

Road Safety Measures for Vulnerable Road Users – IRF Webinar Series

Dr. Ammu Gopalakrishnan,
Transportation Safety Division

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\$35.4 B
Global Sales

95,000
Talented Minds

70
Countries

4
Business Groups

51
Technology Platforms

129,620
Patents awarded in Company history
(2021 data)

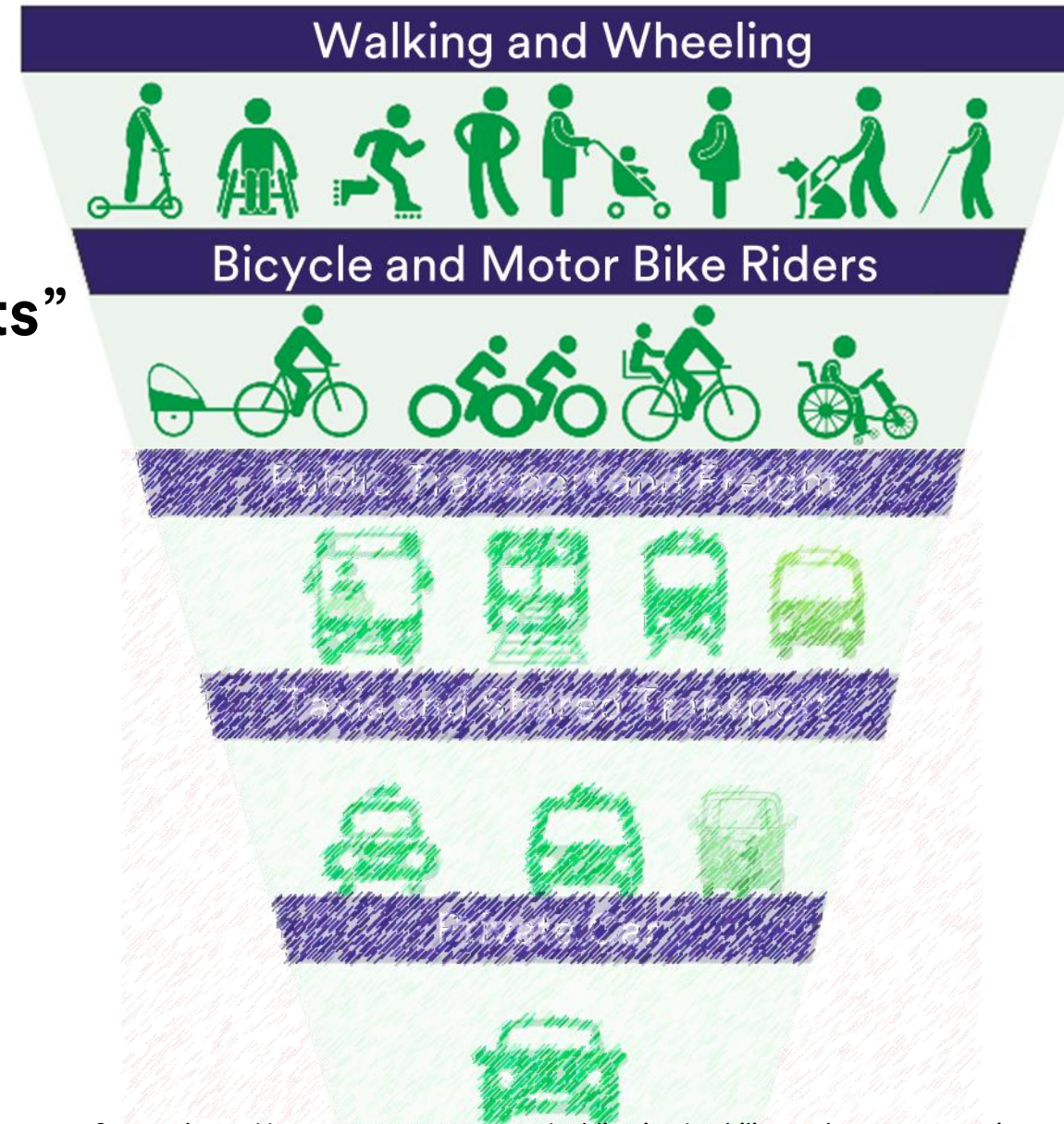
Vulnerable Road Users

Who are Vulnerable Road Users ?

WHO in 2013 considered VRUs to be “**pedestrians, cyclists, and motorcyclists**”

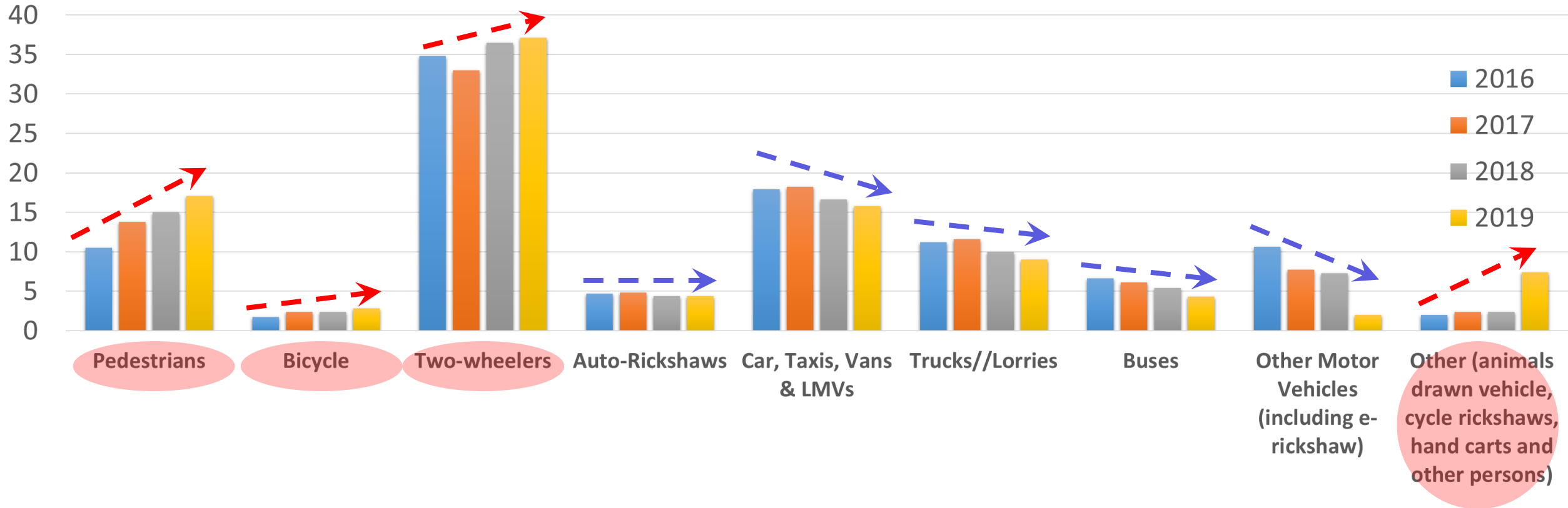
What makes them VRUs ?

- They are susceptible to road accidents.
- They are don't have a protective shell.
- They are having less infrastructure.

