



Designing Safe Streets for All Users

Responses to the challenges posed by growing motorcycle use

Eduardo Pompeo

eduardo@gdci.global

ADB GRRSO Dialogue on
Motorcycle Safety

Manila, Oct 12, 2022

[@GlobalStreets](https://www.instagram.com/GlobalStreets)

www.globaldesigningcities.org

GDCI Global Designing Cities Initiative

The image features a grid of 12x12 aerial city photographs. A diagonal blue line runs from the top-left towards the bottom-right. Three rectangular areas in the top-right quadrant are highlighted with a semi-transparent blue overlay, showing green parks and tree-lined streets. The word "STREETS" is centered in a white, bold, sans-serif font on a solid blue horizontal band that spans the width of the image.

STREETS

The background is a grid of aerial city photographs. Most cells show dense urban areas with buildings and streets. Three cells in the top row are highlighted with a green tint and show parks with distinct tree patterns. A dark blue diagonal line runs from the bottom-left towards the top-right, crossing the grid.

STREETS

are the platform to...

Move



Istanbul, Turkey

Dine



Paris, France

Play



Fortaleza, Brazil

Learn to Ride



Bogotá, Colombia

Spaces to relax



New Delhi, India

To spend time with old friends



Madrid, Spain

....or meet new ones



Portland, USA

An aerial view of a city grid with a blue grid overlay. Three rectangular areas in the top right quadrant are highlighted in a darker blue, showing green spaces and parks. The rest of the grid shows a dense urban landscape with buildings and streets.

STREETS

serve many functions...



Mobility and Access
Environmental Sustainability
Economic Sustainability
Livability and Quality of Life
Public Health and Safety

The image features a grid of 12x12 aerial photographs of a city. The grid is overlaid with a dark blue grid pattern. A prominent diagonal blue line runs from the top-left towards the bottom-right. Several cells in the grid are highlighted with a semi-transparent blue overlay, showing green spaces and parks. The text 'Largest network of continuous public space' is centered in a white, bold, sans-serif font on a solid blue horizontal band that spans the width of the image.

**Largest network of
continuous public space**

The background of the slide is a grid of aerial photographs of a city. Most cells show dense urban development with buildings and streets. Three cells in the top row and one cell in the bottom right are highlighted with a green overlay, showing parks or green spaces within the urban grid. A dark blue diagonal line runs from the top right towards the bottom left, crossing through the grid.

**we must make better, more efficient
use of this valuable space**

























A lot can be done for the safety of motorcyclists

- **Universal helmet use**
- **Safer motorcycles**
- **Strategic enforcement**
- **Better training for motorcyclists**
- **Improved crash response**
- **Better crash data management**
- **...**

When it comes to street design, we should acknowledge that the street is a single space where multiple users interact...



We can we avoid repeating mistakes from the past...



...of considering only one user in isolation...



?



...to asking how do we make our cities safe for all people!





Global Designing Cities Initiative



Global
Designing
Cities
Initiative



Bloomberg
Philanthropies

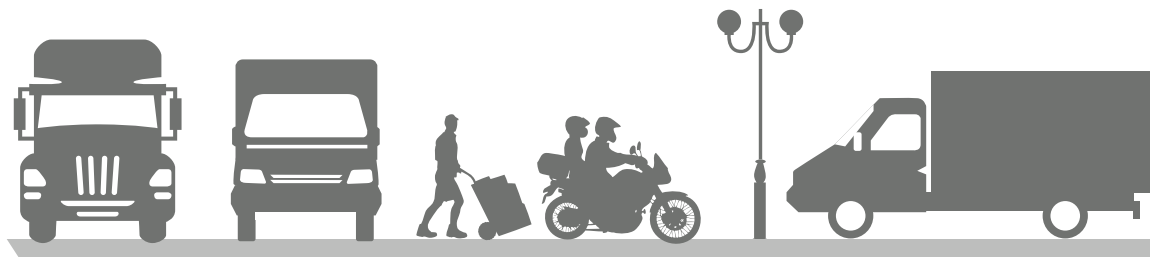
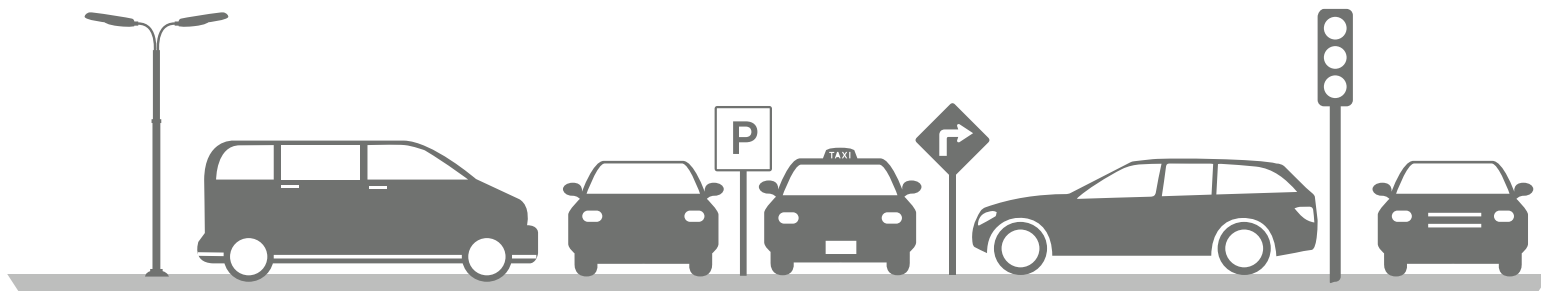
INITIATIVE FOR GLOBAL ROAD SAFETY

Global Expert Contributing Network



40+ countries
70+ cities

- Global Expert Network Member
- Shouping China No Global Road Safety Initiative







What is Possible?




People: Design for All Street Users





 Pedestrians

 Cyclists

 Transit Riders

 Motorists

 Freight Operators and Service Providers

 People Doing Business



**We do not have all the
answers...**



**We do not have all the
answers...**

**...but together we can
dialogue to formulate the
right questions 😊**



Motorcyclists are highly vulnerable



Motorcyclists



Car occupants

Motorcyclists are 38x more likely to be killed
than car drivers in London

Motorcyclists



Motorcyclists are a unique vulnerable road user





Motorcyclists are a unique vulnerable road user



Motorcyclists



Cyclists



Pedestrians

User Protection	Motorcyclists	Cyclists	Pedestrians
	Low	Low	Low



Motorcyclists are a unique vulnerable road user



Motorcyclists



Cyclists



Pedestrians

User Protection	Low	Low	Low
Max Speed		~20km/h	~6km/h
User Mass		Low	Low



Motorcyclists are a unique vulnerable road user



Motorcyclists



Cyclists



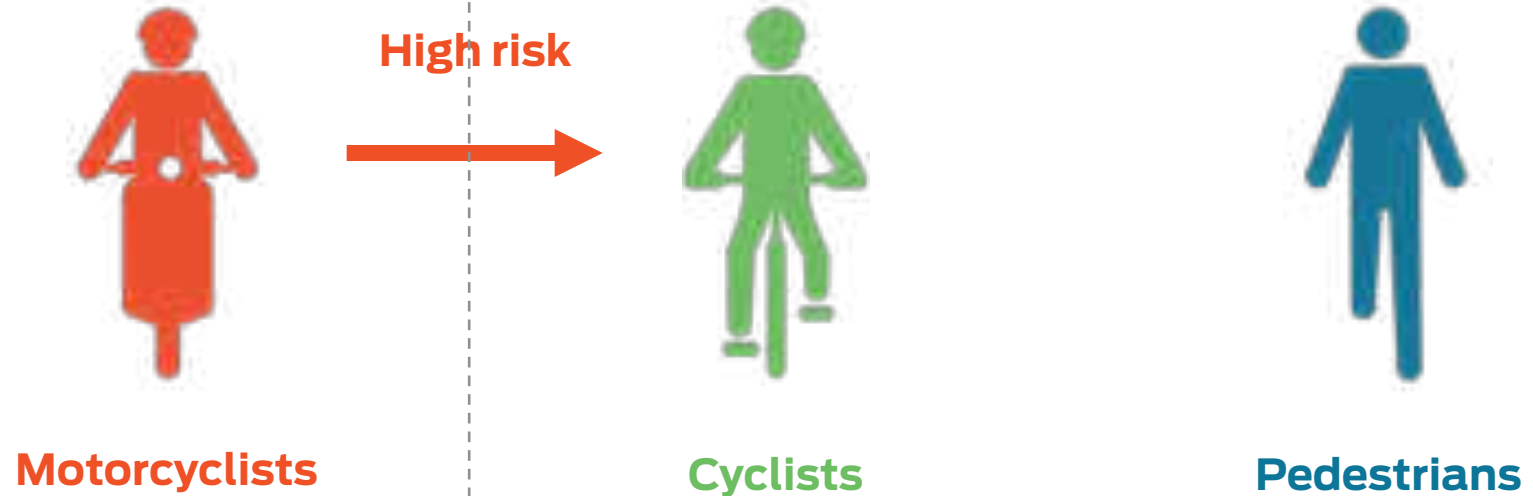
Pedestrians

Minimal risk
→
(low mass and speed differential)

User Protection	Low	Low	Low
Max Speed		~20km/h	~6km/h
User Mass		Low	Low



They also pose risks to other vulnerable users



User Protection	Low	Low	Low
Max Speed	~100km/h +	~20km/h	~6km/h
User Mass	Medium	Low	Low



They also pose risks to other vulnerable users



High risk



In Bogota, motorcycles are the **LEADING cause of death for pedestrians**
(cause 33% of ped deaths, 2020)

Motorcyclists

Pedestrians

Victim/Vehicle	Light vehicle	Motorcycle	Heavy vehicle	Passenger vehicle	Pedestrians	Bicycle	Single-vehicle crash	Missing vehicle	Total
Motorcyclist	25	8	37	33	4	3	43	0	153
Pedestrian	21	44	13	28	0	2	0	22	130
Cyclist	9	6	21	18	1	0	13	0	68
4-wheeler occu.	2	1	5	2	0	0	16	0	26
Total	57	59	76	81	5	5	72	22	377

Source: City of Bogotá / Vital Strategies



They also pose risks to other vulnerable users



Motorcyclists

Motorcycles caused or participated in 27% of all road traffic fatalities in the city, despite mode share of only 5.5%

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They also pose risks to other vulnerable users



Motorcyclists

At high speeds,
**motorcycling is
inherently unsafe
in urban areas**

What does the rapid growth and danger posed by motorcycles mean for the physical design of streets?



Is the implementation of Dedicated Motorcycle Facilities the right design response in cities?



Dedicated motorcycle lane



Advanced stop bar for motorcycles



(a)

Are motorcycling facilities proven to make our streets safer for all users?

(b)

How can we redesign streets to promote safe and sustainable mobility?

(c)

Focus on speeds to make streets safe for all users



(a)

Are motorcycling facilities proven to make our streets safer for all users?

Dedicated Motorcycle Facilities



In motorways, there are positive trends





In cities, there are mixed results



Precedent: pilot implementation of dedicated motorcycle lanes in São Paulo, Brazil



