



Safe Routes to Education

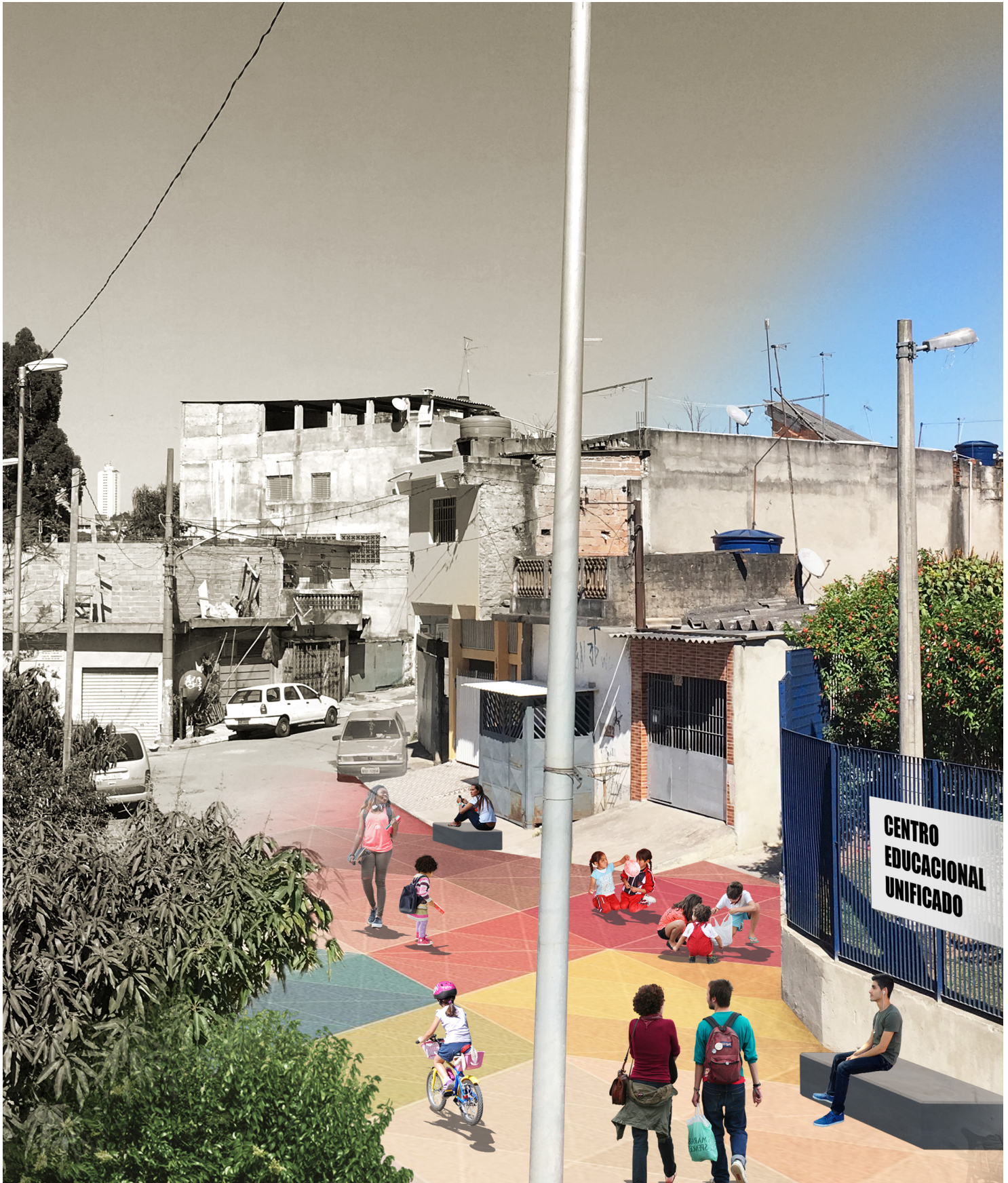
Policy Brief

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ROAD

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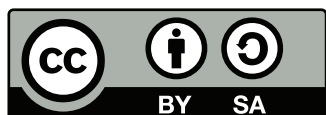
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**SHARE THE
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This publication, developed by The United Nations Environment Programme, Shared the road Program and ITDP Brasil, was based on a pilot project funded by Oak Foundation, elaborated in a partnership between ITDP Brasil, EMTU-SP and apê studies in mobility.



