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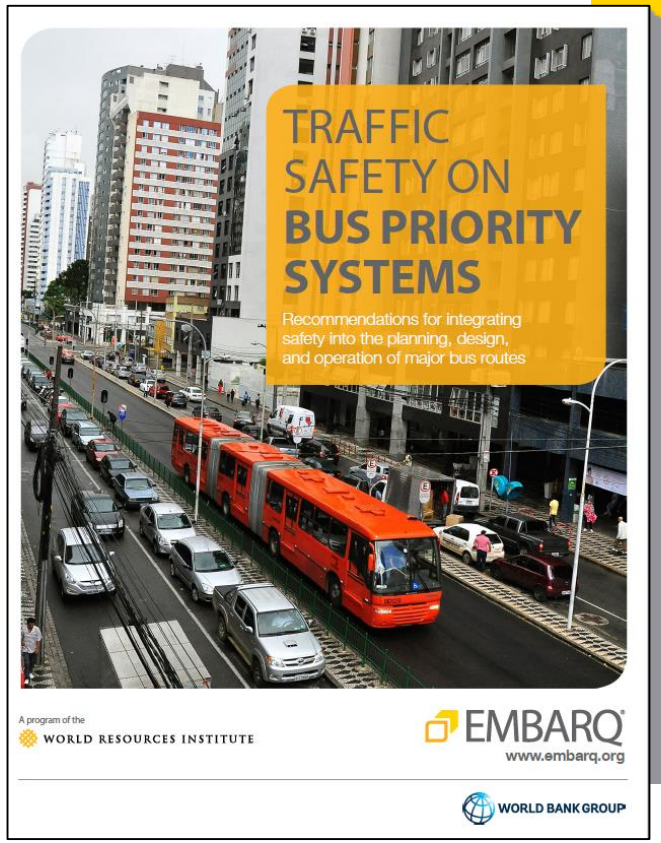
TRAFFIC SAFETY ON BUS CORRIDORS

MARTA OBELHEIRO, Road Safety Specialist, WRI Brasil

TRAFFIC SAFETY ON BUS PRIORITY SYSTEMS



- Road safety audits and inspections
- Crash data analysis

WHAT IS A BRT? WHAT IS BUS-PRIORITY?

