

COMPLETE STREETS IN BRAZIL

Promoting a paradigm shift

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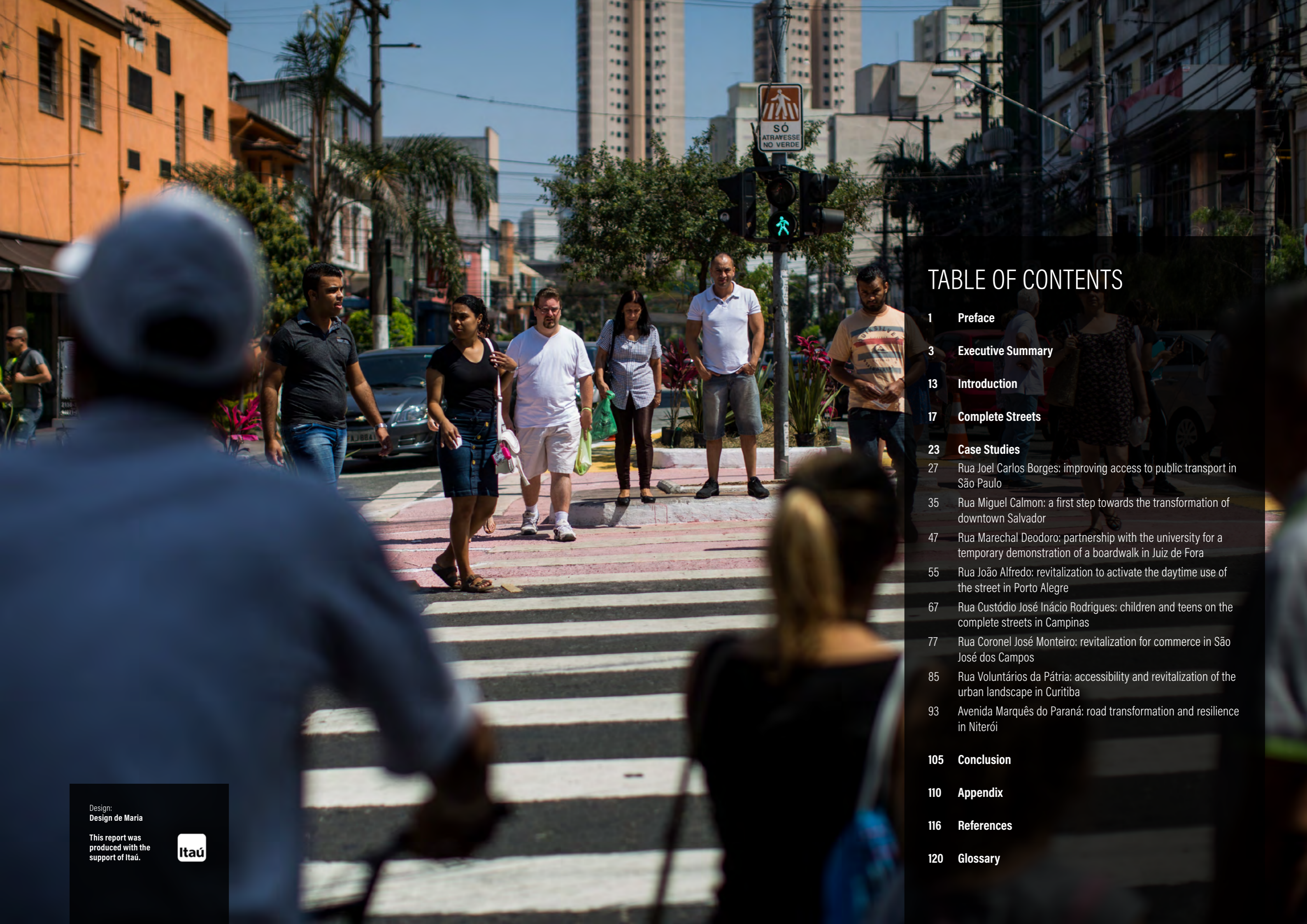


TABLE OF CONTENTS

1	Preface
3	Executive Summary
13	Introduction
17	Complete Streets
23	Case Studies
27	Rua Joel Carlos Borges: improving access to public transport in São Paulo
35	Rua Miguel Calmon: a first step towards the transformation of downtown Salvador
47	Rua Marechal Deodoro: partnership with the university for a temporary demonstration of a boardwalk in Juiz de Fora
55	Rua João Alfredo: revitalization to activate the daytime use of the street in Porto Alegre
67	Rua Custódio José Inácio Rodrigues: children and teens on the complete streets in Campinas
77	Rua Coronel José Monteiro: revitalization for commerce in São José dos Campos
85	Rua Voluntários da Pátria: accessibility and revitalization of the urban landscape in Curitiba
93	Avenida Marquês do Paraná: road transformation and resilience in Niterói
105	Conclusion
110	Appendix
116	References
120	Glossary

Design:
Design de Maria

This report was
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support of Itaú.





PREFACE

Brazilian cities are diverse in their characteristics, but they share a defining trait: the predominance of the car. For more than half a century, motor vehicles have been the masters of public space, a finite resource whose distribution can differentiate an inefficient, polluted, and hostile city from a vibrant, healthy, and livable urban center.

Times are changing. Since 2017, the Complete Streets program has supported 21 Brazilian cities in projects that redistribute public space, prioritizing pedestrians and bicyclists. This network of cities is a promising sign that the old paradigm of road design based on the automobile can, continuously and gradually, be replaced by a design based on people.

Change takes place in the cities, and transformation feeds from the encounters and exchanges between people. Streets become complete as they fulfill their role as spaces for mobility and hospitality. In a complete street, different travel modes have a fair and equitable distribution, considering their costs and benefits for the community. Urban planning guided by these principles is ultimately good for people.

The case studies documented in this publication are examples of another possible city. Completed before the Covid-19 pandemic, they herald the city that we need now more than ever: welcoming, healthy, friendly to the environment, stimulating for the economy, and accessible by any travel mode of choice—but above all the most sustainable.

A complete street is a seed of transformation. Projects can be implemented gradually, first as a temporary intervention, taking advantage of

the speed and low cost of tactical urbanism. Once its benefits are demonstrated through technical validation and user perception, it becomes easier to urge the various actors and foster the conditions for change, and then continue expanding the scale of change, incorporating concepts and guidelines, and making each new intervention an opportunity to solidify the transformation.

The involvement of diverse stakeholders is necessary to achieve numerous and holistic benefits. Transforming public space is not a simple task that can be accomplished in a short time or by a single entity. It involves a systemic view of the city, articulation between departments, participation of society, and professional training aimed at more sustainable cities.

For decades, traffic science has sought to ensure optimal conditions for the flow of cars. Over the last four years, WRI Brasil, which leads the Complete Streets Program in Brazil, and the National Front of Mayors (FNP) trained technicians, managers, and university professors to identify and implement best practices for road design.

Achieving the city we want can be a challenge, but it can be an opportunity to generate more security, resilience, quality of life, and prosperity for everyone. When designing urban space, cities have a chance to de-prioritize the automobile. Complete streets can help.

Luis Antonio Lindau
WRI Brasil Cities Program Director



EXECUTIVE SUMMARY

Complete streets are roads through which all people have safe, comfortable, and convenient access to their destinations, regardless of their travel mode, personal characteristics, skills, and income. Complete streets provide opportunities for the coexistence among all users in addition to facilitating mobility. The street becomes complete when it fulfills its role as a safe road and a public space for everyone to coexist.

Highlights

- The construction of overpasses and the widening of streets to increase the number of lanes and promote better car mobility are still common practices in Brazilian cities. This approach puts at risk people who use other travel modes, as well as those who use the public space for leisure and coexistence. The concept of complete streets brings a new approach to urban street design that considers the urban context in which the street is inserted, aligning the mobility needs of all with the other uses of the street as a public space.
- This report presents case studies of Brazilian cities that transformed their urban spaces according to the guidelines of complete streets. The analyzed cases prove that the concept is applicable in the Brazilian urban context, promoting positive impacts on quality of life. The report was prepared from the documentation of real processes and describes details of the projects, processes, and people whose participation was essential both for the implementation and for the short-term results.
- The analysis of the case studies presented in this report shows that the successful implementation of complete streets requires a coordinated process among different sectors of the local government and dialogue with the community impacted by the project, which includes diagnosis, design, implementation, and measurement of impacts, regardless of the scale of the intervention.
- The different scales of the case studies show how flexible the concept is, and how it can be applied in different realities and contexts, and reinforce the importance of all complete street interventions, regardless of their size and scale. Small, one-off interventions also have the potential to generate large impacts; in these cases, it is important that the streets are located at strategic points and the project prioritizes communication with the public.
- In 2017, WRI Brasil partnered with FNP (National Front of Mayors, from its initials in Portuguese), to launch the Complete Streets Program, to disseminate the implementation of complete streets in Brazilian cities, and to create a network of cities from different regions of Brazil focusing on pilot projects.

Context

The car-oriented urbanization process marked the exponential growth that Brazilian cities faced in the last century. Urban sprawl and traffic congestion emerged as major problems as car ownership grew and the urban population in Brazil jumped from 12.8 million in the 1940s to 160 million today. During this period, engineers and urban planners predominantly practiced methods to maximize traffic flows, supported by a legal apparatus oriented towards prioritizing the circulation of motor vehicles in the urban environment, exposing human vulnerability and the impacting through this practice the quality of life. This approach has resulted in increased vehicle speeds and traffic injuries and deaths.

The car-centered model and the idea that mobility and accessibility are conflicting objectives—for example, that structural traffic routes are not compatible with wide sidewalks and safe crossings—make up a view of street function that remains predominant in Brazil. The paradigm is that streets serve to facilitate the traffic of motorized vehicles and must be designed to facilitate this type of displacement. Many national and international cases, however, show that streets can accommodate efficient vehicular circulation and, at the same time, provide pleasant and safe spaces for pedestrians and bicyclists, improving the coexistence between people and creating a more prosperous environment.

Complete streets can promote a paradigm shift in the role of streets in Brazil. This model proposes to balance the needs of different modes of transport, benefiting people of all ages and abilities, in accordance with the local land use, local economy, and natural environment. The change goes beyond the implementation of dedicated infrastructure for bicycles and buses: it encompasses the neighborhood, the street context, and social coexistence. This approach has been working since the 1970s, in concepts such as “context-sensitive planning”, “traffic humanization”, “pedestrian streets”, “traffic moderation” and, more recently, “complete streets”.

Transformation through complete streets can take place gradually, taking advantage of opportunities to promote a continuous restructuring of the city. Complete streets can be implemented through structural projects, which change the street character, or with the adoption of new guidelines in the dimensions of urban elements in everyday procedures, such as drainage works, maintenance of public spaces, or even the opening of new streets.



About this report

The objective of this report is to show that complete streets, designed to promote positive impacts on people’s mobility and quality of life, are applicable in the Brazilian urban context. Section I provides a contextualization of the emergence and evolution of urban roads in Brazil and addresses the challenges faced as a result of the street model built by cities. Section II introduces some definitions of the concept of complete streets and their main characteristics. Section III presents eight case studies from cities across Brazil that have implemented complete street projects of different scales. The case studies were written by invited university professors in collaboration with technicians from the cities that participated in the implementation of the projects, and reported real street transformation processes, with the challenges faced and the solutions used to put the complete street guidelines into practice. Short-term results range from people’s feedback on changes in street design to a reduction in the number of

collisions recorded after the intervention is completed. Table ES-2 shows the summary of the case studies. Section IV brings together the main highlights of this report and a reflection on possibilities for scaling complete streets in Brazil. Finally, the Appendix describes the Complete Streets Program and the formation of a network of cities, by WRI Brasil and FNP, as a strategy to disseminate complete streets in Brazilian cities.

In the case studies, four steps are described: diagnosis, design, implementation, and initial results, with the information detailed in Table ES-1. Measuring the results and impacts of the intervention should receive special attention, since monitoring urban transformations is not yet a routine practice in Brazilian cities. When adopted, it can become an efficient tool for engagement and contribute to the understanding and acceptance of changes, as well as the knowledge of cost-benefits of interventions.

Table ES-1 | **Steps covered in the case studies**

DIAGNOSIS	PROJECT	IMPLEMENTATION	RESULTS
<ul style="list-style-type: none"> structural and social knowledge of the street to be transformed 	<ul style="list-style-type: none"> definition of the objectives that the work intends to achieve actors involved in the design of the project 	<ul style="list-style-type: none"> actors involved in project implementation financial resources for project implementation 	<ul style="list-style-type: none"> short-term results of the intervention

Source: prepared by WRI Brasil.

This report can be used at various levels of government, especially by technicians and municipal managers, but also by state and federal public managers, potential incentive agents for complete streets, and academia. Public management can use the experiences of case studies to establish strategies to transform the streets of their cities, and to anticipate potential difficulties. University professors, researchers,

and students can combine their knowledge of urban planning with a practical basis to support their research around projects and the impacts of road design. Finally, this report may also be used to guide political advocacy actions carried out by civil society, by recognizing the potential benefits generated by the complete street projects implemented in the country.



Table ES-2 | Summary of case studies presented in the report

	CITY	SÃO PAULO	SALVADOR	JUIZ DE FORA	PORTO ALEGRE	CAMPINAS	SÃO JOSÉ DOS CAMPOS	CURITIBA	NITERÓI
DIAGNOSIS	STREET NAME	R. Joel Carlos Borges	R. Miguel Calmon	R. Marechal Deodoro	R. João Alfredo	R. Custódio José Inácio Rodrigues	R. Coronel José Monteiro	R. Voluntários da Pátria	Av. Marquês do Paraná
	STREET CONTEXT	local street accessing a train station, with a high flow of pedestrians, who were not safely accommodated on the narrow sidewalks	commercial street with high tourist potential downtown, a target of a mixed-use revitalization and dense program	downtown commercial street, with the presence of informal commerce located on the sidewalks and a high flow of pedestrians	street with intense use at night, but little daytime vitality; drivers practice speeds above the permitted limit; no pedestrian-safe dwelling spaces	street with an elementary school, little space for children to occupy on the sidewalk in front of the school gate, dangerous sidewalks along the road, and disorganized traffic at the time of entry and exit of students	one of the main commercial routes downtown, with a high flow of pedestrians, who were not safely accommodated on the sidewalks	a commercial street that is configured as a strategic axis for connecting two important regions of the city; narrow sidewalks for pedestrian flow and accessibility issues	one of the most important structuring axes of urban mobility in the municipality, with significant potential for bicycle and pedestrian between the denser areas and predominantly residential neighborhoods
DESIGN AND IMPLEMENTATION	YEAR OF INTERVENTION	2017	2019	2019	2019	2019	2020	2020	2020
	TYPE OF INTERVENTION	tactical urbanism	permanent	tactical urbanism	tactical urbanism	tactical urbanism	permanent	permanent	permanent
	OBJECTIVE OF INTERVENTION	to qualify customers' access to the train station; improve road safety and comfort for pedestrians through the redistribution of road space	to promote greater balance in the distribution of road space, with a focus on pedestrians and bicyclists; urban revitalization as a stimulus for economic revitalization of the region	to reorganize informal commerce and offer more comfortable sidewalks for pedestrians and retailers	to improve safety conditions, create spaces for permanence that support and make the street more attractive for daytime occupation, strengthening daytime businesses	to improve the sidewalks, providing better road safety conditions in front of the school and the surrounding blocks; engage the school community in the intervention	to provide safety and comfort to the public that frequents the region and more visibility to commerce by prioritizing active modes and qualifying the street for accessibility and attractiveness	to improve the public space of the historic area by prioritizing pedestrians, improving local accessibility, public lighting, and urban drainage	to improve the street, with attributes that make it safer, more alive, and humanized, such as an incentive to active and collective modes, promotion of road safety, redevelopment and creation of public spaces for permanence, and improvement of public lighting and urban drainage
	LENGTH OF INTERVENTION	150 m	1.100 m	50 m	650 m	150 m	120 m	330 m	600 m
	APPROXIMATE COST	BRL70 thousand ¹	BRL4.8 million ²	less than BRL15 thousand ³ (materials donated to city hall)	BRL140 thousand ⁴	BRL52 thousand ⁵	BRL910 thousand ⁶	BRL1.29 million ⁷	BRL12 million ⁸
RESULTS	SHORT TERM RESULTS	after the intervention, 92% of the people interviewed thought that the street has improved in terms of safety and comfort and 80% felt safe on the street from the point of view of traffic safety	in 2019, Rua Miguel Calmon did not record any traffic deaths and had the lowest number of collisions with injuries in the last 8 years	after the intervention, 97% of respondents approved of the tactical urbanism intervention and wanted the intervention to remain six months longer than originally planned	reduction of up to 17 km/h in average speeds and 43% of traffic incidents	after the intervention, 91% approval of the people interviewed, and students using the spaces that were created	accepting a partnership with the authorities, local businesses take care of the furniture	increased circulation and permanence of people in public spaces; improved accessibility	transfer of 35% of the road space previously destined exclusively for private vehicles to public transport; plus 20% of new areas dedicated to pedestrian circulation and permanence

Notes: ¹ US\$13.37 thousand (December 2022). / ² \$920 thousand (December 2022). / ³ less than \$2.86 thousand (December 2022). / ⁴ \$26.74 thousand (December 2022). / ⁵ \$9.93 thousand (December 2022). / ⁶ \$173.78 thousand (December 2022). / ⁷ \$250 thousand (December 2022). / ⁸ \$2.29 million (December 2022).
 Source: prepared by WRI Brasil.

