

# Safe and Sustainable Street Design: Data Collection & Evaluation

A workshop for the City of Ljubljana, Slovenia

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Global Designing Cities Initiative

**29th January, 2025**





# Data collection & Evaluation

Ljubljana, Slovenia

Global Designing Cities Initiative

January 29th, 2025

@GlobalStreets





# How we work at GDCI



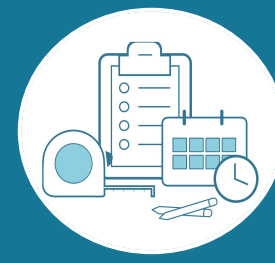
Policy & Design  
Consulting



Training & Public  
Consultation



Interventions &  
Transformations



Data collection  
& Assessment



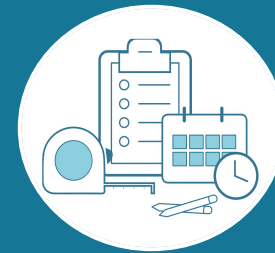
Scaling impact  
across citywide  
programs.



# How we work at GDCI



Interventions &  
Transformations



Data collection  
& Assessment



# 01 Introduction



# *How to* **Evaluate Street Transformations**

A Focus on Pop-up and Interim Road Safety Projects



Global Designing Cities Initiative



Download it for free:

<https://globaldesigningcities.org/publication/how-to-evaluate-street-transformations-english/>

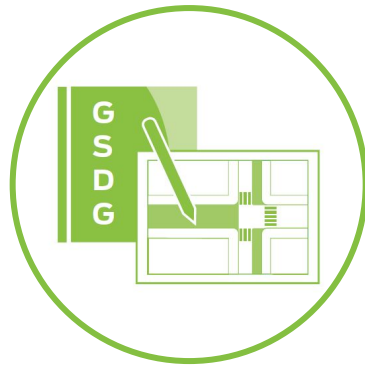


# How to evaluate street transformations?

## Type of data



Existing  
databases and  
archival research



Technical  
drawing  
information



Online research



Interviews, focus  
groups and  
intercept surveys



Observational  
data



# How to evaluate street transformations?

## Type of data



Interviews, focus  
groups and  
intercept surveys



Observational  
data



# SHIFT HOW WE MEASURE SUCCESS

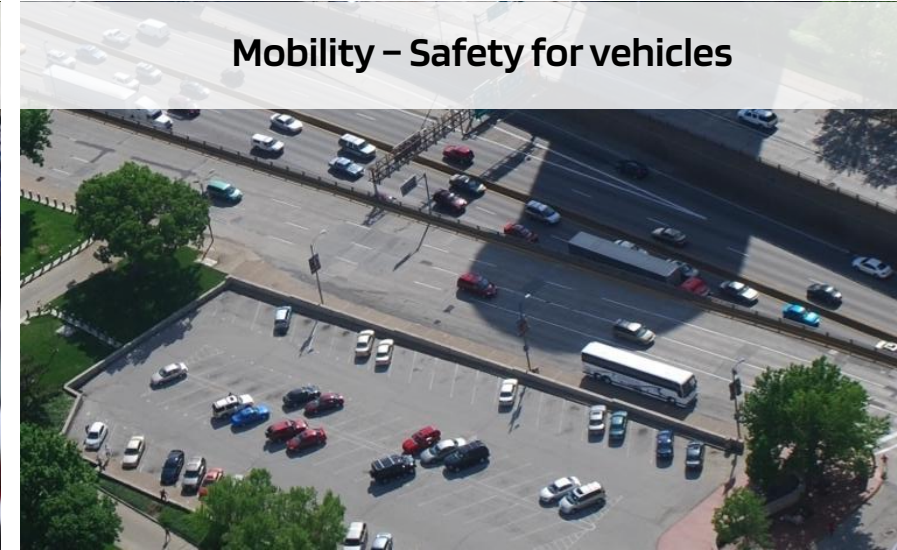
Mobility – Safety for vehicles



Mobility – Safety for vehicles



Mobility – Safety for vehicles



Mobility – Safety for vehicles



Mobility – Safety for vehicles



Mobility – Safety for vehicles





# SHIFT HOW WE MEASURE SUCCESS

Access/Mobility (Multimodal)



Public Health and Safety



Economic Sustainability



Environmental Quality



Quality of life



Equality



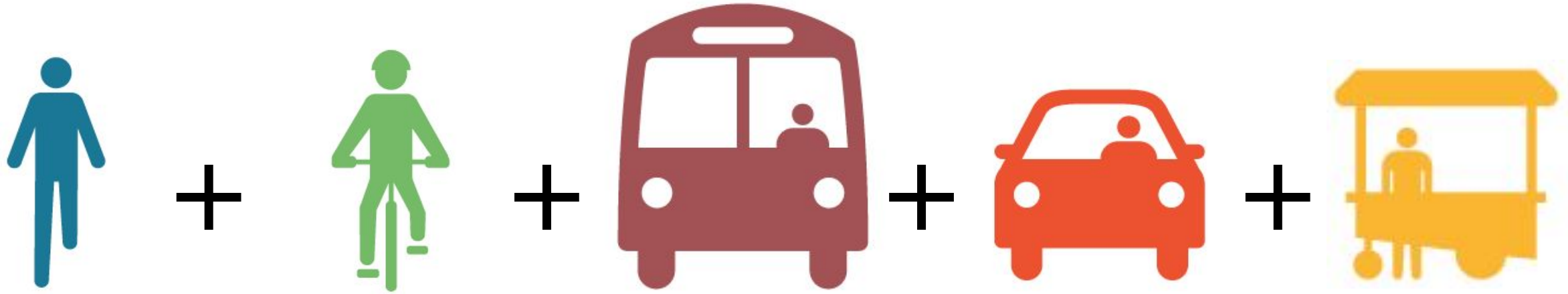


**From considering just one user.....**





**...to considering them all!**





**Meaningful metrics can  
help cities to...**



# Expand upon data collection practices

to focus on more types of street users, mobility, and place functions



São Paulo, Brazil



# Measure the impact

of project designs





# Analyze the performance

of new materials and ideas



Fortaleza, Brazil



# Encourage fairer conversations

focused on equitable design strategies



São Paulo, Brazil



# Build evidence

on the importance and impact of safe, healthy, and sustainable streets



Fortaleza, Brazil



# Strengthen community and political support

for projects through engagement



Addis Ababa, Ethiopia



**What we measure depends on what  
the project objectives are.**



# Determine project objectives

*Improve  
pedestrian safety*



## **Determine project objectives**



## **Determine metrics to collect**

*Improve  
pedestrian safety*

*Number of pedestrians  
crossing safely*



## Determine project objectives



## Determine metrics to collect



## Tell the story

*Improve  
pedestrian safety*

*Number of pedestrians  
crossing safely*

*By designing with  
pedestrians as the  
primary consideration,  
we create a safer, more  
economically  
productive place for  
everyone.*





## **Determine project objectives**



## **Determine metrics to collect**



## **Tell the story**

*Improve  
pedestrian safety*

*Number of pedestrians  
crossing safely*

*By designing with  
pedestrians as the  
primary consideration,  
we create a safer, more  
economically  
productive place for  
everyone.*



**What is the story that  
we want to tell?**





Downtown Fortaleza (Brazil)