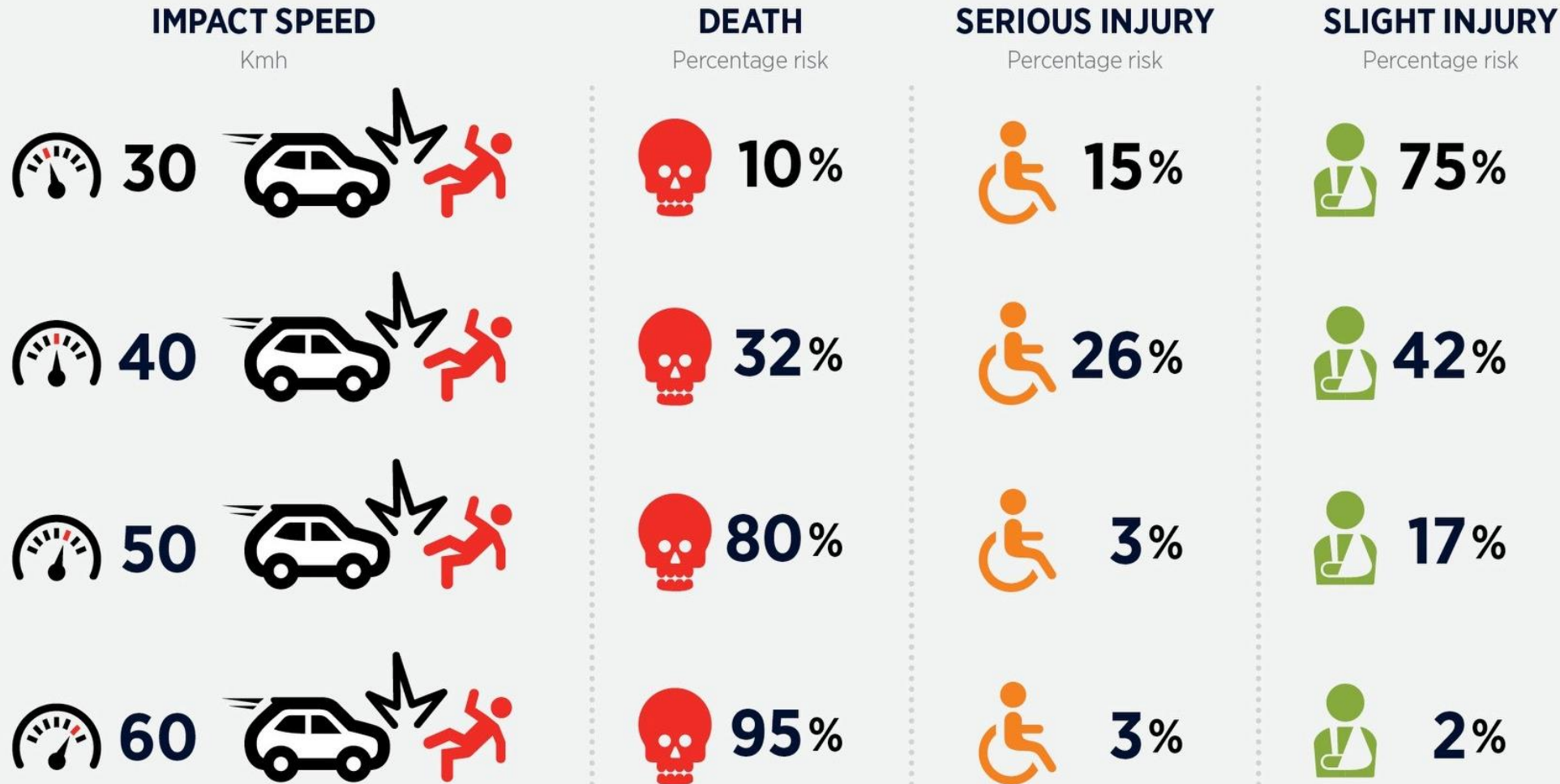


Crash Statistics

Road Fatality Data from 2016 to 2019



Death and injury percentages



Survivability rates vary significantly based on a number of factors and scenarios. AT takes a preventative approach with respect to the survivability of our most vulnerable road users. Data taken from Research Report AP-R560-18 published in March 2018 by Austroads - the Association of Australian and New Zealand Road Transport and Traffic Authorities.

Pedestrian Safety



Wide crossing distance

Average Pedestrian walking speed = 0.98 m/s

Approach arm width = 14 m

Start-up time (Initial Reaction time) = 3 sec

Amber time = 2 sec

**Total phase time for pedestrian required =
(14/0.98) + 3 + 2 = 20 sec (approximately)**

Existing time pedestrian green time = 5 sec



Discontinuous Pedestrian Crossing Facility

Pedestrian Safety



No Refuge Island / Safe Waiting Space



Parking on Pedestrian Pathway



Source : Department of Transport Planning, S.A Delhi

No pedestrian signals. No beepers to guide the visually challenged.



Source : <https://scroll.in/roving/894005/in-photos-why-wheelchair-users-in-delhi-find-it-difficult-to-use-buses-even-low-floor-ones>