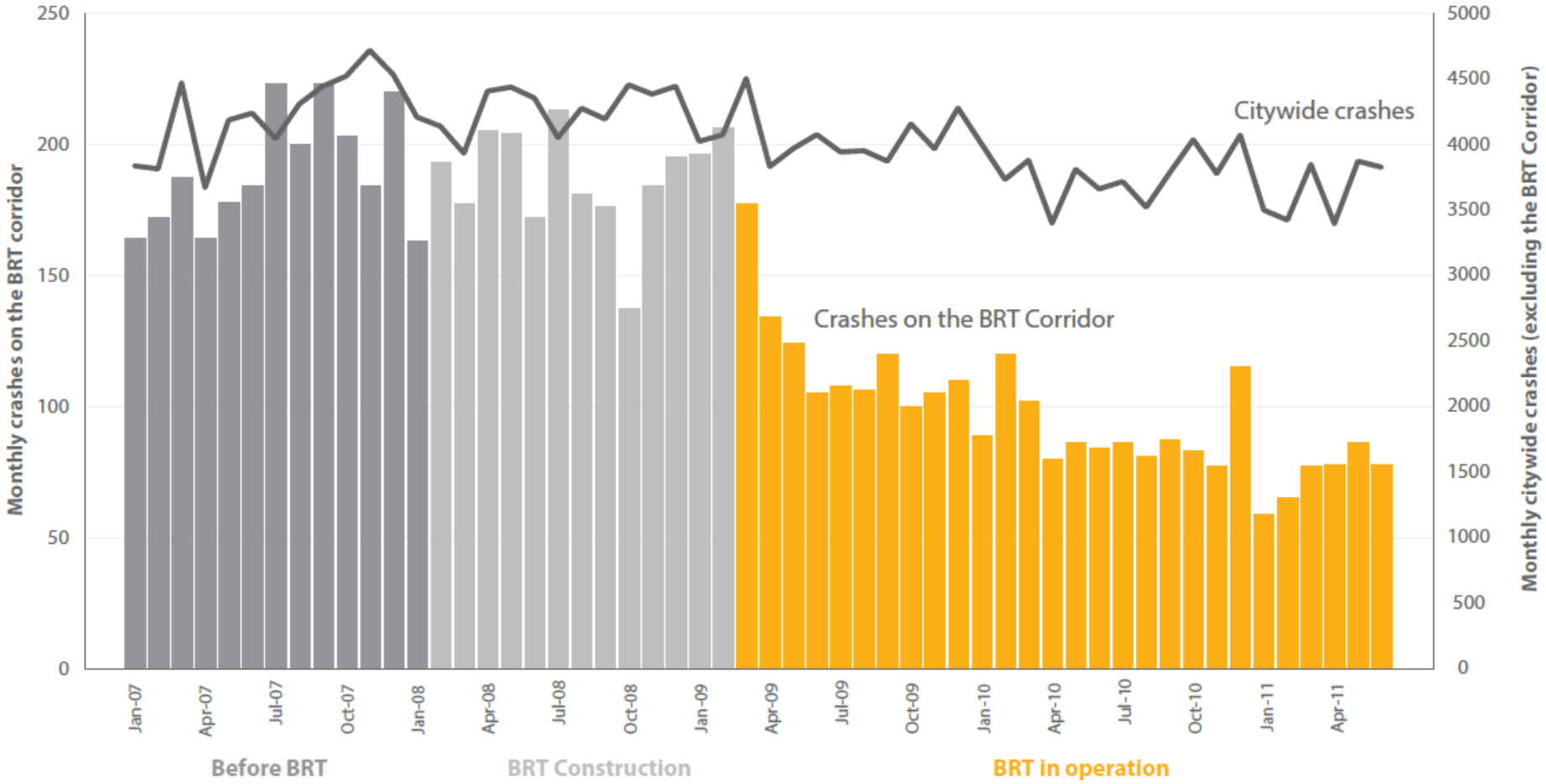
Typical BRT features include:

- Closed busways and stations
- Segregated lanes, turn restrictions
- High frequency, high capacity service
- Signal priority
- Off-vehicle fare collection
- Centralized control
- Level boarding
- Unified system branding
- Passenger Information Systems
- Accessibility improvements, bike lanes

Photo: EMBARQ / EMBARQ Brasil

BRT CORRIDORS SHOW REDUCED CRASH RATES

Before and after data from Guadalajara: Calzada Independencia 2007-2011



Source: Computed from statistics provided by Secretaría de Vialidad y Transporte de Jalisco 2011

EMBARQ analysis of data from Jalisco State, 2011

SAFETY IMPACT OF TRANSIT PRIORITY

Results of safety impact assessment on bus priority systems in Latin America, India, and Australia

City	Change in Bus System	Safety impact		
		CRASHES	INJURIES	FATALITIES
Ahmedabad	Informal transit to single-lane, median-running BRT	-32%	-28%	-55%
Mexico City	Informal transit to single-lane, median-running BRT	+11%	-38%	-38%
Guadalajara	Curbside bus priority lanes to median-running BRT with overtaking lane at stations	-56%	-69%	-68%
Bogotá	Median busway to multilane BRT	n/a	-39%	-48%
Melbourne	Conventional bus service to bus priority using queue jumpers and signal priority	-11%	-25%	-100%