Barão do Rio Branco: Street transformation project



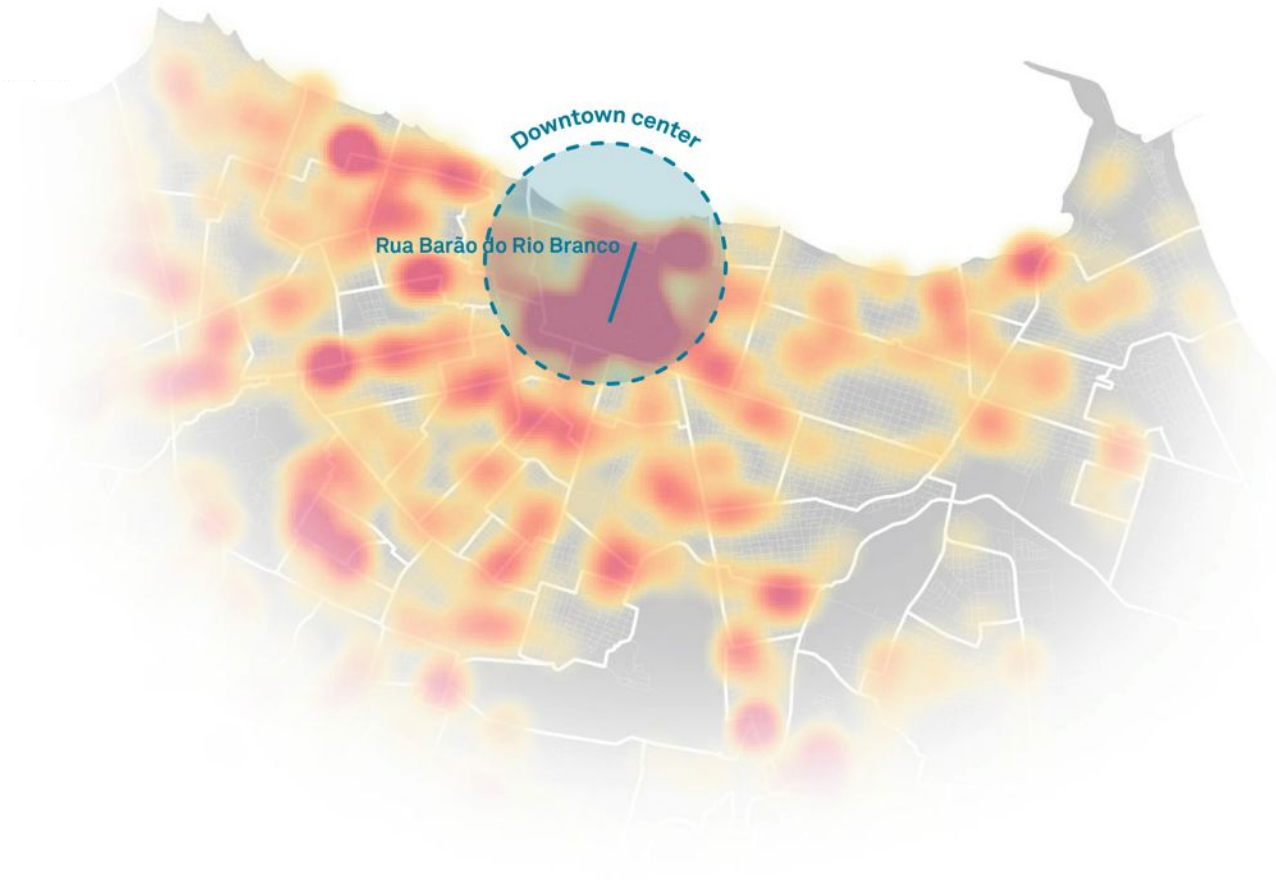


Fortaleza Downtown



# Crash history

## Crashes involving pedestrians

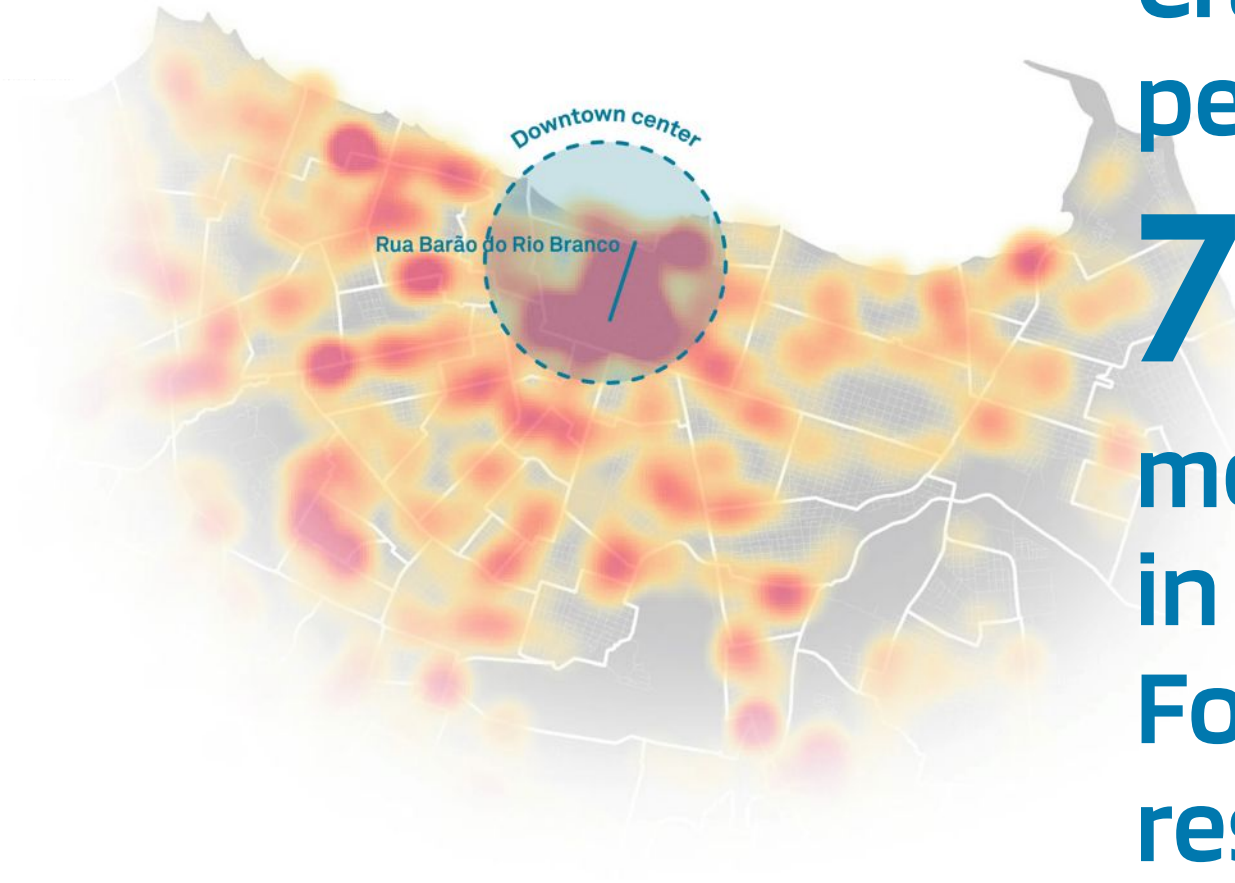


**91**  
**Pedestrians**  
were killed  
in Fortaleza  
in 2019



# Crash history

Crashes involving  
pedestrians



Crashes involving  
pedestrians are

**70%**

more prevalent  
in Downtown  
Fortaleza than the  
rest of the city



# Barão do Rio Branco







Barão do Rio Branco





Objective: improve pedestrian safety conditions

Before



# Choice of indicators



**What metrics can we collect to  
show the impact of the project?**



# What metrics can we collect?



% of space allocated to each user



Percentage of users



% of cyclists who feel safe



% compliance with speed limits



Number of people walking



Reliability of public transportation



Number of pedestrians crossing the street



% of pedestrians walking on the road



Use of loading zones



Number of pedestrians crossing inside or outside the crosswalk



Crossing distance



noise levels



Activities on the street



Pedestrian demographics



Parking use



% of users who feel safe



Number of cyclists



Number of street vendors



# Metric: User Counts



Barão do Rio Branco  
Street





75%  
of street  
users are  
pedestrians

Barão do Rio Branco  
Street

Before







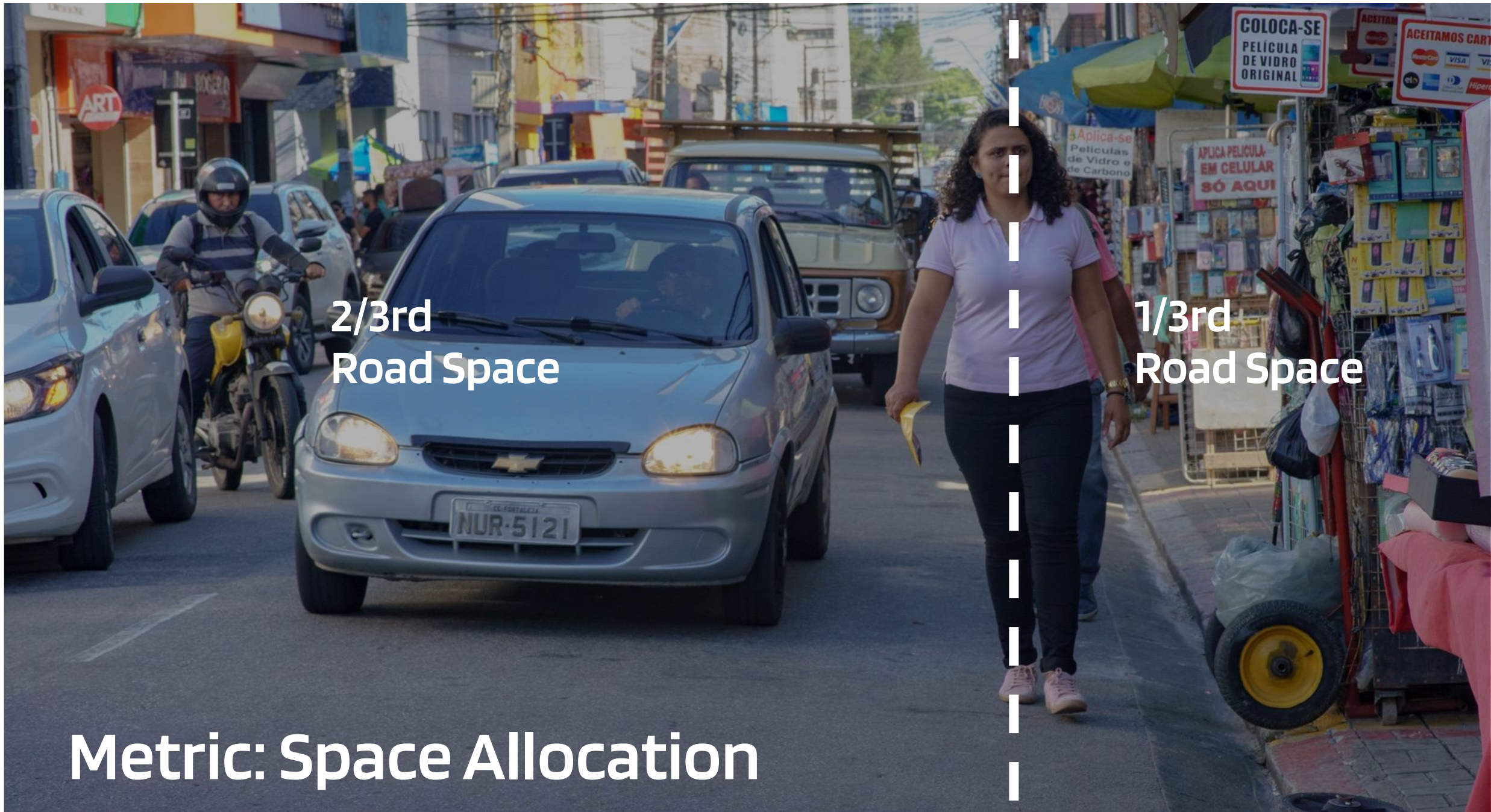
A photograph of a busy street in a developing country. In the foreground, a silver Chevrolet car with license plate NUR-5121 is driving towards the camera. To its left, a person on a yellow motorcycle is also moving forward. On the right side of the street, a woman in a light purple polo shirt and dark pants is walking towards the camera. The background is filled with various shops, including one with a sign that says 'COLOCA-SE PELÍCULA DE VIDRO ORIGINAL' and another that says 'ACEITAMOS CARTÃO'. A white dashed vertical line runs down the center of the image, separating the car and motorcycle from the pedestrian.

Less than  
10%  
of users are cars

75%  
of the users  
are pedestrians

Metric: Modal share





2/3rd  
Road Space

1/3rd  
Road Space

Metric: Space Allocation



A photograph of a busy street in Brazil. In the foreground, a man wearing a brown cap and a blue and white striped shirt is riding a blue bicycle. He is carrying two large plastic water jugs, one green and one blue, on a rack attached to the back of the bike. He is looking towards the camera. Behind him, two men are walking on the sidewalk. One man is wearing a bright pink polo shirt and dark shorts, and the other is wearing a dark blue t-shirt and dark shorts. They are both looking away from the camera. The street is lined with shops and parked cars. On the right side, there are signs for 'COLOCAR-SE PELÍCULA DE VIDRO ORIGINAL' and 'ACEITAMOS CARTÕES' (MasterCard, Visa, Hipercard). There are also signs for 'Aplica-se Películas de Vidro e de Carbono' and 'APLICA PELÍCULA EM CELULAR SÓ AQUI'. The overall scene is a typical busy urban street in a developing country.