In cities, there are mixed results

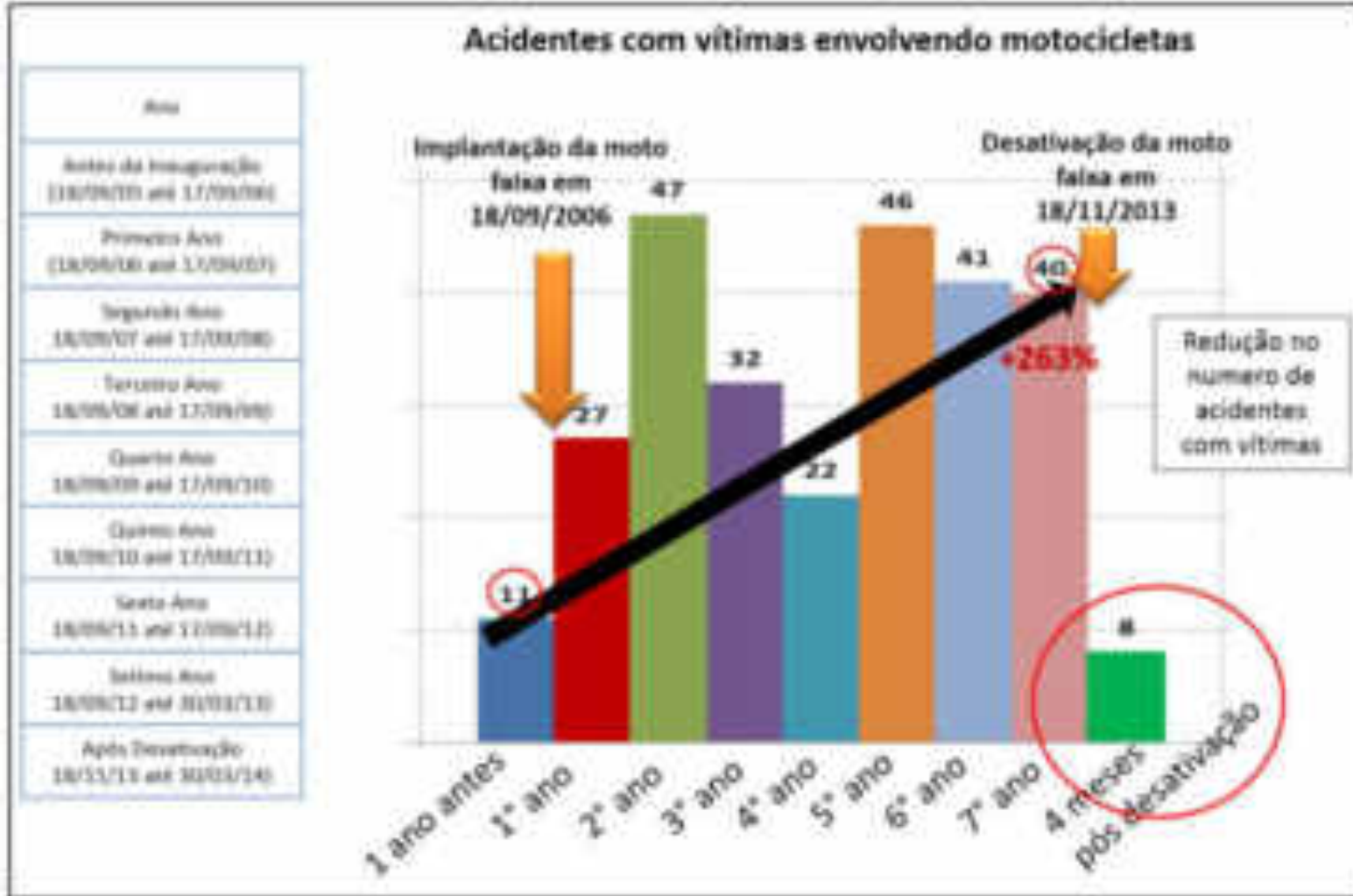
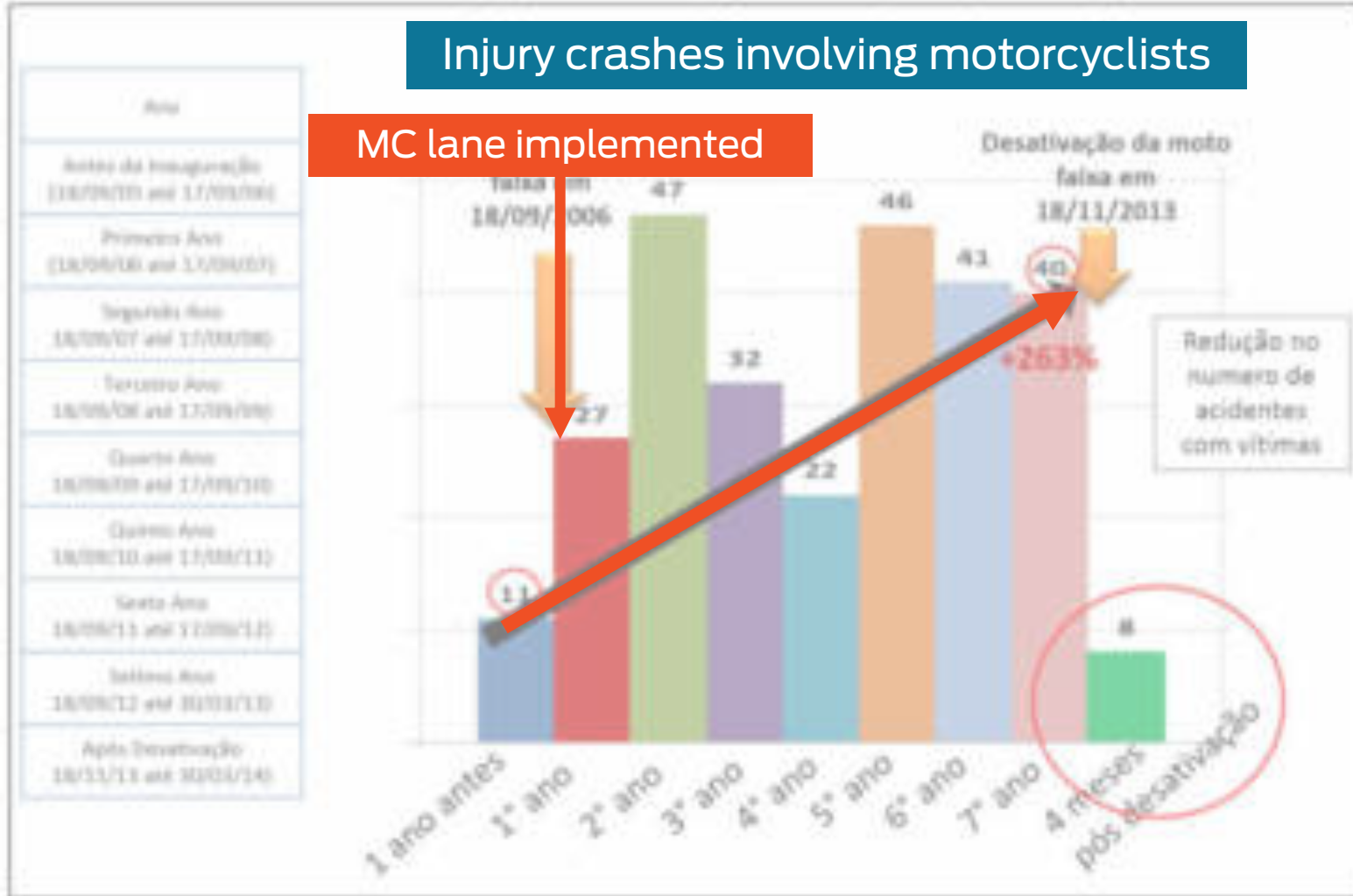


Gráfico B – Acidentes veiculares com vítimas envolvendo motocicletas Av. Sumaré e Av. Paulo VI- SAT CET



In cities, there are mixed results



+263% injury crashes

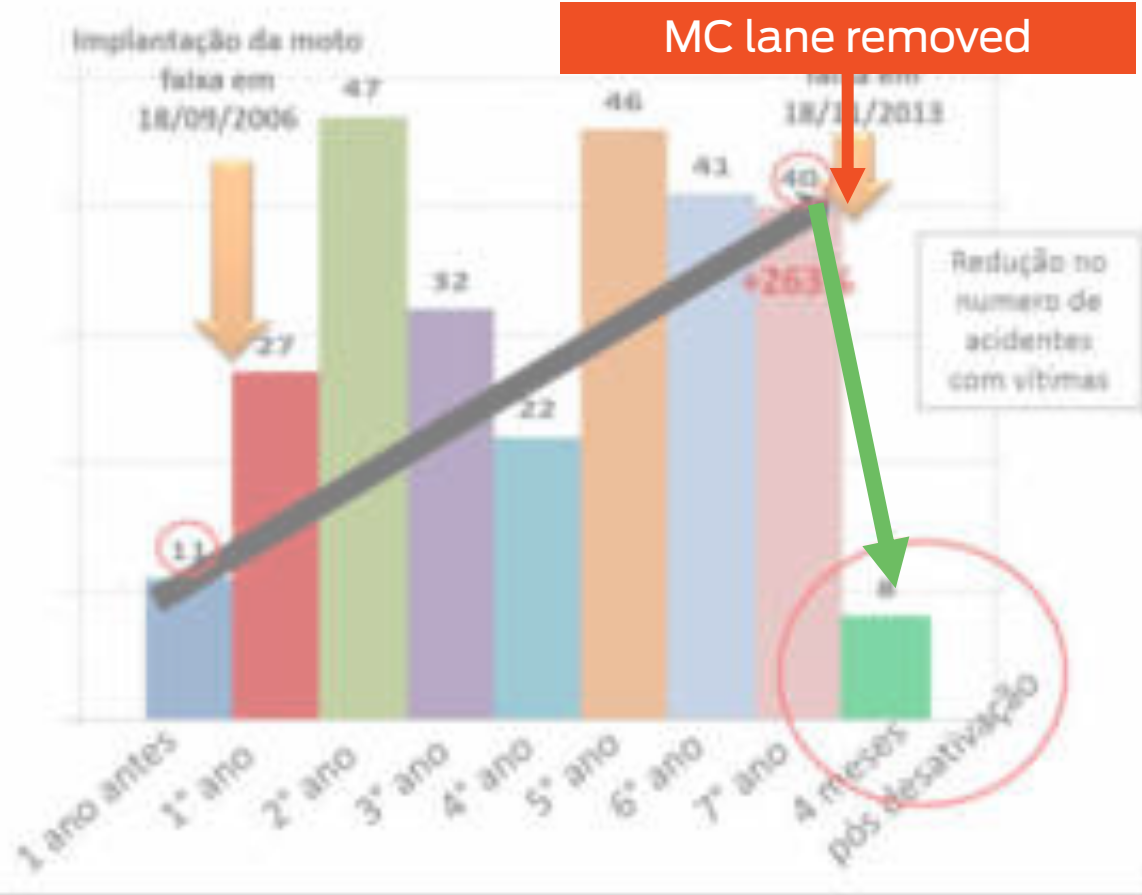
Gráfico B – Acidentes veiculares com vítimas envolvendo motocicletas Av. Sumaré e Av. Paulo VI- SAT CET



In cities, there are mixed results

Injury crashes involving motorcyclists

Ano
Antes da inauguração (18/09/05 até 17/09/06)
Primeiro Ano (18/09/06 até 17/09/07)
Segundo Ano (18/09/07 até 17/09/08)
Terceiro Ano (18/09/08 até 17/09/09)
Quarto Ano (18/09/09 até 17/09/10)
Quinto Ano (18/09/10 até 17/09/11)
Sexto Ano (18/09/11 até 17/09/12)
Sétimo Ano (18/09/12 até 17/09/13)
Após Desativação (18/11/13 até 30/03/14)

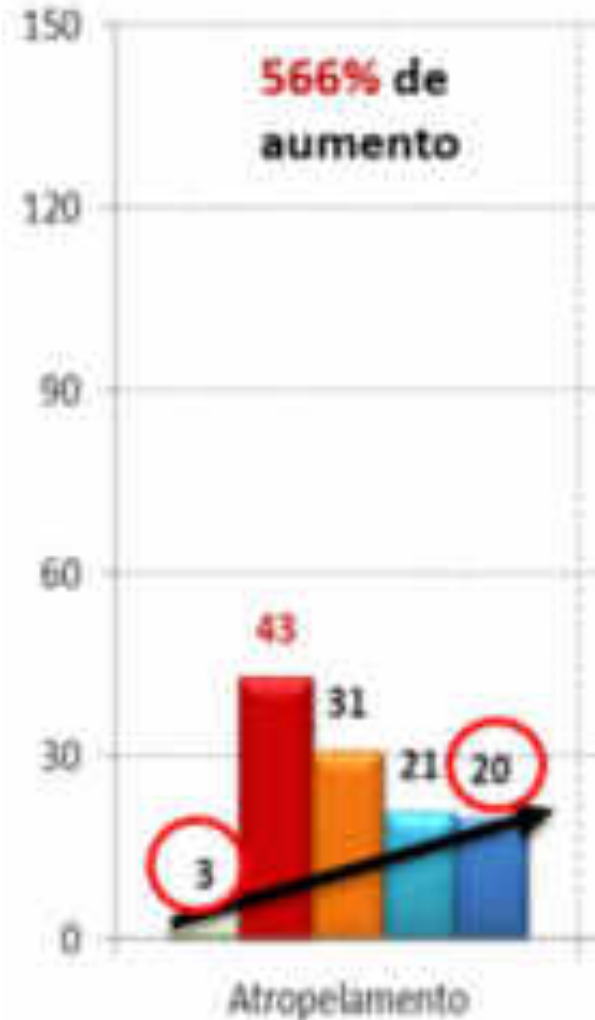


Immediate safety improvement after removal

Gráfico B – Acidentes veiculares com vítimas envolvendo motocicletas Av. Sumaré e Av. Paulo VI- SAT CET



In cities, there are mixed results



On another corridor with the same typology, there was a **566% increase in motorcycle-pedestrian crashes**

Gráfico 13 – Dados de acidentes Av. Liberdade/ Av. Vergueiro/ Av. Noé Azevedo "antes" e "depois" – SAT CET