SAFETY IMPACT OF TRANSIT PRIORITY

	% change in accidents	95% confidence interval	Source
Arterial BRT (Latin American countries)			
Fatalities	-47%	(-21%; -64%)	EMBARQ analysis
Injuries	-41%	(-35%; -46%)	
All crashes	-33%	(-29%; -36%)	
Arterial BRT (Latin America and India)			
Fatalities	-52%	(-39%; -63%)	EMBARQ analysis
Injuries	-39%	(-33%; -43%)	
All crashes	-33%	(-30%; -36%)	
Bus priority (Australia)			
All crashes	-18%	n/a	Goh et al. 2013

SAFETY IMPACT OF TRANSIT PRIORITY

Our findings:

- More transit-priority = improved safety
- 90% of crashes on transit corridors did not happen in the bus lanes
- Transit priority features tends to improve street design that improves safety
- Transit priority makes transit safer, attractive, efficient

DESIGN FACTORS THAT IMPACT SAFETY

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Left-Turn Prohibitions
-22% injury crashes

Removal of one lane of mixed traffic
-12% vehicle crashes

Central Median
-35% injury crashes

Shorter crosswalk
-6% pedestrian crashes for each meter reduced

	Crash type	% change in crashes	95% confidence interval
Converting a four-way intersection into two T-junctions	Severe	-66%	(-1%, -88%)
	All types	-57%	(-37%, -70%)
Removing a traffic lane	Severe	-15%	(-11%, -17%)
	Vehicle collisions	-12%	(-9%, -15%)
Shortening crosswalks (each additional meter removed)	Severe	-2%	(-0.04%, -4%)
	Pedestrian crashes	-6%	(-2%, -8%)
Prohibiting left turns on main corridors	Severe	-22%	(-12%, -32%)
	Vehicle collisions	-26%	(-10%, -43%)
Introducing a central median	Severe	-35%	(-8%, -55%)
	Vehicle collisions	-43%	(-26%, -56%)
Introducing a counterflow bus lane	Severe	+83%	(+23%, +171%)
	Vehicle collisions	+35%	(+0.02%, +86%)
	Pedestrian crashes	+146%	(+59%, +296%)
Reducing distance between traffic signals (for each 10m)	Severe	-3%	(-1%, -5%)
	All types	+2%	(+0.03%, +4%)
	Pedestrian crashes	-5%	(-1%, -7%)
Pedestrian bridge on expressway	Pedestrian crashes	-84%	(-55%, -94%)
Pedestrian bridge on arterial road	Pedestrian crashes	No statistically significant impact	(-23%, +262%)

COUNTERFLOW BUS LANE

Case 1

Case 2

COUNTERFLOW BUS LANE

Case 3

COUNTERFLOW BUS LANE

The **common issue** among these cases is that it is **difficult** to vehicles and crossing pedestrians to **understand the traffic pattern**

The results show that counterflow bus lanes are associated with **more crashes** of all levels of severity

+35% vehicle collisions

+83% severe crashes

+146% pedestrian crashes

DESIGN FACTORS THAT IMPACT SAFETY

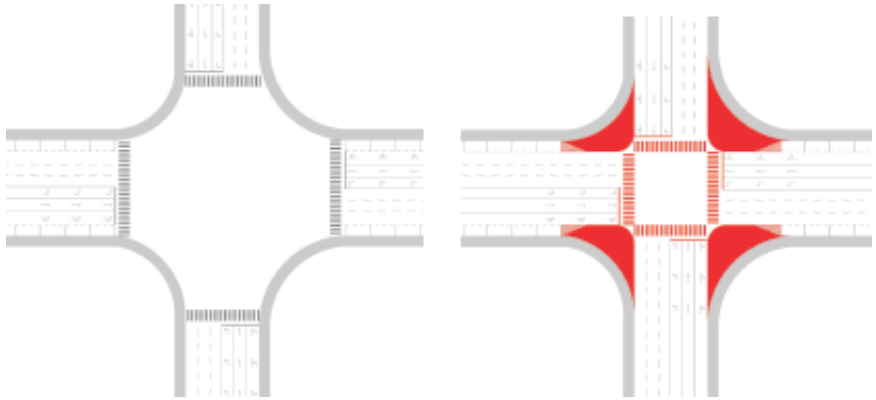
Our findings:

1. Bus System configuration
   - location, accessibility, integration, other modes

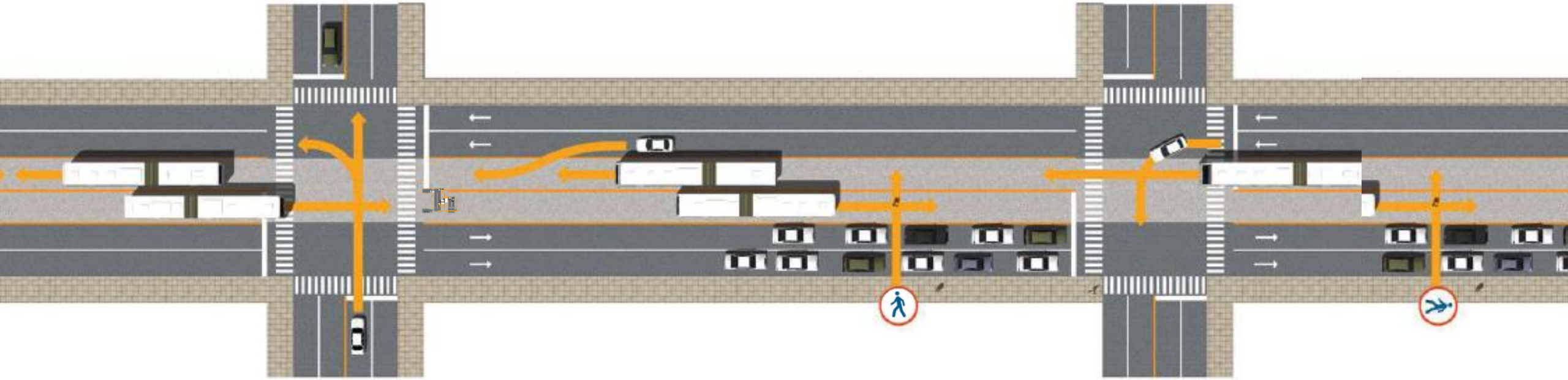
2. Street geometry
   - size and complexity of design