172  
Pedestrians/  
h

Metric: # of pedestrians walking on the roadway

Before





92%   
less people walking  
on the roadbed

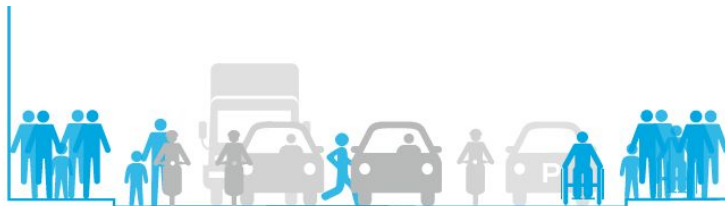
Fortaleza, Brazil

After



# Before and after

Barão do Rio Branco



**33%**  
pedestrian facilities



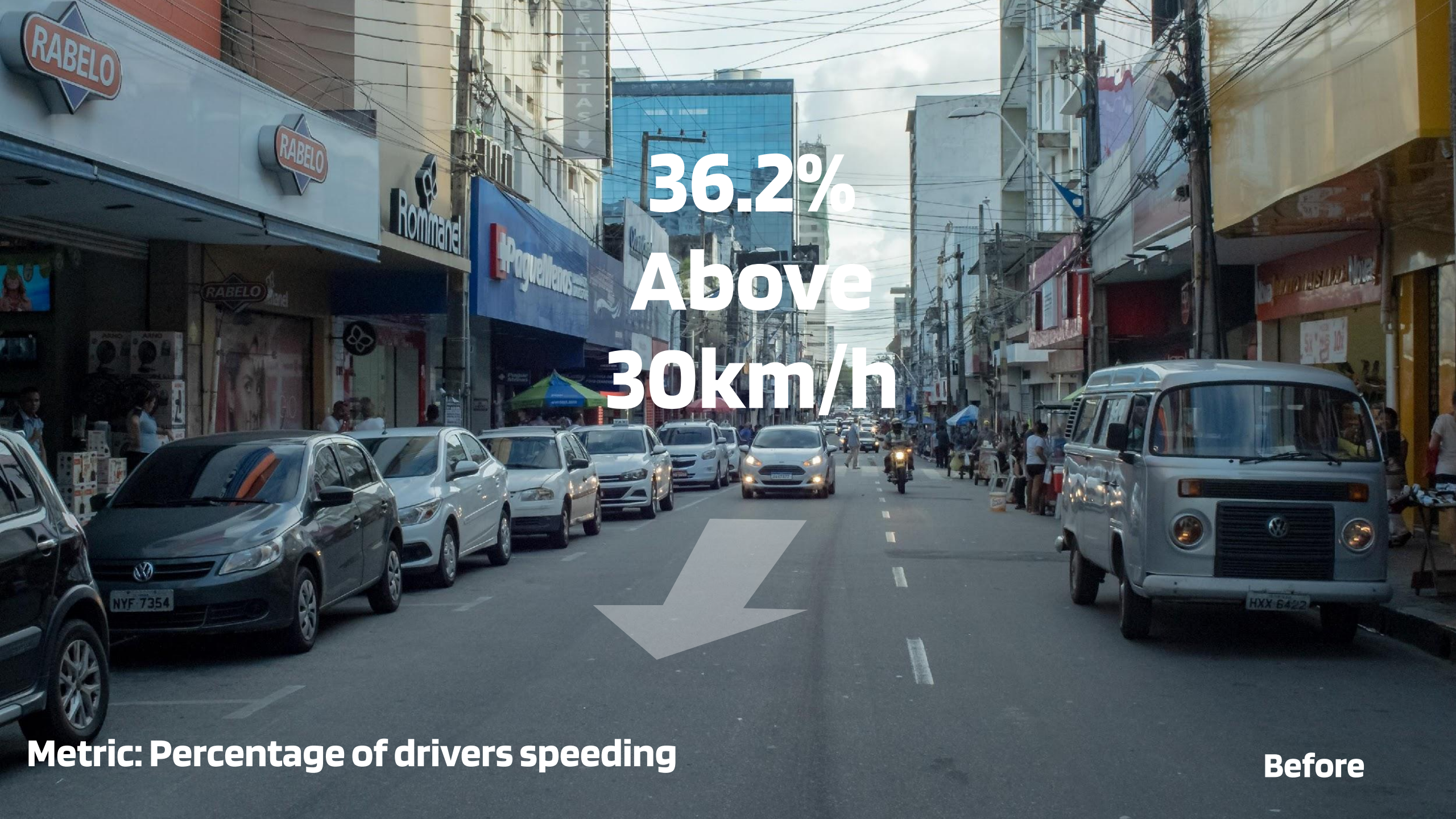
**60%**  
pedestrian facilities





**Before**



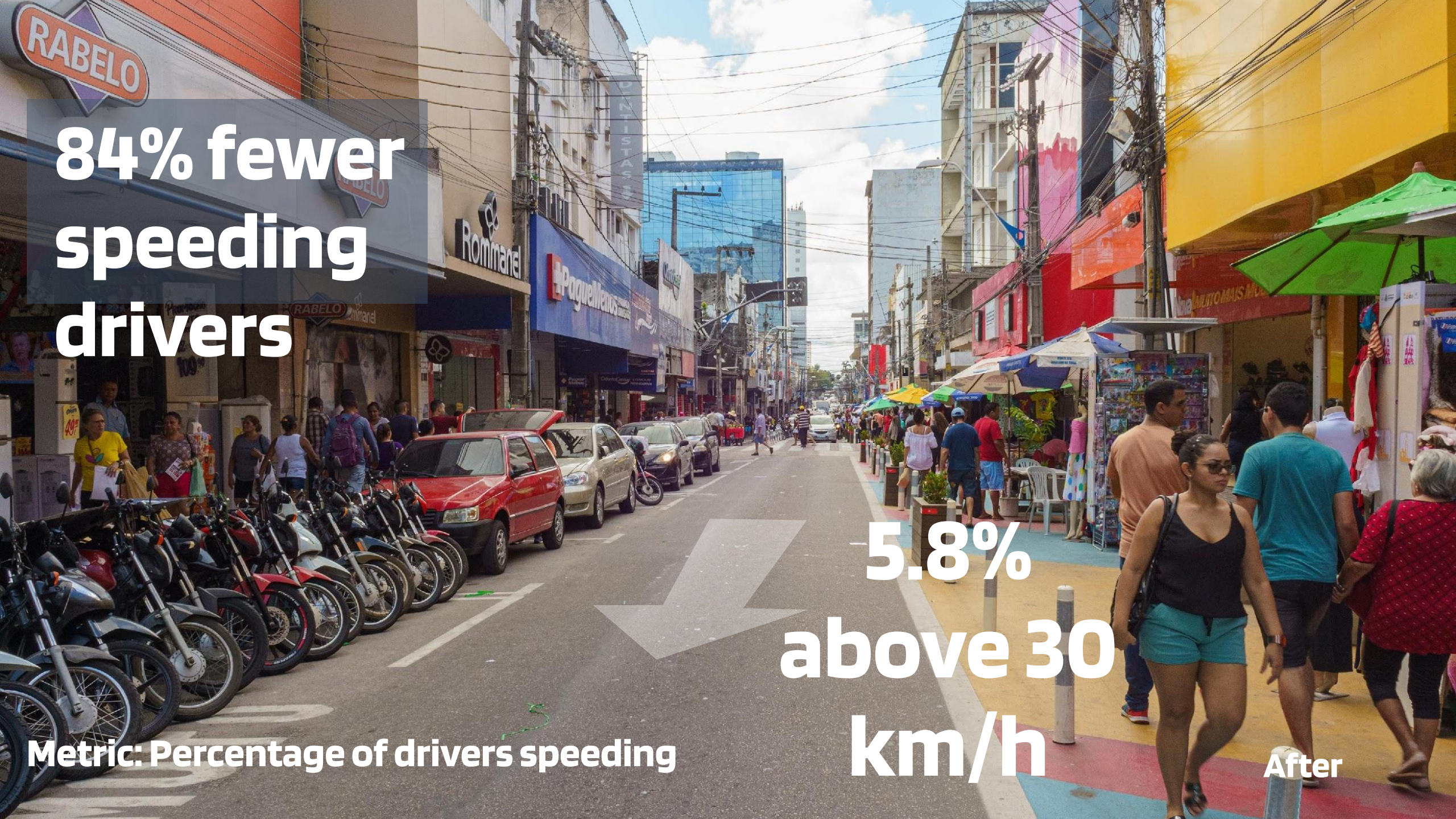


**36.2%  
Above  
30km/h**

**Metric: Percentage of drivers speeding**

**Before**





**84% fewer  
speeding  
drivers**

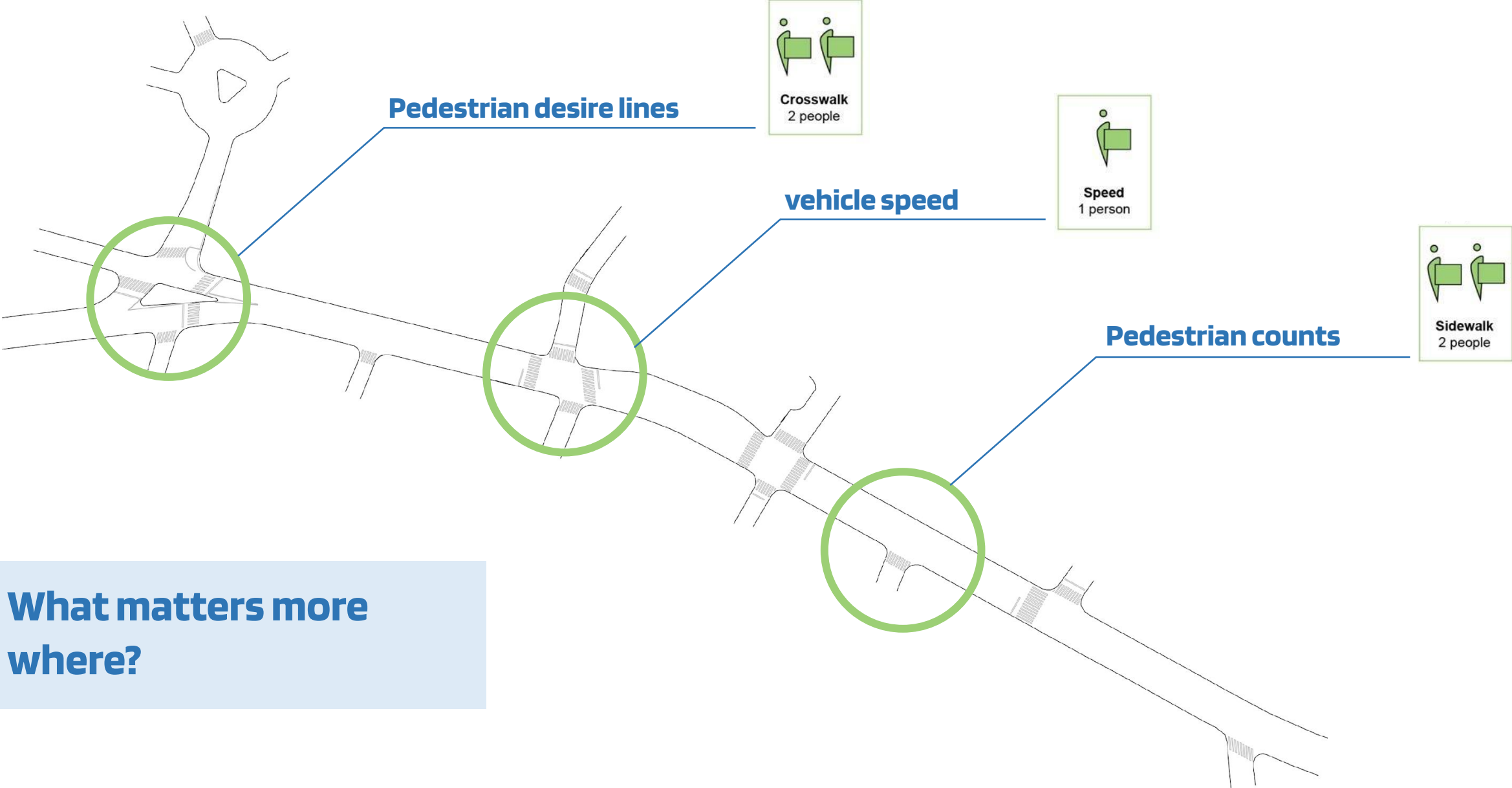
**5.8%  
above 30  
km/h**

**After**

**Metric: Percentage of drivers speeding**





















# Use limited resources wisely



**What matters more  
where?**





















# Be selective

	% of space allocated to each user		Percentage of users		% of cyclists who feel safe
	% compliance with speed limits		Number of people walking		Reliability of public transportation
	Number of pedestrians crossing the street		% of pedestrians walking on the road		Use of loading zones
	Number of pedestrians crossing inside or outside the crosswalk		Crossing distance		noise levels
	Activities on the street		Pedestrian demographics		Parking use
	% of users who feel safe		Number of cyclists		Number of street vendors



# ...and prioritize

 % of space allocated to each user	 Percentage of users	 % of cyclists who feel safe
 % compliance with speed limits	 Number of people walking	 Reliability of public transportation
 Number of pedestrians crossing the street	 % of pedestrians walking on the road	 Use of loading zones
 Number of pedestrians crossing inside or outside the crosswalk	 Crossing distance	 noise levels
 Activities on the street	 Pedestrian demographics	 Parking use
 % of users who feel safe	 Number of cyclists	 Number of street vendors