No ramp to access the bus stop / footpath

Pedestrian Safety



Obstruction in seamless movement of pedestrians



Boarding and Alighting on main carriageway



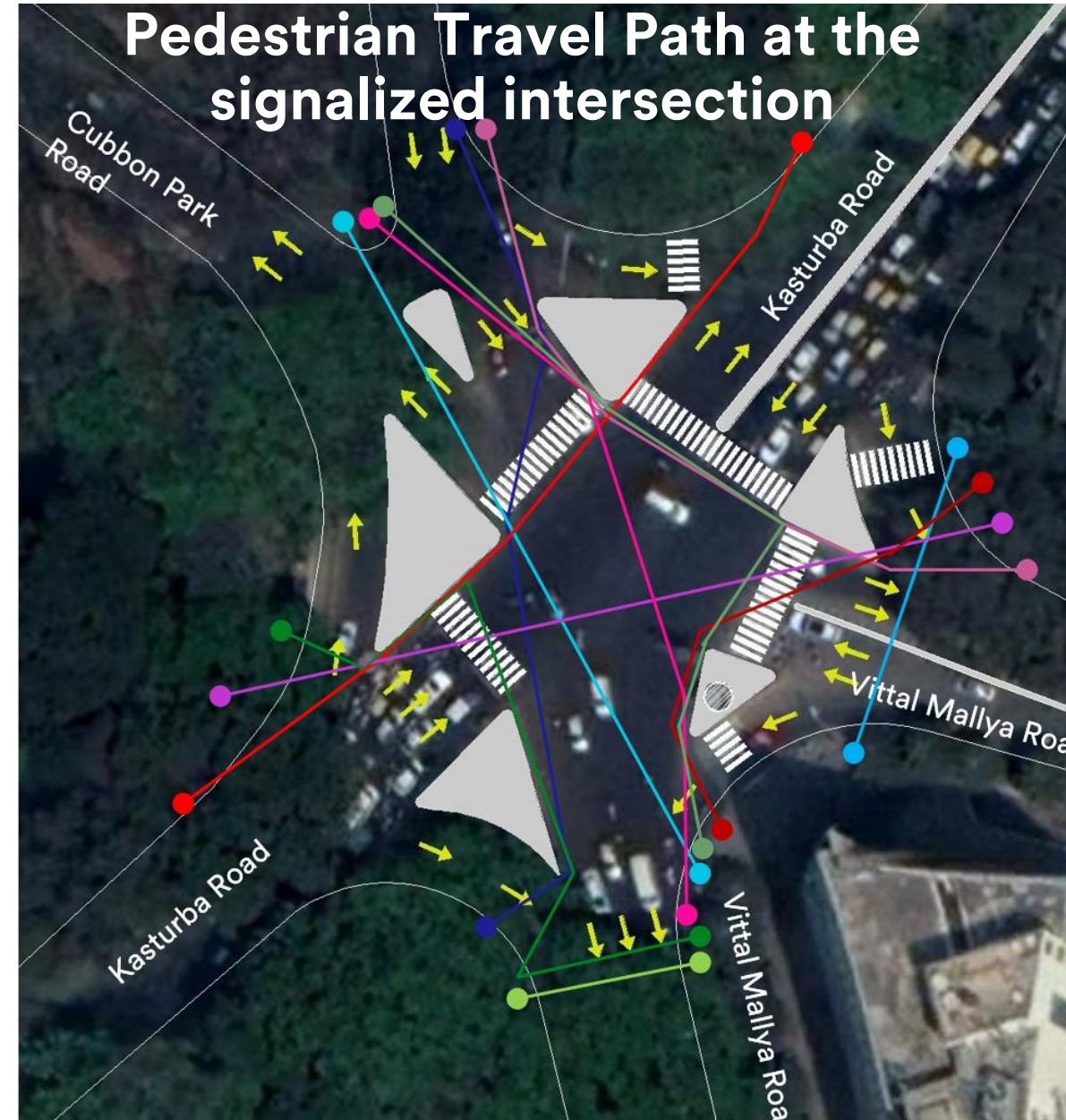
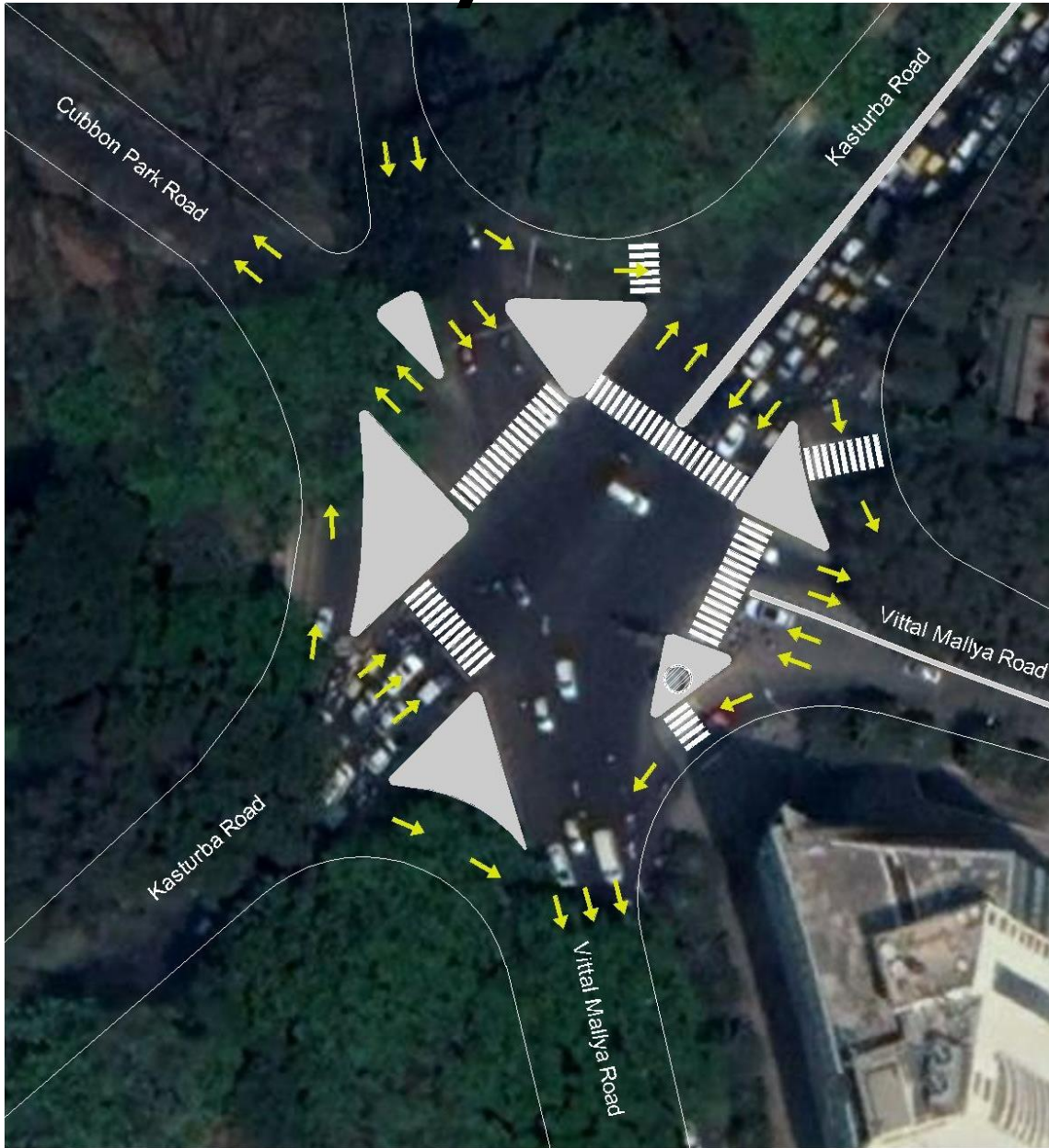
Amrapali Green M...
Jan 27, 2020 14:46:33