The Institute for Transportation and Development Policy (ITDP) is a non-profit organization that promotes sustainable and equitable transportation around the world, focusing on reducing carbon emissions, air pollution, traffic occurrences and social inequality. Founded in 1985, ITDP is headquartered in New York and has offices in a number of developing countries, including China, Mexico, Indonesia, Kenya and India. Present in Brazil since 2009, ITDP Brasil's office is located in Rio de Janeiro and has country-wide operations, inspired by the principles of Transit-Oriented Development.



The São Paulo Metropolitan Urban Transport Agency (EMTU-SP) is the State agency responsible for planning, implementing, managing and supervising medium and low capacity intercity transport in the Metropolitan Region of São Paulo. EMTU-SP is part of the Metropolitan Transportation Secretariat (STM-SP), which also concentrates the public agencies responsible for the subway (METRÔ-SP) and metropolitan trains (CPTM-SP).



The apê (from indigenous-tupi "pathway") is a group of studies of the most diverse forms of mobility. The group started in 2012 at the University of São Paulo (USP), initially composed by civil engineering and architecture students and since 2014 spun-off the campus as an interdisciplinary NGO. The activities carried out by apê touch several fields around mobility and education and include projects such as public space interventions, sustainable urban mobility plans, articles for seminars and city-focused education.

CONTEXT

Rapid transit corridors offer fast and efficient connections between distant areas in a city. However, their implementation often does not take into consideration improvements in walking and cycling conditions and the potential to improve the surrounding area, resulting in poor integration with existing facilities. Their implementation often creates a barrier effect for pedestrians in the areas where implemented, contributing to the isolation of urban spaces and communities. This process has happened with many Bus Rapid Transit (BRT) projects implemented in the last decade in Brazil, according to a recent assessment made by the Institute for Transportation and Development Policy (ITDP Brazil)¹.

Besides, in most Brazilian cities, an incentive is given for motorized transport and high speeds, endangering pedestrians and particularly vulnerable groups, such as infants, children, adolescents and the elderly. Deaths related to traffic accidents in Brazil add up around 40,000 per year². Historically, the greatest cause of accidental deaths in traffic occurrences are related to children and adolescents from 0 to 14 years old, and the second largest is among young people aged 15 to 19 years³. Additionally, the air quality is directly affected by the motor vehicles' emissions, endangering the health of these vulnerable groups, especially infants and children⁴. In São Paulo, which has the fifth biggest motorization rate among Brazilian's capitals⁵, had the elderly as the principal victim of traffic accidents in 2017⁶.

Road unsafety is not only a result of drivers' behavior, but is also largely related to urban form. The more friendly the environment is, the more people feel safe to use it, contributing directly to the residents' health since the practice of walk and cycling, especially among children, is disappearing. Consequently, this can influence the reduction of an emerging health risk, childhood obesity (United Nations Environment Programme).

In 2017, ITDP Brazil and the São Paulo Metropolitan Urban Transport Agency (EMTU-SP) engaged in a partnership in order to improve their capacity for sustainable transport planning. The agency is in charge of rolling out a BRT network of over 300 km split into 13 operational corridors in São Paulo's Metropolitan Area. The lack of adequate integration and accessibility conditions around the stations was considered an important aspect to be further explored and discussed as part of the agency's capacity building program. Therefore the use of the United Nations Environment Programme's toolkit was essential in order to develop a more inclusive and participative project.