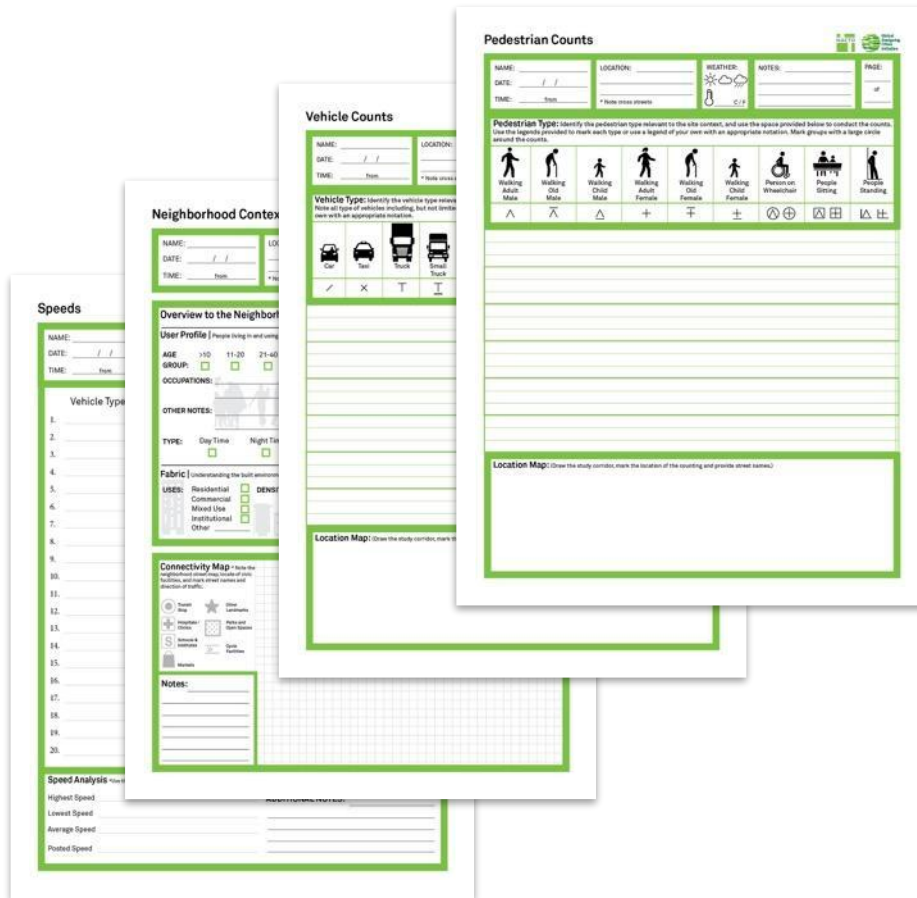
# Define a methodology

 Quantitative

 Qualitative

 Inclusive

 Contextual



The image shows a stack of four data collection forms from the Global Designing Cities Initiative. The forms are titled 'Speeds', 'Neighborhood Context', 'Vehicle Counts', and 'Pedestrian Counts'. Each form includes sections for user profile, location map, and specific data collection instructions and tables.

- Speeds:** Includes fields for Name, Date, Time, and a table for recording speed data.
- Neighborhood Context:** Includes fields for Name, Date, Time, and a table for recording neighborhood context data.
- Vehicle Counts:** Includes fields for Name, Date, Time, and a table for recording vehicle count data.
- Pedestrian Counts:** Includes fields for Name, Date, Time, and a table for recording pedestrian count data.

GDCI data formats (available on our website)



**Determine when to  
collect the data**



# When to collect data

**Before  
implementing  
the project**



**During or  
immediately after  
implementation**



**Weeks, months  
or years after  
implementation**

- Understand the site and define a vision
- Have baseline data to compare with future data.
- Document and understand the needs, interests and knowledge of community members and other interested parties
- Locate activities, obstacles, and opportunities for implementing specific design elements, and take plenty of “before” photos to show the change.



# When to collect data

**Before  
implementing  
the project**



**During or  
immediately after  
implementation**



**Weeks, months  
or years after  
implementation**

- Maintain momentum and transparency by communicating short-term results and initial community reactions
- Document immediate physical and operational changes
- Refine design based on new observations
- Begin preparing the arguments in favor of a more permanent project.



# When to collect data

**Before  
implementing  
the project**



**During or  
immediately after  
implementation**



**Weeks, months  
or years after  
implementation**

- Assess long-term changes in site use, function, and perception
- Support new policies and future designs for similar projects
- Assess the impact on the frequency and severity of injuries caused by traffic accidents, air quality, etc.
- Argue for a more permanent project.



## How often and for how long should data be collected?

- Take a measurement at various times of the day: peak and off-peak hours for vehicles, pedestrians, micromobility, and transit
- Take a measurement several days of the week (weekdays and weekends)
- Divide daily tasks into 2-4 hour shifts
- Make sure breaks are scheduled between shifts



**Can the team save time and resources  
when calculating certain counts?**



**Can the team save time and resources  
when calculating certain counts?**

**Yes!**



# Organize the team



1

### **Communicate goals**

- Start by explaining the goals and scope of the project.
- Explain the context of the site using maps and photos: show activities, operations and conditions that the team needs to consider.

2

### **Review schedules and materials to bring on site**

3

### **Review data collection forms and tools**



1

**Communicate  
goals**

2

**Review schedules  
and materials to  
bring on site**

- Review the schedule and times each surveyor will collect data.
- Distribute contact information for everyone who will be on site.
- Provide checklists indicating what materials, safety equipment, and documentation each surveyor is responsible for, and what the team leader will bring to the site.

3

**Review data  
collection forms  
and tools**



1

**Communicate  
goals**

2

**Review schedules  
and materials to  
bring on site**

3

**Review data  
collection forms  
and tools**

- Review how to collect data on specific forms and provide instruction sheets.
- Perform test counts and use each of the tools; review surveyors' results and make corrections as necessary.
- Remind participants how each of the data points contributes to the broader goal of the project. For example: Collecting data on pedestrian desire lines will help define where to implement the new crossings





- Set a meeting time and location, and tour the site with all surveyors before beginning counts.
- Provide an overview of site conditions, operations, and functions in each data collection area.
- Be clear about how surveyors can communicate project goals to bystanders when they are not conducting counts, and follow up with potential local supporters of the project.



## Organize the team



- When returning data collection forms, the staff should review the results and clarify any discrepancies as soon as possible.