Roadside Vegetation

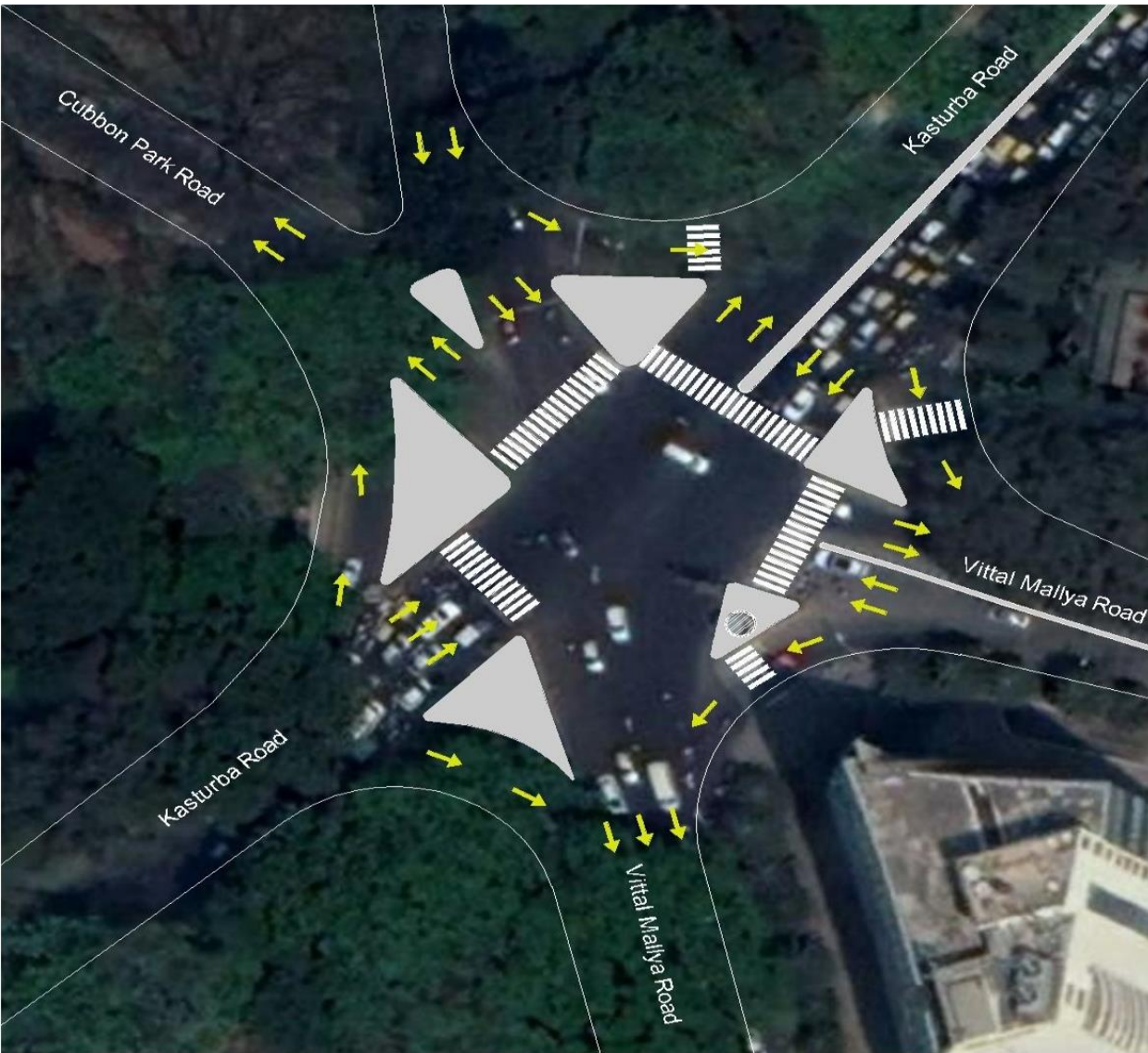


No proper signs and marking indicating crossing

Case Study - 6-arm Intersection



Case Study - 6-arm Intersection



Pedestrian Safety – Good Practice



Pedestrian Guard Rail

Source : <https://www.constrofacilitator.com/indian-pedestrian-infrastructure-and-probable-mitigation-measures/>,



Ramp to footpath

Source : Project TenderSURE, Bangalore



Dedicated crossing

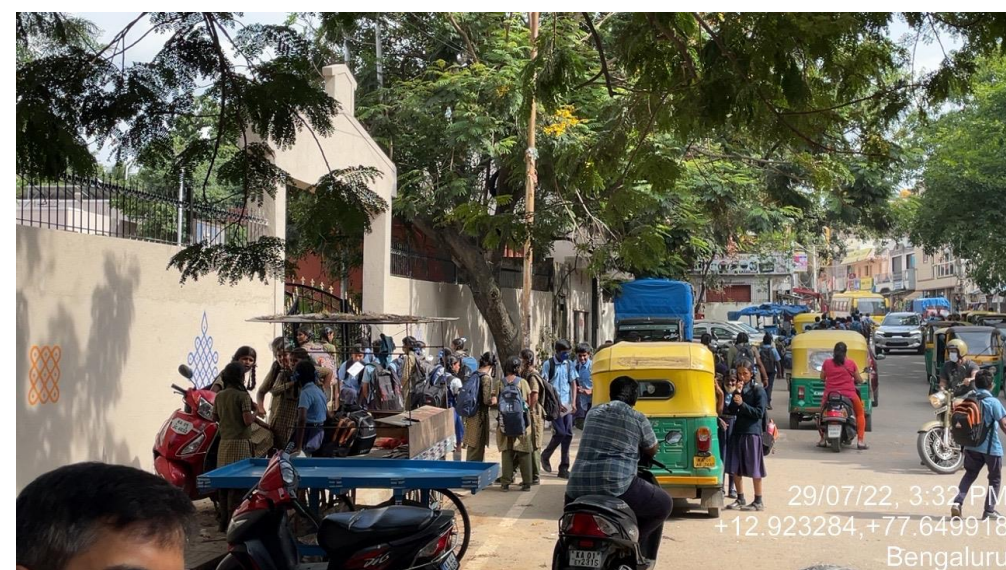
Source: <https://www.tribuneindia.com/news/andhra-pradesh/haryana/karnal-road-to-be-pedestrian-friendly-593830>,



Seamless crossing facility

Source : Project TenderSURE , Bangalore

School Zone Safety



School Zone Safety



- School Zone Ahead signs, median opening and speed limit signs are present on the median.
- Due to vegetation, orientation of signs and non-retro-reflective property these signs are not communicating clear message to road users.
- Scope for traffic signs are identified.