Dedicated Motorcycle Facilities

Advanced Stop Bars



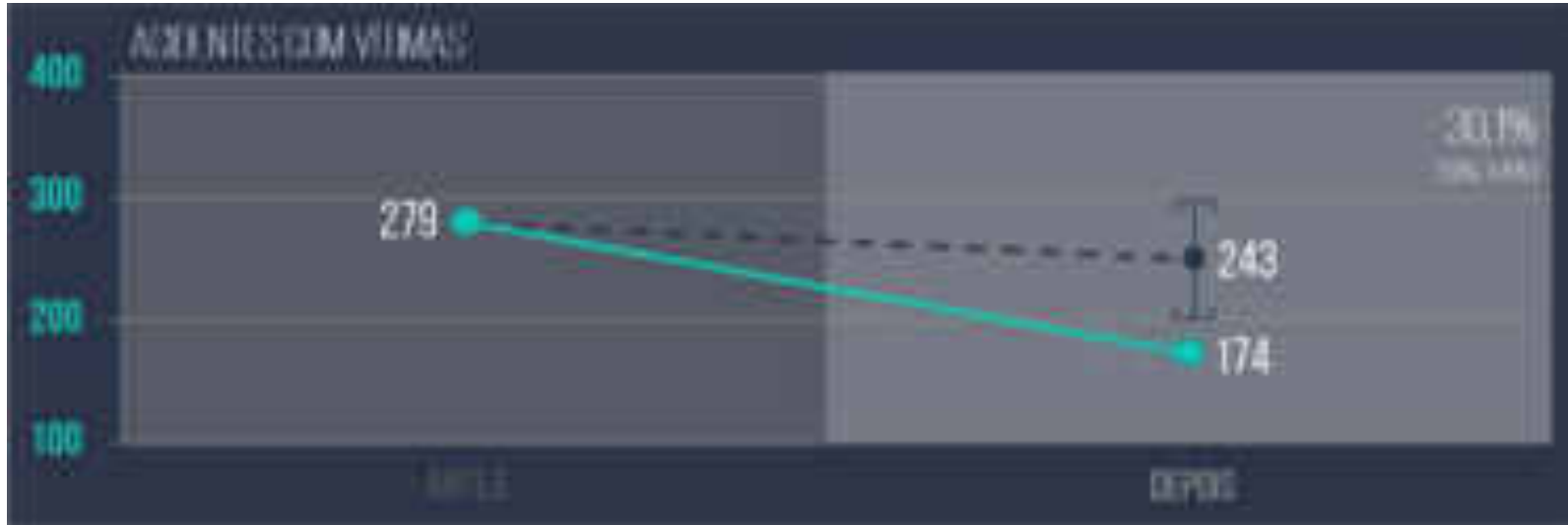


Advanced Stop Bars





Advanced Stop Bars

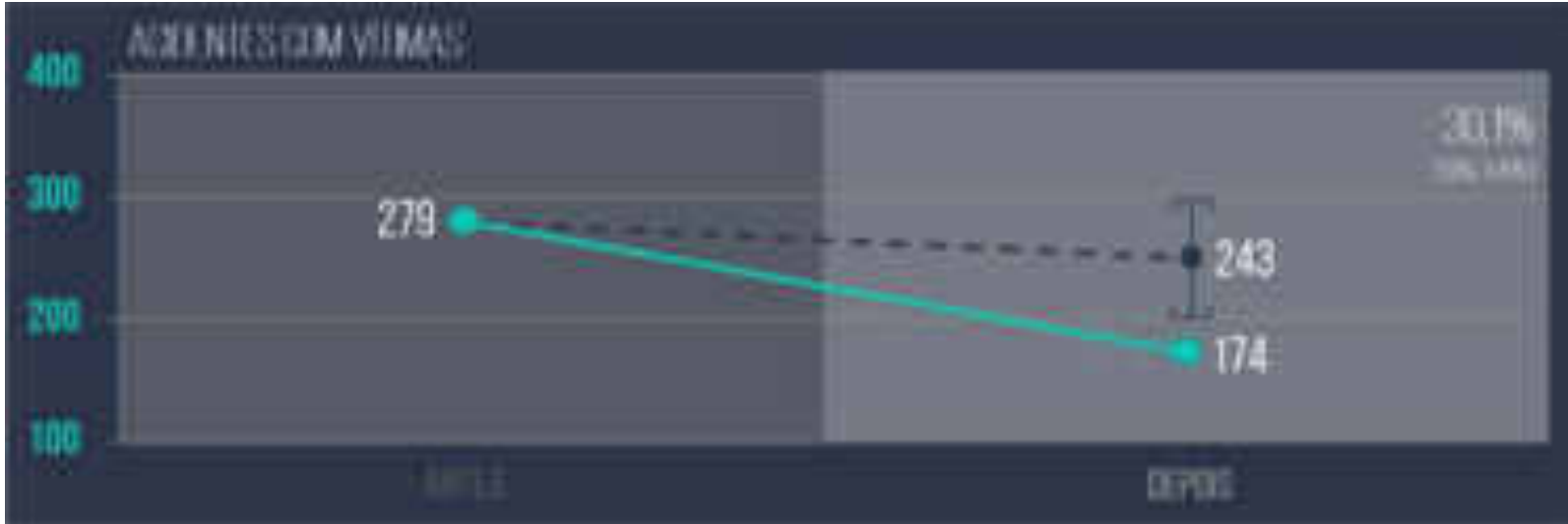


-30.1% injury crashes

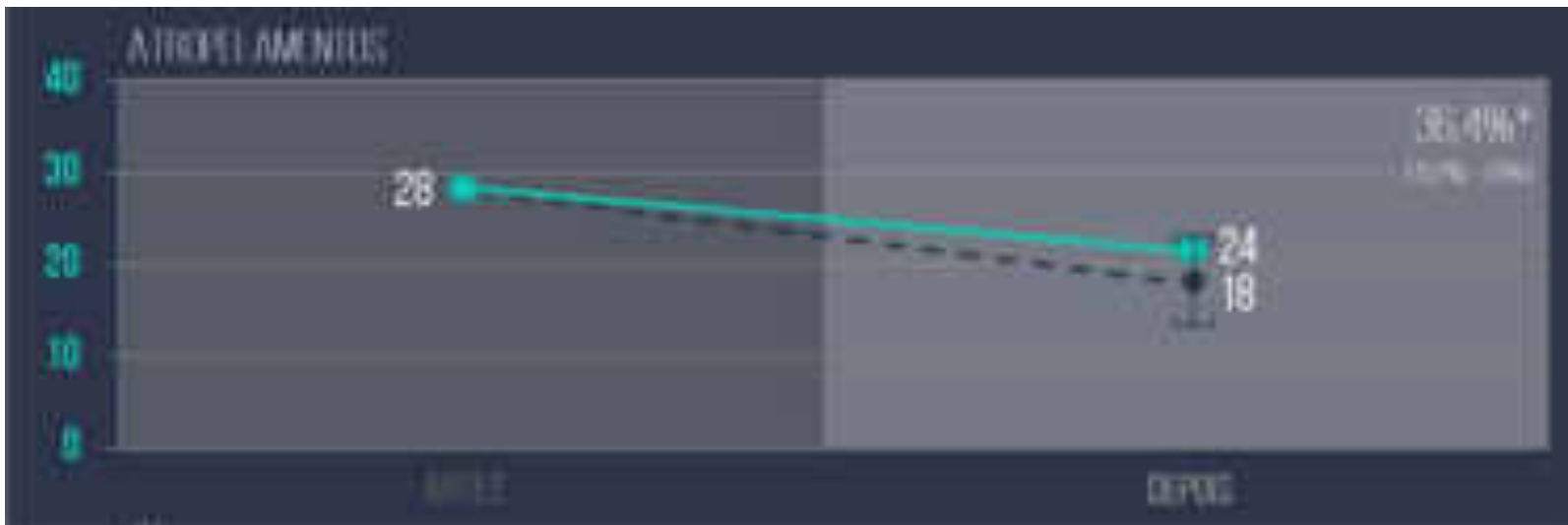




Advanced Stop Bars



-30.1% injury crashes



+36.4% pedestrian crashes



Multiple contexts and typologies



To evaluate their impact we should understand:

- The context
- The typology
- Safety of all users
- Why does it work or doesn't?



Filtering traffic



Travel Lane Widths



Can wider lanes make it safer for MCs to filter through traffic?

Filtering traffic

Travel Lane Widths

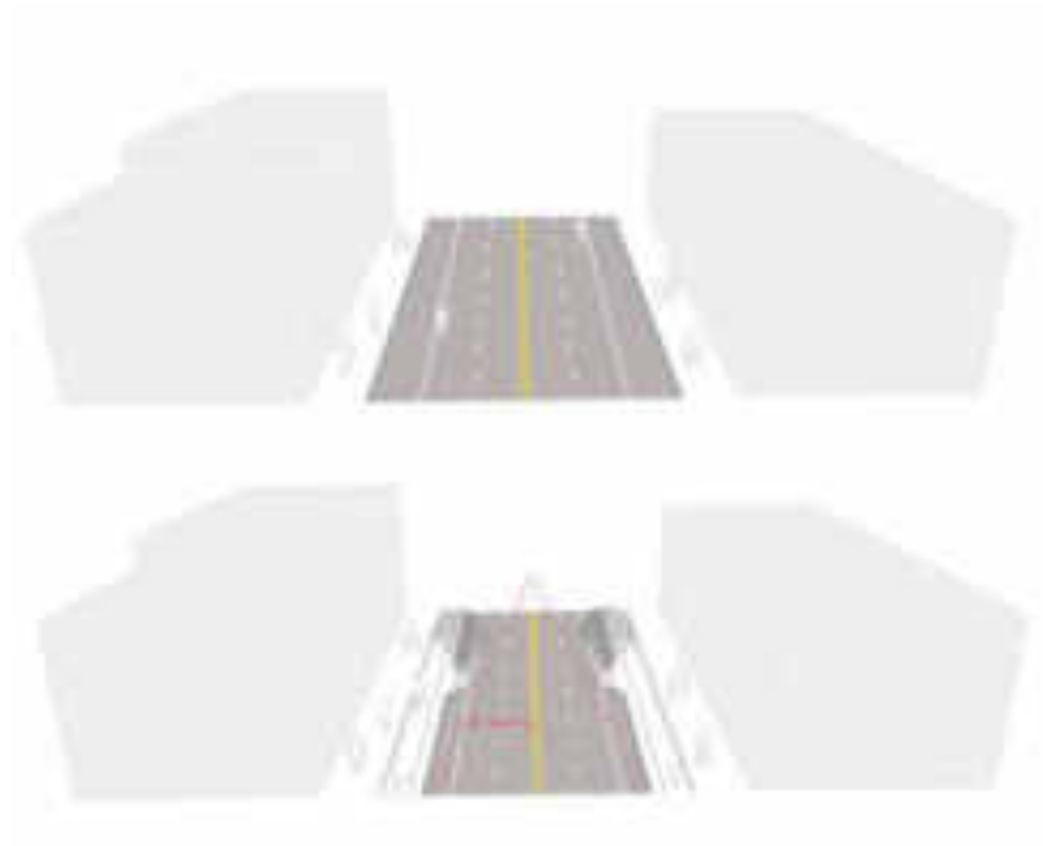


Can narrower travel lanes limit speeding opportunities?