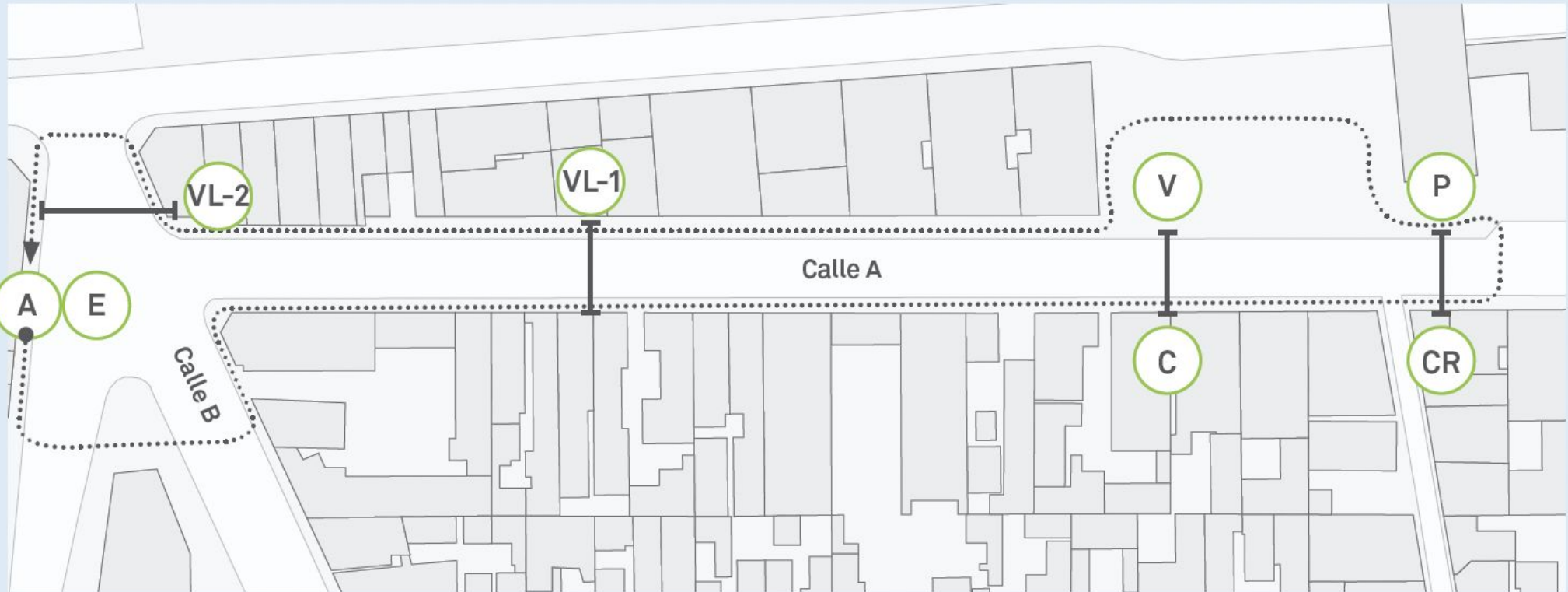
# Surveyor schedule for data collection

Metrics Chart

No.	Aim	Metrics	Location takes	Staff	Take time	Take Frequency	Inputs take
1	Reduce the turning speed of buses at the intersection with the cycling infrastructure on Av. Revolución	% compliance with rotation speed	Point No. 1	1_Radar operator 2_Data annotation	12:30 pm to 3:30 pm (3 hours)	Periods of 15 minutes for 3 hours.  Include a 15-minute break at the end of each hour	Radar Data annotation format Pen Table to support  Sunscreen Cap hat
2	Improve and create safe pedestrian crossing points within the intersection	Number of pedestrians crossing inside or outside the crosswalk	Point No. 2	1_Occ-Ori Capacity 2_Ori-Occ Capacity	12:30 pm to 3:30 pm (3 hours)		Data annotation format Pen Table to support  Sunscreen Cap hat