1 For a webinar on BRT state of the practice in Brazil, access: https://youtu.be/YCz0JFOO_bA

2 ONSV (2018). Iris: portal de estatísticas do Observatório Nacional de Segurança Viária.

3 BBC (2017). O que mais mata os jovens no Brasil e no mundo, segundo a OMS.

4 UN Environment (to be published). Toolkit Herramienta para la implementación de Caminos Seguros a la Escuela en la Región de América Latina y el Caribe

5 Data from 2017. Mobilidados Platform, available in: <https://mobilidados.org.br/>

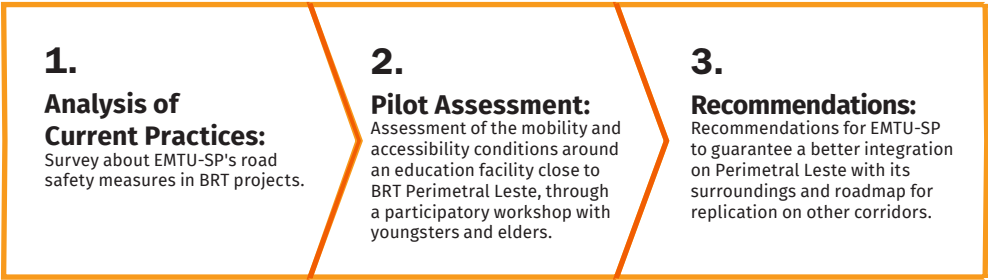
6 INFOSIGASP (2017). Mortes no trânsito: idosos são principais vítimas de atropelamento.

GOALS

The present project focuses on proposing a framework for BRT planning in São Paulo's metropolitan area that incorporates the needs of vulnerable groups in urban mobility, guaranteeing social inclusion and improved accessibility for all. Perimetral Leste was the corridor selected as a pilot, and the project aims at contributing for the improvement of São Paulo Metropolitan Urban Transport Agency's (EMTU-SP's) road safety, integration and participatory policies for the 300km-network of rapid transit corridors in São Paulo, with the broader goals to:

- Guarantee safe access to educational facilities nearby rapid transit corridors;
- Improve the walkability, cycling and crossing conditions along rapid transit corridors and in adjacent local streets with high volumes of pedestrians and cyclists;
- Improve the rapid transit corridors integration with the surrounding urban environment, reducing the barrier effect caused by the installed infrastructure.

The project was conducted in three phases:



For this pilot project, the main reference, considering the need for direct participation of vulnerable groups in its planning and revision, was the toolkit "Herramienta para la implementación de Caminos Seguros a la Escuela en la Región de América Latina y el Caribe", developed by the United Nations Environment Programme (UN Environment) and the Inter-American Development Bank⁷.

This publication framed the current project design. The first phase, defined as a prerequisite in UN Environment's toolkit, was a key element to allow a better orientation of the final recommendations that EMTU could incorporate. The workshop carried out in the second phase was the first activity performed directly with users by the technical team of EMTU, enhancing the agency's capacity on this matter. According to EMTU, the participatory workshops were the fundamental activity to be further incorporated as a standard public policy.

7 The toolkit is available on the website <http://caminosseguros.iadb.org>
The publication pdf can be downloaded on the link <https://publications.iadb.org/es/herramienta-para-la-implementacion-de-caminos-seguros-la-escuela-en-la-region-de-america-latina-y>

1 ANALYSIS OF CURRENT PRACTICES

In order to have a deeper impact over São Paulo Metropolitan Urban Transport Agency's (EMTU-SP's) planning processes on public transport corridors in order to consider social inclusion and accessibility for vulnerable groups, it was necessary to learn about the current practices of urban infrastructure and street design. For this purpose, ITDP conducted face-to-face meetings using structured questionnaires with managers and technicians from EMTU-SP Department of Engineering and Design and Department of Corporate Planning. The interviews aimed at understanding how and if design measures for road safety and participatory processes are present in the company's engineering and infrastructure projects and programs.

From these interviews, it was possible to observe that:

- EMTU-SP generally plans corridors on arterial and express roads where traffic calming devices are hard to implement;
- There is a great emphasis on traffic flow, sometimes at the expense of universal access for all types of users (for example, for the proposal of at-level crosswalks, EMTU-SP evaluates the number of pedestrians vs. number of vehicles on the street);
- There is no standard framework for the basic and executive projects terms of reference, and their scope and breakdown may vary from one project to another;
- The projects currently are only evaluated by the residents after the start of the construction. The elaboration of the project needs a participatory framework, particularly considering the needs of the vulnerable groups; and
- The detailing of traffic calming devices (such as sidewalks, radius of curvature, width of traffic lanes, etc.) in the corridor avenue as well as in local street depends on the understanding and approval of the municipal traffic engineering company. Their engagement during the participatory planning process would be critical for a sound road safety and improved integration policy.