Main conclusions of this report

Complete streets can be widely implemented in Brazilian cities, considering the characteristics of urban context and local processes. This report presents case studies of urban transformations in eight Brazilian cities that followed the complete street guidelines, showing the applicability of the concept at different scales of intervention. Each case study presents the challenges faced throughout the project and the essential actors and circumstances for the implementation of the complete street according to the characteristics of each context.

The formation of city networks can facilitate the implementation of complete streets by promoting experience exchange. The sharing of experiences is a driver for the development of urban projects and policies in Brazil. Networks allow urban planners to exchange challenges and lessons learned and thereby help each other overcome local problems and deliver better solutions. As a group, these professionals can develop projects more quickly, encouraging each other and acting as a team focused on a shared vision for the improvement of their cities.

The implementation of complete streets requires joint action by different actors. Complete streets require changes in the usual process of roadwork, which benefit one transport mode at a time and which often need to be redone due to the lack of coordination between public authorities and an insufficient response to local demands. As a multimodal approach, complete streets entail an interdisciplinary implementation process, with the involvement of several actors, both internal to the local government, such as departments, transport agencies, and public companies, and external, such as research institutes and contracted companies for project development. Political will is essential to lead the integration between them and succeed in changing reality.

A complete street project begins with the recognition of the local context. It is not possible to design a complete street from afar, as this concept does not provide a ready-made recipe. Social and economic dynamics and topographical characteristics mean that each street has peculiarities that prevent standardized solutions at this level of road structure. It is necessary to know the streets, their function, day-to-day life, character, and who their users are to successfully design and implement complete street projects. At the city scale, both managers and the population must have at their disposal, not a complete street recipe, but a “menu” of design options, technologies, and local policies that can be implemented respecting the dynamics of the neighborhood and the city.

Community consultation is critical to the acceptance of complete street designs. The engagement of the communities who will be impacted by the project should be encouraged at different stages of the street transformation process. In addition, the involvement of students and people working in the development of products that can be used on the street, such as furniture and landscaping, generates a sense of belonging and contributes to the care for these spaces when the work is complete.

Every urban intervention under complete street guidelines is important, regardless of scale. The different scales of the case studies show that small, one-off interventions also have the potential to generate large impacts. In these cases, they must be located at critical points, such as intersections and access to schools. Often a small intervention is the first step to engaging politicians and citizens in large-scale change.

Measuring impact and disseminating results is an essential part of the process of implementing and expanding complete streets. Data can justify the investment in an innovative concept. The community may worry about possible negative results of the

actions or have the fear of “losing something”, such as parking space, and become a powerful opponent of the projects. However, if people are well informed and engaged, they can support the intervention and, understanding that the change benefits everyone, also support the expansion of complete streets to other parts of the city. Measuring the impacts achieved with a complete street pilot project enables an objective communication of the results obtained, supporting the expansion of actions in the city.

Complete streets must be broadly implemented to benefit the entire population, prioritizing the safety of the most vulnerable road users. Cities around the world are systematizing the multimodal approach of complete streets in urban planning by incorporating the concept into public policies. Changes in the functional classification of roads and their incorporation into an official city manual was the strategy adopted in Boston, enabling a gradual adaptation of the road system. The institutionalization of complete streets through national guidelines and municipal planning instruments, such as master plans, mobility plans, and urban design manuals, is one of the ways to take advantage of opportunities for physical change in the street, such as drainage repair or new paving, and to rethink urban space to make it safer and more comfortable for everyone.

It is necessary to know the streets, their function, day-to-day life, character, and who their users are to successfully design and implement complete street projects.





SECTION I

INTRODUCTION

The objective of this report is to show that complete streets can be applied in Brazilian urban context and that they promote positive impacts on people's quality of life. Based on eight case studies, the report describes the execution of projects of different scales in Brazilian cities, highlighting the challenges faced throughout the process and the essential actors and circumstances for the implementation of the complete street according to the particularities of each context.

Streets in Brazil

The streets in the first Brazilian cities were designed to follow the topography and offer protection against invaders, generally presenting an irregular pattern. Other villages, such as Salvador and São Luiz do Maranhão, were originally planned with straight and orthogonal streets (Gonçalves 2020). Unique centrality was characteristic of colonial-era Latin American cities, which began to transform as urban growth drove poor families to the outskirts of formal cities. Urban expansion at that time took place through large informal peripheral areas, accompanied by a lack of infrastructure and basic services, such as public transport and adequate access roads (UN-Habitat 2013; Assunção 2006). At the end of the 19th century, more robust roadworks began to be carried out in cities like Rio de Janeiro, which opened wide avenues to fight epidemics caused by rapid population growth and lack of sanitation (Gonçalves 2020).

However, the biggest leap in investments in road infrastructure in Brazil took place in the 20th century, marked by the exponential growth of cities. The urban population increased from 12.8 million in 1940 to the current 160 million (Stamm et al. 2013; Farias et al. 2017). In the 1960s and 1970s, many urban highways were built in Brazil to offer more convenience in commuting, since many people left the central areas to live in the wealthy suburbs. These roads had an impact on economic growth, but they also degraded regions of historical value and harmed the air quality of populated areas (ITDP Brasil and EMBARQ Brasil 2013), problems that still affect the cities. This development model was supported by the automobile and oil industries. The planning and construction of cities based on the primacy of motor vehicles took place, mainly, to accommodate the commuting migrations necessary to take people from residential neighborhoods (periphery) to the economic centers where work opportunities were concentrated.

The construction of viaducts and the widening of roads to increase the number of lanes is still common practices in Brazilian cities. In addition to contributing to social inequality, this approach increases vehicular speeds, distances traveled, and, consequently, traffic deaths. Pedestrians and bicyclists account for 21 percent of traffic

fatalities in the country (WHO 2018). In urban contexts, such as in the city of São Paulo, this number is even more expressive, reaching more than 45 percent of fatalities (São Paulo 2019). Despite being the most vulnerable users on the roads and representing the majority of travels—between 43 and 51 percent, depending on the size of the city (ANTP 2020)—active mobility practitioners circulate on streets that lack the infrastructure that prioritizes their travels. Considering that public transport travel is mainly complemented by walking, the representation of pedestrians is even greater—in São Paulo, for example, it can reach twice the official estimate (Pereira and Nunes 2017).

Brazilian legislation also reflects the prioritization of motor vehicles in modern road planning. The Brazilian Traffic Code (Brasil 1997) classifies urban roads according to operational characteristics predominantly related to mobility and the traffic capacity of motor vehicles, and it is based on these vehicles that lane widths, maximum speeds, geometry, and intersection configurations are recommended. This functional classification is the basis for most road projects at the local, state, and national levels.

At the beginning of the 21st century, studies revealed the negative economic and environmental impacts of conventional, automobile-oriented road design (Chung 2011; Foster and Winkelmann 2011; Blincoe et al. 2010). Since then, the search for solutions to minimize these impacts and improve the efficiency of road systems has grown worldwide. The car-centered model and the idea that mobility and accessibility are conflicting objectives—for example, that traffic-structured roads are not compatible with wide sidewalks and safe crossings—configure a view of the function of streets that is still predominant in Brazil. There is the paradigm that the streets serve to facilitate the traffic of motorized vehicles and must be designed to facilitate this type of travel. Many national and international cases, however, show that streets can accommodate efficient vehicular traffic and, at the same time, provide pleasant and safe spaces for pedestrians and bicyclists, improving coexistence between people and creating a more prosperous environment.

Paradigm change

UN-Habitat relates the prosperity and good functioning of cities to the proportion between public and private space. Ideally, public spaces—streets, squares, and parks—should make up between 45 and 50 percent of the urban area, with 30 to 35 percent of the total urban area reserved for streets (UN-Habitat 2018). From these data, it is estimated that approximately 70 percent of the public space corresponds to streets, which, if treated as safe and pleasant environments for coexistence, can constitute a network of public spaces distributed throughout the city, complemented by parks and squares.

The effective transformation of streets requires the recovery of their public character—they must be inhabited paths, places of mobility, and permanence (Gonçalves 2020). Concepts established since the 1970s, such as “context-sensitive planning”, “traffic humanization”, “pedestrian streets”, “traffic moderation” and, more recently, “complete streets” (Valença and Santos 2016), resume these features. Studies indicate that the way streets are used has significant impacts on health and quality of life. Less walkable neighborhoods, for example, are related to higher rates of overweight in the adult population. Walkability indicators mainly include residential and population density, street connectivity, and land use diversity (Barbosa et al. 2019). More walkable streets not only reduce traffic congestion and the number of passengers in motor vehicles, but also greenhouse gas emissions (Marshall et al. 2009). Other studies also show that the safety perception in the urban environment influences the practice of physical activity by children: paths to school that pass through streets with traffic calming measures, clear signage, and parks are considered appropriate by parents for children to walk through (Timperio et al. 2004; Rothman et al. 2015).

The debate on the role of streets is historically associated with transformative movements in society. In Brazil, popular protests linked to traffic safety were registered since the 1980s onwards. Currently, bicycle activism is the best-organized movement in the country, demanding the adequacy of urban infrastructure for the safe use of bicycles and the participation of its members in the creation of public policies (Valença and Santos 2016). The number of civil society organizations working towards mobility by foot has also grown in recent years in Brazil, and more than half were inaugurated after 2013 (Como Anda 2020).

The demonstrations were part of a set of impetus from various groups in society that demanded better conditions of safety and accessibility and were significant for the discussion about public space. However, for the transformations to take place, authorities must recognize the need to change the paradigm of the role of streets and have the willingness to do so. Many Brazilian cities are making progress and committing to improving the safety and quality of public space by adopting approaches to reduce speeds and traffic deaths, expanding and improving spaces for coexistence, and making streets more resilient to climate change.

This report presents eight case studies of Brazilian cities that carried out transformations at different scales in their streets, describing the challenges faced and the solutions used to put the complete street guidelines into practice. As an introduction to the case studies, the report contextualizes the emergence and evolution of urban roads in Brazil and introduces the concept of complete streets. Finally, the report describes the creation of the Complete Streets Program, by WRI Brasil and FNP, as a strategy to disseminate complete streets in Brazilian cities and reflects on possibilities to scale complete streets in Brazil.



SECTION II

COMPLETE STREETS

Complete streets are a concept that provides safe, comfortable, and convenient access for all people, regardless of mobility and mode of transport used.

The term “complete streets” first appeared in the United States in 2003, in response to significant changes in the planning and road infrastructure of American cities that occurred with the strong increase in individual motorization after World War II. While street design prioritized automobiles—and urban planning made cities increasingly dependent on vehicles—the comfort and safety of using other modes of transport decreased, which led to a considerable reduction in the use of active modes, such as walking or cycling (Winters 2015). An effort led by the organization America Bikes helped launch an initiative to demand the effective inclusion of the bicycle in road infrastructure projects, as well as the adoption of the term “complete streets” to replace the expression “routine accommodation”, which was until then used by planners to refer to the inclusion of active modes in road planning (McCann 2010). The idea arose from the perceived importance of the social function of public roads, promoting transport sustainability and investing in streets that serve different modes and promote road safety (McCann 2013).

In 2005, the National Complete Streets Coalition was created in the U.S., formed by several entities, to discuss and improve the term “complete streets” and transform it into a concept that went beyond the cycling issue. The coalition’s main objective was to influence, at the municipal, state, and federal levels, the adoption of public policies that promote the implementation of complete streets in the United States. Since then, complete streets have become popular in the country and, in 2020, more than 1,600 policies have been implemented (Smart Growth America 2020).

BOX 1 | DEFINITIONS OF “COMPLETE STREET”

“Complete Streets are streets for everyone. They are designed and operated to enable safe access for all users, including pedestrians, bicyclists, motorists, and transit riders of all ages and abilities.” (U.S. National Complete Streets Coalition)

“A Complete Street is designed for all ages, abilities, and modes of travel. On Complete Streets, safe and comfortable access for pedestrians, bicycles, transit users and the mobility-impaired is not an afterthought, but an integral planning feature.” (Complete Streets for Canada)

“A ‘Complete Streets’ approach focuses on moving people around a city, rather than moving cars. It involves designing and operating our roads to provide safe and convenient access for all users—whether they happen to be walking, riding the bus, driving, cycling, or delivering goods on a given trip. It recognizes the need to plan for the most vulnerable road users—children/youth, seniors, and persons with disabilities—which results in a design that fits all users.” (Green Action Centre, Winnipeg)

“Complete Streets is the planning, scoping, design, implementation, operation, and maintenance of roads in order to reasonably address the safety and accessibility needs of users of all ages and abilities. Complete streets consider the needs of motorists, pedestrians, transit users and vehicles, bicyclists, and commercial and emergency vehicles moving along and across roads, intersections, and crossings in a manner that is sensitive to the local context and recognizes that the needs vary in urban, suburban, and rural settings.” (Minnesota Department of Transportation).

Source: TAC 2015.

But what is a complete street?

There are many definitions of complete streets, including the examples presented in Box 1. In this report, complete streets are treated as a street concept that provides safe, comfortable, and convenient access for all people, regardless of mobility means and travel mode. In addition to facilitating mobility, complete streets are also characterized by providing opportunities for coexistence among all users. A street becomes more complete when it fulfills its purpose as a safe route for all who use it and as a public space for socializing. Complete streets do not necessarily need to design separate spaces for each mode of transport; the configuration of the street must allow its functions within the mobility system to be performed, offering safety and comfort to all users.