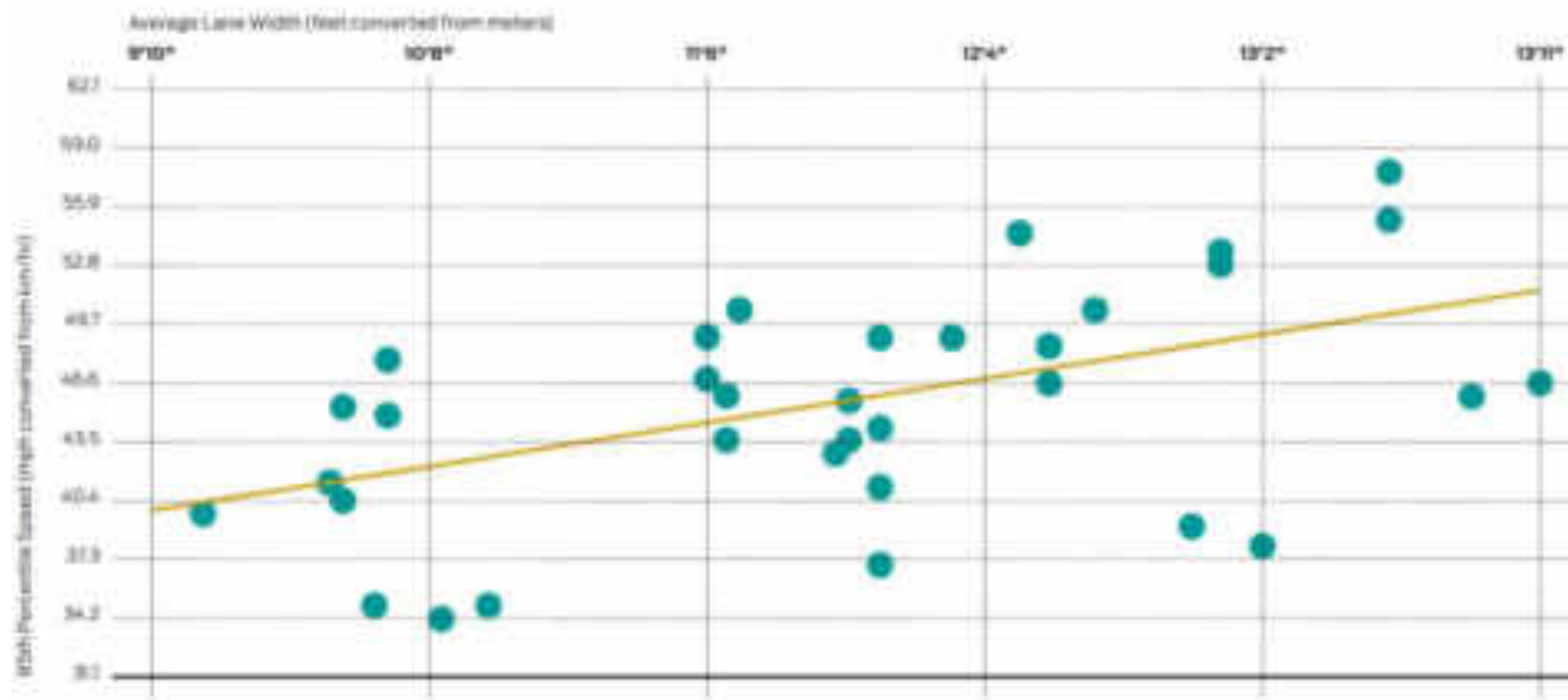
Street Design Strategies

Narrow travel lanes



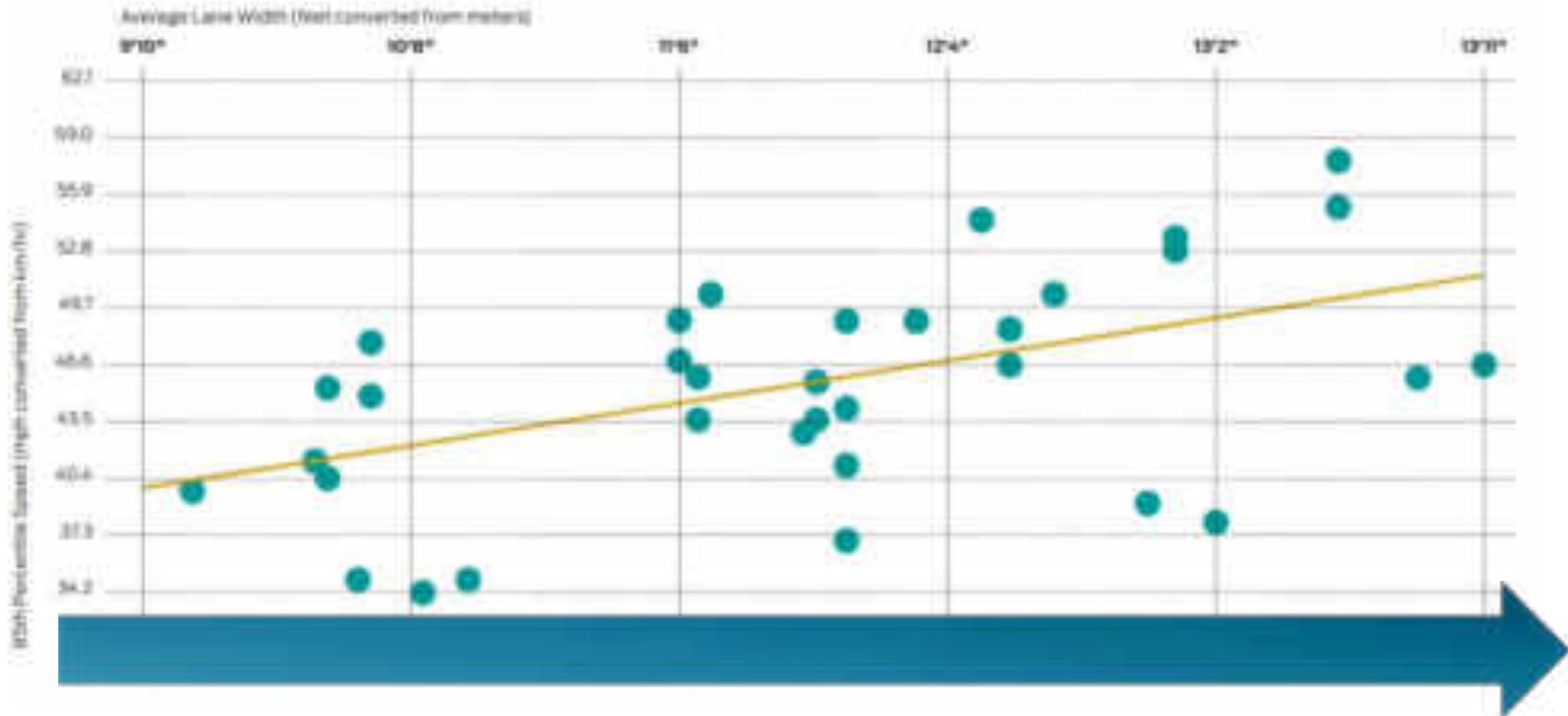


Wider travel lanes are correlated with higher vehicle speeds.



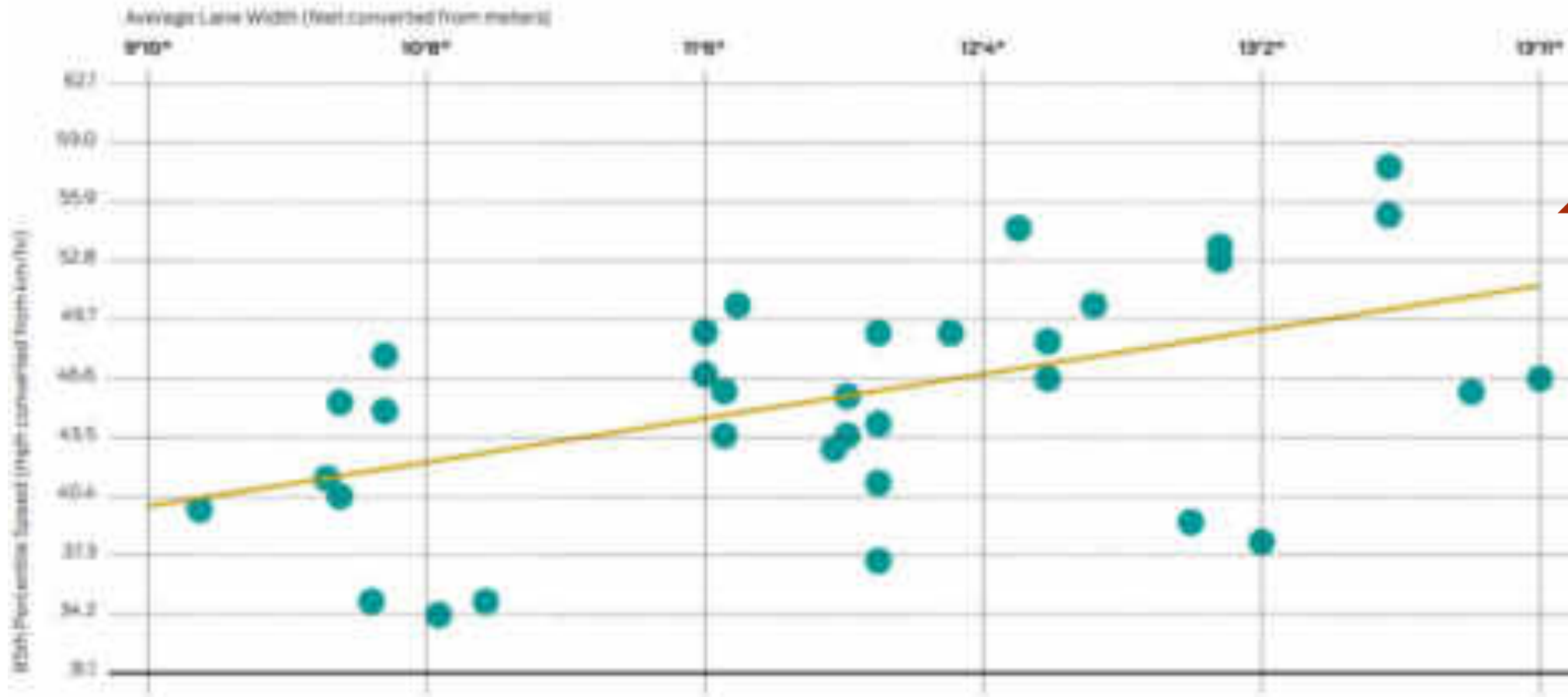


Wider travel lanes are correlated with higher vehicle speeds.





Wider travel lanes are correlated with higher vehicle speeds.



Wider lanes = Higher Speeds



Research questions:

What is the impact of lane width on motorcyclists speeds and safety?

How does it impact safety **for all street users?**



(b)

The street space is finite.

What should we prioritize to promote safe and sustainable mobility?

Promote a shift to sustainable modes



Reallocate street space



4 m

3.5 m

3.5 m

4 m

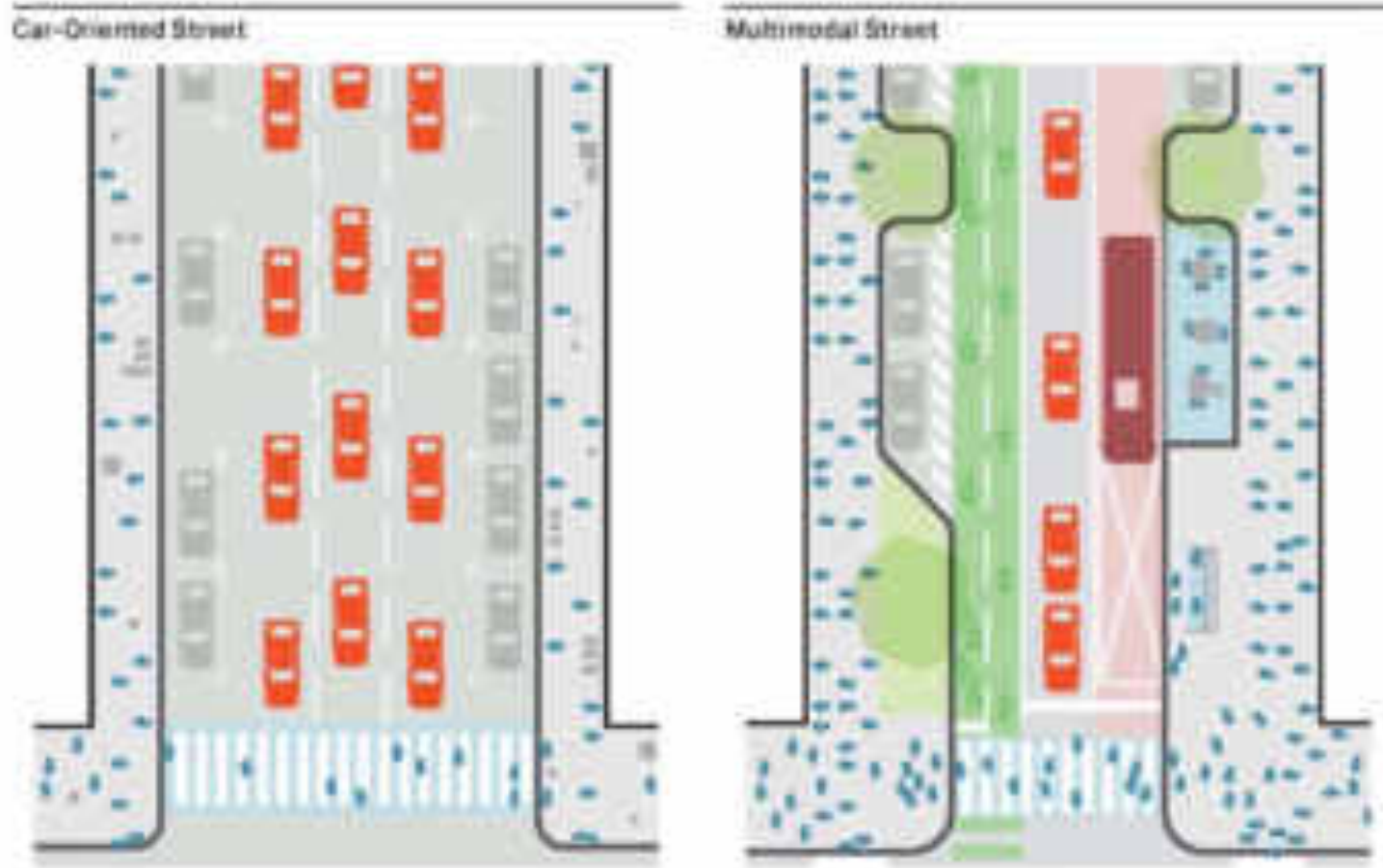
Promote a shift to sustainable modes



To make safe alternatives convenient and attractive



Multimodal streets are more efficient



Total capacity:

12,300
people/ h



Total capacity:

30,100
people/ h

x 2.4
people

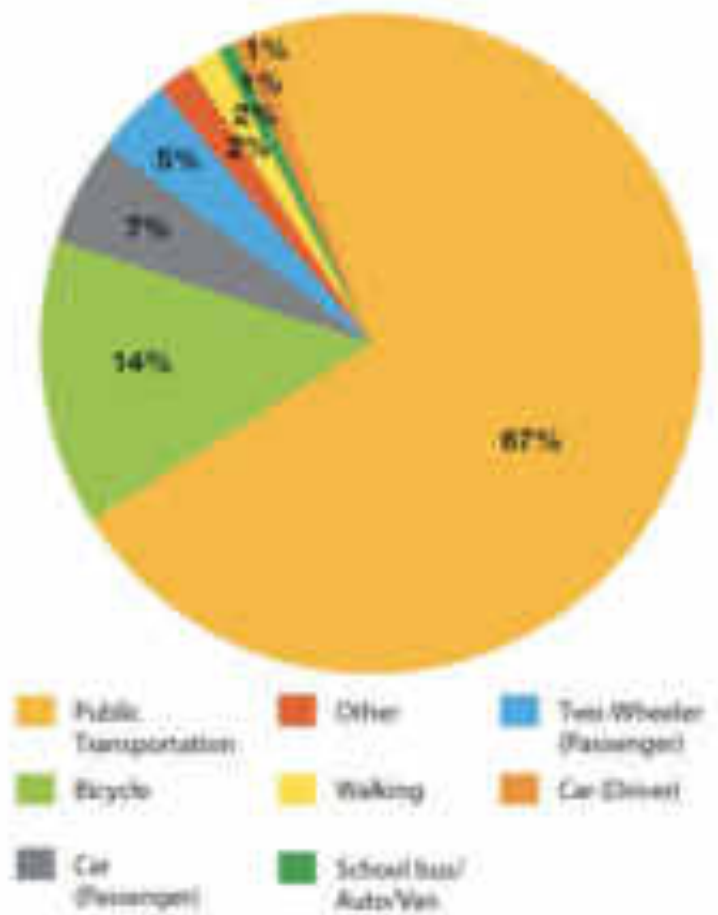


How can we reverse the trend of transit riders shifting to motorcycles?