3. Block size and speed

Also Land use



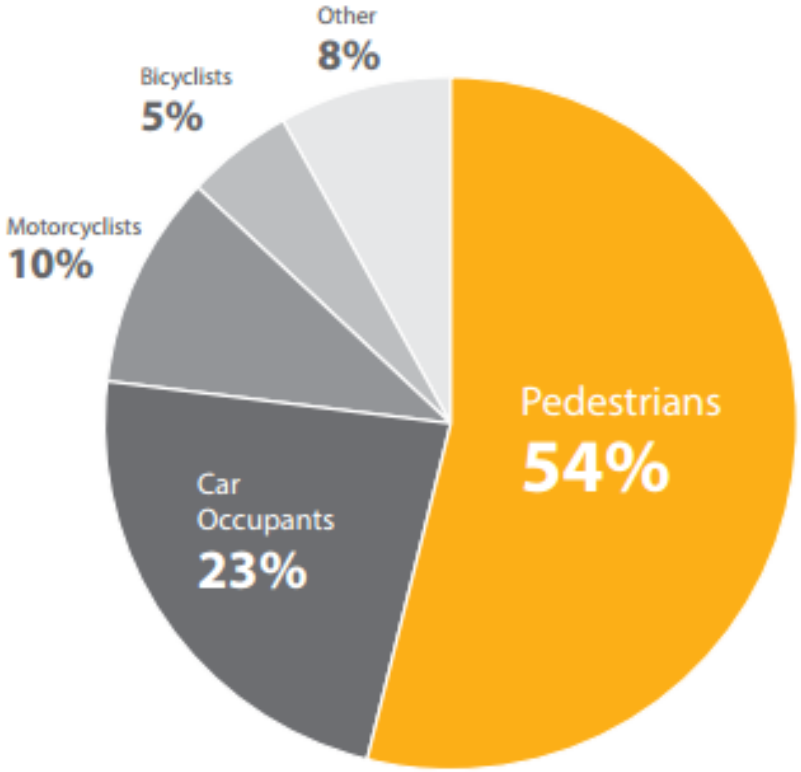
COMMON CRASH TYPES



PEDESTRIANS REPRESENT OVER HALF OF FATALITIES ON BUS CORRIDORS

The safest place on the bus corridor is on the bus or in a station

Only **9%** of all crashes occurred in the bus lanes



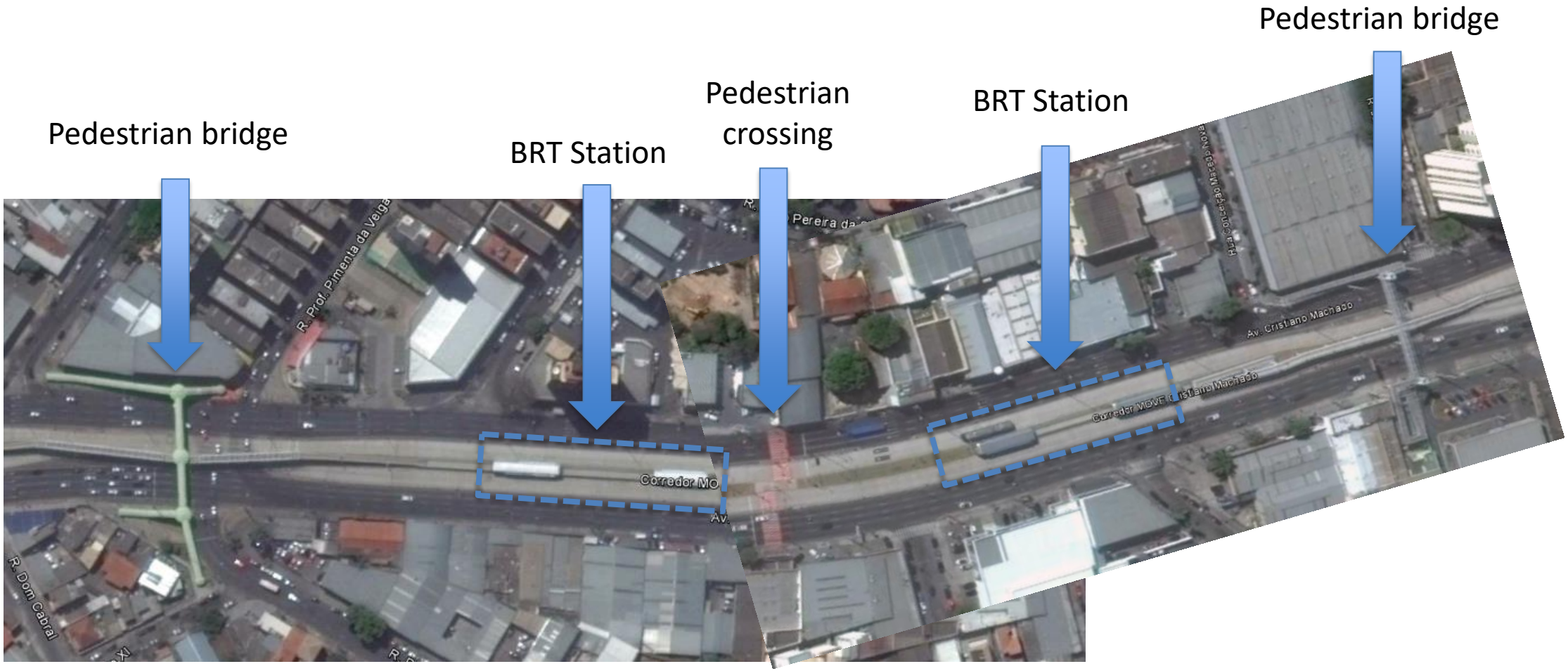
Improving safety on a BRT is mainly an issue of **improving safety for pedestrians**