Main features of complete streets

- **Integration of mobility functions and public living space:** when street designers use only the functional classification system according to motility—differentiating arterial, collector, and local roads—they tend to focus on lane width, speed limit, and the flow of vehicles (LaPlante and McCann 2008). These characteristics do not make it possible to identify whether the use of the street is commercial, industrial, or residential, whether public transport lines pass through it or whether there is a significant number of pedestrians and bicyclists, which requires different measures of road design. Complete street designs align existing mobility conditions with adjacent land uses, as this factor influences the way streets are used.
- **Coordinated planning between different sectors of public administration:** the first step in implementing complete streets is to recognize that this is a multimodal and interdisciplinary approach, which requires the articulation of several internal actors, such as transport agencies and departments, and external actors that can contribute to the process. Traditional roadwork benefits one transport mode at a time and often

needs to be redone due to the lack of coordination between public authorities and an insufficient response to local demands. Street planning as an integrating approach embraces a holistic and coordinated implementation model.

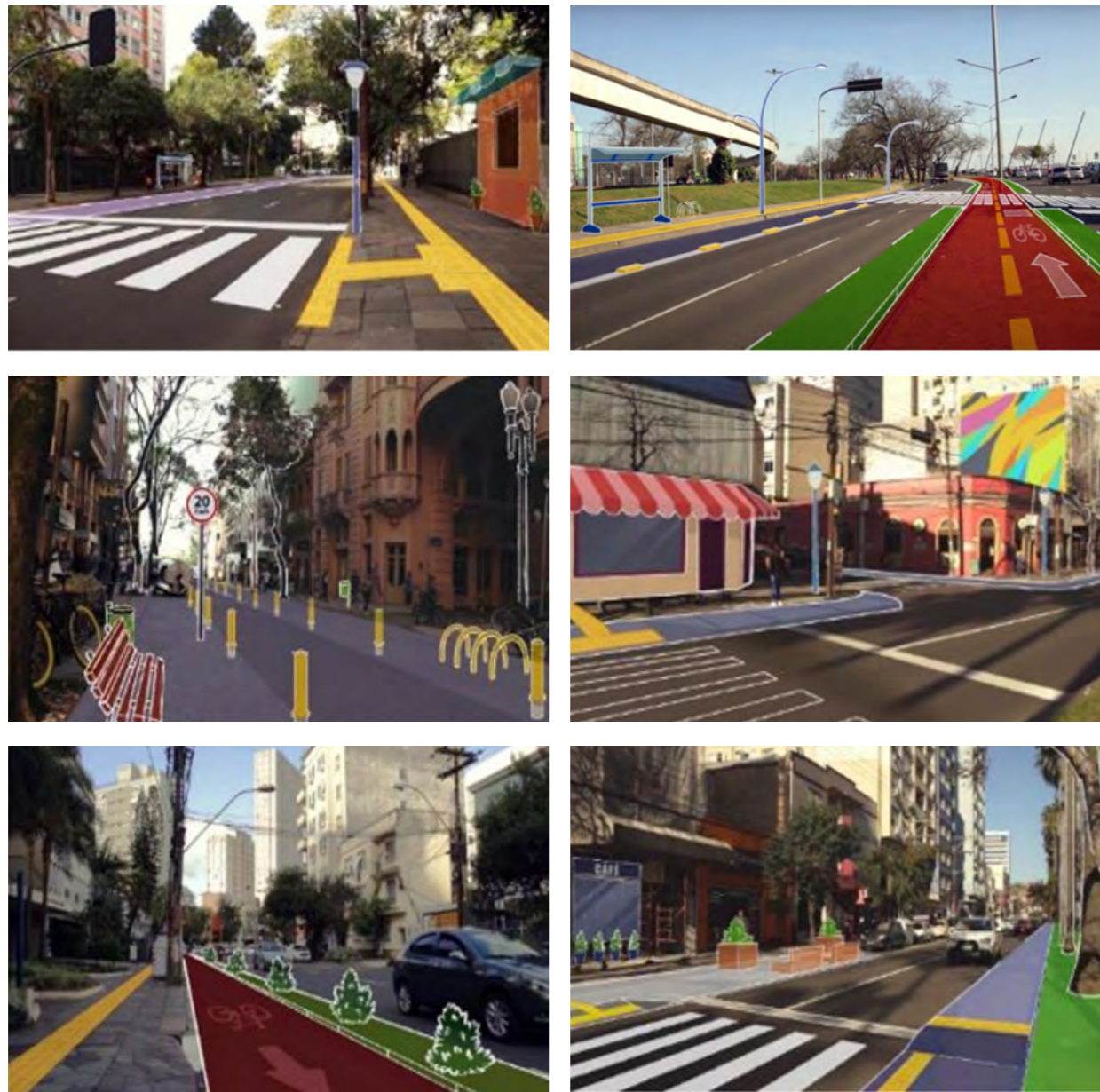
- **Unique projects that are based on the street’s character and not on standardized models:** as it is a solution sensitive to the context of each street, there is no single complete street typology. The guideline of planning the road for all users does not mean that all complete streets result in the same designs (LaPlante and McCann 2008). As with the functional road classification system, the complete streets approach is also applicable to the entire road network. In other words, local, collector, arterial, and rapid transit roads can be complete streets, as well as stretches of highways that pass through cities and rural roads. A pedestrian-only street can be as complete as one that caters to all modes of transport, as long as it reflects its function and character.
- **Focus on people:** despite not having a single solution, all complete streets prioritize universal accessibility and the safety of the most vulnerable road users. Complete streets do not propose the exclusion of car and motorcycle traffic, but, in most cases, propose measures that restrict the road space dedicated to them and reduce speed to promote an environment where they can coexist safely with more sustainable and healthy modes. For this reason, even small interventions, such as the narrowing of a road to reduce the crossing time in front of a school, can direct the street design to its most complete version. As the concept of complete streets is adopted as a guiding policy for road planning, streets with a better distribution of public spaces will emerge, returning to the population a valuable environment for the practice of citizenship and changing the paradigm that streets are designed to move vehicles



and not people. The applicability of the concept of complete streets in Brazil is reinforced by its alignment with the guidelines of the National Urban Mobility Policy (PNMU), established by Law No. 12.587/12, which guides mobility planning by prioritizing active and collective modes of transport over individual motorized ones.

While complete streets can contribute to improving the feeling of safety by attracting more people to the public space—which can be done through elements such as active frontages and efficient lighting of the sidewalks—a transformation of the street infrastructure does not have to conflict with policies aimed at education, land use, occupation, inspection, and policing.

Figure 1 | Some examples with proposals for complete streets: the configuration of the complete street depends on the context of each street



Source: WRI Brasil.





SECTION III

CASE STUDIES

This section of the report presents eight case studies of pilot projects of complete streets, which features examples in different scales and contexts. The case studies describe the implementation process as well as short-term impacts, important to demonstrate the scale of these interventions within the city. They also present specific aspects of the implementation process of each pilot project, such as the partnership with private actors or universities, the importance of political leadership, and the different forms of community involvement.

The projects were developed by the municipal governments of São Paulo, Salvador, Juiz de Fora, Porto Alegre, Campinas, São José dos Campos, Curitiba, and Niterói, which had their complete street pilots completed before or during the preparation of this report. These cities are part of the National Network for Low Carbon Mobility (RNMBC), whose objectives and work history are described in the Appendix. The texts and analyses in the case studies were prepared by invited university professors who are part of the University Professors Network for Complete Streets, also described in the Appendix, in collaboration with technicians from the municipal governments directly involved in the development and/or implementation of the pilot projects. The two networks are part of the Complete Streets Program, conceived and coordinated by WRI Brasil and the FNP.

In the case studies, the phases of diagnosis, design, implementation, and initial results are described. The diagnosis includes a brief history of the street and relevant quantitative and/or qualitative data, reflecting a structural and social analysis of the street. The design phase includes the intervention objectives, the actors involved (both from the government and from the private sector), the form of engagement of the public, and the detailing of the proposed design for the street. In the same way, the project implementation phase also comprises different actors, as well as arrangements, articulations, and human and financial resources necessary to carry out the intervention. The initial results of the interventions—that is, the impacts perceived soon after the changes were carried out—are evidenced with data, and the report of each case also presents how the data was collected.

Measuring the impacts of urban transformations, such as those using the concept of complete streets, is important to understand the cost-benefit of interventions. Through this analysis, it is possible to relate the investment with, for example, the improvement of local economic vitality or the reduction of traffic incidents. In addition, impact measurements can be an effective tool to inform the public about the benefits of the new design and how it contributes to everyone's quality of life, helping to promote understanding and acceptance of changes. Box 2 addresses the importance of measuring these impacts and shows some examples of indicators that can be monitored in complete street interventions.

Each case study presents a summary table with the following information:

- **Diagnosis (pre-intervention):**
 - **Functional classification of the street:** local, collector, or arterial, according to the classification provided for by the Brazilian Traffic Code (Brasil 1997). No case study describes transformations in expressways..
 - **Context:** main functions and activities on the street.
- **Design and implementation:**
 - **Objectives:** purpose for carrying out the intervention.
 - **Financial resources:** investment applied from the conception of the project to the implementation of the work.
 - **Type of intervention:** tactical urbanism, implemented with paint, planters, and light street furniture; or permanent work, implemented with robust materials, such as concrete and asphalt, and durable landscaping and furniture.
 - **Length of the intervention:** linear dimension in meters.
 - **Inauguration of the intervention:** month and year of completion and opening of the new street to the public.
 - **Measures implemented:** main actions taken to transform the street.
 - **Time:** period necessary for the execution of the intervention.
 - **Key circumstances for the transformation of the street:** actors, studies, urban revitalization programs, partnerships, and/or urban planning instruments.
- **Results (post-intervention):** main results measured or perceived immediately after the implementation of the work in the areas of road safety, public approval, quality of life, or redevelopment of the road space.

The objective of reporting in detail the challenges faced in each city and the solutions found to implement complete street projects is to demonstrate different possibilities for transforming roads into quality public spaces, even within a culture of urban planning that prioritizes the function of streets to provide motility to vehicular traffic.

BOX 2 | THE IMPORTANCE OF MEASURING THE IMPACTS OF COMPLETE STREETS

Increasingly, the urban population recognizes that mobility systems have both positive and negative impacts on the urban environment. Faced with a community that is increasingly aware of these issues—and that expects to be involved in the planning and decision-making processes—cities must anticipate the possible effects of the redesign on residents, retailers, and occasional road users, communicating the potential benefits, problems, and

changes. While these stakeholders may support qualification interventions at a general level, they may also be concerned about the potential negative impacts of actions such as reducing parking space and may become major opponents of the projects. These are groups that, if well-informed and engaged, can be in favor of change.

Complete streets form more accessible communities for children, people with

disabilities, and the elderly, improving accessibility, safety, and public health. These benefits can be demonstrated by measuring the impact of the intervention. Cities need to set targets for investments and methods to measure the results of their work (NYC DOT 2013). The set of metrics of complete street projects can point to results in safety, accessibility of people and goods, and the creation of spaces that are economically active, healthy, and attractive (Table B2-1).

TABLE B2-1 | EXAMPLES OF METRICS FOR EVALUATION OF COMPLETE STREETS INTERVENTIONS

GOAL	METRICS
Safety	Crashes and injuries for motorists, pedestrians, and bicyclists
	Traffic speeds
Access/Mobility	Volume of vehicles, bus passengers, bicycle riders, and users of public space
	Efficiency in parking/loading
	Traffic speeds
Economic Vitality	Number of businesses; employment opportunities
	Retail sales; visitor spending
Public Health	Minutes of physical activity per day
	Rates of obesity, asthma, diabetes, etc.
Environmental Quality	Air quality; water quality
	Urban heat island; energy use
Livability/ Quality of Life	User satisfaction
	Public space usage

Source: NYC DOT 2013.

Monitoring road project indicators, however, is different from measuring impact. Similar to what happens in a medical experiment, in which a group receives treatment and a control group does not receive the same treatment, the intention is to measure how the

change in the urban environment affected the community beyond what could have happened ordinarily, without making changes to the road design. Thus, one way to measure the real impact of changes made on a street is to check the same indicators

in a control street with similar characteristics. The same indicators must be collected before and after the intervention, in both streets, so that the results can be compared in each location at these two moments.

Source: prepared by WRI Brasil



CASE STUDY 1

RUA JOEL CARLOS BORGES: IMPROVING ACCESS TO PUBLIC TRANSPORT IN SÃO PAULO

Authors:

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SUMMARY TABLE 1 | INTERVENTION AT RUA JOEL CARLOS BORGES

DIAGNOSIS (PRE-INTERVENTION)

Functional street classification: local—characterized by non-signalized intersections, intended only for local or restricted areas access

Context: a local street that gives access to a train station, with a high flow of pedestrians who were not safely accommodated on the narrow sidewalks.

DESIGN AND IMPLEMENTATION

Objectives: to improve the users' access to the Berrini station; improve road safety conditions and pedestrian comfort through the redistribution of road space.

Financial resources: approximately BRL70,000¹

Type of intervention: tactical urbanism

Length: 150 m

Inauguration: september 2017

Measures implemented: widening of sidewalks with green paint, bollards, and raised pavement markers; reduction in the number of parking spaces; reduction of the maximum speed of the road from 30 km/h to 20 km/h; new vertical and horizontal signage along the road; insertion of new pedestrian crossings.

Intervention time: less than a week

Key circumstances for the transformation of the street: previous studies of micro-accessibility in the region of Avenida Berrini had already identified the street as a possible point of intervention. The municipal government received an intervention proposal through a contest. The implementation of the project was only possible with broad institutional articulation, involving the Mobility and Transport Department, the Traffic Engineering Company (CET), the sub-prefecture, and external actors, especially the leadership of the Mobility and Transport secretary.

RESULTS (POST-INTERVENTION)

Public approval: after the intervention, 92 percent of the people interviewed considered that the street has improved in terms of safety and comfort and 80 percent felt safe in terms of traffic safety.

¹ US\$13.37 thousand (December 2022).

Source: WRI Brasil.

1.1 Diagnosis

Located in the Brooklyn neighborhood in São Paulo, Rua Joel Carlos Borges is approximately 150 meters (m) long and is one of the two roads that give access to the Berrini train station (line 9, Emerald, from the São Paulo Metropolitan Train Company—CPTM). The station accumulates more than 21,000 daily passenger boardings (CPTM 2020), who move predominantly on foot. During just one hour in the morning rush, more than 1,800 people walk along the street—compared to no more than 70 cars (WRI Brasil and EMBARQ Brasil 2015).

The road's sidewalks—narrow and sheltering poles, traffic signs, and trees—did not provide a comfortable space for walking, leading thousands of pedestrians to walk alongside vehicles in the middle of the road (Figure 2). The large space dedicated to parking spaces met a small demand: an area of 451 square meters (m²) was divided into 41 car spaces, with 11 m² for each space. This space was adapted for the safe use of pedestrians, a change that represented 203 more people per minute walking comfortably on the road, considering a Service Level C for pedestrians (stable flow—23 to 33 people/min per meter (TRB 2015). The allocation of the limited road space on Joel Carlos Borges for parking vehicles was not coherent in a train access road, which jeopardized the quality of access to high-capacity public transport, essential for urban mobility in São Paulo.

In 2017, Rua Joel Carlos Borges was selected for a complete street pilot project. In 2014, the street had been the subject of the Concurso 3 Estações, a contest developed by WRI Brasil and USP Cidades

Figure 2 | Section of Rua Joel Carlos Borges before the intervention



Photo: Daniel Hunter/WRI Brasil 2017a.