Prevent a shift from sustainable modes...

Figure 9 Transport Modes Used Prior to Two-wheelers by Pune Survey Respondents



Source: Pune survey, 2012

Motorcyclists in Pune, India:

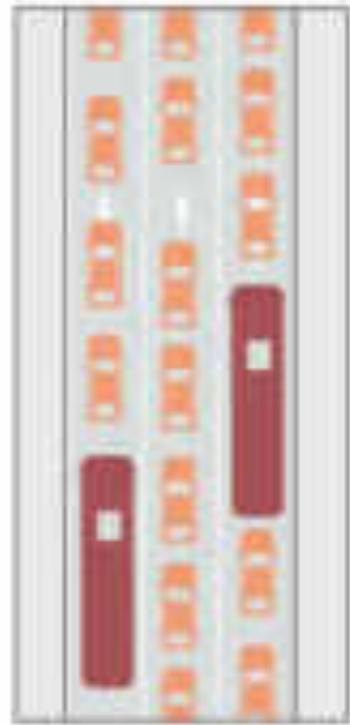
67% of formerly used public transit

14% formerly used bicycle



Save travel time with dedicated transit facilities

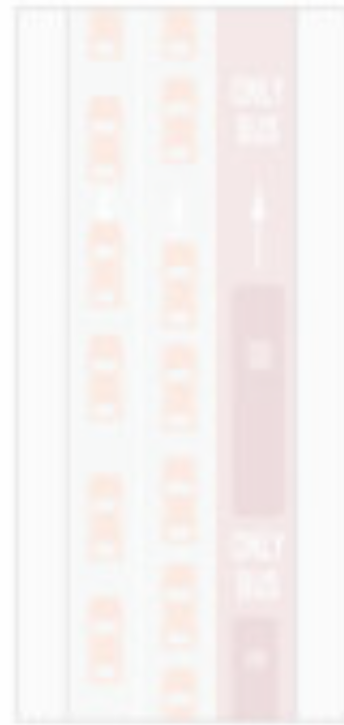
Transit stuck in congestion



**1000-2800
people/ hour**



Transit given dedicated space



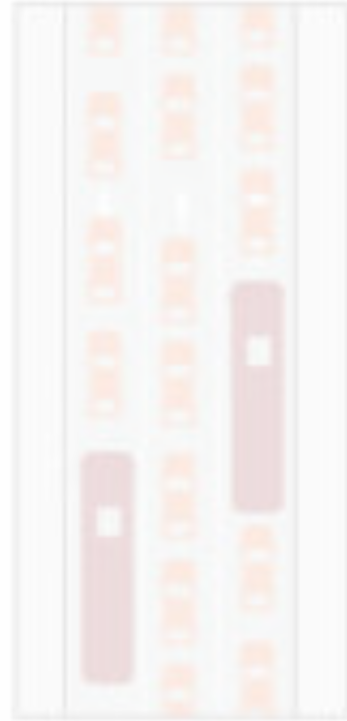
**4000-8000
people/ hour**



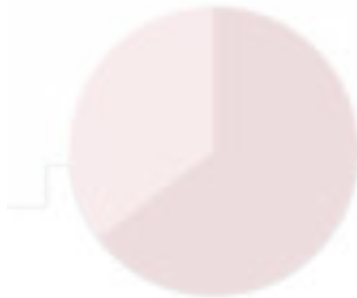


Save travel time with dedicated transit facilities

Transit stuck in congestion

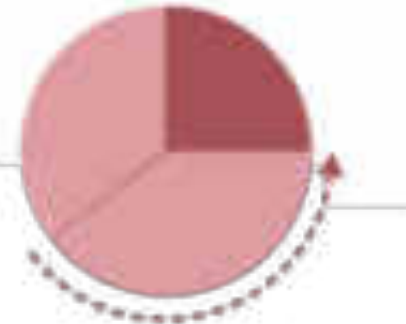


**1000-2800
people/ hour**



Transit given dedicated space

**4000-8000
people/ hour**



Transit, motorcycles and road safety



Roll out the red carpet





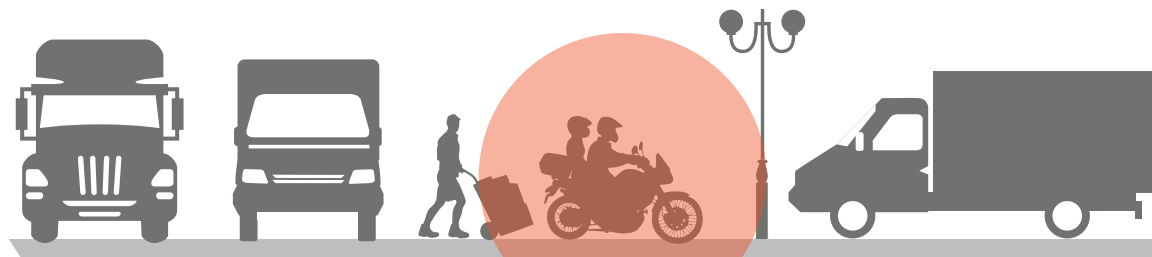
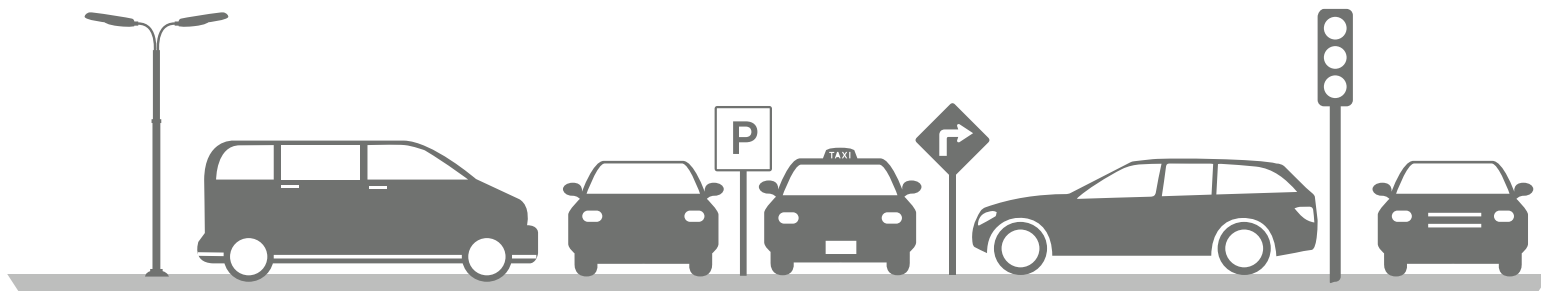
Different types of transit facilities



Nantes, France



Why should we not treat cycle and motorcycle facilities equally?