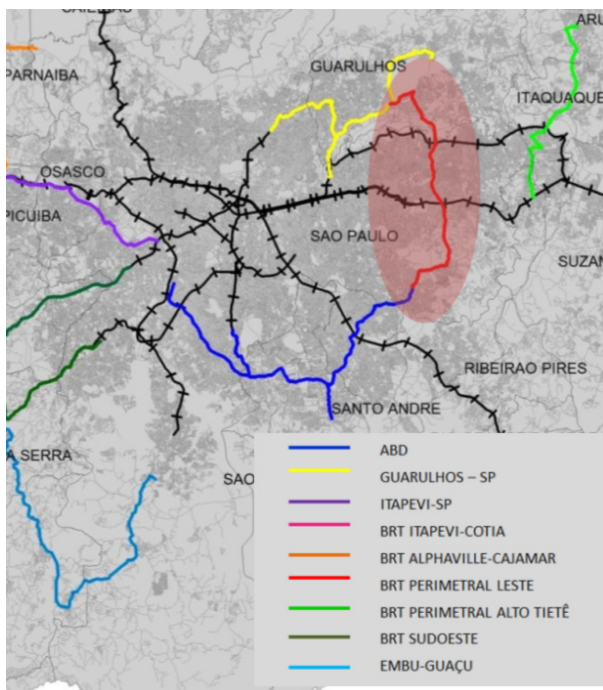
Previous analysis of current practices is an important step to better design the assessment with users.
Source: The authors

2 PILOT ASSESSMENT

BRT Perimetral Leste already has a Basic Engineering Design, was granted Environmental Licensing and is currently prospecting funds to initiate the Executive Project. The corridor will connect the city of Guarulhos with the district of São Mateus, in the city of São Paulo, crossing the city's dense East Zone. In São Paulo, the corridor is located along Jacu-Pêssego Avenue, which stands out as an important perimetral axis for both municipal and intercity trips in the metropolitan region of São Paulo. In addition, the corridor has the potential to promote the area's redevelopment since it crosses a predominantly low-income and high-density residential region and connects two industrial-logistical sites.

Jacu-Pêssego Avenue is an arterial street with 4 lanes in each direction, that follows a river on its course. The BRT corridor project will not alter the street's arterial function since it will maintain 3 lanes for mixed traffic in each way. Even though there was a significant drop in fatal traffic accidents in the last decade, it remains amongst the most dangerous streets in the city of São Paulo. In the year of 2017, the route was ranked 6th in the city, in terms of fatal accidents, and 8th, in terms of accidents with victims. Besides, the 536m average distance between crosswalks is considerably high and represents a clear barrier effect for pedestrian mobility. Considering the street's profile and its record of traffic victims, the avenue can be considered highly inhospitable for pedestrians.

The BRT project provides new crossing possibilities, however, it should be noted that footbridges were predominately favoured in the project (of the 10 new crossings, 6 are footbridges), an equipment that considerably lengthens the crossing distance for pedestrians and that prompts them to cross in dangerous parts of the avenue.



Location of BRT Perimetral Leste in the metropolitan region of São Paulo
Source: EMTU-SP



Conceptual renders of BRT Perimetral Leste
(from the Basic Engineering Design)
Source: EMTU-SP

The pilot assessment aimed at analysing the current conditions of safety and accessibility to an educational facility near the future BRT Perimetral Leste. The survey was based on the direct engagement with distinct users of the educational facility who face in their daily travels a great degree of vulnerability to urban mobility's environmental externalities (students from the 9th grade and elders). Other users present in the educational facility can be indirectly impacted through the project's presentation and dissemination of the workshop's results in the educational facility venues.

ACCESS TO BRT STATIONS: AT-GRADE CROSSINGS OR PEDESTRIAN OVERPASSES?