(Research Support Center at the University of São Paulo), which awarded the best proposal for access to the Berrini station and gave rise to the tactical urbanism intervention that was implemented on Rua Joel Carlos Borges three years later. The winning proposal was developed by the urban solutions startup Urb-i, which considered the problems diagnosed in the area and proposed the feasibility of the solutions in

three phases. In the first phase, the changes would be temporarily tested and evaluated by the public (Figure 3); in the next two phases, permanent changes would be made (Figure 4). This framework secured the award. After the award, the conceptual project was delivered to the municipal authorities and efforts began on the part of various actors of civil society to implement the proposal.

Figure 3 | Tactical urbanism phase of the winning project of the contest for the intervention of Rua Joel Carlos Borges



Source: Urb-i.

Figure 4 | Proposta para fase com obras permanentes para a intervenção da Rua Joel Carlos Borges



Source: Urb-i.

1.2 Project

Throughout 2015, the project was presented to the Traffic Engineering Company (CET), CPTM, and the Subprefecture of Pinheiros, where the street is located. The biggest challenge for the implementation of the project that year was the absence of a specific regulation that made

possible the operationalization of the project with the proposed requirements using tactical urbanism, so the involvement of a decision-maker from the city hall was needed to articulate the execution of the project among various sectors of the municipal government.

In September 2016, during Mobility Week, Urb-i and the smart carpooling website Caronetas held an event on Rua Joel Carlos Borges as an ephemeral intervention (Figure 5). The street was closed to car traffic and a survey was carried out to assess the public's perception of the proposed intervention. According to the data collected, people wanted more road safety and comfort on the road. The survey also revealed that, of the 190 respondents, 74 percent used to walk along the car lane and 92 percent would like the street to have larger sidewalks (Urb-i 2016).

In early 2017, the project was presented to the then Secretary of Mobility and Transport of São Paulo as part of the Bloomberg Initiative for Global Road Safety (BIGRS). The secretary's engagement was essential to reactivating the possibility of implementing the project. Then the idea was also supported by the Pinheiros subprefecture. With these two actors engaged, the project was adapted to comply with the technical standards established by CET and approved for implementation in July 2017. The adaptation of the project and the development of the basic project (Figure 6) were carried

out by the Urb-i team, with an investment of BRL13,885.00² from BIGRS, and the CET Signaling Board was responsible for the executive project.

Figure 5 | Event at Rua Joel Carlos Borges during Mobility Week in 2016



Source: Urb-i.

Figure 6 | Project for the tactical urbanism intervention of Rua Joel Carlos Borges



Source: Urb-i.
²\$2.65 thousand (December 2022).

1.3 Implementation

In March 2017, São Paulo joined the National Network for Low Carbon Mobility (Appendix). The city used the existing proposal for Rua Joel Carlos Borges as a complete street pilot project. This selection gave considerable prominence to the intervention, which was the first of the Network, inspiring, at the time, the other ten cities of the Network to develop and implement their projects.

In September 2017, the project was implemented with tactical urbanism by the CET team during Mobility Week. The intervention included painting sidewalk extensions, installing bollards and raised pavement markers, horizontal and vertical signage indicating priority for pedestrians, and the installation of trash cans and planters (Figure 7). The road speed limit was reduced from 30 km/h to 20 km/h, in line with the predominant use of the street by pedestrians.

Figure 7 | Rua Joel Carlos Borges before and after the urban intervention in September 2017



Photos: Pedro Mascaro/WRI Brasil 2017a.

The materials used in the implementation were acquired from several sources: the paints were donated by partner organizations, the planters by the Pinheiros Subprefecture, and the execution was carried out by CET. This composition of actors allowed the rapid implementation of the project but also posed challenges in adapting the materials provided. The planters, for example, were supposed to be along the road, but they were larger than expected in the project and would compromise the flow of pedestrians, so it was then decided to place them in a wider stretch of sidewalk, next to the entrance to the Berrini station.

The cost of project implementation (Table 1) was low compared to the standard of urban interventions. For the permanent phase, the intervention on Rua Joel Carlos Borges was estimated at approximately BRL2 million³, including the development of detailed projects, infrastructure, signage, landscaping, and furniture.

Table 1 | Costs of implementing tactical urbanism on Rua Joel Carlos Borges

Hired team (material + labor)	BRL 51,107.20 ¹
CET team (material + labor)	BRL 13,173.71 ²
Paints (donation)	BRL 3,913.90 ³
Total	BRL 68,194.81⁴

Notes: 1 US\$9.76 thousand (December 2022). / 2 \$2.52 thousand (December 2022). / 3 \$0.75 thousand (December 2022). / 4 \$5.11 thousand (December 2022).
Source: prepared by WRI Brasil with information from PMSP

1.4 Short-term results

The first report on the impacts of the new Rua Joel Carlos Borges was released in early 2018 by WRI Brasil in partnership with Cidade Ativa and LABMOB (Laboratory of Sustainable Mobility at the Federal University of Rio de Janeiro). The survey collected data on the traffic flows of pedestrians and vehicles, the permanence

of people on the street, and their perception of the road (Cidade Ativa 2018). The data were compared with measurements made in 2014 during the diagnosis of the areas. To prevent the results of data analysis from being influenced by factors unrelated to the intervention, the same data were collected in a control way, with similar characteristics, following the Propensity Score Matching methodology (Austin 2011). Rua Gomes de Carvalho, located at the access to the Vila Olímpia station of the CPTM, was chosen as the control street.

The analysis reveals that, even if 70 percent of the street is now dedicated to pedestrians, there are still pedestrians using the lanes destined for cars in rush hours. It is observed that, as the flow of vehicles is very low compared to the high number of pedestrians (passenger vehicles represent 4.3 percent of the number of pedestrians on a weekday), the road may become fully pedestrianized, with access to local traffic only. The great majority (91 percent) of local commerce consumers reach the street on foot, by bus, or by train, confirming the need to prioritize active and collective modes of transport (Cidade Ativa 2018).

The modifications to Rua Joel Carlos Borges proved to be effective in traffic calming and increasing comfort and safety for pedestrians. The survey showed that 92 percent of them consider that the street has improved in terms of safety and comfort after the intervention, and 80 percent feel safe on the street after the intervention from a traffic safety point of view.

The use of tactical urbanism to ensure the rapid implementation of the project was an important choice. After more than two years after the intervention, the paint and markers, which were already worn out, should be replaced by permanent measures on Rua Joel Carlos Borges and its surroundings. The intervention is part of the Emergency Sidewalk Plan (PEC), enacted in July 2019 and which establishes emergency plans for the improvement of sidewalks, to be carried out by the Municipal Department of Subprefectures.

³\$380 thousand (December 2022).



CASE STUDY 2

RUA MIGUEL CALMON: A FIRST STEP TOWARDS THE TRANSFORMATION OF DOWNTOWN SALVADOR

Author:

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SUMMARY TABLE 2 | INTERVENTION AT RUA MIGUEL CALMON

DIAGNOSIS (PRE-INTERVENTION)

Functional street classification: arterial—characterized by intersections generally controlled by traffic lights, with accessibility to adjacent lots and secondary and local roads, allowing traffic between the city's regions.

Context: commercial street with high tourist potential in downtown Salvador, the target of a mixed-use revitalization and consolidation program.

DESIGN AND IMPLEMENTATION

Objectives: to redevelop the urban street to restore the local infrastructure and the economic, social, and cultural vigor of the street; to balance the distribution of road space, in order to promote safety and comfort in all modes of travel, with special attention to pedestrians, bicyclists, and the environment.

Financial resources: approximately BRL4.8 million⁴

Type of intervention: permanent intervention

Length: 1.100 m

Inauguration: september 2019

Measures implemented: addition of bike lane; widening of sidewalks; road resurfacing; interlocked pavement at intersections; tree planting; addition of urban furniture; definition of parking along the road intended exclusively for service vehicles, such as taxis, app-taxis, ambulances, and transport of valuables; installation of intelligent traffic lights and remote monitoring through cameras; LED street lights.

Intervention time: 10 months

Key circumstances for the transformation of the street: resources for the implementation of the project came from the Plano Municipal Salvador 360 – Eixo Centro Histórico (Salvador 360 Municipal Plan – Historic Center Axis), which allocates BRL 3 billion⁵ for the modernization of the city's infrastructure and the revitalization of downtown Salvador.

RESULTS (POST-INTERVENTION)

Road safety: In 2019, Rua Miguel Calmon did not record any traffic deaths and had the lowest number of accidents with injuries in the last eight years.

Source: WRI Brasil.

⁴\$920 thousand (December 2022).

⁵\$570 million (December 2022).

2.1 Diagnosis

Salvador is one of the 11 cities that have integrated the National Network for Low Carbon Mobility since the beginning of its activities in 2017 (WRI Brasil 2020). Rua Miguel Calmon was chosen for the complete street pilot project in Salvador for several reasons:

- in line with the Plano Municipal Salvador 360 – Eixo Centro Histórico, which encompasses a series of actions and investments aimed at restoring the economic, social, and cultural vigor and the urban and infrastructure revitalization of the traditional downtown;
- strategic location, in the heart of the Comércio neighborhood, the first organized business district in the country, within the heart of downtown Salvador;
- historical and cultural importance, where many sites, monuments, and buildings of architectural value can be found;
- strategic area for the connection between uptown and the suburbs;
- region of economic importance and, consequently, a point of intense circulation of people in search of the services and activities offered; and
- environmental heritage landmarks: three large public squares with significant green areas and large trees.

Based on this context, the City Hall of Salvador developed the Complete Streets Project – New Rua Miguel Calmon, through the Mário Leal Ferreira Foundation (FMLF), in partnership with WRI Brasil and FNP, and with the contribution of a working group composed of several municipal bodies, private organizations, and a university. The intervention covers approximately 1,100 meters (m) along Rua Miguel Calmon (Figure 8) and a stretch of Avenida Jequitaia (Figure 9), covering an area of approximately 24,000 m²

Figure 8 | Intervention in the Mercado Modelo section, at Rua Miguel Calmon – Praça Riachuelo



Source: FMLF.

Figure 9 | Intervention in a stretch of Avenida Jequitaia



Source: FMLF.

The diagnosis was the first step to support the intervention and assess the main problems in the area. For this, a thorough analysis was carried out along Rua Miguel Calmon and Avenida Jequitiaia, in order to identify the conditions of infrastructure, sidewalks, pedestrian circulation, accessibility, informal commerce, accesses, and car lanes, in addition to evaluating the situation of parking along the road, presence or lack of landscape, micro drainage conditions, public lighting, land use, and the existence of people at social risk, among other items identified in the diagnosis.

The diagnosis resulted in a clearer perception of the difficulties pedestrians faced. A series of factors created barriers to comfortable movement on the road, such as the paving (basically Portuguese pavement and in a poor state of conservation); the presence of vertical obstacles, such as poles, signs, and construction developments in inconvenient areas—which imposed physical barriers; and the lack of accessibility ramps, crosswalks, and even traffic lights that would enable a safe crossing.

Added to these are other aspects that have proved to be problematic in the region: the disorganization of the public space, due to informal trade and parking spaces; flood points; and the poor conditions of public lighting. The diagnosis also identified an opportunity to create spaces for the planting of dozens of new trees.

A perception survey collected qualitative data among street users. The FMLF had the technical support of WRI Brasil and Universidade Salvador (Unifacs) for the development of the research form, which included 21 questions (Figure 11) about the characterization of the population, land use, and the perception of space.

Figure 10 | Stretch of Rua Miguel Calmon before the intervention



Source: Google Street View.

The FMLF team segmented the research application points and then georeferenced the data in the QGIS platform, generating maps with the spatialization of the information. In total, 500 forms were applied on Rua Miguel Calmon and Avenida Jequitiaia and on the street selected as the control street—Rua Portugal, parallel to Rua Miguel Calmon, which was chosen because it has similar characteristics to Miguel Calmon and, therefore, makes it possible to compare, in new stages of the research, between the perceptions of the renovated street and the street that has not undergone interventions.

The idea was to carry out a second survey six months after the intervention and another two years after the completion of the work. However, due to the Covid-19 pandemic, these actions were temporarily suspended.

Figure 11 | Perception survey form for the intervention on Rua Miguel Calmon

SECRETARIA DA CIDADE SUSTENTÁVEL
PROJETO RUAS COMPLETAS
QUESTIONÁRIO PERCEPÇÃO URBANA DOS MORADORES E USUÁRIOS DO BAIRRO DO COMÉRCIO

O senhor(a) está sendo convidado(a) a participar de uma pesquisa relacionada a percepção dos usuários do bairro do Comércio - Salvador /BA. Sua participação é muito importante e as respostas irão ajudar a compreender melhor a relação de seus usuários com o rua Miguel Camon. Quero agradecer pela sua participação e informar que o questionário não é identificado e todas as respostas serão mantidas em sigilo. Muito obrigado!

Data da Entrevista: ___/___/2018 Nº do Quest.: _____
Dia da semana: S T Q Q S S D Turno M T N
Entrevistador: [A]; [D]; [L]; [M]; [S];
SETOR: _____ SUB SETOR: _____
Nº. de identificação do questionário: _____

PROJETO RUAS COMPLETAS – NOVA MIGUEL CALMON/AV. JEQUITAIA

I – CARACTERIZAÇÃO DA POPULAÇÃO

Q1- Sexo (não perguntar, observar)
[1] Masculino [2] Feminino

Q2- Idade _____

Q3 – Possui algum tipo de deficiência ou restrição de mobilidade?
[1] Sim. [2] Não. Se sim, qual? _____

Q4- Qual é a sua escolaridade?
[1] Não frequentou a escola [2] Primário
[3] Ensino fundamental [4] Ensino médio
[5] Superior (Universitário) [6] Pós-graduação

Q5- Seu trabalho é:
[1] COM carteira assinada [2] SEM carteira assinada
[3] Autônomo/Empresário [4] Aposentado ou pensionista
[5] Funcionário público [6] Não se aplica

Q6 - Qual a sua renda média mensal?
[1] Menos de 1 salário mín. [2] 1 salário mín.
[3] De 2 a 4 salários mín. [4] De 4 a 6 salários mín.
[5] De 6 a 10 salários mín. [6] Mais de 10 salários mín.
[7] Não tem renda

II – CARACTERIZAÇÃO DO USO DA RUA

Q7 – Mora na cidade de Salvador?
[1] Sim. [2] Não. Se sim, qual bairro _____

Q08 – O seu destino final é a Rua Miguel Calmon?
[1] Sim [2] Não

Q09- Qual a finalidade de sua estadia na Rua Miguel Calmon?
[1] Residência [2] Estudo [3] Trabalho
[4] Prestação de Serviço [5] Compra [6] Passagem
[7] Outro _____

Q10 – Qual meio de transporte utiliza para chegar à Rua Miguel Calmon?
[1] A pé [2] Bicicleta
[3] Transporte público, ônibus [4] Automóvel particular
[5] Transporte privado de uso público (Aplicativos, Uber, Táxi)

Q11- Com que frequência está Rua Miguel Calmon?
[1] Diariamente (≥5 dias) [2] 1 a 4 vezes na semana
[3] 1 a 5 vezes no mês [4] Eventualmente

III – PERCEPÇÃO DO ESPAÇO

Responda as perguntas a seguir com um número numa escala 1 a 5, onde na resposta número 1 você está totalmente insatisfeito e na resposta número 5 você está extremamente satisfeito em relação aos seguintes tópicos:

QUAL O SEU NÍVEL DE SATISFAÇÃO COM?