Data from Mexico City, Guadalajara, Delhi, Ahmedabad, Curitiba, Porto Alegre, Belo Horizonte

ACCESS TO TRANSIT

Curitiba - PR

ACCESS TO STATIONS



ACCESS TO STATIONS

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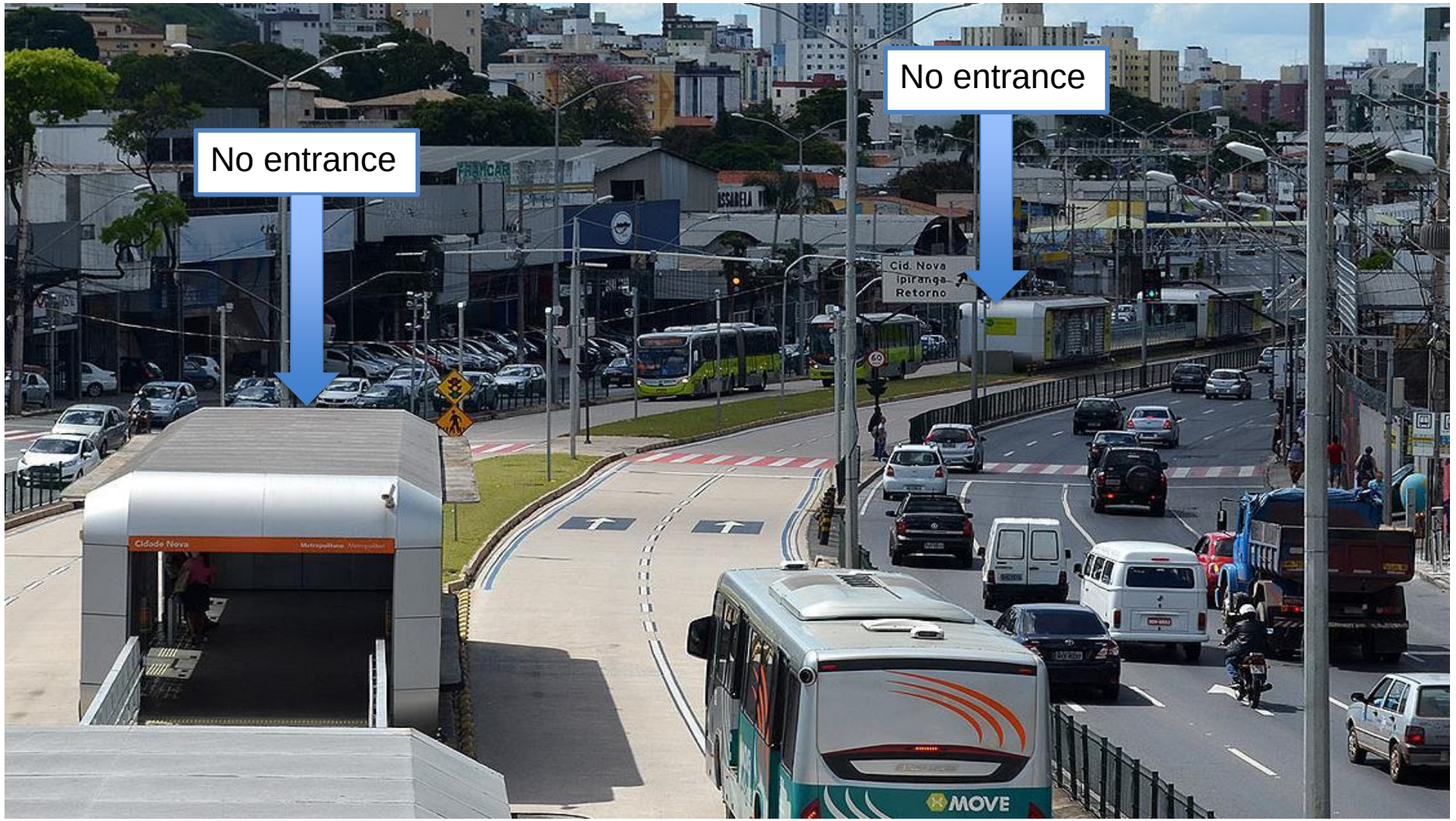
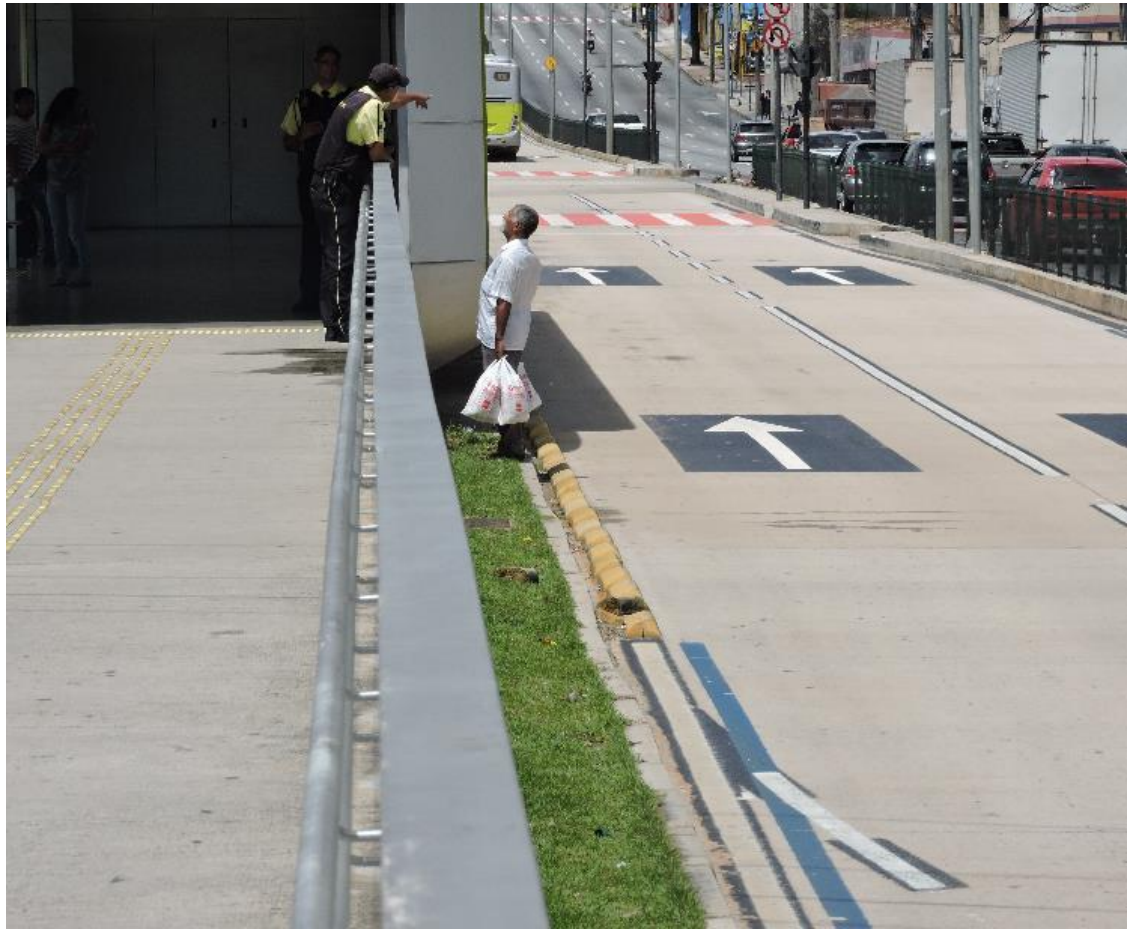
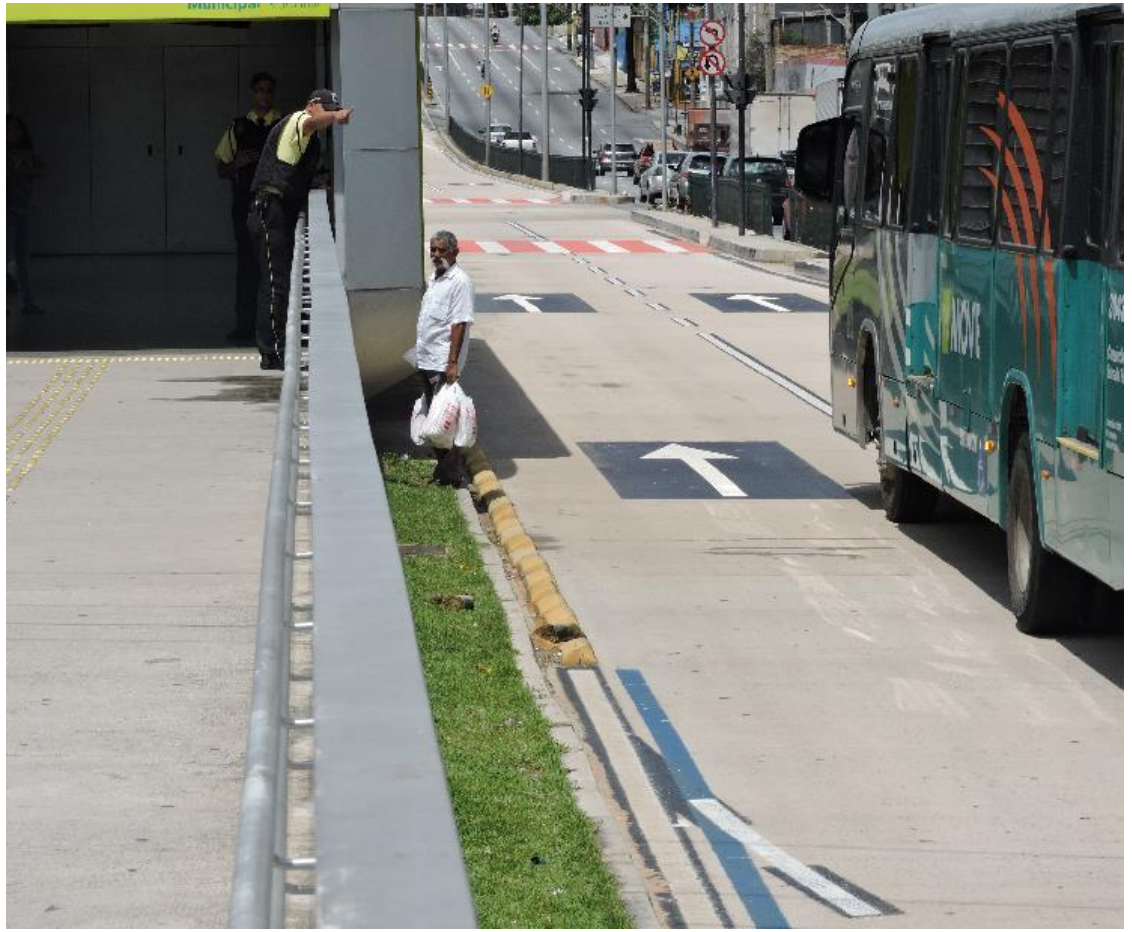


ACCESS TO STATIONS





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THANK YOU! GRACIAS! OBRIGADA!

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