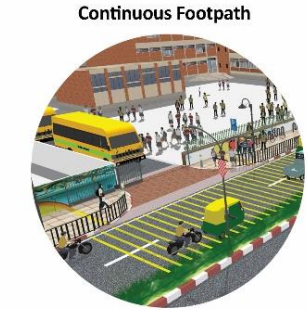
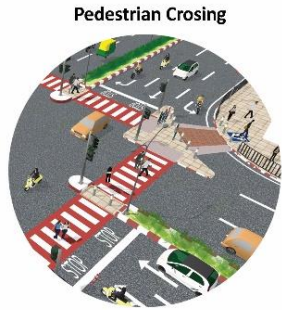
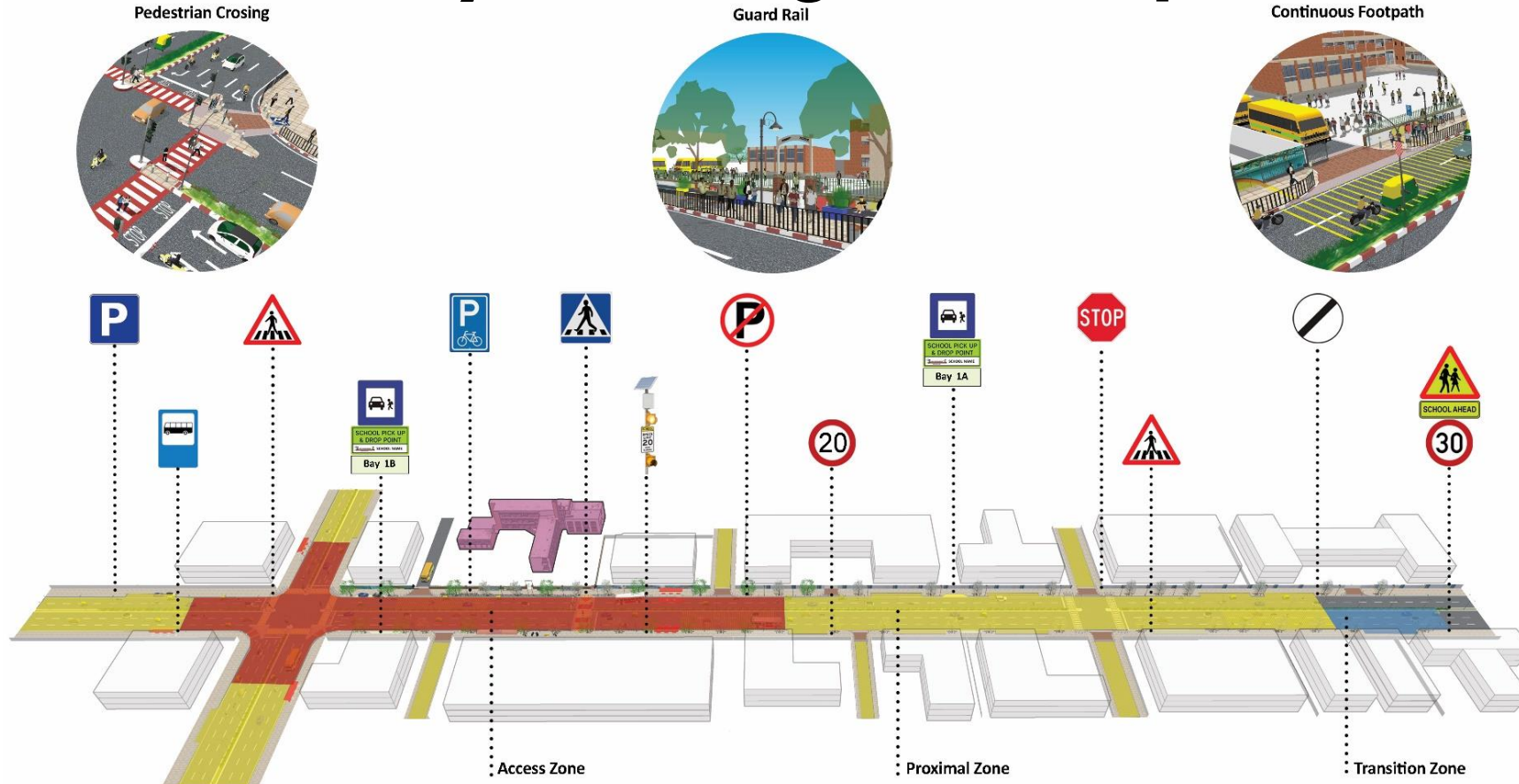


- Wide road where little road marking or road safety furniture are provided.

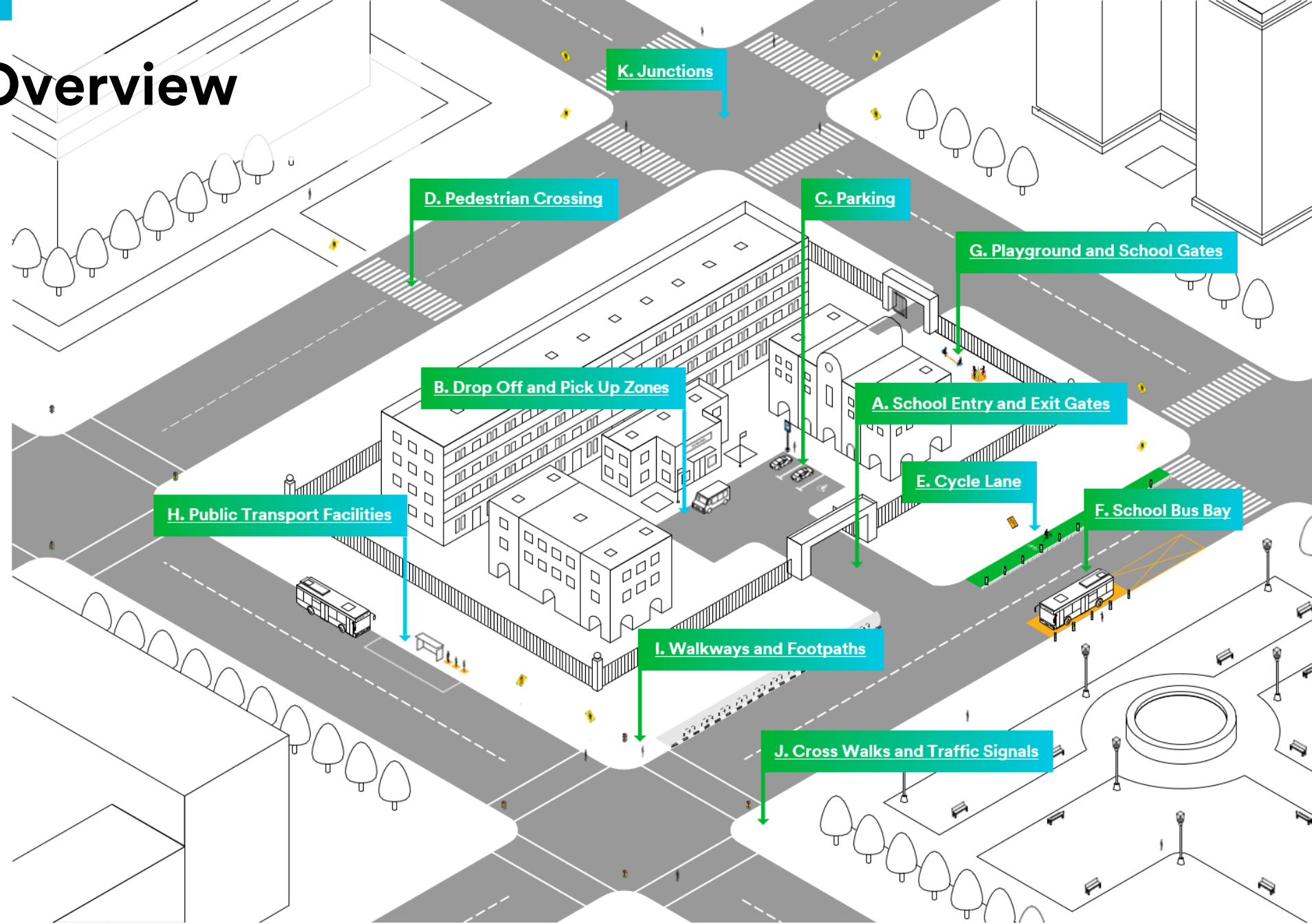


- Road studs are present at few places.
- Presence of speed hump.

School Zone Safety – Design Principle



School Zone - Overview



Examples of 3M School Zone program from India



To bring the students vision of a safe school zone to life, using 3M Science



Source: 3M Young Change Agent for Road Safety Program – CSR Initiative for School Zone Safety, 2019.