Q12 – Calçadas e passeios públicos
☹️ 1 2 3 4 5 😊

Q13 – Mobiliário urbano (bancos, lixeiras, abrigo de ônibus)
☹️ 1 2 3 4 5 😊

Q14 – Acessibilidade (rampas, piso tátil, faixa de pedestre)
☹️ 1 2 3 4 5 😊

Q15 – Segurança Viária (sinalização, sinalizas, acidentes envolvendo pedestres e ciclistas)
☹️ 1 2 3 4 5 😊

Q16 – Arborização e sombreamento
☹️ 1 2 3 4 5 😊

Q17 – Barulho/Ruído urbano
☹️ 1 2 3 4 5 😊

Q18 – Iluminação (para pedestre e espaços públicos)
☹️ 1 2 3 4 5 😊

Q19 – Limpeza urbana
☹️ 1 2 3 4 5 😊

Q20 – Segurança pública
☹️ 1 2 3 4 5 😊

Q21 – Comércio e diversidade de atividades disponíveis
☹️ 1 2 3 4 5 😊

Source: FMLF

Figure 12 | **Conducting the research by the FMLF team**



Source: FMLF.

2.2 Project

The conceptual, afforestation/landscape, and engineering⁶ projects were prepared following the criteria and methodology established by the FMLF and WRI Brasil. The same was done for the budget and descriptive and specification memorials. All projects were prepared by the FMLF at an executive level.

The complexity of planning an urban redevelopment project of this scale, in an area so significant for the city, required the structured participation of technicians from different bodies and institutions to guarantee a multidisciplinary vision of the solutions. This articulation, combined with systematic monitoring by the WRI Brasil technical team, was essential for the success of the project and the implementation of the intervention.

⁶Geometric, paving, street lighting, construction details, and micro drainage adequacy.

The partners in the development of the Complete Streets Salvador Project acted with the following responsibilities:

- Salvador Transit Superintendence (Transalvador): issues related to mobility, reorganization of traffic lanes and parking lots; development of projects for road signage, smart traffic lights, and remote monitoring by cameras;
- Municipal Mobility Department (Semob): public passenger transport, bus stops, and reorganization of bus lines;
- Municipal Public Order Department (Semop): planning of informal commerce;
- Municipal Department for Sustainability, Innovation, and Resilience (Secis): interface with WRI Brasil and support in the preparation of the afforestation/landscape project;
- Department of Development and Urbanism (Sedur): environmental licensing and authorization for the intervention;
- Department of Infrastructure and Public Works (Seinfra): bidding, management, and supervision of the intervention;
- Associação Comercial da Bahia: participatory process by the community, which involved businessmen, retailers, workers, street vendors, and other trade professionals;
- Universidade Salvador (Unifacs): through an agreement signed between FMLF and Unifacs, the Architecture Course Coordination was responsible for analyzing data from the survey;
- National Institute of Historic and Artistic Heritage (Iphan): approval of the project, as the intervention is located in a protected area;
- Patrimony of the Union (SPU): approval of the project, as it is inserted in a marine protected area.

Community engagement with the population and their effective participation were decisive factors. This process ensured that the local community

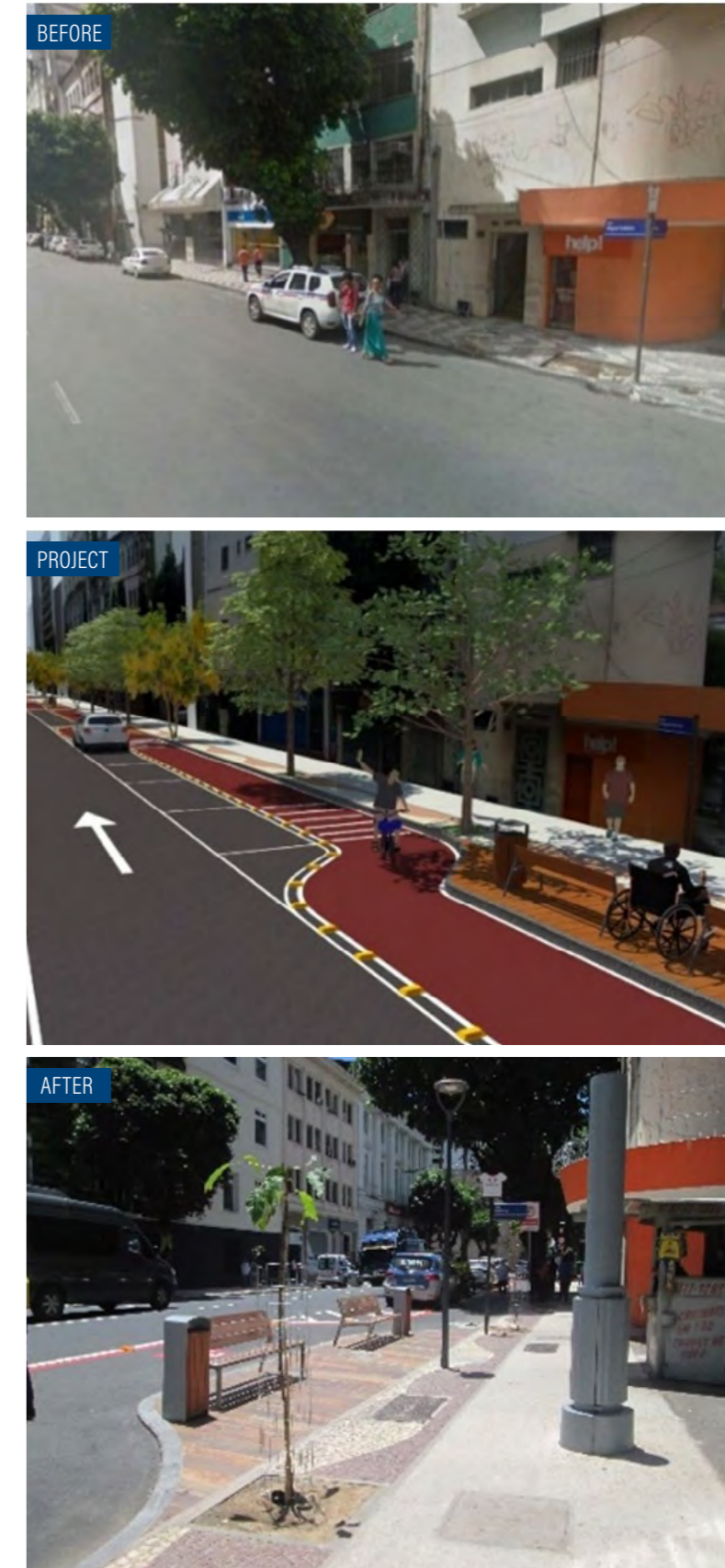
understood the concepts used in the project and felt involved with the city's causes, which is essential for the acceptance of proposals that are increasingly common these days, such as reducing space for car

Based on a detailed diagnosis of the area, the concept of complete streets, and the expertise of FMLF in the elaboration of urban projects, the conceptual project was initially conceived to demonstrate clearly and simply all the interventions proposed for the area. Subsequently, the project was submitted to the appreciation of the local community—businessmen, liberal professionals, formal and informal workers, consumers, and pedestrians around the entire Comércio neighborhood. This stage was supported by the Associação Comercial da Bahia, whose headquarters in a historic building on Rua Miguel Calmon housed the public consultation processes of the conceptual design. It was also there that the proposal was presented by the President of the FMLF, together with the various interventions planned for the neighborhood, and everybody was invited to learn and elaborate on criticisms and proposals that could be incorporated.

On the occasion, printed plans of the conceptual design were made available to retailers so that they could cross out, draw, and write, suggesting changes or pointing out problems. The plans were returned to the FMLF and the comments were summarized by Associação Comercial da Bahia and passed on to the technicians who developed the project. As a result, the demands were met and incorporated into the final urban design.

The project proposed the total redevelopment of Rua Miguel Calmon and a stretch of Avenida Jequitaia, to promote greater balance in the road system, with more safety and comfort for all modes of transport and special attention to pedestrians, bicyclists, and the environment. To make this possible, the urban project redefined the road system—from four car lanes to three, two of them 3 m wide and one 3.5 m, preferably intended for public transport. The change did not imply a loss of motility, according to an analysis by the municipal transit agency. This decision allowed other urban elements to be considered, such as the implementation of a bike lane and the widening of some stretches of sidewalk (Corrêa and Batista 2019).

Figure 13 | **Stretch of Rua Miguel Calmon: before, during the project, and after the intervention**



Source: FMLF.

Figure 14 | **Praça Riachuelo, before, during the project, and after the intervention**



Source: FMLF.

The designation of the bike lane route sought to facilitate the connection to the vertical transport system (a large public urban elevator) that connects the lower city to the upper city and, so, encourage active transport and sustainable mobility in downtown Salvador. The bike lane is 1.1 kilometers (km) long, 2.4 m wide, bidirectional, segregated with granite blocks and reflective raised pavement markers, and has been positioned between the remaining parking spaces and the sidewalk, protecting bicyclists.

New sidewalks were designed for pedestrian circulation, in a humanistic and inviting design, with portuguese pavement on the furnishing zone. The new sidewalks comply with universal accessibility standards, with the implementation of ramps, tactile flooring, and pedestrian crossings, including some elevated ones. Mini squares were created, defined as “resting spaces”: areas with differentiated paving, benches, trees, and special lighting to offer more comfort and create opportunities for people to coexist.

New urban furniture was implemented throughout the intervention area, with facilities such as benches, trash cans, and bike racks. Ninety new trees of native species and adequate size, considering the space available at each point, were planted to provide shade and cooler temperatures (once they are grown), in addition to contributing to the offset of carbon emissions from cars circulating in the region.

The organization and security of the area involved rethinking the parking spaces. Thus, another solution was to establish that parking along the road was intended only for service vehicles, such as taxis, app-taxis, ambulances, and transport of valuables, a measure also foreseen for transversal streets. The new track geometry was designed to promote road safety, realigning the entire curb layout, defining new horizontal and vertical alignments, and redefining all the curb radii at the corners.

Paving was carried out along the entire street, adapting to the new alignment, in preparation for a new layer of pavement. Praça Riachuelo received interlocked pavement, highlighting the monument and serving as a traffic-calming measure. The micro drainage was adapted to the modifications imposed by the new urban design, with provision for maintenance of the entire existing network.

The horizontal and vertical signaling project included road markings, crosswalks, and parking spaces, as well as new speed regulations and signs (the speed limit was maintained at 50 km/h). New smart traffic lights and remote monitoring through cameras were added.

The public lighting project included the use of LED lamps, with greater energy efficiency, as an essential factor to make the street prettier and safer. The lampposts were installed in the new furnishing zone, with special models for the resting spaces, and the monument at Praça Riachuelo and the façade of Associação Comercial da Bahia received special lighting.

2.3 Implementation

Once the executive project was concluded, the municipal government made the resources available through financing contracted with Caixa Econômica Federal. In total, BRL4.8 million⁷ were invested in the implementation of the design on Rua Miguel Calmon and Avenida Jequitaia. The Salvador 360 – Eixo Centro Histórico defined investments in the order of BRL300 million⁸ for downtown Salvador, incorporating the Complete Street Miguel Calmon to the list of projects for the area.

⁷ \$920 thousand (December 2022).

⁸ \$57.29 million (December 2022).

Figura 15 | **TSection of Rua Miguel Calmon during the intervention**



Crédito: FMLF.

The transformation of the space included changes in the underground infrastructure networks, such as new drainage pipes and conduits, and the adjustment of over 200 telecommunications networks and junction boxes that serve the area. Everything was adjusted to the new level of the sidewalks, to guarantee the safety and comfort of pedestrians.

The intervention was carried out by a private construction company that participated in the bidding process. The FMLF accompanied the execution, recording all stages of the work and ensuring that all items provided for in the various designs were executed. The management and supervision of the work were the responsibility of Seinfra. On average, 200 people were working throughout the whole process, reaching 300 in some stages.

The complete street in Salvador was delivered on September 20, 2019, after ten months of construction (Correio 2020).

2.4 Short-term results

According to Transalvador (2020), the city has been reducing the number of deaths in traffic year after year (Table 2). Since 2016, Salvador has broken records for reducing the rate of deaths per 100,000 inhabitants in traffic (A Tarde 2019).

Table 2 | **Traffic accidents in Salvador have been decreasing in the last decade**

OCCURRENCE	2012	2013	2014	2015	2016	2017	2018	2019
Injuries	6,962	6,238	8,226	6,424	5,143	5,107	4,726	2,470
Fatalities	247	221	189	182	138	121	114	68
Traffic injuries	6,588	5,515	6,935	5,300	4,288	4,263	3,962	2,062
Traffic fatalities	239	213	184	176	131	116	110	66

Source: Transalvador/Gepro/Siat (2020)

These results are part of a management effort that involves the entire administrative structure, through inspection, organization, and education. Part of these results is attributed to investments in the urban revitalization of different areas of the city, such as the one that was made on Rua Miguel Calmon.

In terms of road safety, the impacts of redevelopment began to be noticed in the region immediately after the intervention was completed (Table 3). There was good repercussion among pedestrians, who recognized the improvements in walking space and road safety. Local workers and retailers approved the reorganization of space and were enthusiastic about the recovery of economic, cultural, and tourist vitality. There was extensive coverage in the local and national press.

One of the expectations is that the success of Rua Miguel Calmon will induce new urban improvements in the rest of downtown Salvador. The revitalization of three large squares bordering the complete street has already begun: Praça Cayru, Praça da Inglaterra, and Praça Marechal Deodoro. This set of interventions is associated with a profound transformation in the quality of life of all who visit and work in the region, in addition to contributing to a substantial reduction in greenhouse gas emissions.

Salvador's complete street is a significant achievement. The project brings the metropolis closer to those who live and move around it every day, promoting walking, coexistence, safety, and accessibility for all and improving environmental conditions.

Table 3 | **Traffic accident statistics for the intervention streets, from 2012 to 2019**

Year	RUA MIGUEL CALMON		AVENIDA JEQUITAIA	
	Traffic injuries	Traffic fatalities	Traffic injuries	Traffic fatalities
2012	4	0	41	1
2013	6	0	22	0
2014	5	0	52	2
2015	7	0	51	1
2016	5	0	31	0
2017	6	0	42	1
2018	11	0	47	3
2019	3	0	19	1

Source: Transalvador (2020).

It is important to point out that good results were only possible with the understanding, awareness, and commitment of managers and various municipal professionals involved in the intervention. Finally: the project was anchored in a participatory process, with goals, deadlines, and costs according to what was agreed with the community.

The aerial images of the new Rua Miguel Calmon demonstrate the dimensions of the intervention and have a visual impact. But it is the close-up images, which show people walking and cycling safely, or contemplating life in the mini squares, portraying the legacy of the intervention. One can be sure that the complete street contributes to a more humane, participatory, sustainable, and, if possible, even prettier Salvador.

Figure 16 | **Praça da Inglaterra and Praça Riachuelo after completion of the intervention**



Photo: Rafael Martins/WRI Brasil, 2019.

Figure 17 | **Appropriation of the urbanized space by the people**



Photo: Rafael Martins/WRI Brasil, 2019.



CASE STUDY 3

RUA MARECHAL DEODORO: PARTNERSHIP WITH THE UNIVERSITY FOR A TEMPORARY DEMONSTRATION OF A BOARDWALK IN JUIZ DE FORA

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Marcelo Valente, Supervisor of Structural Projects at the Department of Transport and Traffic (SETTRA), Juiz de Fora City Government

SUMMARY TABLE 3 | INTERVENTION AT RUA MARECHAL DEODORO

DIAGNOSIS (PRE-INTERVENTION)

Functional street classification: local—characterized by non-signalized intersections, intended only for local or restricted areas access.

Context: downtown commercial street, with informal trade located on the sidewalks and a high flow of pedestrians.