In any transportation system, a safe and convenient pedestrian access is fundamental for greater attractiveness. One of the most common questions in the design of a new, center-running BRT system is: “How will the customers get to the BRT station if it is in the center of the roadway?”.

The most significant BRT-access decision is typically whether to utilize at-grade crossings (street-level crosswalks) or grade-separated infrastructure (overpasses or tunnels). As a general rule, at-grade pedestrian crossings are the most convenient way for pedestrians—and people with disabilities—to access a BRT station.

Grade separation should reduce the exposure risk to pedestrians, but significantly increases their inconvenience. Pedestrian overpasses or underpasses are usually designed with the primary aim of getting pedestrians out of the way of vehicle traffic—not to enhance the safety and convenience of pedestrians. In cities around the world, pedestrians avoid such infrastructure because it is poorly located, overly steep, badly maintained, or inherently crime-ridden.


According to the Liga Peatonal, a pedestrian overpass costs twice as much as a safe at-grade crossing and has a maintenance cost 2.4 times higher. In addition, the at-grade crossing would be able to generate 2.7 times more benefits (in terms of time saved and accidents) than the pedestrian overpass.

SAFE AT-GRADE CROSSING



- A safe at-grade crossing does not entail extra effort to be covered.
- On a safe at-grade crossing the pedestrian walks 11 meters.
- On a safe at-grade crossing, the driver only needs to move her foot to brake.
- A safe at-grade crossing encourages people to walk in a human scale city

PEDESTRIAN OVERPASS ("ANTI-PEDESTRIAN BRIDGE")



- On a pedestrian overpass with 6% ramps, the pedestrian is obliged to walk a larger path, 103 meters.
- Crossing a pedestrian overpass represents more physical effort for the most vulnerable pedestrians.
- Pedestrian overpasses encourage the use and speed of cars.

ITDP (2017). BRT Planning Guide, Chapter 29.3 Station Access. Available at: [link](#)

Liga Peatonal (2018). Puentes Antipeatonales. Available at: [link](#)

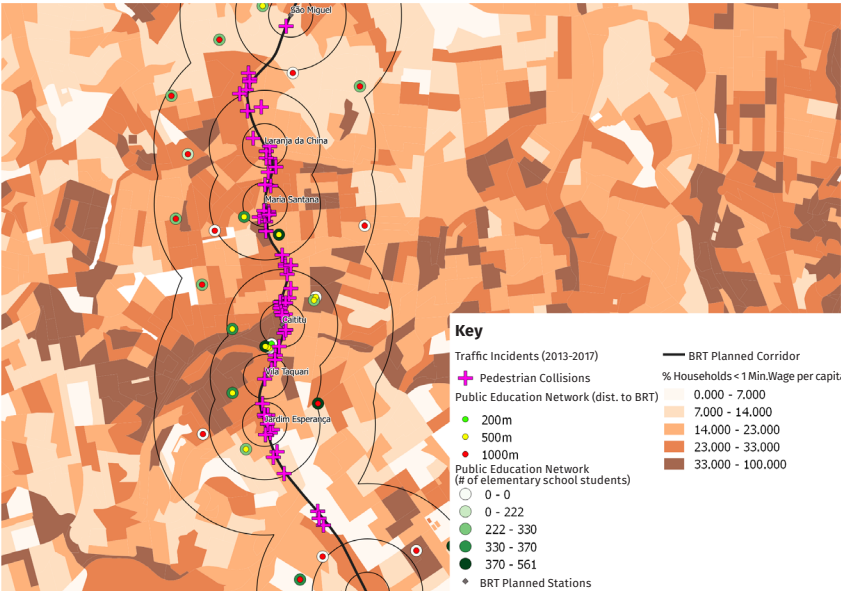
Source: Adaptation from Liga Peatonal (2018)

8

CHOOSING THE EDUCATIONAL FACILITY

In order to select the educational facility (nursery, kindergarten, school) near the future BRT Perimetral Leste to focus on, a set of criteria related to urban location and type of existing facilities were considered, including the location of São Paulo’s municipal public education network, traffic and collision data, as well as density and income distribution along BRT Perimetral Leste planned stations.

Analysis of planned stations urban location
Souce: The authors with data from IBGE, CET-SP.