3		Number of pedestrians crossing inside or outside the crosswalk	Point No. 3	1_Occ-Ori Capacity 2_Ori-Occ Capacity	12:30 pm to 3:30 pm (3 hours)		
4		Number of pedestrians crossing inside or outside the crosswalk	Point No. 4	1_Occ-Ori Capacity 2_Ori-Occ Capacity	12:30 pm to 3:30 pm (3 hours)		
5	Capture multiple intersection operational dynamics	Top-down drone shot where the entire intersection can be observed	Point No. 5		12:30 pm to 3:30 pm (3 hours)	30 min during HDM	drone



# Surveyor Map



## Leyenda

— Referencia a «línea invisible»

xx

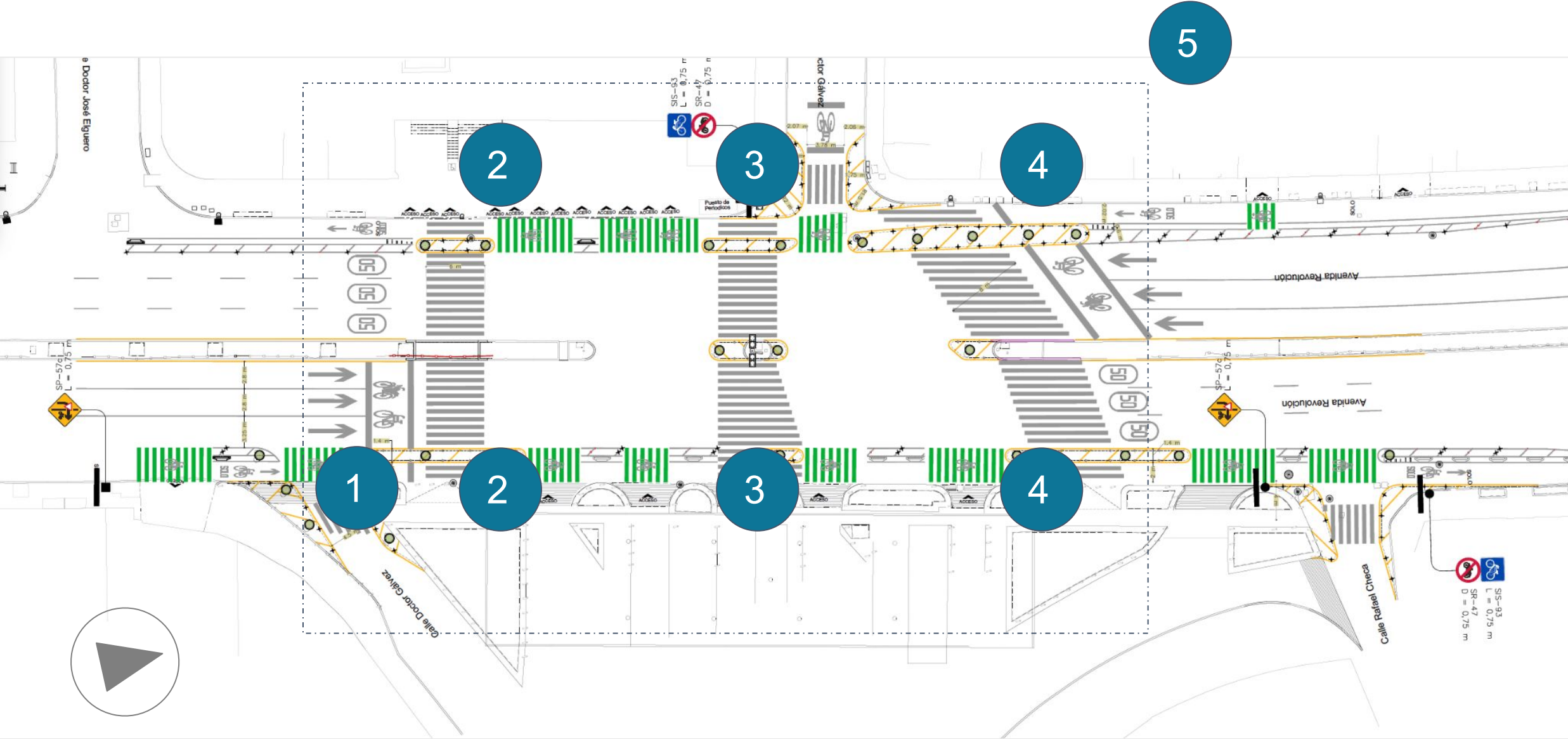
Código de datos



Camino comprendido por el mapa de actividades (A)



# Example: Surveyor map





# COMMUNICATING

# SUCCESS



## How to evaluate street transformations

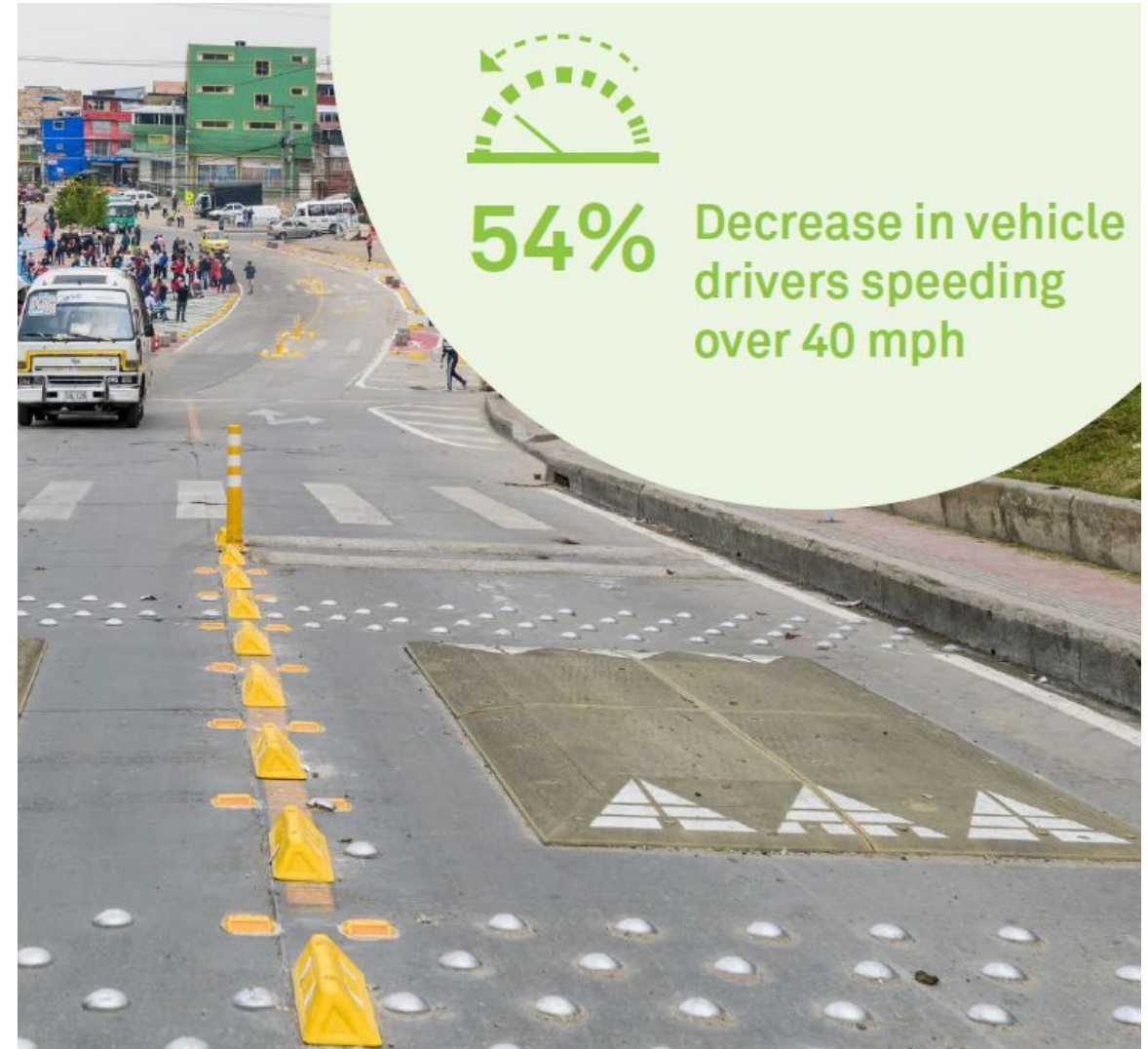
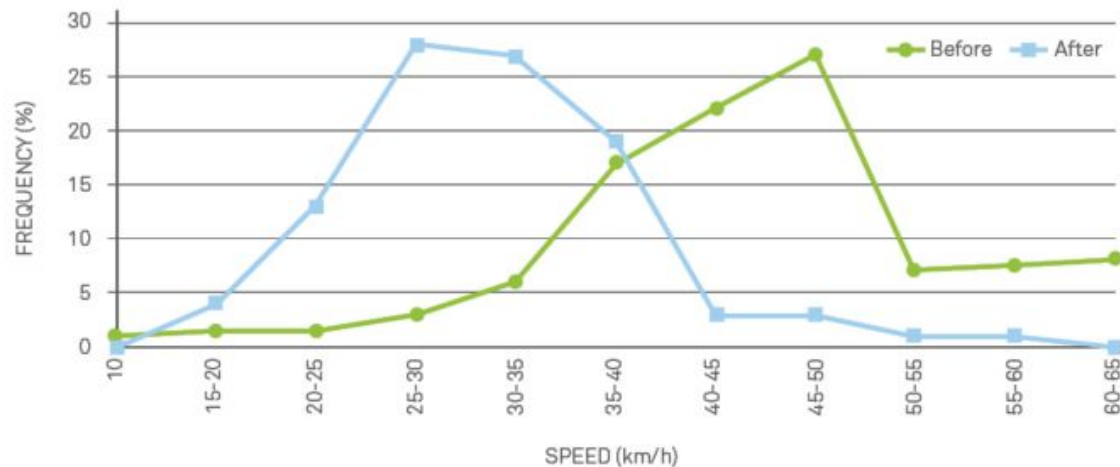
# Communicate results in appropriate formats