DESIGN AND IMPLEMENTATION

Objectives: to demonstrate, through temporary intervention, a new configuration of the street as a boardwalk, reordering informal trade and making the sidewalks more comfortable for pedestrians and retailers.

Financial resources: all materials were donated to the city hall (cost estimated at less than BRL15,000⁹).

Type of intervention: tactical urbanism

Length: 50 m

Inauguration: March 2019

Measures implemented: the installation of a wooden platform to level the road, simulating the characteristics of a boardwalk; urban furniture for pedestrians; reorganization of informal trade, centralizing the stands on the street; and addition of vegetation.

Intervention time: less than a week

Key circumstances for the transformation of the street: leadership and direct action of the then Secretary of Transport in the articulation of actors inside and outside the municipal government, in search for partners and financiers to fund the intervention and supporters for implementation.

RESULTS (POST-INTERVENTION)

Public approval: after the intervention the perception survey showed 97 percent of respondents approved it and 95 percent indicated that they would like the street to be permanently transformed into a boardwalk; the intervention remained on the street longer than originally planned (from one month to seven months).

Source: WRI Brasil.

⁹less than \$2.86 thousand (December 2022).

3.1 Diagnosis

With almost 600,000 inhabitants, Juiz de Fora is a regional hub in the Zona da Mata region of Minas Gerais. It is known for its commercial downtown area, where the main streets are interconnected through corridors which thousands of people circulate every day. The introduction of the concept of complete streets in Juiz de Fora was based on a pioneering initiative in Brazil, involving academics, urban planning professionals, government agencies, and civil society. In November 2017, a technical-scientific cooperation agreement signed between the municipal government of Juiz de Fora (PJF), FNP, WRI Brasil, and the Federal University of Juiz de Fora (UFJF) marked the beginning of the project, which paved the way for a series of actions related to the concept of complete streets in the city and region.

The street chosen for the intervention, Marechal Deodoro, is located in downtown Juiz de Fora and plays a significant role in the urban dynamics since it is close to other relevant roads (especially concerning public transport, being near three important avenues). In addition, it is inserted in a network of corridors and boardwalks and connects other important streets, shops, residences, and public spaces.

Over the years, the streets in the area have undergone transformations, from the growth of pedestrian prioritized spaces to the appearance of the boardwalks seen today. Rua Marechal Deodoro and Rua Batista de Oliveira are the last streets downtown not yet prioritized for pedestrians. Both streets witness an intense movement of people, often coming from other cities, who seek services in the region, mainly in the education and health sectors.

On Rua Marechal Deodoro, the ground floor of the buildings is mostly commercial with several internal galleries that connect with surrounding streets. The street has an intense flow of pedestrians accessing services in the region. The road registers very low vehicle traffic, characterized mainly by ambulances that access an important municipal medical center of the SUS (Public Health System). Thus, it is common to find people walking along the car lanes and street vendor stands occupying the sidewalks in all its extension.

Figure 18 | Map of downtown Juiz de Fora



Source: prepared by the authors / Google Earth.

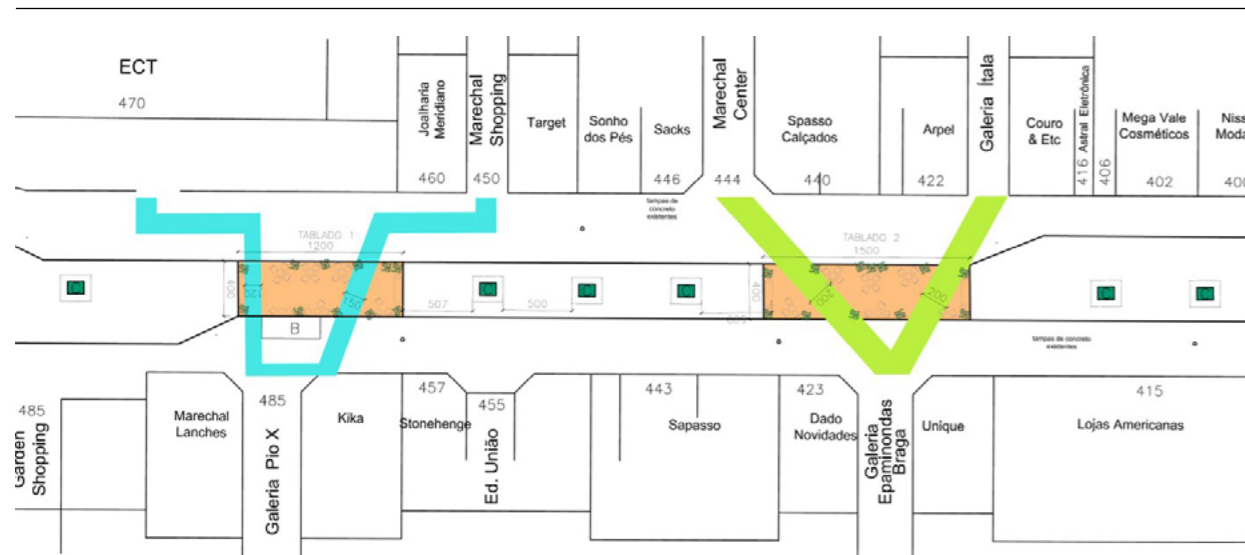
3.2 Project

The amplification of the proposal involved two actions to introduce the public to the discussion on complete streets: a tactical urbanism intervention on Rua Marechal Deodoro (Tribuna de Minas 2019a) and an exhibition of academic works with project proposals for Rua Marechal Deodoro and Rua Batista de Oliveira (Tribuna de Minas 2019b).

Tactical urbanism was the type of intervention chosen by the authorities to implement the pilot project because it was a quick and low-cost transformation strategy. It was necessary to collaborate with different groups to overcome different challenges: the strong and organized street trade that occupies part of the sidewalks; retailers eager for change; residents who need essential services; demand for services from people in the surrounding cities; and the need for services, commerce, and leisure areas available on a street while maintaining vehicular access.

The proposal was designed to humanize the urban environment and promote the democratization of the use of public space, promoting coexistence between people. For this, the project used a temporary intervention to demonstrate a new configuration for the street, reordering informal commerce and improving the quality of the sidewalks. Vehicle traffic was banned and street vendors—whose previously occupation of the sidewalks made it difficult for pedestrians to pass—were relocated to the central axis of the street, expanding the space on the sidewalks. The construction of two platforms in the middle of the street completed the proposal, creating level connections between galleries and spaces for respite (with tables and chairs) (Figure 19).

Figure 19 | Tactical urbanism project on Rua Marechal Deodoro with two wooden platforms, rearrangement of street vendors, and painted floor



Source: PMJF (Juiz de Fora municipal government).

At the same time, the UFJF Faculty of Architecture and Urbanism implemented the “Project and Urban Mobility” involving the preparations of projects for Rua Marechal Deodoro and Rua Batista de Oliveira that could meet the demands of the complete streets concept (O Estado de S. Paulo 2018). The elective course was offered in two academic periods in 2018, to about 20 students per semester.

A lecture on complete streets was the students’ first contact with this approach. During the course, they discussed topics such as street character and road design, the city we want, the different lanes (for pedestrians, bicyclists, public transport, and private vehicles), and the common elements of all street users (Welle et al. 2015, Santos et al. 2017). At the end of this process, which included technical visits to the site and guidance from teachers, the works developed by the students was presented in a public and free exhibition, to encourage debate on the proposals and share new ideas for street design and urban mobility.

3.3 Implementation

One of the main challenges to the success of the project was the search for partners and financiers because the municipal government could not afford it. Meetings were organized with local traders and partners, who acquired the necessary material for the implementation and paid for the assembly of the platforms. Street vendors participated in a meeting with the authorities, who explained the project and the need to relocate the stalls so that the sidewalks were clear for pedestrian circulation. The prohibition of vehicle circulation was also announced for the other services that use the street.

Thus, on March 14, 2019, Rua Marechal Deodoro opened with a new configuration (Figure 20). The intervention caught the attention of street users and local traders, stirring the interest of pedestrians and attracting local media to publicize the project. This action was coordinated by the Department of Transport and Traffic of Juiz de Fora (Settra/PJF) with the participation of UFJF students, as volunteers, both in the project stage and in the execution of the intervention.

Figure 20 | Intervention at Rua Marechal Deodoro

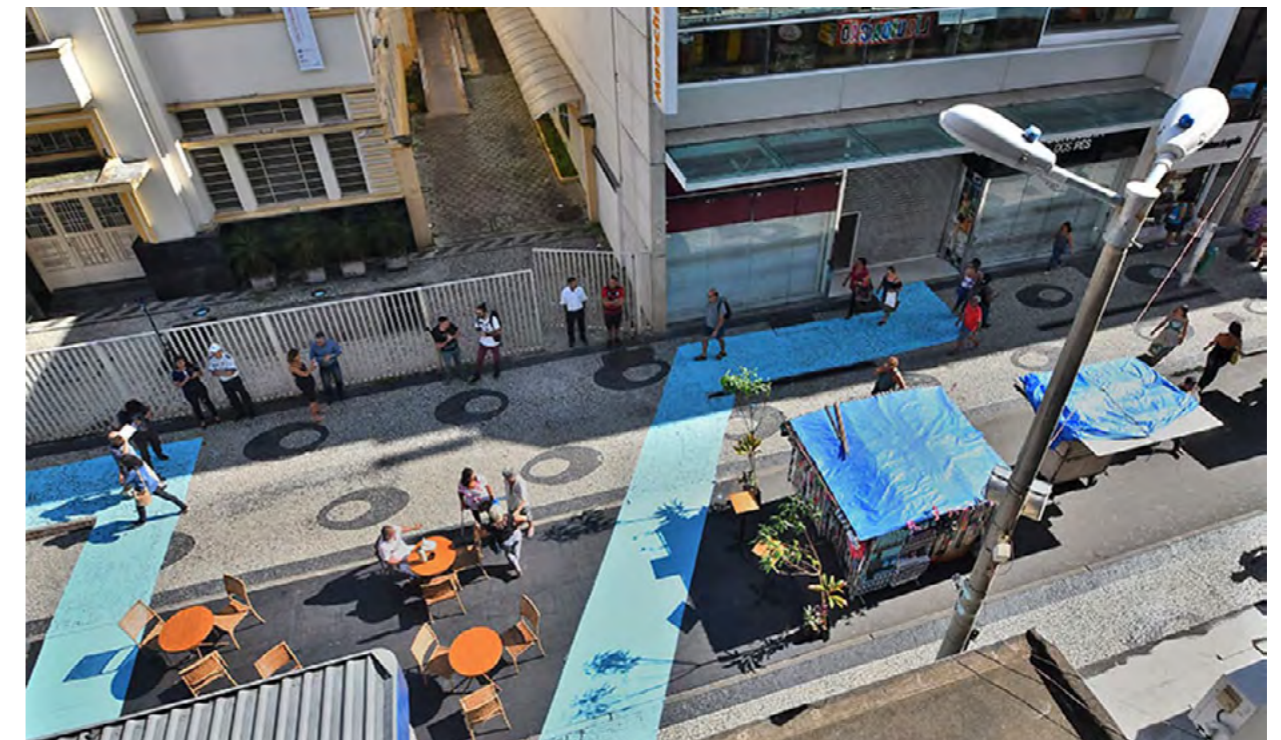


Photo: Marcelo Ribeiro/Tribuna de Minas, 2019

The “Juiz de Fora for the people: Marechal Deodoro and Batista de Oliveira in the logic of complete streets” exhibition was inaugurated along with the implementation of the pilot project, being held between March 14 and May 10 at Espaço Cultural dos Correios, located on Rua Marechal Deodoro, allowing easy access for street users, who were the most directly affected by the changes (Tribuna de Minas 2019b; ArchDaily Brasil 2019). The organization was coordinated by DOMVS (Research Laboratory in Architecture and Urbanism at UFJF), with support from Settra, the Pro-Rector of Extension at UFJF (Proex/UFJF), WRI Brasil, FNP, and the UFJF Built Environment Graduate Program.

The exhibition consisted of four project proposals (Figure 21), selected among the works of 19 students who took the course. For didacticism and the dissemination of new concepts and ideas for urban planning and cities, the exhibition also featured explanatory panels from the partners, which presented their attributions and contributions to this and other initiatives.

Figure 21 | Exhibition of complete street project proposals for Juiz de Fora



Photo: Daniel Hunter/WRI Brasil 2019..

The proposals presented by the students were evaluated through a public consultation with visitors to the exhibition, to gather the public impressions about the use of the streets and the proposals developed. At the exhibition site, there was an ballot and comment box for visitors to evaluate each proposal with a grade from 0 to 10 and leave their comments.

3.4 Short-term results

The impacts achieved can be reported and evaluated from two perspectives: the results of the pilot project and the exhibition. Even on the opening day, the temporary intervention made it possible to observe the positive response of the public. People were satisfied with the result, enthusiastic about what could be done in case of a permanent reformulation, and also engaged, since they were involved in the process to test something new.

Two opinion surveys were employed to assess the public's perception of the intervention: one on-site, in which people could indicate the desired response and answer questions using colored stickers in the desired response options (Figure 22), and another on the internet, through the "Collab" app. A month after the inauguration a week long in-person survey collected responses from around 300 respondents.

"\$26.93 thousand (December 2022).

The street survey showed that 97 percent of respondents approved of the tactical urbanism intervention and 95 percent indicated that they would like the street to be permanently transformed into a boardwalk. Some questions were designed to help the authorities in the permanent modification of the street. The respondents answers to these questions revealed that the three main problems of the street and its surroundings are the irregular occupation of spaces and sidewalks, insufficient or non-existent accessibility, and public safety (violence and robberies). Some of the solutions identified as the most urgent are increased policing, improved conditions on the sidewalks, increased planting of trees, and inspection of informal trade.

The duration of the intervention was also a clear indication of the success of the project. The intervention was planned to last only 30 days but given the positive repercussions and acceptance by the public, it ended up remaining in place for seven months—and it was only withdrawn due to the conditions of the materials used, which had already deteriorated from the sun and rain.

