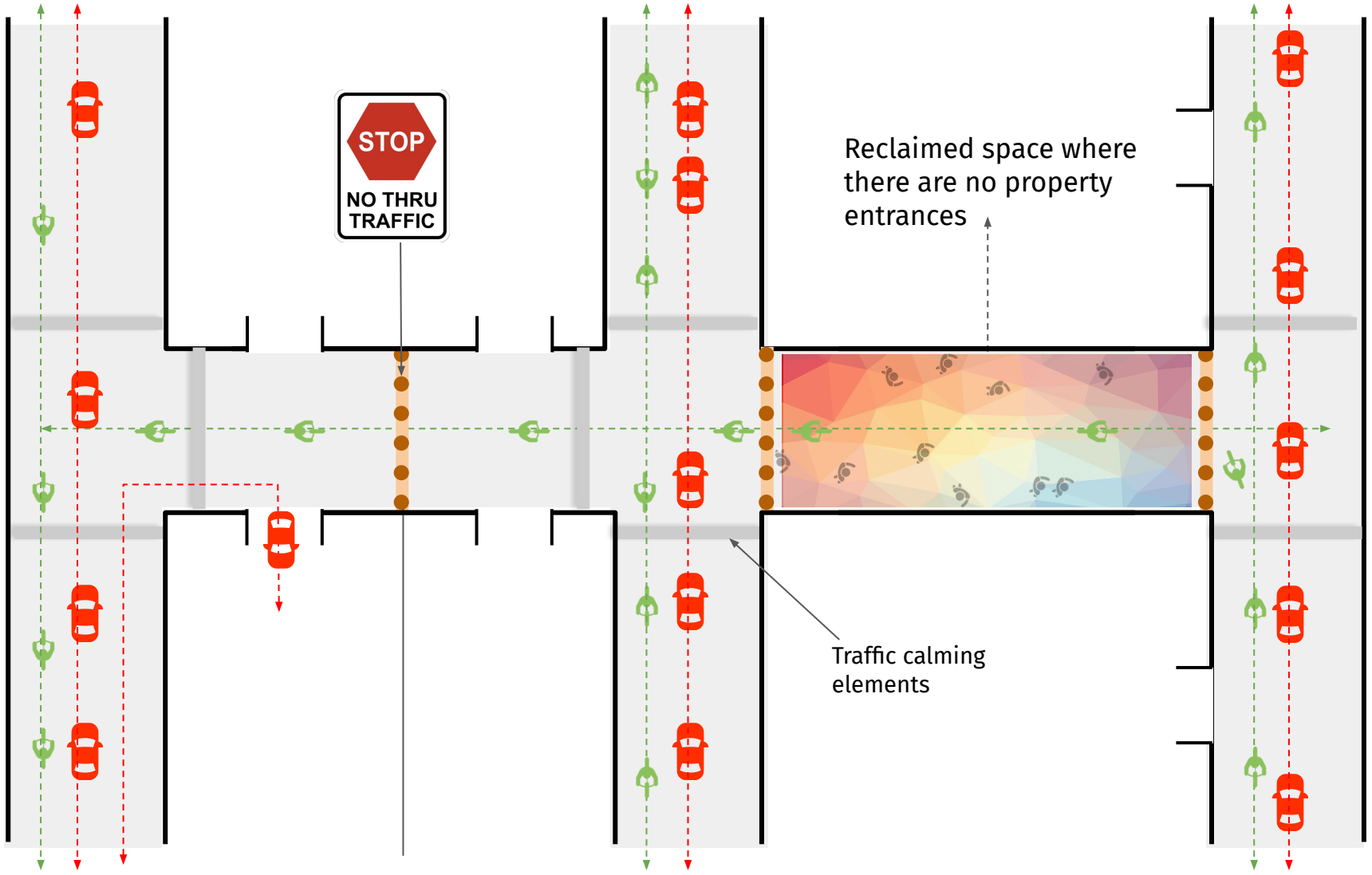
Source: BBCC

Source: Air quality news

B. CHOOSE THE RIGHT POINT ON THE STREET TO CLOSE

Bollards can be placed in multiple ways...

Filtering traffic at mid-blocks



C. CHOOSE THE RIGHT MATERIALS

- **Use planters, bollards,** cycle gates or any other elements to close the street to through traffic.
- Add a **'No through traffic' sign at the entry points** to the street so vehicles do not enter expecting to cut across the neighbourhood

Watch how traffic **re-routing transformed a neighbourhood** in the Netherlands **here**

Source: SFMTA

D. REDESIGNING RECLAIMED SPACE

Streets that do not allow through-traffic can be **repurposed for better walking, cycling and liveability elements.** This allows residents to enjoy the street space and make it safe for all.