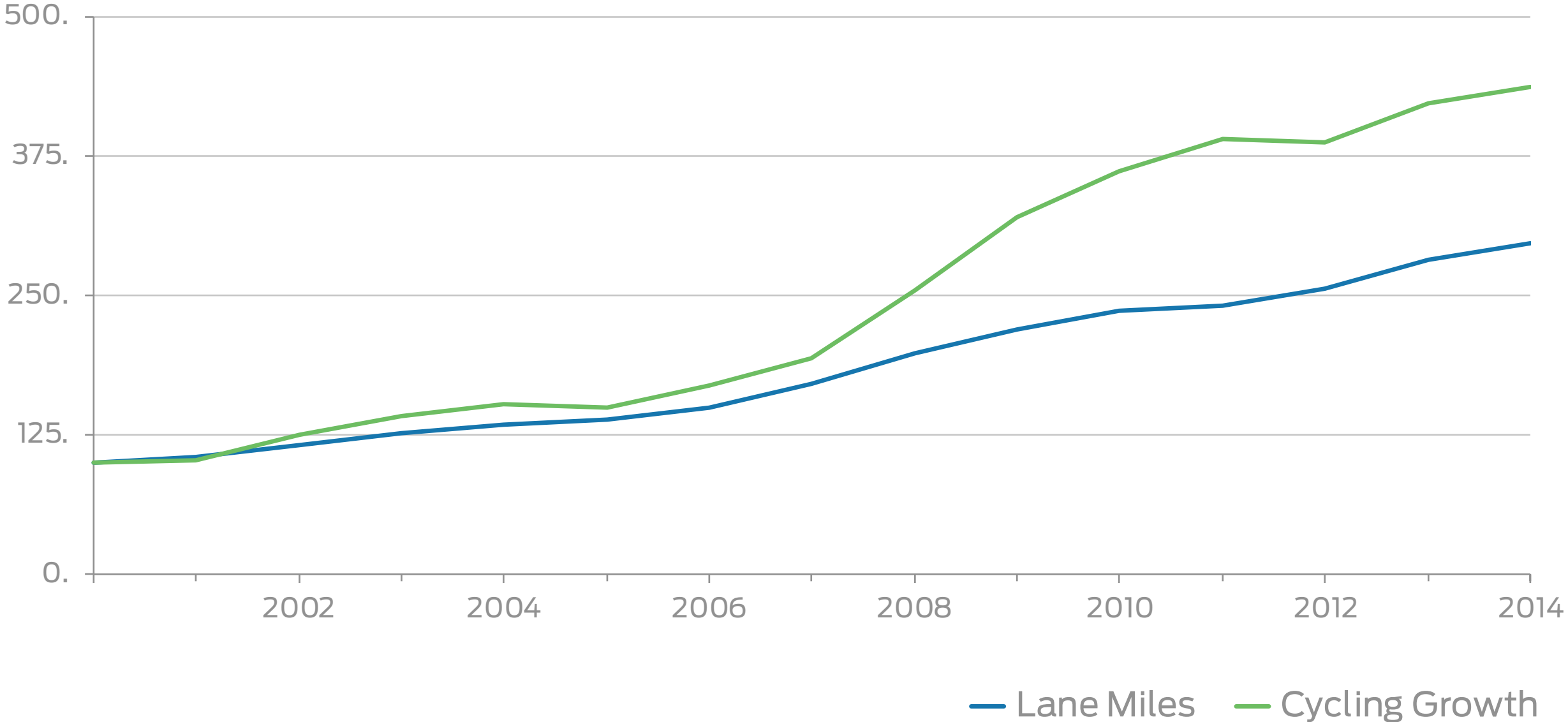




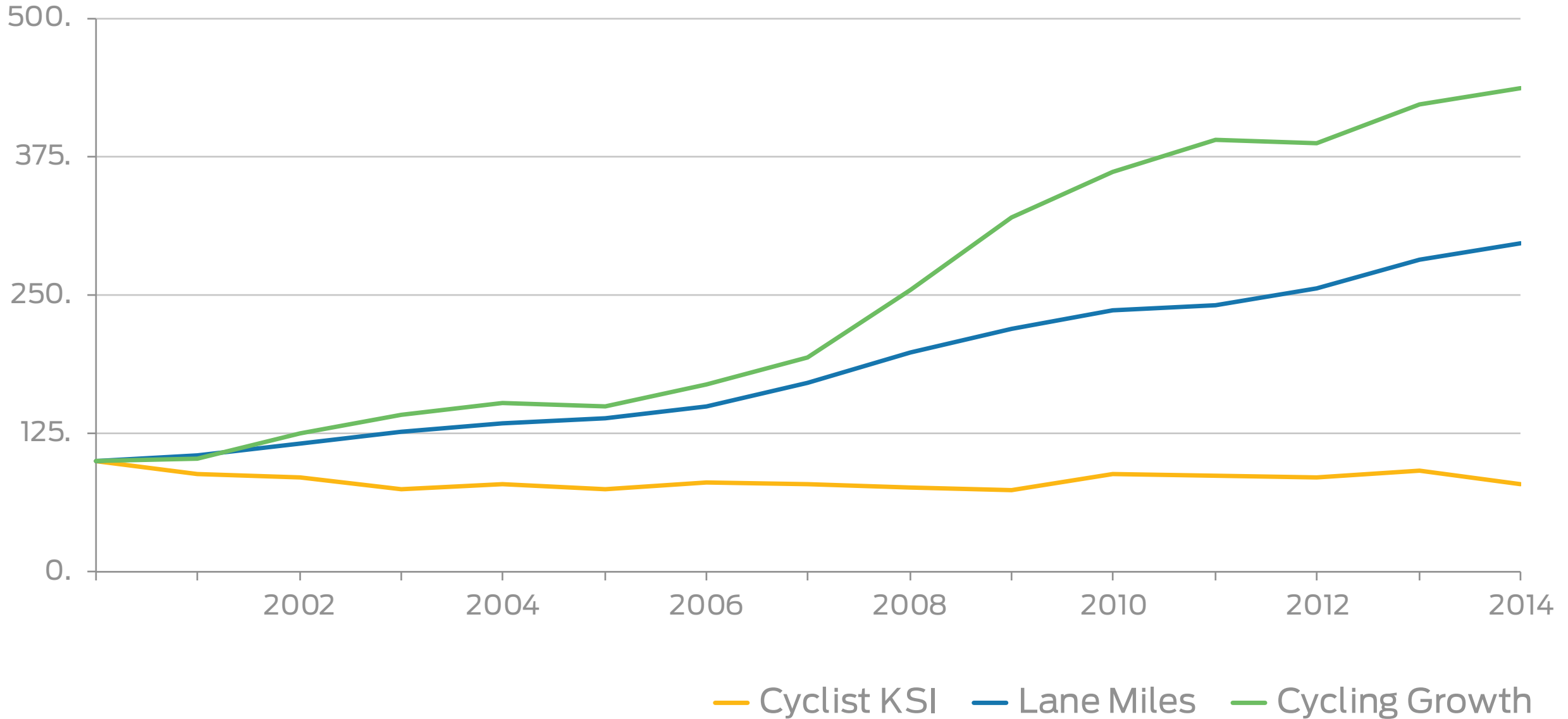
Designing for all ages and abilities



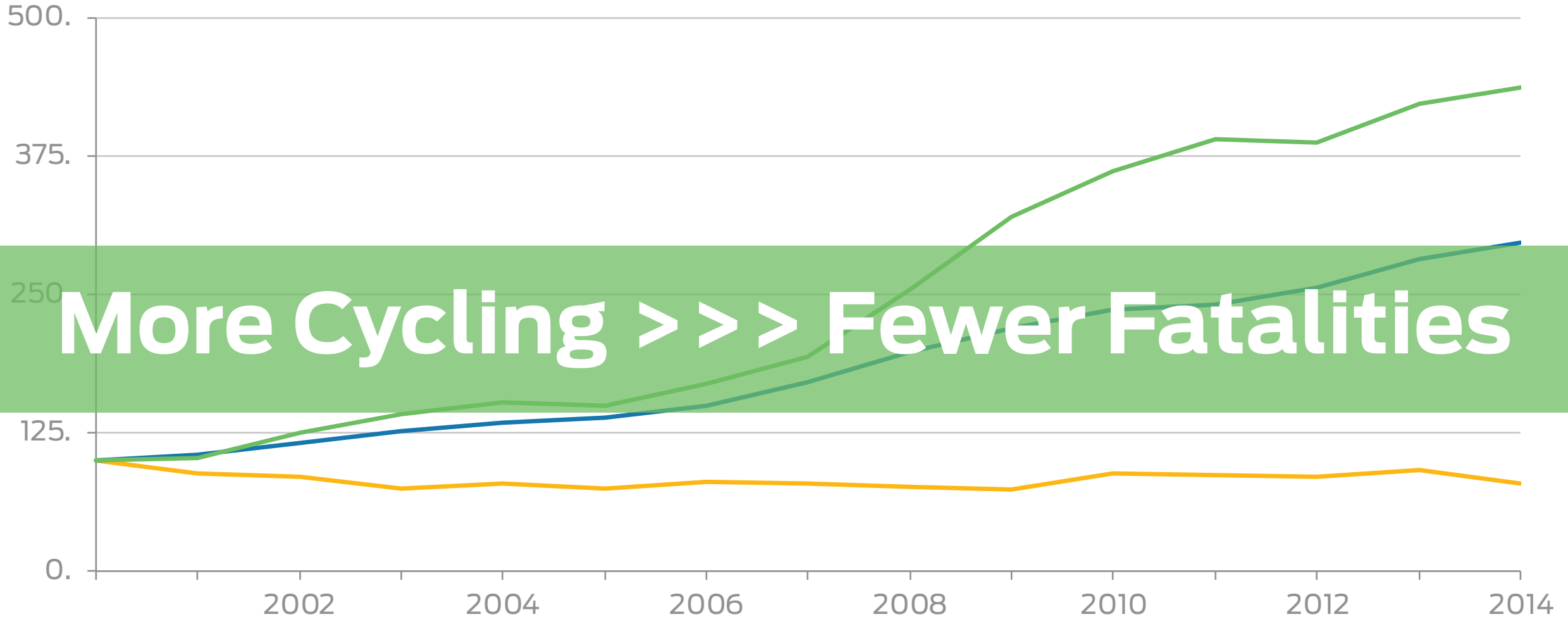
More Lanes = More Cyclists



More Lanes + More Cyclists = Reduced Risk (For All Users)



More Lanes + More Cyclists = Reduced Risk (For All Users)

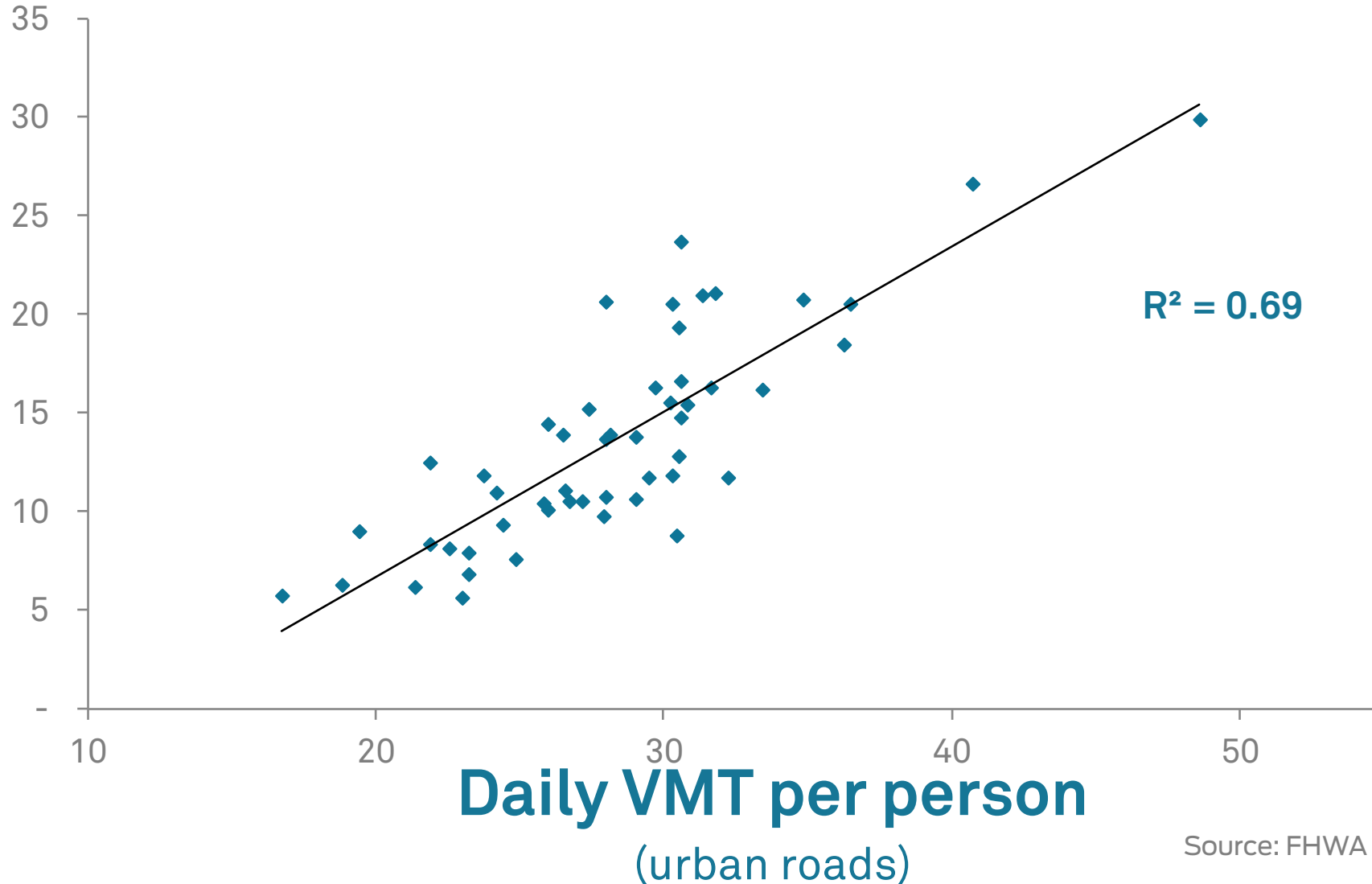


— Cyclist KSI — Lane Miles — Cycling Growth

More Personal Driving is Associated with More Traffic Fatalities



Traffic fatalities per
100,000 people
(urban roads)