Figure 23 | Before and after the temporary intervention on Rua Marechal Deodoro

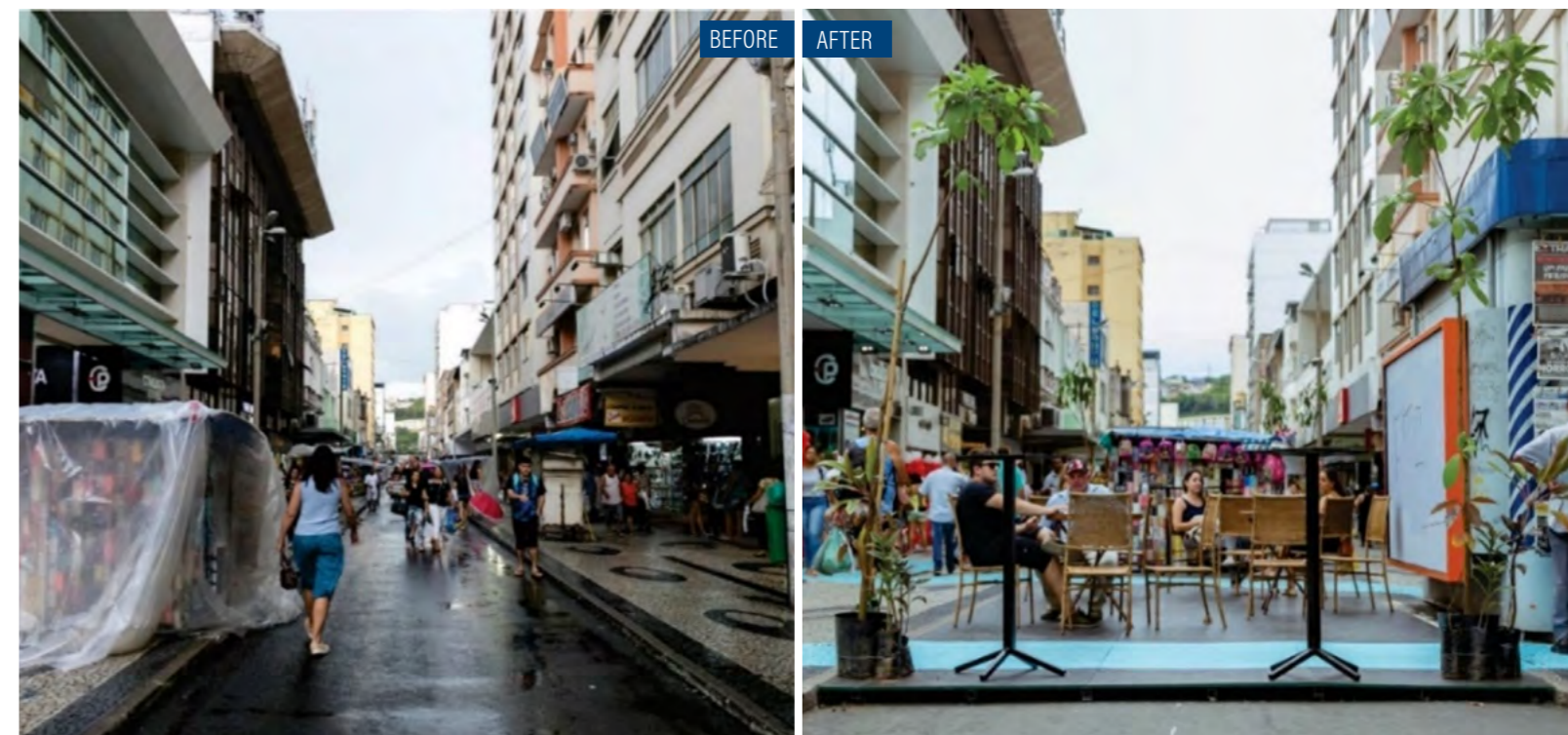


Photo: Daniel Hunter/WRI Brasil, 2019.

Figure 22 | Street users responding to the opinion survey about the intervention on Rua Marechal Deodoro



Photo: Settra/PIF.

From the exhibition, it was also possible to capture some of the anxieties and expectations of people who know and use Rua Marechal Deodoro. The survey results from the exhibition suggested the proposals that received greater acceptance by people as well as their opinions on the quality of the projects presented.

The course and, more specifically, the results achieved in the proposals show that the teaching-learning relationship was strengthened with the application of a methodology and an approach that allow the proactive involvement of students, through direct contact with the street, its users, and, later, with the generated impacts of the project. The contact with other agents and initiatives of tactical urbanism, the project practice, and the possibility of being seen and having their ideas presented were factors that encouraged the participation and dedication of the students. As a result, the initiative proposals

were consistent, aware of the problems, and aligned with the dynamics, approach, and concepts explored.

In addition to instigating a new vision of the public space, the initiative built a new model of social participation, in which the public's perception effectively becomes an indicator of the potential of the success of the interventions. The participatory process involved opinion surveys and discussions about the future of Rua Marechal Deodoro, and the community also participated in financing the intervention. Consulting the community increases the chances of success of interventions since it considers popular demands and brings society and public power closer together, sharing the responsibilities. The intervention generated expectations among the residents of Juiz de Fora regarding its permanent implementation, and the authorities are still in negotiations to make the project viable.



CASE STUDY 4

RUA JOÃO ALFREDO: REVITALIZATION TO ACTIVATE THE DAYTIME USE OF THE STREET IN PORTO ALEGRE

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SUMMARY TABLE 4 | INTERVENTION AT RUA JOÃO ALFREDO

DIAGNOSIS (PRE-INTERVENTION)

Functional street classification: collector—intended to collect and distribute the traffic that needs to enter or leave the arterial roads, easing the traffic in the city.

Context: street with intense night use, but little daytime vitality; drivers go above the permitted limit; lack of safe leisure areas for pedestrians; unsafe for active modes.

DESIGN AND IMPLEMENTATION

Objectives: to reduce the speeds on the road; create comfortable and safe leisure areas for pedestrians; remove parking spaces; enable diversification and revitalization of local commerce in the medium term.

Financial resources: approximately BRL140,000¹⁰

Type of intervention: tactical urbanism

Length: 650 m

Inauguration: March and October 2019 (first and second stages, respectively)

Measures implemented: widening of sidewalks with green paint, bollards, and raised pavement markers; new roundabout; new pedestrian crossings; urban furniture (benches and vases); planting of different types of vegetation; new horizontal and vertical signage; maximum speed reduction to 30 km/h; reduction in the number of parking spaces.

Intervention time: 2 to 3 months (carried out in phases)

Key circumstances for the transformation of the street: the then mayor prioritized the street intervention and dedicated a technical team to the development of the project. The Department of Urban Mobility also played an essential role in identifying resources for implementing the project within the government's budget.

RESULTS (POST-INTERVENTION)

Road safety: reduction of speeds at intersections. The vast majority of vehicles started to travel at speeds below the newly established limit (30 km/h), reaching a reduction of 17 km/h for one of the intersections. In the initial months after the intervention, there was a 43 percent reduction in the number of accidents and there were no fatal victims.

Source: WRI Brasil.

¹⁰\$26.74 thousand (December 2022).

4.1 Diagnosis

Rua João Alfredo is in downtown Porto Alegre, a neighborhood with recognized cultural value due to its historical structures and architectural types. The region also has numerous bars and nightclubs. It is close to Parque Farroupilha (also known as Redenção), one of the most arboreal areas in the city, and the proximity of the Federal University of Rio Grande do Sul campus favors the concentration of university students, intellectuals, and artists in the evenings.

Rua João Alfredo is a collector road, 650 meters long, with a regulated speed of 40 km/h, two-way traffic, and designated parking on both sides. According to the Master Plan of Porto Alegre, it forms part of the Pedestrian Tourist Route and crosses three Areas of Cultural Interest (AIC) that must receive special treatment to preserve cultural values, buildings, environmental quality, or even the activation of certain city sectors. The central blocks of the street, between República and Lopo Gonçalves streets, are home to many of the buildings included in the Downtown Cultural Heritage Inventory (Costa 2019).

João Alfredo has vastly different profiles during the day and night (Figure 24). While during the day activities related to the residential profile prevail, with small businesses and local services, four schools in the surroundings, and little movement in the central blocks, at night the situation is reversed, and the road starts to accommodate the movement of the nightlife, mostly pedestrian. The considerable number of people that accumulate gives an idea of the profile of the night public: young people drinking and talking—and moving along the car lanes due to the narrow width of the sidewalks. Graffitied fences and façades, with political and social inclusion motifs, complete the scene.

One hypothesis for the low activity during the day reflects the poor condition of the sidewalks, which are narrow and cluttered and do not offer adequate conditions for walking. The low quality is also related to the lack of mixed land use, as buildings have little physical (doors) or visual (windows) connection with the sidewalks. The qualification project for Rua João Alfredo sought to reverse this scenario, aiming to increase the use of the street during the day and make the place attractive for residents and visitors.

The high rate of pedestrians being involved in traffic crashes at night was one of the factors that made technicians turn their attention to the street at the beginning of 2017. Inspections that year found a general deficiency in infrastructure, with narrow and poorly maintained sidewalks, insufficient accessibility ramps, infrequent pedestrian crossings, and a lack of bike racks, which led to the accumulation of bicycles on the street and sidewalks (the presence of bicyclists is high, despite the lack of bike lanes on the street). Also, the absence of vegetation along the street contributed to a barren and uninviting landscape (Figure 25).

During the day, the lack of suitable places for safe crossing leads to risky behavior by pedestrians and bicyclists. The width of the road, combined with poor signage, induces drivers to disrespect the regulated speed. At night, the crowding of people on the car lanes in the central blocks, where several nightclubs are concentrated and the sidewalks are narrow, contributes to reckless behavior, leading drivers to pass between pedestrians (Tavares et al. 2016).

Figure 24 | Different uses of Rua João Alfredo during the day and night



Photo: EPV/EPTC/SMIM

Figure 25 | Barren landscape of Rua João Alfredo is not inviting for pedestrians and bicyclists



Source: Google Street View.

A mapping activity of the existing buildings along the road was conducted to identify patterns of use and possible high-conflict locations (Figure 26). A survey was also conducted on the data available at EPTC (Public Company of

Transport and Circulation) on accidents on Rua João Alfredo between 2007 and 2017. Vehicular, bicycle, and pedestrian counts were conducted, in addition to speed measurements in places considered to be at potential risk of accidents.

Figure 26 | Analysis of land use on Rua João Alfredo



Legend for Figure 26:
 ■ Schools ■ Mixed-use buildings ■ Bars/Rest. Daytime ■ Churches, temples ■ Vegetation ■ Commerce and services
 ■ Institutional buildings ■ Restaurants/Nightclubs ■ Residential buildings

Source: PMPA (Porto Alegre City Government)

4.2 Project

The revitalization of Rua João Alfredo began as a road safety project prepared by EPTC, linked to the Municipal Department of Infrastructure and Urban Mobility (SMIM).

group was also created with the participation of technicians from other departments with knowledge of road projects.

In September 2017, the proposal was chosen as a pilot project for Porto Alegre in the Complete Streets Program. From then on, it began to follow the schedule proposed by WRI Brasil: partial delivery of the project, participation in training workshops, and involvement of the stakeholders impacted by the project, among others (WRI Brasil 2017a). The municipal entities involved were EPTC, SMIM, and the Municipal Department for Institutional Relations (SMRI). A working

Throughout 2018, thematic workshops related to the concept of complete streets were held: strategic alignment, tactical urbanism, social participation (Figure 27), and financing. This process initiated a broad shift in thinking about ingrained planning concepts. As the project gained visibility, support from other partners, from organized civil society to the private sector, became increasingly important.

Figure 27 | Social participation workshop for the complete street of Porto Alegre, May 2018

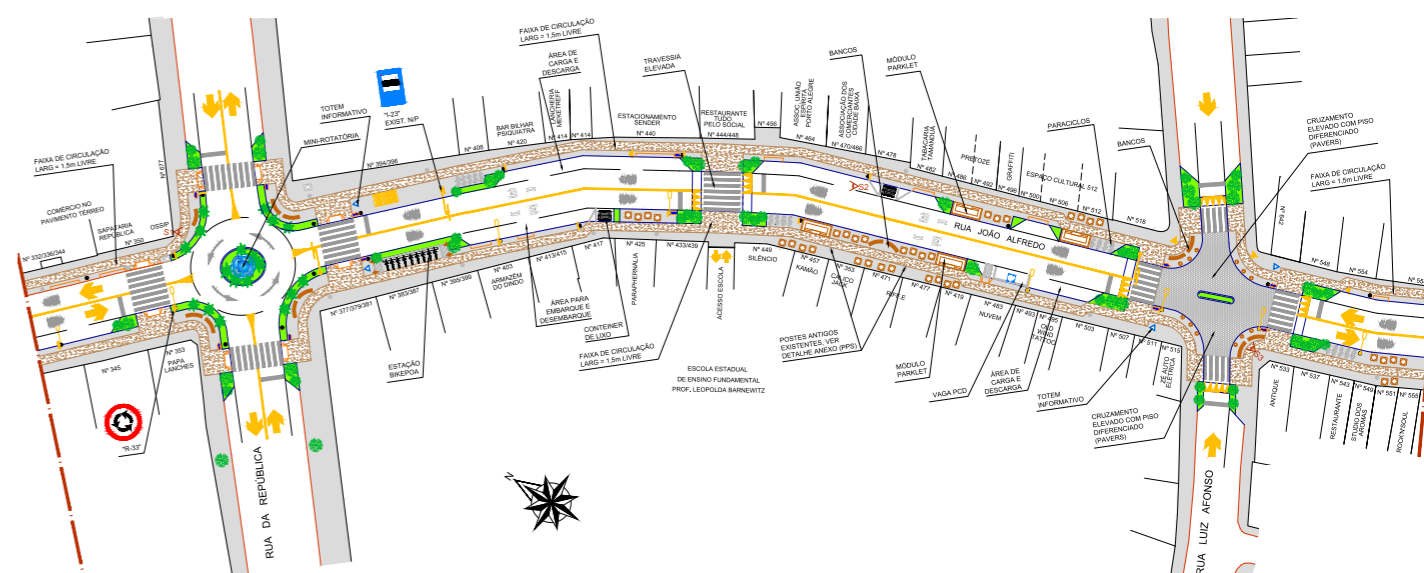


Source: WRI Brasil.

At the same time, the Universities Project took place, as part of the “EPTC in Higher Education” project, which aims to promote greater interaction between EPTC and higher education institutions. EPTC/SMIM technicians were at Unisinos (Vale do Rio dos Sinos University) to present the project to teachers and students from five classes in their 8th semester of the Architecture and Urbanism course. On that occasion, the concept of a complete street was presented, highlighting the work conducted by technicians to obtain information and the methodology used in the diagnosis stage, aspects that guided the proposal developed by EPTC for Rua João Alfredo. The students’ feedback was positive and contributed to other actions, such as activities at the university’s Academic Week and technical visits to EPTC.

The project guidelines prioritized active mobility and the creation of areas for coexistence and leisure in the urban space. The width of the road made it possible to widen the sidewalks and traffic moderation measures created shorter and safer crossings, increasing accessibility in general (Figure 28) (WRI Brasil 2018). The new road design provided a better organization of vehicular and pedestrian traffic circulation, more clearly demarcating the space for each mode while still maintaining the two lanes. The installation of parklets, benches, tables, chairs, and bike racks; the improvement of public lighting; and the expansion of green areas were also planned (most for the final stage). It is important to point out that traffic moderation measures were complemented by traffic education and surveillance.

Figure 28 | Complete street João Alfredo project



Source: EPTC/PMPA.

4.3 Implementation

To accommodate the needs of street users and residents, which differed greatly, the project was implemented in two stages. The first stage was temporary and, in addition to allowing for adjustments, it enabled greater community involvement, creating a sense of belonging among people and encouraging everyone to collaborate in the preservation of public heritage.

The first phase of the temporary intervention took place in March 2019, when a new roundabout and security lanes were implemented on Rua João Alfredo. A publicity event on the street called residents and visitors to learn about the intervention and participate in educational activities for sustainable mobility (Figure 29). The EPTC Traffic Research Team A administrated a survey to understand the profile of the public, how they used the space, and what they expected from it.