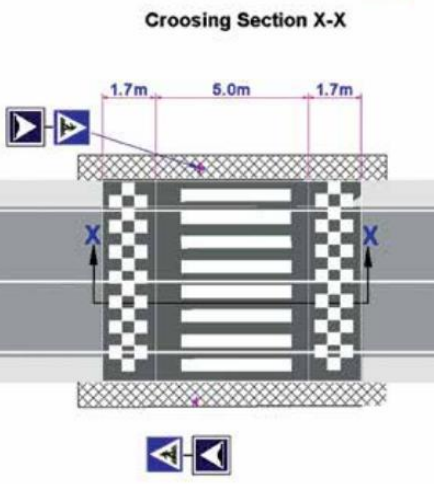
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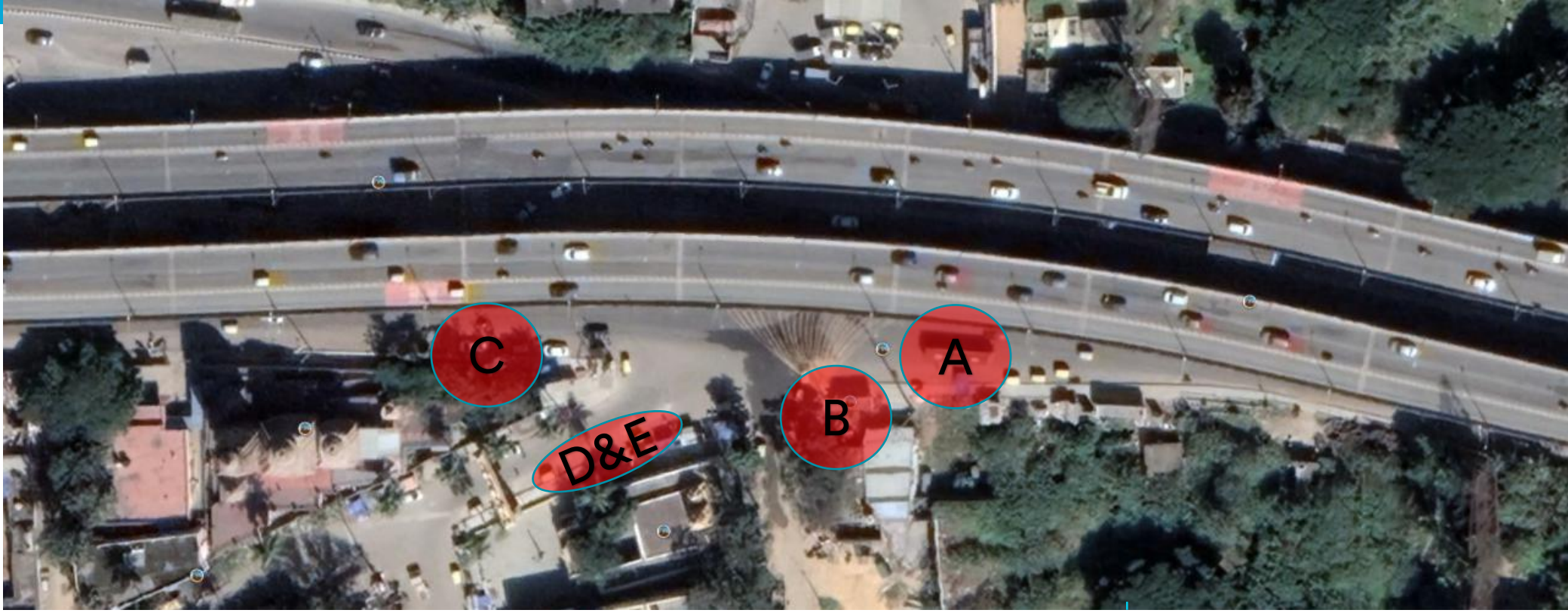
School Zone Safety – Case Study



A



Raised Pedestrian Crossing at Mid-Block Junction near the bus bay with uneven road surface. Clause 3.1.4 and Fig.3.6 of IRC 99:2018.



B

Bus Stop with Information boards on Bus Timings, Number and Destination



C

- Dedicated Autorickshaw Parking** – On Shoulder Side adjacent to temple on MCW.
- Auto-rickshaw parking shall not be allowed on dedicated bicycle path.

D

- Dedicated Hawker and Vendor Zone**
- Should be kept separate from pedestrian path.
- Dedicated spot shall be allocated.
- Should not cause hinder to vehicular movements

3M

E

Pedestrian Guard Rails

Pedestrian Guard rails to be provided near the school access zone.

To avoid use of footpath by Hawkers and vendors and provide seamless pedestrian walkway to the children.

Traffic Sign Plan



School Ahead and Speed Limit Sign in single Yellow Backing board.

Proposed at the start of the School Proximal Zone.



No Parking Sign. Proposed adjacent to the bicycle dedicated lane to provide regulatory information of parking prohibition to the autorickshaws.



Pedestrian Crossing Sign. Proposed on the Main Carriageway.



School Zone and Speed Limit Sign in Yellow Backing board.

Proposed at the start of the School Access Zone.



Restriction Ends. Proposed after the School Zone Proximal Area



Stop Sign. Proposed on the minor roads before entry to Main Carriageway.



Universal Accessibility



Dedicated Auto-rickshaw Parking



Speed Breaker Informatory Sign Proposed on the mid-block Speed Breaker, Traffic Calming Measure.



Pedestrian Crossing Informatory Sign. Proposed on the Mid-block Pedestrian Crossing Facility.



PICK UP AND DROP POINT
TIME: 8:00 am to 9:00 am
4:00 pm to 5:00 pm
PARKING HERE WILL BE A PUNISHABLE OFFENSE

Pick Up and Drop Off Sign. Proposed on the dedicated Pick Up and Drop Off facility,



Bus Stop Informatory Board proposed at the bus stops where the buses are designated to stop.