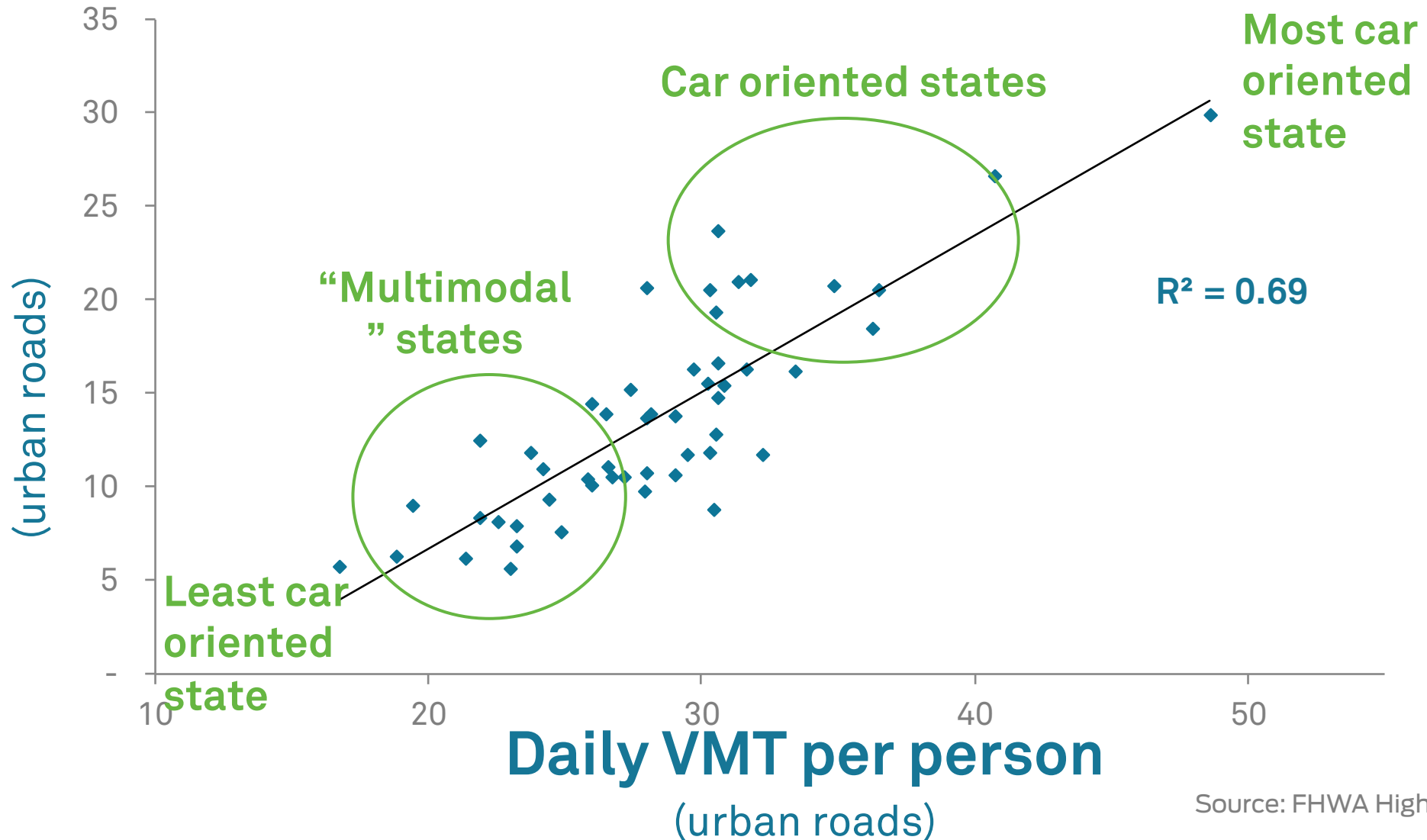


Source: FHWA Highway Statistics, 2008

More Personal Driving is Associated with More Traffic Fatalities



Traffic fatalities per
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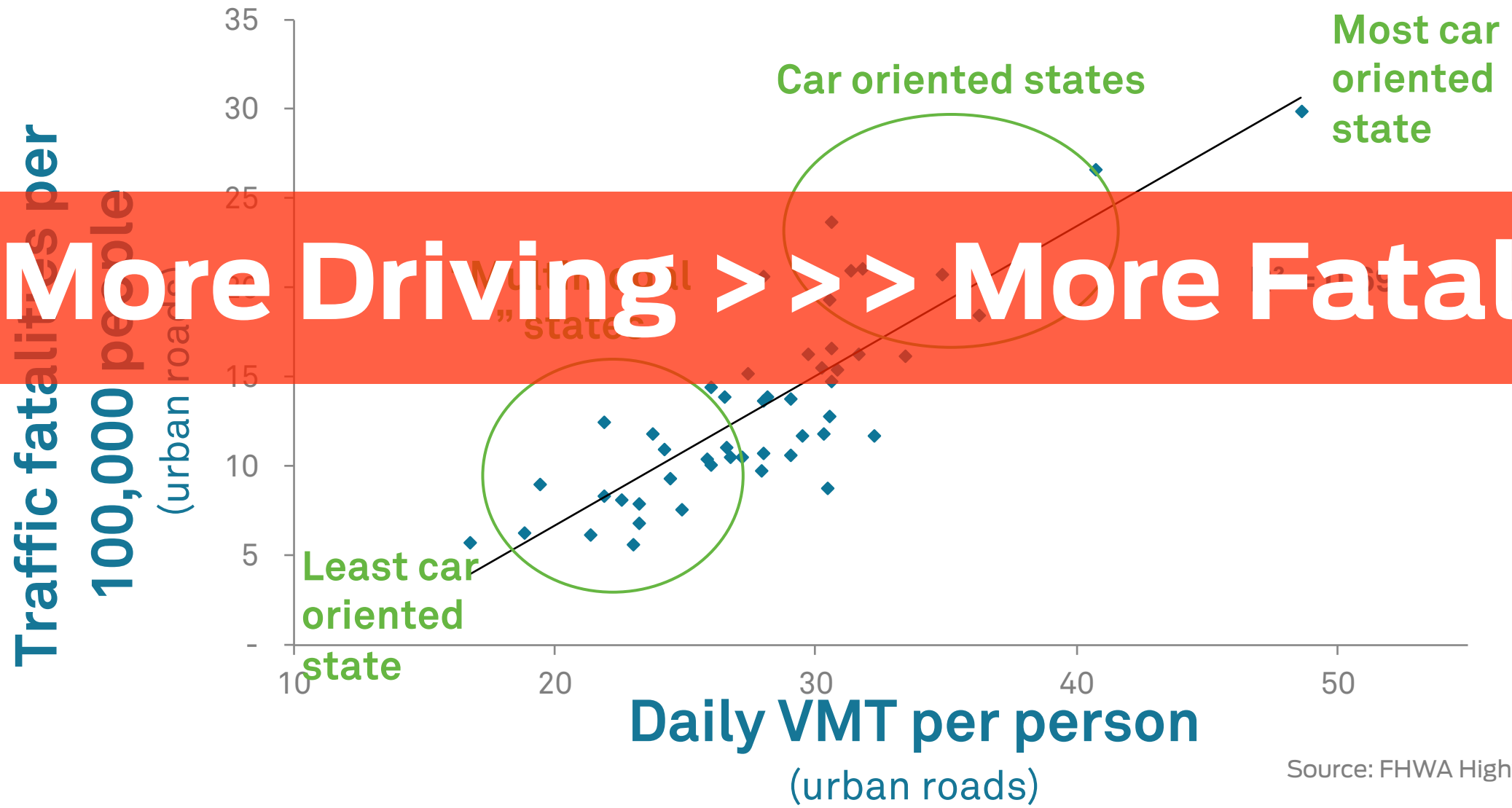


Source: FHWA Highway Statistics, 2008

More Personal Driving is Associated with More Traffic Fatalities



More Driving >>> More Fatalities



Source: FHWA Highway Statistics, 2008



Research question:

**Does dedicated infrastructure
induce demand for motorcycling?**



Research question:

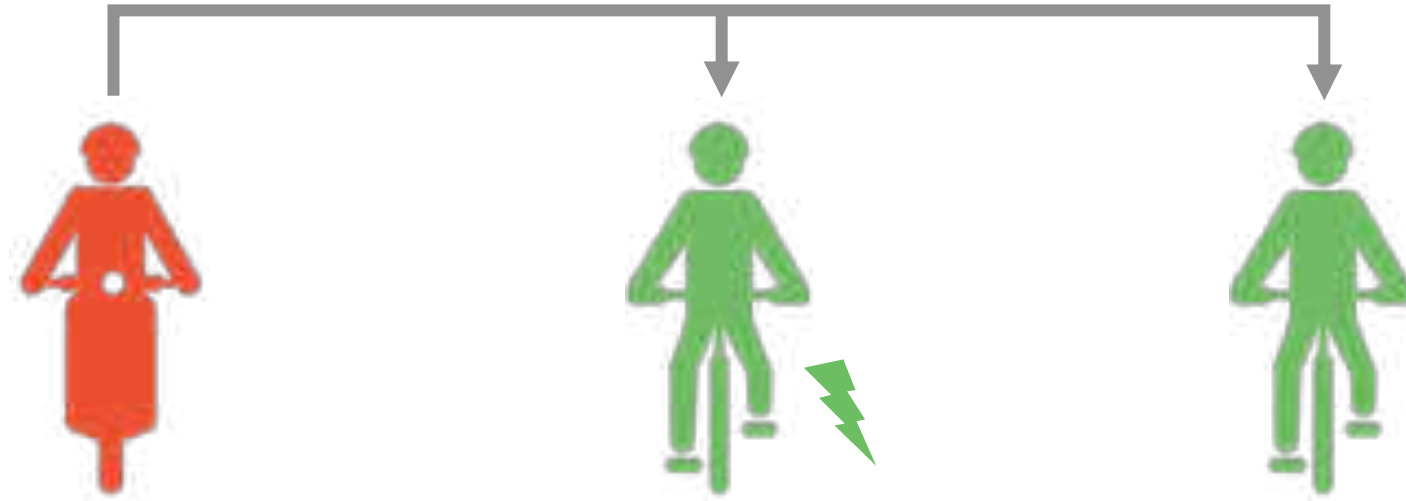
**Are higher percentages of
motorcycle use/higher VKT also
correlated with higher fatality rates?**



How can we capture the benefits of motorcycles but avoid the negative impacts?



Can governments support a shift towards bikes and e-bikes?



Motorcycles

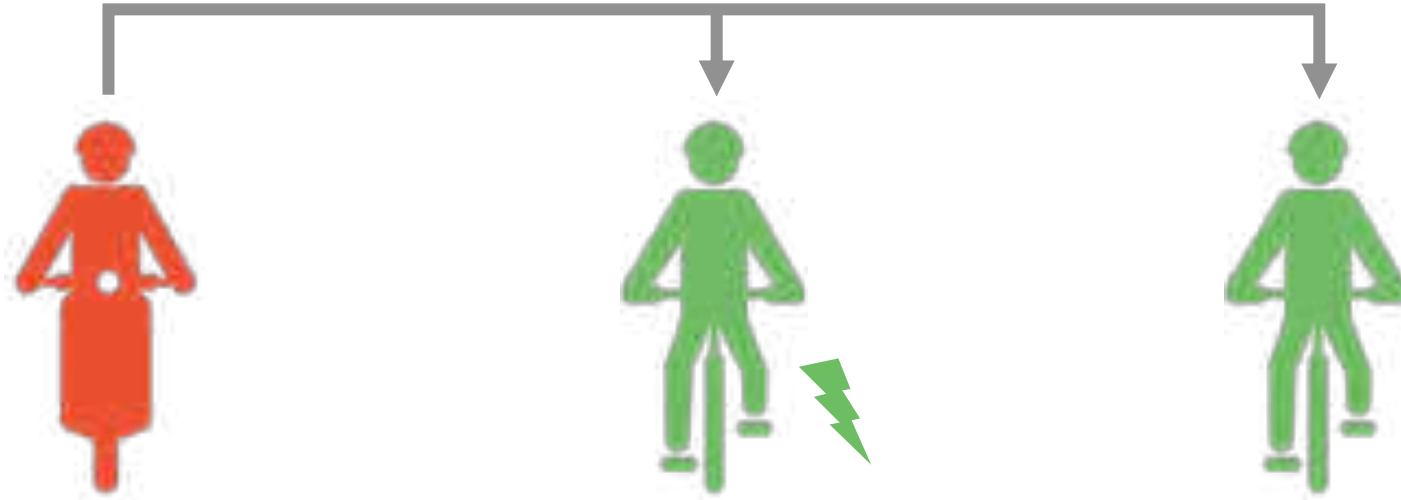
E-bicycles

Bicycles

Max Speed	~100km/h +	~25km/h ?	~20km/h
User Mass	Medium	Low ?	Low



Can governments support a shift towards bikes and e-bikes?



Motorcycles

E-bicycles

Bicycles

Max Speed	~100km/h +	~25km/h ?	~20km/h
User Mass	Medium	Low ?	Low

**Needs careful definition
and regulation**



What will they look like?



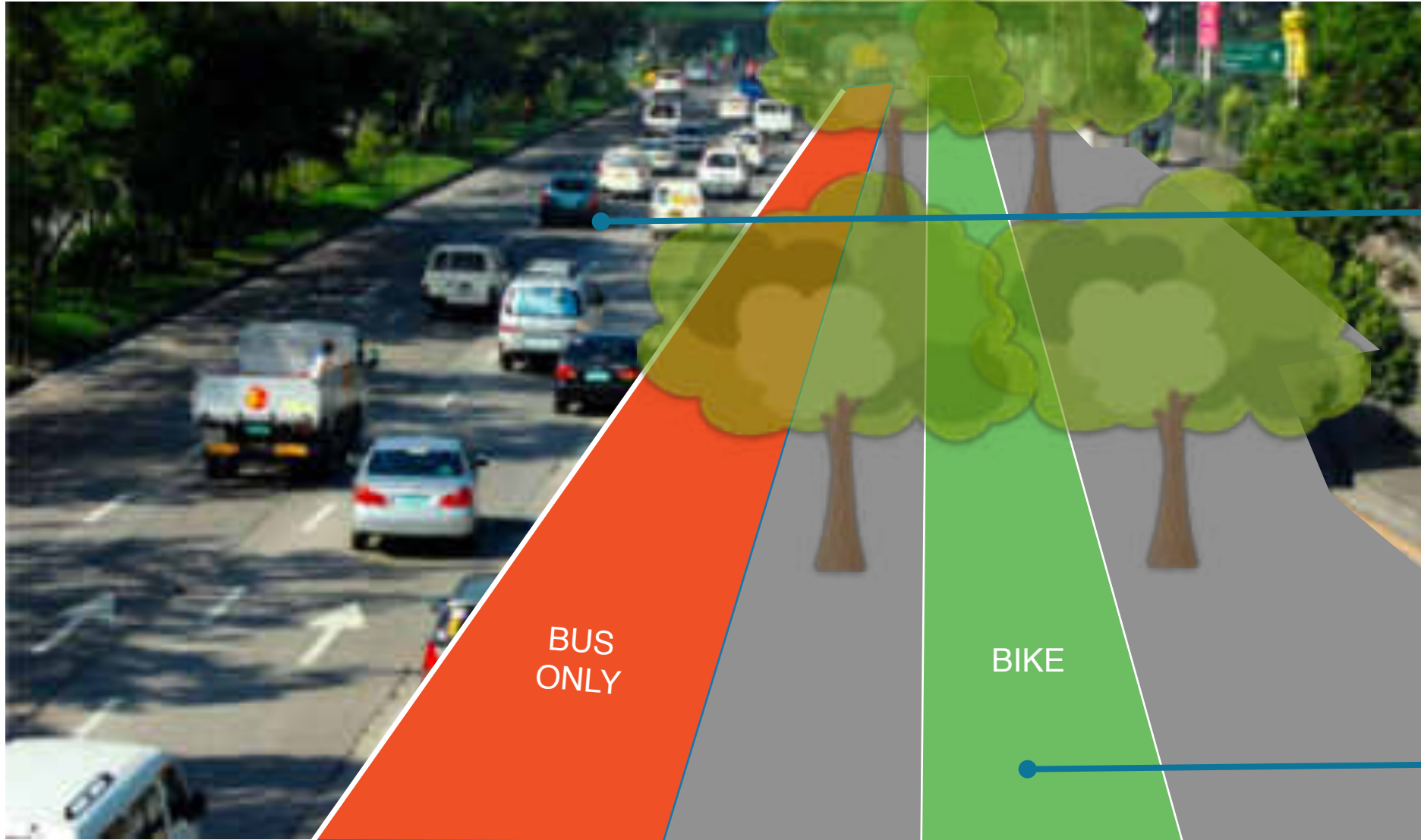


Can infrastructure design catalyze such shift?





Can infrastructure design catalyze such shift?



Motorcyclists in mixed traffic + Speed limit reduction + Roadbed width reduction

Cycles and E-Cycles



(c)

Act now - Focus on speeds to make streets safe for all users



We know that
Speed kills!





And that lowering it
saves lives!