Example table

Speeds	50th Percentile	85th Percentile	40+ MPH Speeders
Before	25.6 MPH	31.2 MPH	1119
After	23.1 MPH	29.0 MPH	513
% Change	-9.8%	-7.1%	-54.2%

Example graph

Before and after speed data





# Find relevant elements in Before & Afters



Before



After



Metrics collected during site visits:

# Before – After Photographs

Before-and-after photos taken at street level are very effective in demonstrating the process, appreciating the exact changes that were made in the geometry and the operations of the street. To plan for effective before-and-after images, determine an imaginary frame that includes trees, signs, and/or identifiable

street elements that will guide you to take the same image on different days and at different times. Mark this on a site map in case the same photographer cannot return for the “after” shot. It is also helpful to take “during” shots of the implementation process.

## Tools you'll need:



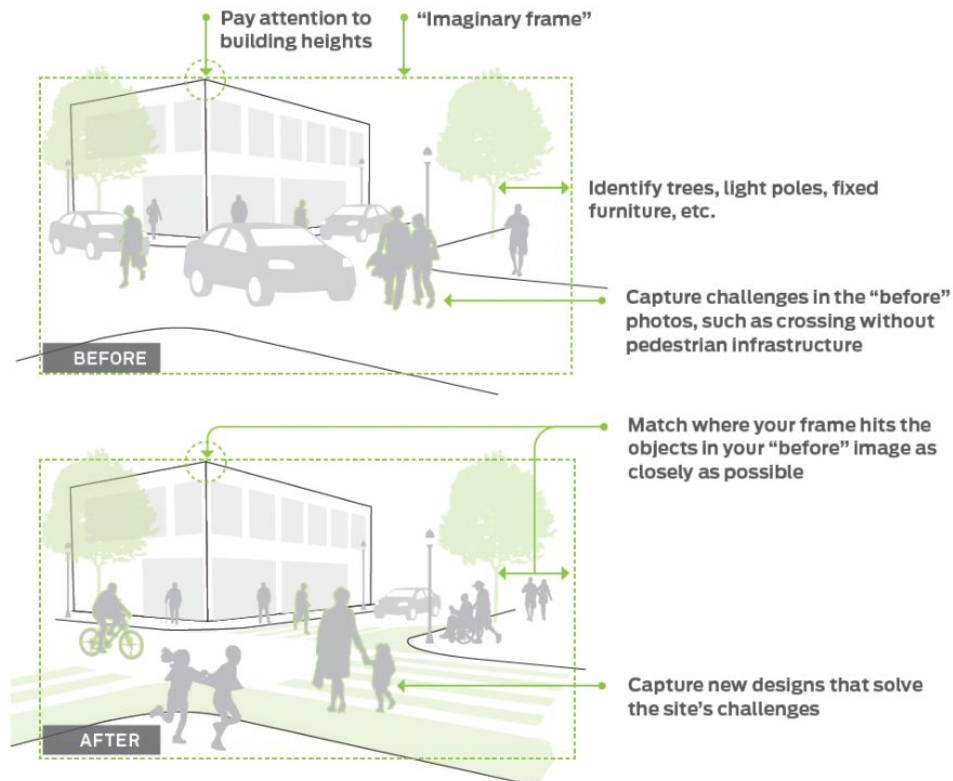
Camera



Drone



Site map



## Model photographs

Ideally, the “before” photo should show some key challenges on site, and the “after” photo should show some key improvements. When placed together, the photos match almost exactly. The perspective, frame, angle, and elements all have the same position in both photos, making it easier to see the changes. Small differences are to be expected, but the main features of the image should align (e.g., a light pole or building edge in the same location).



## Photographs that could be improved

The images are not aligned.

- Different perspective: it helps to have the camera perpendicular to the ground plane
- Different location (farther away)
- Different elements show up in the photos

Images that don't align can sometimes be adjusted or cropped with computer software, but alterations may affect the quality of the images.



## Tips when taking before-and-afters

- Capture many different angles and locations, and crop for an exact match.
- Photos must not only show the design improvement, but also people using it! Pick active times to document the project and wait until you get people within the frame.
- Capture moments without large shadows cast over the site, and at the same time of day.



## If a smartphone is the only camera

- Smartphones are great for taking illustrative pictures “on the fly” of how people use the street.
- Take a time-lapse video moving through the site or record the change over time from one spot.
- Take aerial photos and videos by using a bucket truck, ladder, nearby rooftops, or second-story retail/office windows.
- Check resolution of photos.