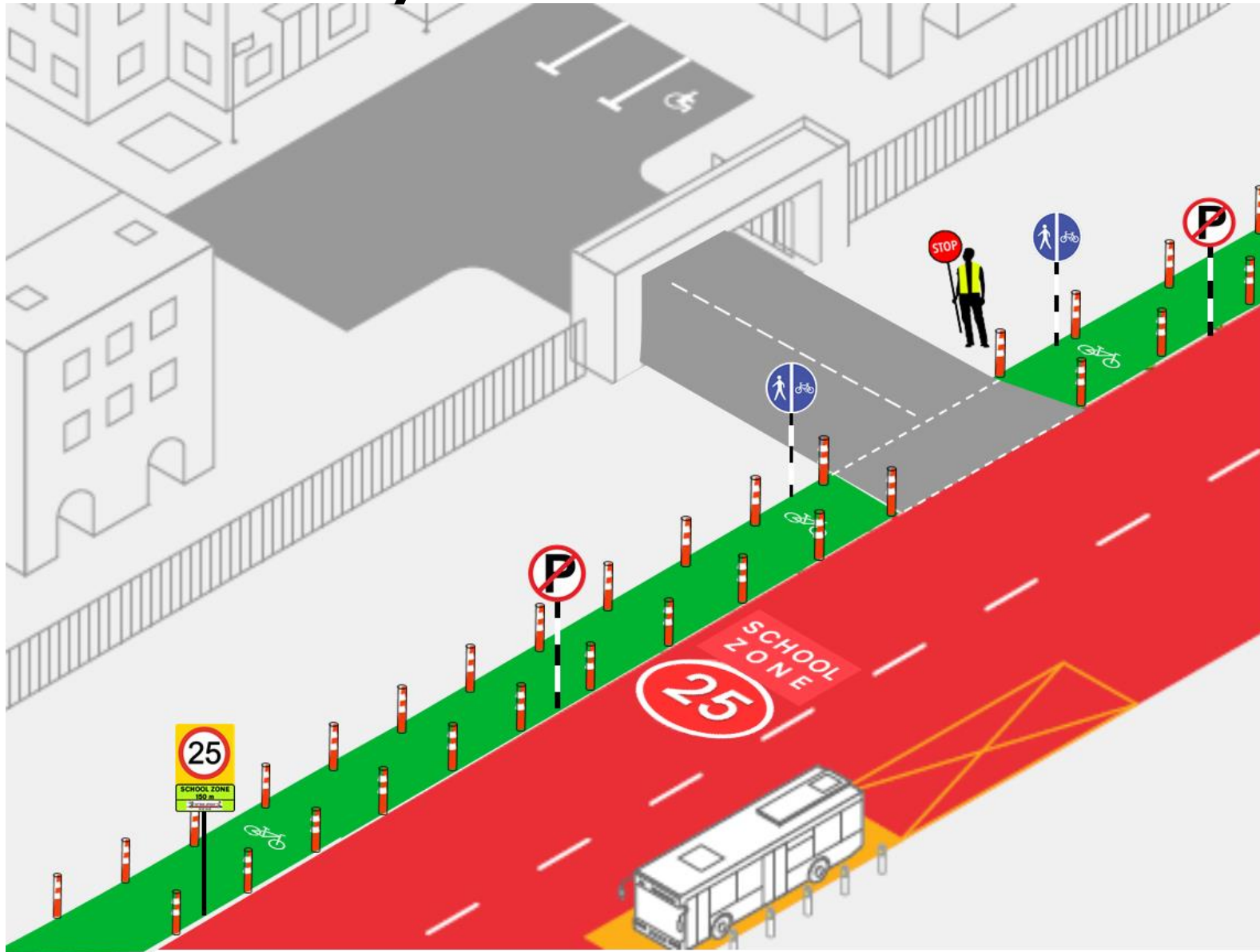
Finger type sign Proposed on the approach arm to the school zone with school names.

Graphical Pavement Marking for NMT.