30

Bogota



First 10 corridors – 2018/2019



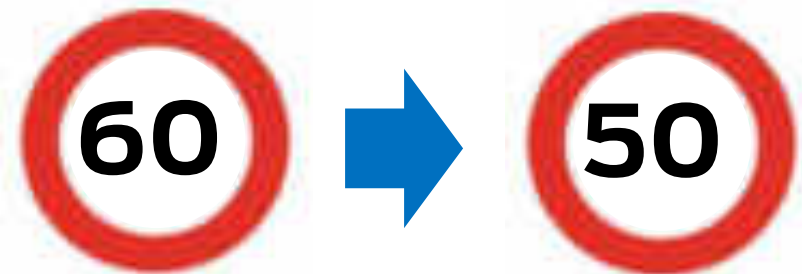
160 Km intervened
29% of the road network

+210 deaths each year
35%-40% of the deaths



Créditos: Bogotá Visión Cero
Secretaría Distrital de Movilidad de Bogotá

Fortaleza, Av. Leste-Oeste



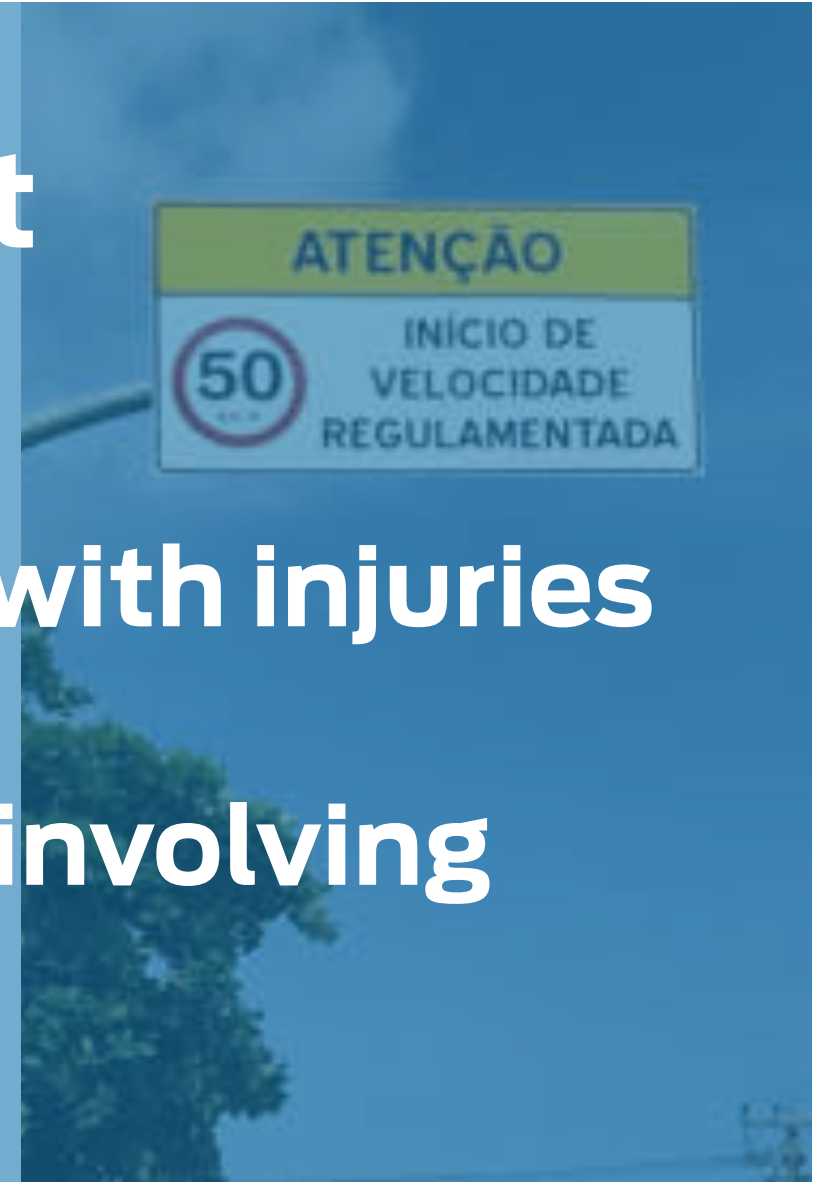
Fortaleza, Av. Leste-Oeste



Redesign + Enforcement

42% reduction in crashes with injuries

83% reduction in crashes involving pedestrians



Can design help reduce speeds?

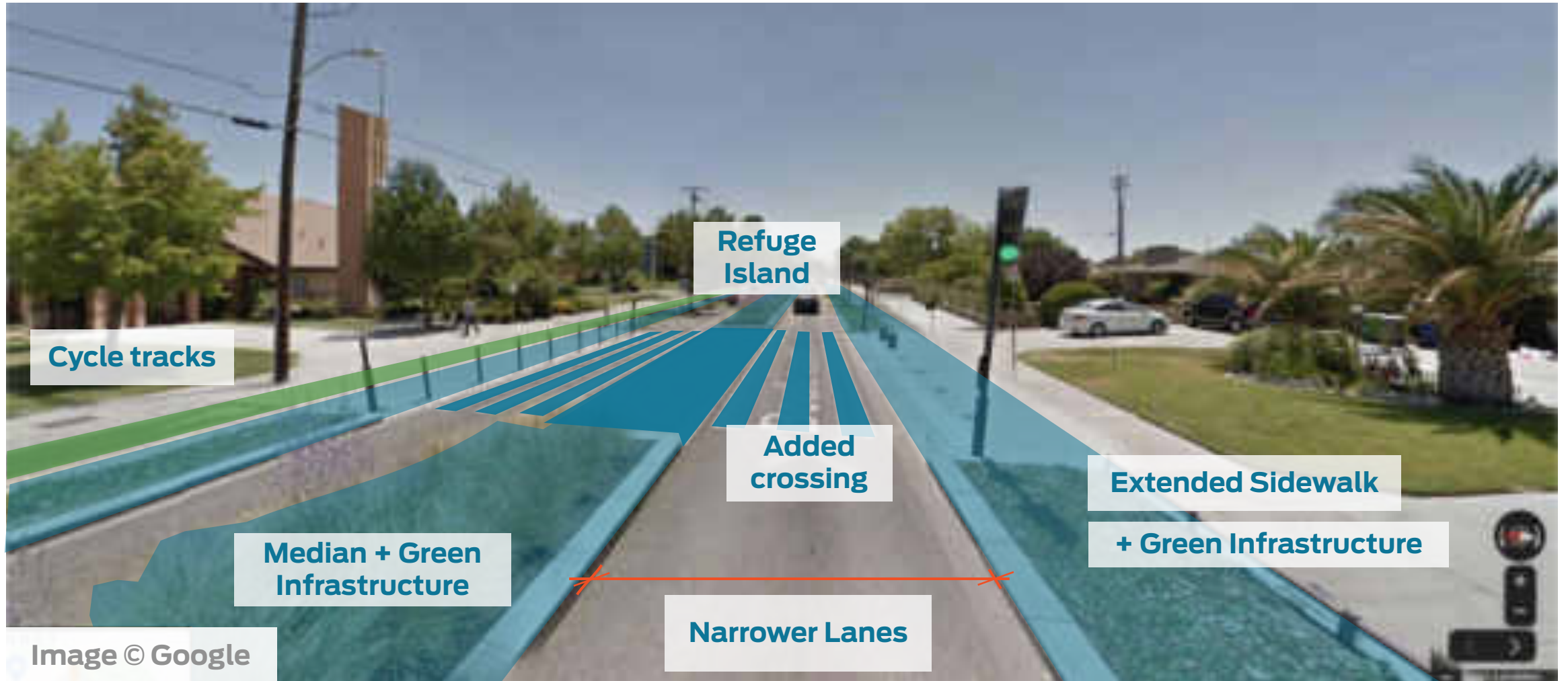


Image © Google

Yes, the way streets are designed impact how they are used!

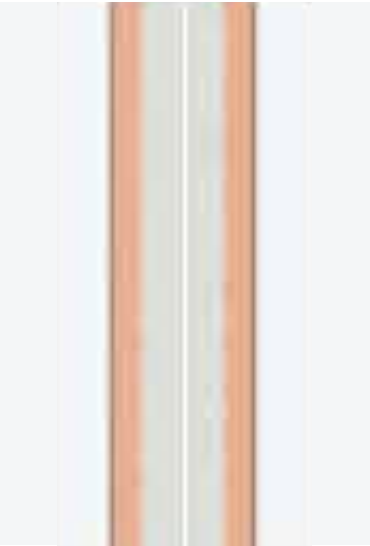


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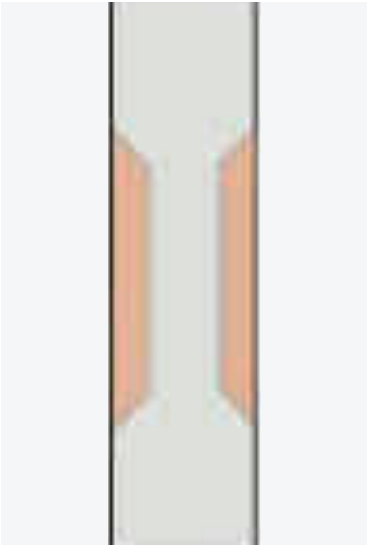


Geometric Design

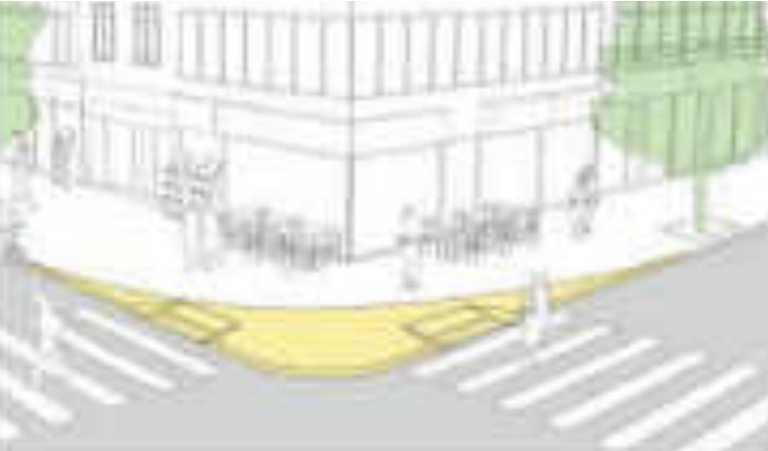
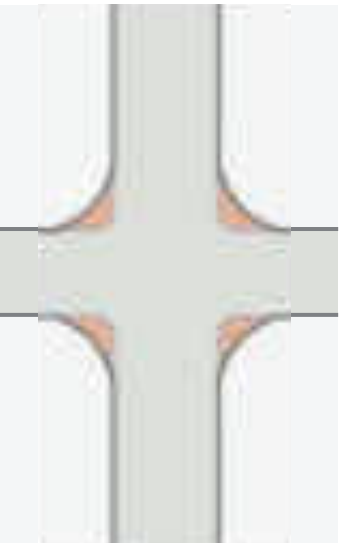
(Vertical + Horizontal Deflection, Compact Intersections, Narrower Lanes etc.)



Lane Narrowing



Pinchpoints



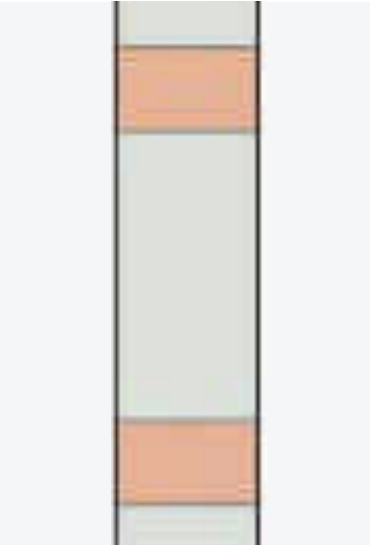
Corner Radii



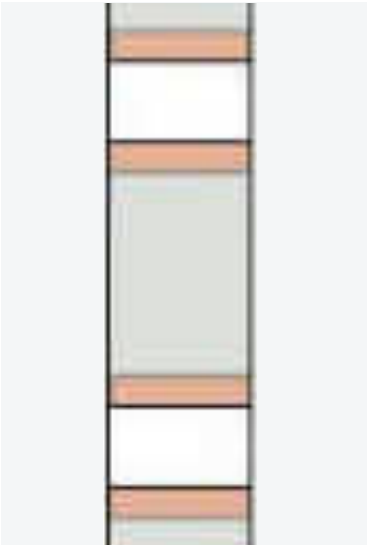
Chicanes and Lane Shifts

Geometric Design

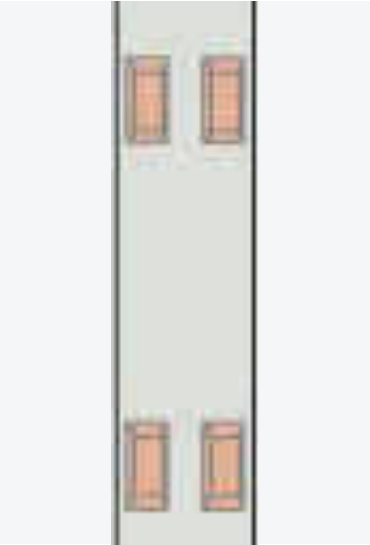
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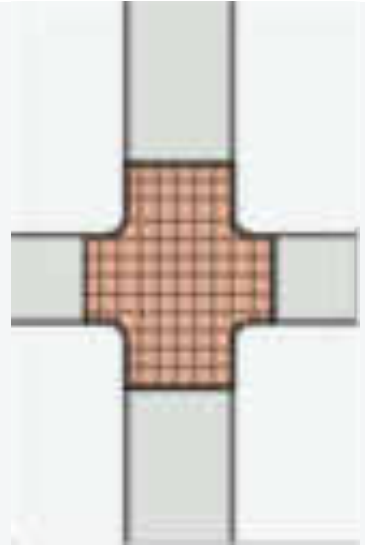
Speed Humps



Speed Tables



Speed Cushions



Pavement Material and Appearance

Traffic calming area

Albert Sabin Children Hospital - Fortaleza, Brazil





1. Focus on speeds

reducing the overall speed of traffic will directly improve safety of motorcyclists (and all other users)



1. Focus on speeds

reducing the overall speed of traffic will directly improve safety of motorcyclists (and all other users)

2. Consider all users

When it comes to street design, do not address the needs of motorcyclists in isolation – evaluate the impact of decisions for all users



1. Focus on speeds

reducing the overall speed of traffic will directly improve safety of motorcyclists (and all other users)

2. Consider all users

When it comes to street design, do not address the needs of motorcyclists in isolation – evaluate the impact of decisions for all users

3. Shift to safer modes

Street space is finite – use it wisely to promote a shift from motorcycling to safe and sustainable mobility



















Thank you!



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