Data analysis and discussions with the Municipal Department of Education resulted in the selection of the Unified Educational Complex (CEU) Azul da Cor do Mar which:

- Receives on average 3500-4000 users per day;
- Is the largest municipal elementary school along the corridor;
- Has a diverse group of users in the CEU Azul da Cor do Mar, including senior users;
- Is 270 m away from the Perimetral Leste planned station of Caititu, a location that concentrates 20% of collisions with pedestrians in the avenue;
- Is in a very dense and low-income area; and
- Is in an area with heterogeneous road signage, that has "adequate" traffic signaling in the institution "front-side", but lacks adequate road signage at its "backside", where it interfaces with Jacu-Pêssego Avenue.



CEU/School "Front-side"
Souce: The authors



CEU/School "Back-side"
Souce: The authors

ACTIVITIES WITH EDUCATIONAL FACILITY

1 ENGAGEMENT OF ACADEMIC STAFF

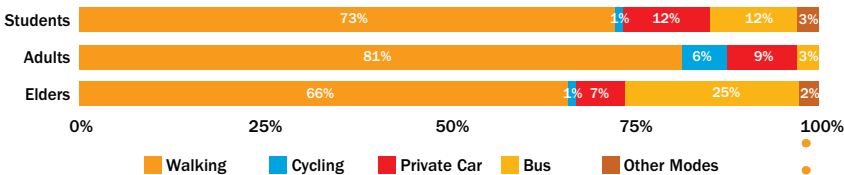
In order to implement planned activities, it is essential to have full support not only from the managers and directors but also the teachers' engagement. To this end, meetings for presentations and discussions were arranged with teaching staff, introducing concepts of urban accessibility and mobility, local engagement in road safety, the project's objectives, activities and expected results.



2 IDENTIFICATION OF INTEREST GROUP

The school's community comprises thousands of students and other users, including seniors. A survey sample was conducted with 285 people. The survey results allowed to select 20 participants for the workshop and learn about their means of transport and the routes most used to access the facility.

MODE SHARE TO ACCESS CEU/SCHOOL
Survey carried out with



3 WORKSHOP

A workshop was carried out during two days with 20 people who use or cross, on a daily basis, the road where the transport corridor will be implemented. This step aimed to identify the critical points and qualities of the surrounding environments as perceived by users on their way to the institution. To achieve this, a more subjective methodology is used, emphasizing the users' ideas and identifying opportunities and threats in the urban environment. Results were shown in a school exhibition.

1. Sensitive Walk: a walk with the group led to identify positive and negative points while crossing Jacu-Pêssego avenue and on the way to CEU. Participants were instructed to observe their surroundings and fill out questionnaires and maps.

2. Playful Intervention Workshop: Participants were instructed to assemble posters about road safety from photos taken during the sensitive walk. The posters reflect their vision for the corridor once the project is implemented. Posters were shown in a school exhibition and then fixed in the public spaces surrounding the school.



3 POLICY RECOMMENDATIONS

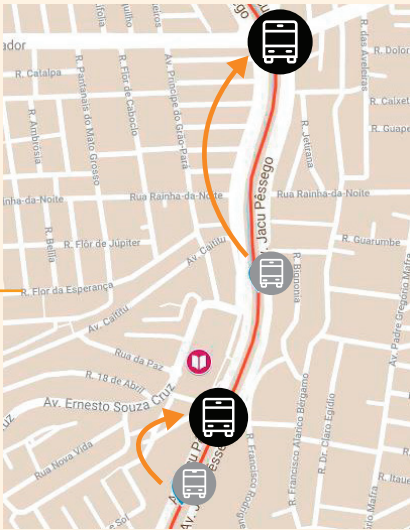
Based on the pilot assessment with the interest group, this project provides clear recommendations for EMTU-SP's road safety, integration and participatory policies and for general procedures adopted in the rapid transit corridors planning processes.

1 Adjust station location to better connect them to existing and projected pedestrian networks and link them directly to surrounding opportunities, especially educational, health and cultural facilities.

Application in BRT Perimetral Leste

Adjustment of station location to better integrate with existing urban opportunities and offer more direct access through at-level crossings, instead of pedestrian bridges.