4. IMPROVE PERSONAL SECURITY

Design streets to make women and children feel safe to cycle at all times, even after it gets dark. Lively neighbourhoods with several family friendly activities provide **'eyes on the street'** and encourage these vulnerable groups to cycle safely.

- IMPROVE STREET LIGHTING
- ADD NEW FAMILY FRIENDLY ACTIVITIES
- MAKE THE COMMUNITY FEEL SAFE TO CYCLE
- MAINTAIN SECURITY THROUGH ENFORCEMENT

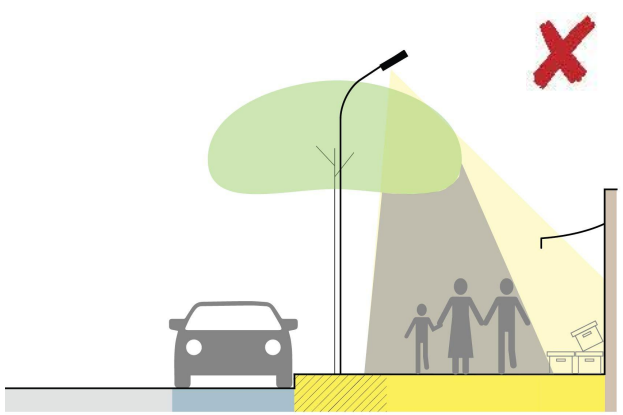
STREET LIGHTING

Improve **street lighting** to enhance personal security

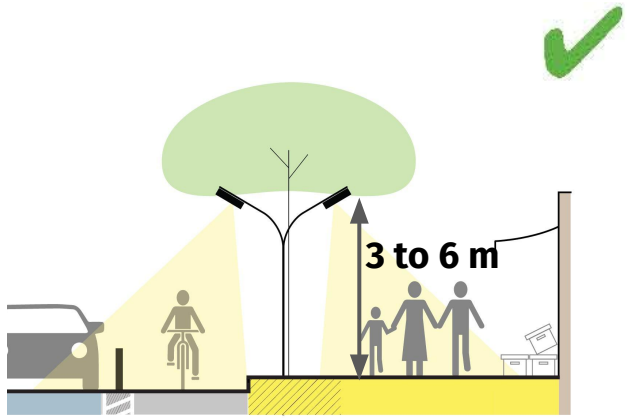
- Good street lighting ensure that all road users can see and be seen. It also increases personal security especially for women and children.

- Street lighting should be placed such that tree foliage does not obstruct 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

Source: I love cycling SF

ADD NEW FAMILY FRIENDLY ACTIVITIES

Streets that have good visibility ensure cyclists safety. Introduce 'eyes on street' by activating the street space.

MAKE THE COMMUNITY FEEL SECURE TO CYCLE

Host training camps, discussions and more..

To further improve personal security, here are some initiatives that can be considered:

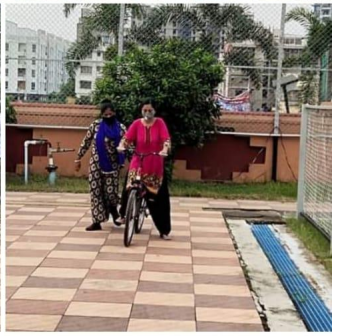
- **Cycle training:** Training makes women more confident to cycle **hence increases the number of women cyclists** on the streets, hence improving overall women security.

- **Cycling events: Women and children feel more confident when they cycle in groups**. This is why cycle rallies, cyclothons etc. improve the overall confidence and security of these vulnerable user groups.

- **Community group discussions:** Hosting such discussions with **women cyclists to understand the barriers** they face would make women feel heard hence encourage them to cycle within neighbourhoods.
  Such discussions can also **facilitate relationships between local communities and enforcement** agencies

Do Cycling.Safely
20h

Cycle training at NKDA Football ground, Every Sunday, 4pm to 6 pm



MAINTAIN SECURITY THROUGH ENFORCEMENT

- Identify spaces with frequent ‘anti-social’ activities in the neighbourhood such as
- **Parking lots**
- **Dead alleys** etc.
- **Alcohol shop** zones
- **Dead canal fronts**

- **Provide strict on-ground enforcement** to eradicate all anti-social activities especially during night time.

Source: The hindu

Other resources for designing cycling friendly interventions

Refer to Design Guidelines 1 for more details on the the essentials of cycling interventions

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

India Cycles4Change is a programme of

Smart City
MISSION TRANSFORM-NATION

Ministry of Housing and Urban Affairs
Government of India

FIT INDIA

स्वच्छ भारत
एक कदम स्वच्छता की ओर

Publication developed by

ITDP
India Programme

www.itdp.in