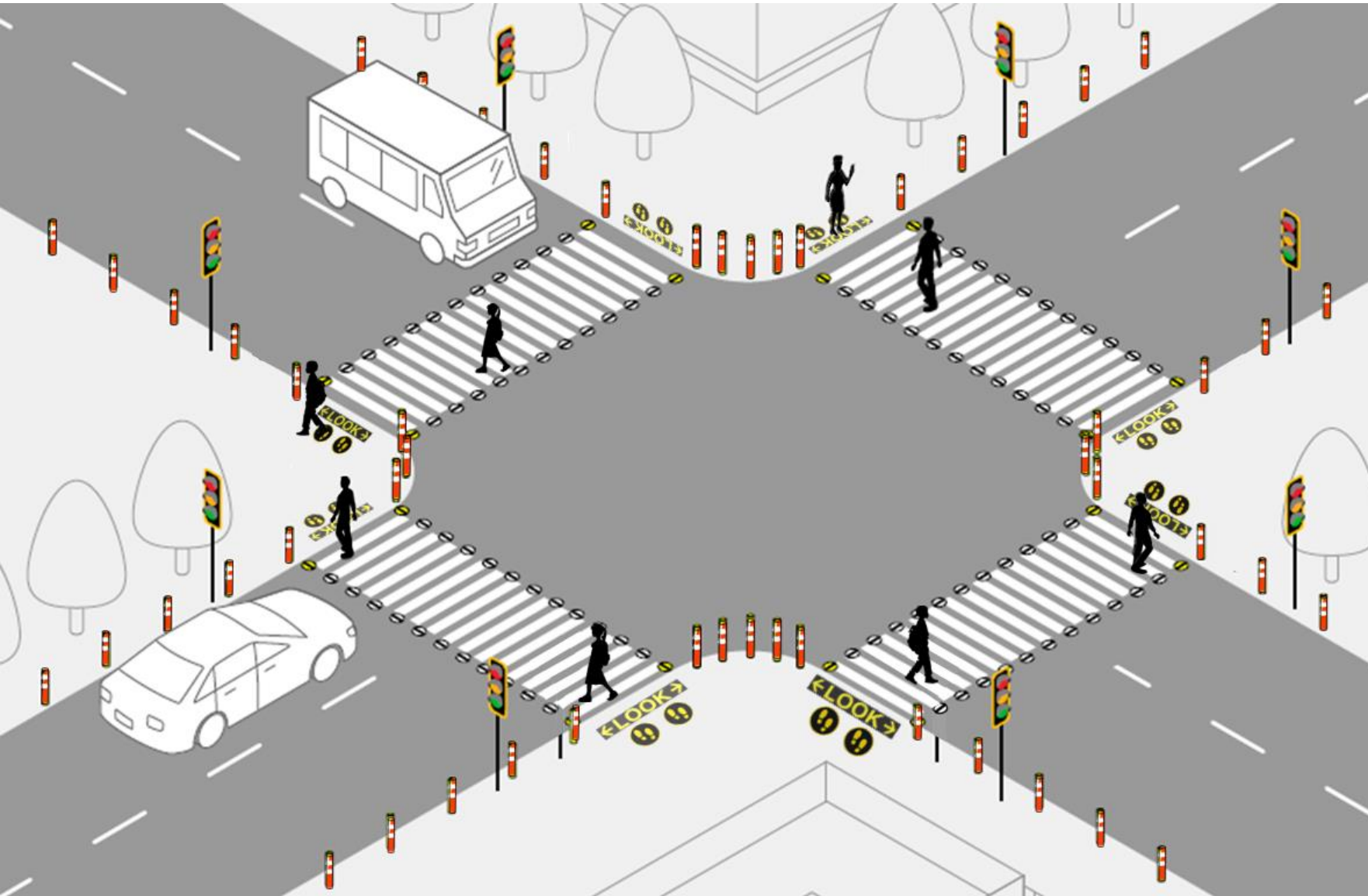


Recommend on NMT lanes / facilities

School Entry and Exit Gates



Junction Treatment

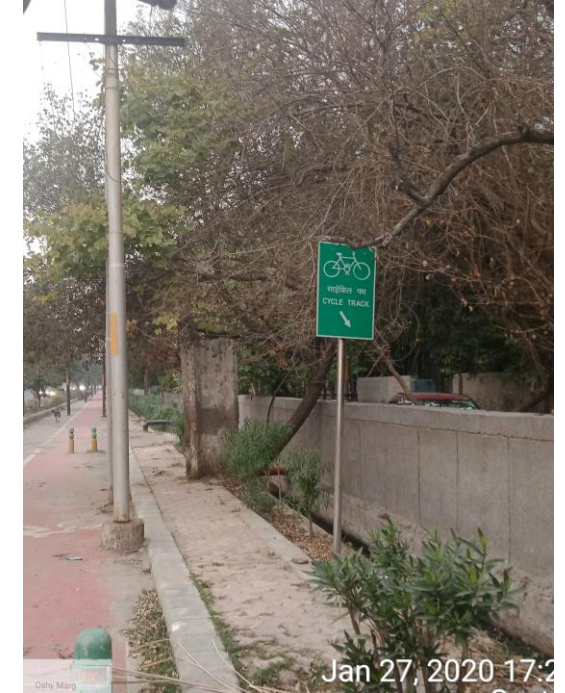


We hope to transform school zones with innovative 3M solutions



Source: 3M Young Change Agent for Road Safety Program – CSR Initiative for School Zone Safety, 2019.

Bicycle Safety



Cycle track is encroached for Autorickshaw Parking

Placing of Traffic Signs

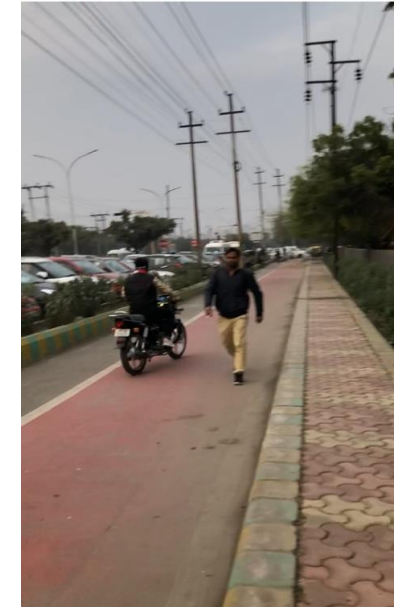
Bicycle Safety



Lack of maintenance of bollards



Parking and motorized movement on Cycle Track



Bicycle Safety



Absence of Street Light and Parking Provided on Cycle Track during night

Bicycle Safety



Source: <https://www.smartcitiesworld.net/news/manchesters-cyclops-junction-reaches-major-milestone-5383>

IS 10613-2014 Standard- Clause 4.15 Application on Bicycle

Product Details	White Front Stem	White Lamp Bracket	Yellow Front Fork	Yellow Seat Stay	Red Rear Mudguard
Piece Size (mm)	15 x 50	36 x 27	15 x 90	15 x 90	15 x 75
No. of Pieces in 1 Kit	2	1	2	2	2



Front Viewing



Side Viewing



Rear Viewing

Bicycle Safety



Motor-Cycle Safety



Source: <https://www.eqmagpro.com/climate-consequences-2022-india-sneezes-eg-mag-pro/>



Source: <https://www.carblogindia.com/indians-legends-traffic-violations-cons/>



Source: <https://www.alamy.com/stock-photo/street-of-agra.html?page=10>



Source: <https://twitter.com/MumbaiPolice/status/1060784117040713729/photo/3>

Motor-Cycle Safety – Traffic Management

Solution	Cost	Effectiveness
Motor Cycle Lanes	Medium	25-40%
One Way Network	Medium	25-40%
Speed Management and Traffic Calming	Medium to High	25-40%
Intersection - Signalize	Medium	25-40%
Intersection – Grade Separation	High	25-40%
Intersection - Delineation	Low	10-25%
Delineation	Low	10-25%

Source : <https://toolkit.irap.org/road-users/motorcyclists/>

Motor-Cycle Safety – Reflective Solution



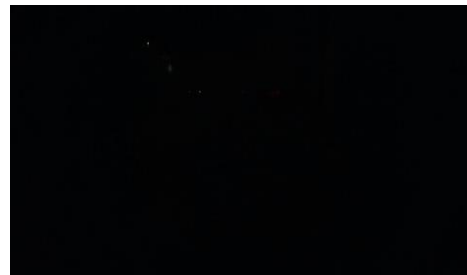
Tractor Application- with and without Retro Reflective tapes

CSR activity & Initiative by Police and Transport Department

Day View without Retro Reflective tape



Night View without Retro Reflective tape



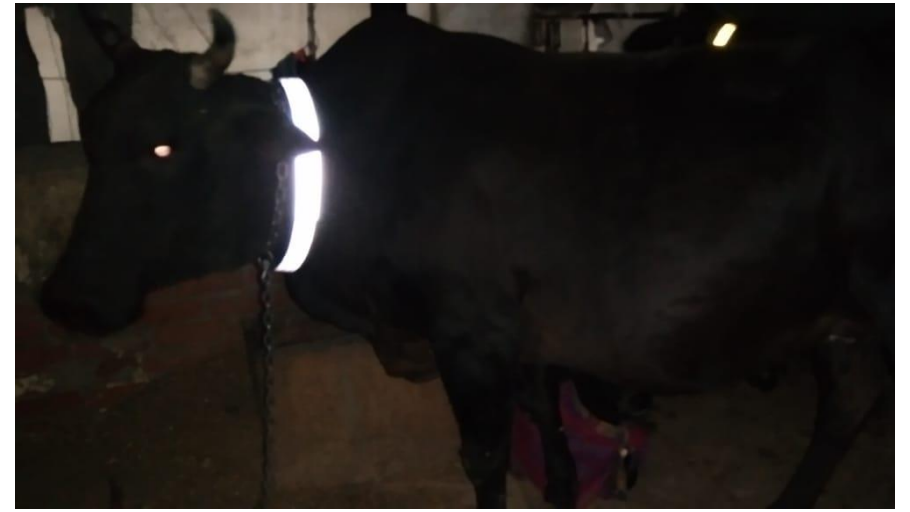
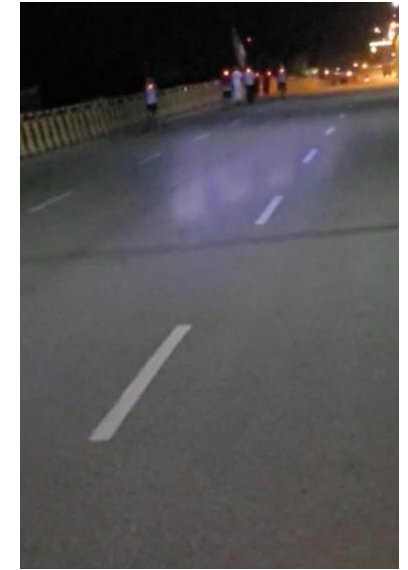
Day view With Retro Reflective Tape



Night View with Retro Reflective tape



Other Safety Measures



Thank you

For more details, please contact your 3M Sales representative or drop an email to **transportation_safety.in@mmm.com**.

3M India Ltd.

48-51, Phase 1, Electronics City

Hosur Road, Bangalore - 560100 | Karnataka | India

Office: +91 80 45543000

Website: https://www.3mindia.in/3M/en_IN/road-safety-in/

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