The station location adjustment and at-grade crossing provision would also facilitate access to the CEU, that has over 4,000 users/ daily. Currently, access from the other side of the transit avenue is only possible through an unsafe and unsheltered pedestrian bridge.



Source: The authors



Source: ITDP Brasil / Alex Nimonia

2 Reduce distances between crossings along transit corridors and improve walking conditions in the main accesses to future stations.

Application in BRT Perimetral Leste

Nearby the CEU, crossings to the other side of the avenue are distant from each other. In areas where there is continuous activity on both sides of the corridor, the BRT Standard suggests safe crossings should be provided every 200 meters. In the image to the right, existing crossings are noted in orange. Proposed crossings are noted in red and should provide connections between the surrounding pedestrian networks. At-level crossings should be prioritized over footbridges whenever possible. When footbridges are inevitable, they should meet minimum conditions such as clear visibility and shelter. Children have also mentioned that providing free wifi connection in the footbridges would most certainly attract more users and increase natural surveillance.



Source: The authors

3 Identify hotspots for pedestrian collisions and deploy speed reduction measures making the area safer for everyone.

Application in BRT Perimetral Leste

Suggestion of locations for road safety inspections considering high concentration of pedestrian collisions.

Redesigning intersections deploying speed reduction measures for vehicles exiting the express roadway where the BRT will be located.

Corridor (above flyover) and arterial avenue, with high pedestrian volumes

End of flyover, with high concentration of pedestrian collisions

Exit from express roadway to neighborhood allows high speed traffic into local streets



Source: The authors



Source: ITDP Brasil / Alex Nimonia

4 Improve bicycle access conditions to stations to favor intermodal connections.

Application in BRT Perimetral Leste

Proposed stations should connect to existing cycleways nearby the corridor and offer adequate bicycle parking at all stations.



Source: Google Street View

The rapid transit corridor should be complemented with proposed cycleways to offer connections to surrounding neighborhoods.

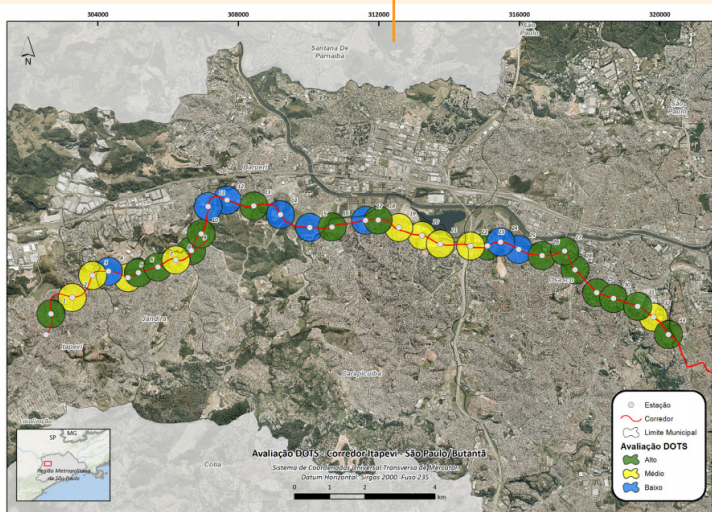


Source: ITDP Brasil / Alex Nimonia

5 Promote higher density and mix land use around the stations and encourage the activation of building facades near the transport corridor.

Application in BRT Perimetral Leste

Evaluation of TOD potential around proposed stations would allow to direct urban planning incentives and foster densification and development of new activities along the corridor. For this type of evaluation it is essential to engage governmental institutions that are responsible for the city or metropolitan urban planning.



Source: EMPLASA-SP, ITDP Brasil

Activation of facades in front of the future BRT corridor would help create a more vivid environment.



Source: ITDP Brasil / Alex Nimonia

6 Conduct participatory methodologies focused on vulnerable users to engage citizens and collect ideas for improvement of corridor's design.

Application in BRT Perimetral Leste

A similar methodology to the one applied in this pilot project should be expanded to other educational facilities near all stations of the corridor and to other rapid transit corridors planned by EMTU-SP.



Source: The authors

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