# Document the Project – Before & After

Before

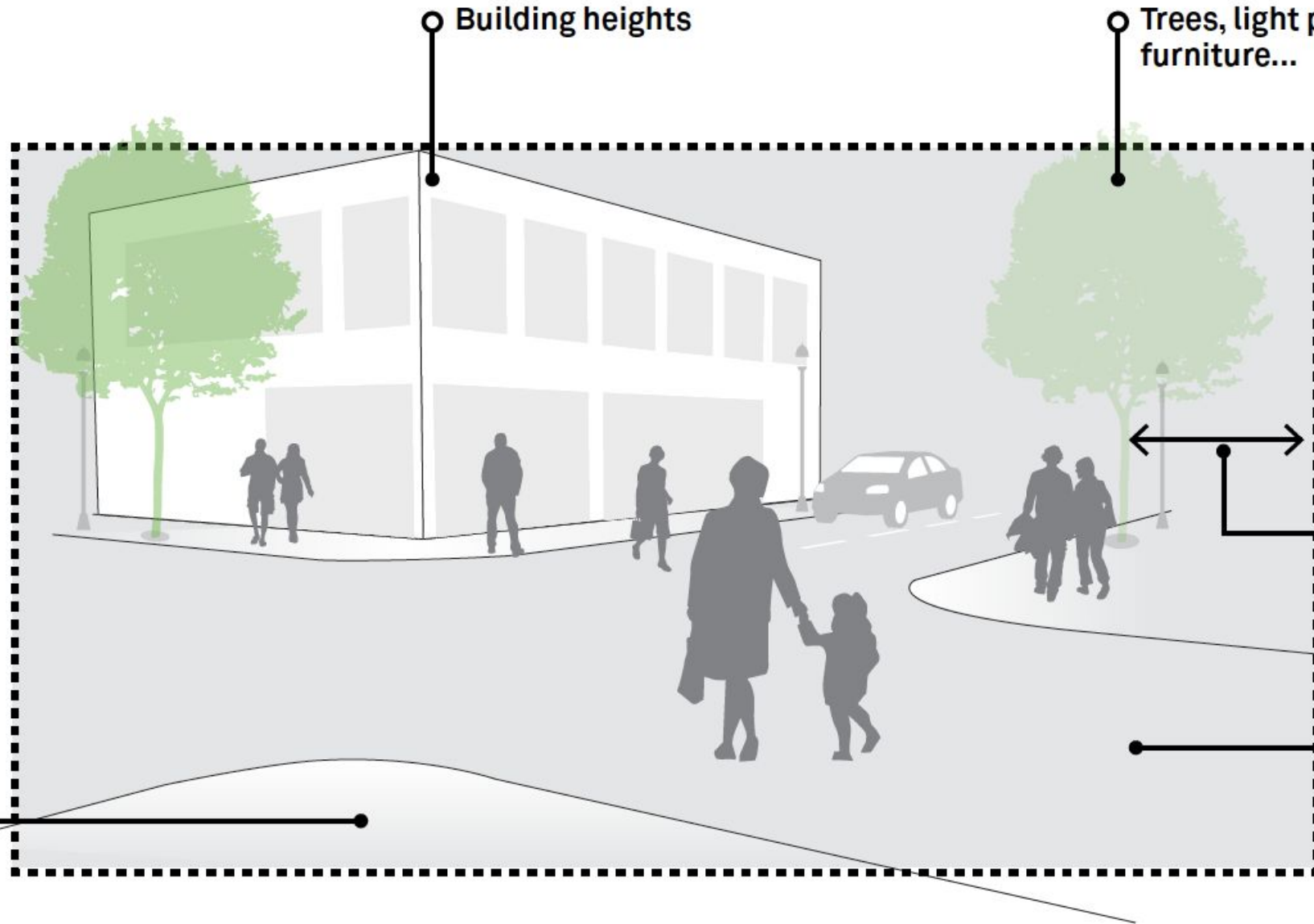
Building heights

Trees, light poles,  
furniture...

Distance of  
elements to the  
image frame

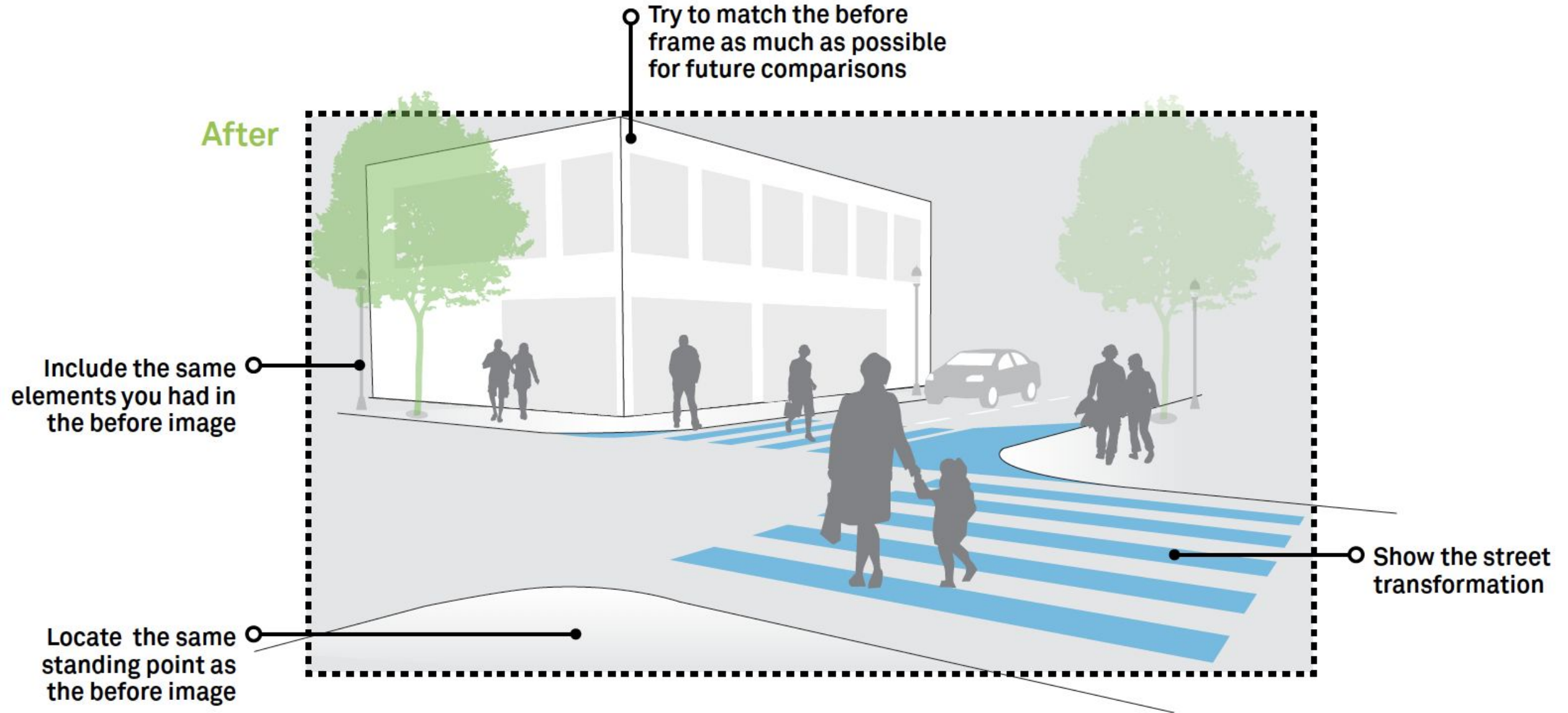
Think about the  
location of the  
intervention

Select a standing  
point and mark it in  
a plan





# Document the Project – Before & After





# Use drone images





# Use drone images





# Show people!





# Document the process





# Collect testimonials and videos











Before





desp  
ues





**4,000 m<sup>2</sup>**  
Recovered  
Public space

**17.50m**  
**Before**

**3.50 m**  
**After**



**UP TO 80%  
REDUCTION IN  
CROSSING  
DISTANCES**



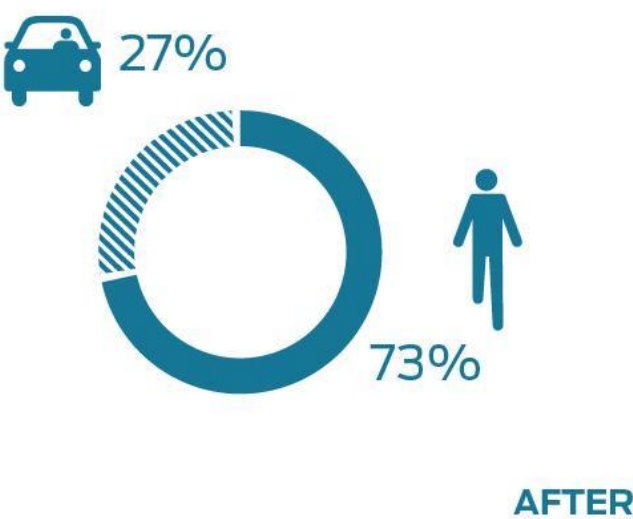
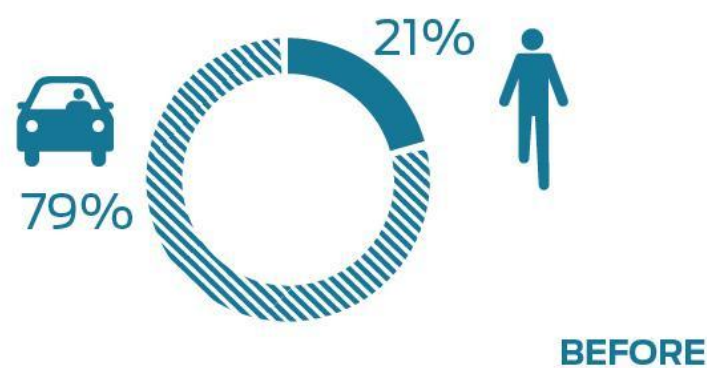


**109% more pedestrians in the area**



# Fortaleza

## Space allocation





## Fortaleza

User satisfaction and experience



**94%**  
Approve of the  
intervention



**97%**  
Believe Pedestrians  
should be prioritized  
over motorized traffic





# Thank you!

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[www.globaldesigningcities.org](http://www.globaldesigningcities.org)

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