The survey revealed that 45.8 percent of respondents were residents of the neighborhood, while 53.7 percent defined Rua João Alfredo as a destination. Figure 30 shows that the most used mode of transport to reach the street on the day of the event was on foot. Figure 31 illustrates the scale that measured people's satisfaction,

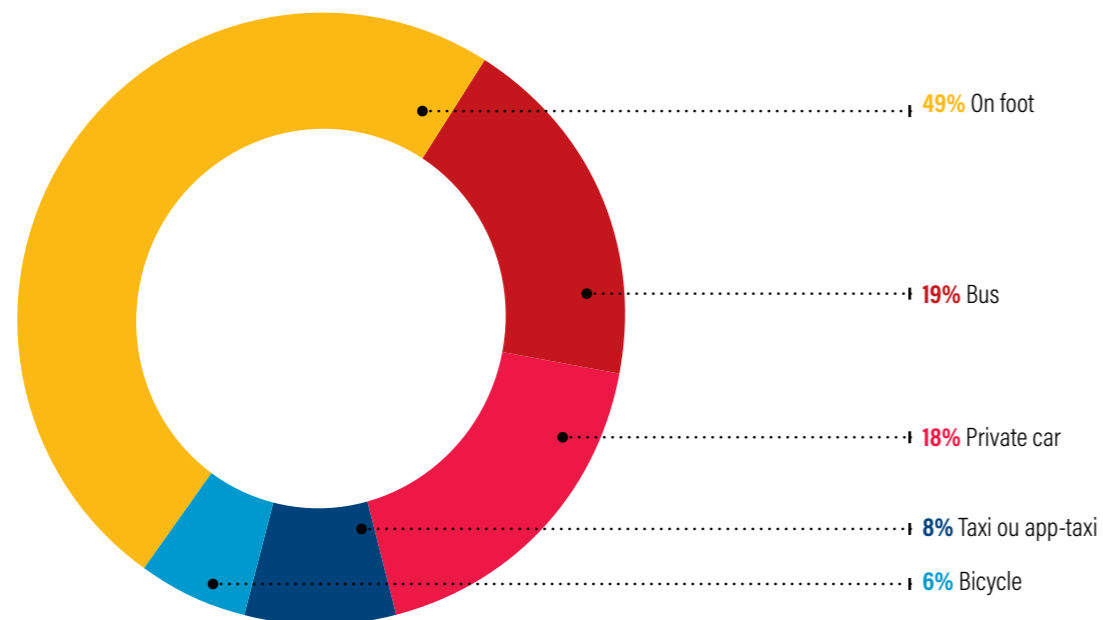
Figure 29 | **Colorful roundabout painted by children, with the intention of making the street a space for the family.**



Photo: Daniel Hunter/WRI Brasil, 2019.

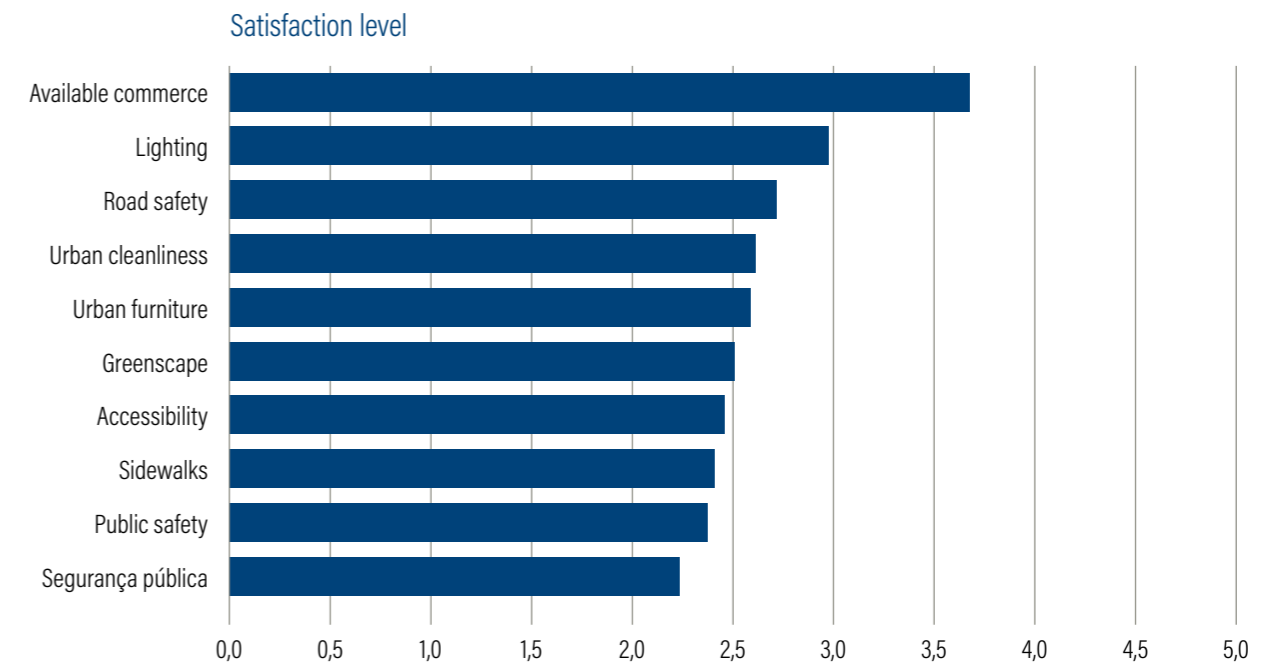
and most of the respondents in the first phase considered it medium or unsatisfactory (most below 3). The level of satisfaction influences the use of the street: more satisfactory spaces are generally utilized more by people, become safer, and improve local commerce.

Figure 30 | **Mode of transport used to get to the street on the day of the event**



Source: EPTC, 2019.

Figure 31 | **Chart of people's satisfaction level**



Source: EPTC, 2019.

The temporary stage (Figure 32) was completed in October 2019, with installation of horizontal and vertical signage, and cost BRL141 thousand¹¹, funded by the government of Porto Alegre. Temporary furniture and planters were added in addition to signage. The furniture was developed in an initiative that brought together WRI Brasil, Fundação O Pão dos Pobres de Santo Antônio, Hype Studio Arquitetura (the last two located near Rua João Alfredo), the NGO Engenheiros

Sem Fronteiras and Refaz, a company of furniture design that uses sustainable materials. The carpentry school of Fundação O Pão dos Pobres built temporary furniture used on the street with pallets donated by the company Gerdaud and a project developed by Refaz to offer leisure areas (Vargas 2019).The initiative was essential to encourage the participation of local actors in the transformation of the street in addition to adding to the concept of a complete street (Figure 33).

Figure 32 | **Section of Rua João Alfredo after completion of the temporary stage**



Photo: Daniel Kener Neto/WRI Brasil, 2019.
¹¹\$26.93 thousand (December 2022).

Figure 33 | Furniture built by carpenters from Fundação O Pão dos Pobres for Rua João Alfredo



Photo: Daniel Kener Neto/WRI Brasil, 2019.

4.4 Short-term results

When speeds decrease, people perceive the street as better for walking. Thus, the intervention was expected to increase the appropriation of public space by pedestrians, reduce the number of traffic accidents, and reduce the speed of vehicles. Quantitative data were analyzed to verify the effects of the changes and the public's response to street use.

Speed assessment was performed by measuring the 85th percentile speed (West and Dunn 1971), which is the speed at or below which 85 percent of drivers drive on a given street, unaffected by slower traffic or bad weather. This indicates the speed that most drivers on the street would consider safe and reasonable under ideal weather and light conditions. In the case of Rua João Alfredo, the 2017 results indicate that there was a considerable reduction in the speed practiced on the road, with two sections approaching a 50 percent reduction related to the speed measured before the intervention (Figure 34).

Figure 34 | Average speed within the 85th percentile, downtown direction, before and after the implementation of the temporary stage



Source: photos by Daniel Kener Neto/WRI Brasil, with data from EPTC and WRI Brasil

The Propensity Score Matching methodology was used in the analysis of traffic accidents (Table 4), (Austin 2011). The data was compared with those of Rua General Lima e Silva, chosen as the control street due to its similar characteristics, to assess the difference of a location that did not receive interventions. As the intervention on Rua

João Alfredo was completed in October 2019 and restrictions on mobility due to the Covid-19 pandemic began in Brazil in March 2020, five periods of analysis were established—the first four between October 2015 and March 2019 (before the intervention) and the last from October 2019 to March 2020 (after the intervention).

Table 4 | Number of occurrences recorded on Rua João Alfredo before and after the intervention and on Rua General Lima e Silva (control street)

Period of Analysis	FRONTAL COLLISION BETWEEN MOVING VEHICLES		SIDE COLLISION BETWEEN VEHICLES		COLLISION BETWEEN A VEHICLE AND A NON-MOVING OBJECT		FALLS		RUN OVERS		
	Rua João Alfredo	Rua General Lima e Silva	Rua João Alfredo	Rua General Lima e Silva	Rua João Alfredo	Rua General Lima e Silva	Rua João Alfredo	Rua General Lima e Silva	Rua João Alfredo	Rua General Lima e Silva	
Before the Intervention	Oct 2015 - Mar 2016	3	6	4	6	0	0	0	0	1	1
	Oct 2016 - Mar 2017	2	5	4	18	0	1	0	0	0	1
	Oct 2017 - Mar 2018	1	5	5	6	2	1	1	0	1*	1
	Oct 2018 - Mar 2019	2	1	2	12	0	2	0	0	1+1*	1
	Average	2	4,25	3,75	10,5	0,5	1	0,25	0	1	1
	Median	2	5	4	9	0	1	0	0	1	1
After the Intervention	Oct 2019 - Mar 2020	1	2	2	11	0	1	0	0	1	3

*Indicates the number of fatal accidents.

Source: authors, adapted from EPTC 2020.

Traffic accidents were categorized into five types: collision between moving vehicles, collision between a moving vehicle and a stationary vehicle, collision between a vehicle and an unmovable object, falls, and run overs. The post-intervention evaluation period shows that the number of accidents on both streets remains similar to the pre-intervention periods, especially in the months between 2018 and 2019. After the intervention, Rua João Alfredo maintained a reduced number of pedestrians being run over, while there was an increase on the control street. New medium and long-term analyzes must be carried out to accurately assess the impacts of the intervention in reducing all types of accidents due to the effects of the Covid-19 pandemic on mobility and the short post-intervention evaluation period.

Given the positive results of the temporary stage, in June 2020 the public notice for the “Executive Urban redevelopment Project for Rua João Alfredo” was published, leading to the definitive stage with financing from the Development Bank of Latin America (CAF),

in the amount of BRL250 thousand¹² for the execution of the project. The intervention is estimated at BRL3 million¹³ and will also be financed by CAF (Fonseca 2020). However, to reverse the closure of establishments in the region—a movement that was already taking place due to conflicts between street users, residents, and the public authorities, and which increased with the Covid-19 pandemic—the remodeling of the space must present a set of actions that encourage active mobility and involve the entire street community: residents, businesses, and visitors (Weber 2020)..

The case of Rua João Alfredo makes it clear that the interventions conducted by the city government were successful in keeping the number of accidents low and reducing the average speed of vehicles. This is a determining factor for people to reoccupy the street, which has become safer and more pleasant. The results of the João Alfredo’s project has already encouraged several other interventions in the city, where sidewalks are being expanded with paint, bollards, and raised pavement markers.

Figure 35 | Before and after the intervention on the roundabout between Rua João Alfredo and Rua Lopo Gonçalves



Photos: Apple Maps (before), Daniel Kener Neto/WRI Brasil, 2019 (after)
¹²\$47.74 thousand (December 2022).
¹³\$570 thousand (December 2022).





CASE STUDY 5

RUA CUSTÓDIO JOSÉ INÁCIO RODRIGUES: CHILDREN AND TEENS ON THE COMPLETE STREETS IN CAMPINAS

Authors:

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Michelle da Silveira Rosa, Leader of the Development Process and New Technologies at Emdec, Campinas city government

SUMMARY TABLE 5 | INTERVENTION AT RUA CUSTÓDIO JOSÉ INÁCIO RODRIGUES

DIAGNOSIS (PRE-INTERVENTION)

Functional street classification: local — characterized by non-signalized intersections, intended only for local or restricted areas access.

Context: street with an elementary school, little space for children on the sidewalk in front of the school gate, dangerous sidewalks along the street, and disorganized traffic when students come and go.

DESIGN AND IMPLEMENTATION

Objectives: to redo the sidewalks; improve road safety conditions in front of the school and on the surrounding blocks; and engage the school community in the intervention.

Financial resources: approximately BRL52,000¹⁴

Type of intervention: tactical urbanism

Length: 150 m

Inauguration: October 2019

Measures implemented: installation of a parklet in front of the school entrance with a waiting area and recreational activities for students; reduction of pedestrian crossing distance; redone crosswalk; sidewalk widening with paint and planters at intersections; installation of removable speed bumps near the entrance to the school.

Intervention time: less than a week

Key circumstances for the transformation of the street: a pilot project for tactical urbanism intervention. Engagement of the school community in the project and partners for implementation were essential for positive results.

RESULTS (POST-INTERVENTION)

Public approval: after the intervention, 91 percent of people interviewed and approved of the visible occupation of spaces created for school students.

Source: WRI Brasil.

¹⁴\$9.93 thousand (December 2022).

5.1 Diagnosis

Emef (Municipal Elementary School) Professor Vicente Ráo, located at Rua Custódio José Inácio Rodrigues, was the chosen location for the implementation of a pilot project of tactical urbanism in Campinas. The school is in the heart of Parque Industrial, an old working-class neighborhood in Campinas and where middle-class residential use currently predominates, located about 3 km from downtown. The location was selected based on the identification of conflicts between pedestrians and vehicles when students entered and exited the school and the frequent disrespect for traffic signs, which generated significant risks of accidents. Conflicts were due, in part, to the insufficient width of the sidewalk, where students and their companions crowded with great discomfort.

Professor Vicente Ráo has around 700 students aged between 6 and 15, from 1st to 9th grade, divided into morning and afternoon shifts. One of the accesses to the school, for which the intervention was planned, is on Rua Custódio José Inácio Rodrigues—a one-way street, with no passing traffic outside peak hours, during the entry and exit of children. Many conflicts took place between 12:20 and 12:30 PM when the morning shift leaves and the afternoon shift begins. However, as the drop-off of the children is faster than the pick-up, most of the conflicts used to happen at the end of the afternoon shift, at 5:30 PM, when parents had to park and walk to the gate to pick up the youngest childrens.

The main aspects that motivated the development of the project were:

- vehicles that travel in the opposite direction to the permitted flow and vehicles that practice speeds incompatible with the character and characteristics of the street;

- double-parking, disrespecting the demarcation of preferred spaces;
- lack of space for students and companions on the narrow sidewalk in front of the school and in part of the street, before and after the gates open; and
- garbage, theft, and vandalism due to the low traffic on the street outside peak hours.

The project for the school exit on Rua Custódio José Inácio Rodrigues was selected as the complete street project in Campinas. Originally, the chosen street was Rua José Paulino, but the lack of forecast for complex road repair forced the change. The process, however, led to the idea of executing specific interventions in the city, through which it would be possible, with few resources, to create quality public spaces for people through tactical urbanism—as is the case of the intervention on Rua Custódio José Inácio Rodrigues.

One of the key principals of tactical urbanism interventions is the possibility of executing the project in phases, on an experimental basis, until permanent implementation. The final objectives of the project are the readjustment of the road space and the enhancement of public spaces—precisely for this reason, interventions must be tailored to the needs of each location and promote dialogue with the community affected by the changes to understand the expected benefits, explain the implementation phases, collect feedback, and even form partnerships (Campinas 2018).

5.2 Project

The pilot project at the Professor Vicente Ráo school is aligned with the Municipal Plan for Early Childhood of Campinas (PIC) 2019-2029 (Campinas 2019), which lists proposals for actions and public policies aimed at early childhood, implemented from an Intersectoral Municipal Committee. The PIC highlights the importance of family participation in the process of building shared public spaces as places for meeting, exchange, and diversity that are safe for children to play.

Thus, from the beginning the project sought the involvement and awareness of families and, especially, of children to adopt participatory and safety actions. One of the great challenges throughout the process was mobilizing society and involving different actors, such as government agencies, private companies, class entities, associations, federations, and organized civil society.

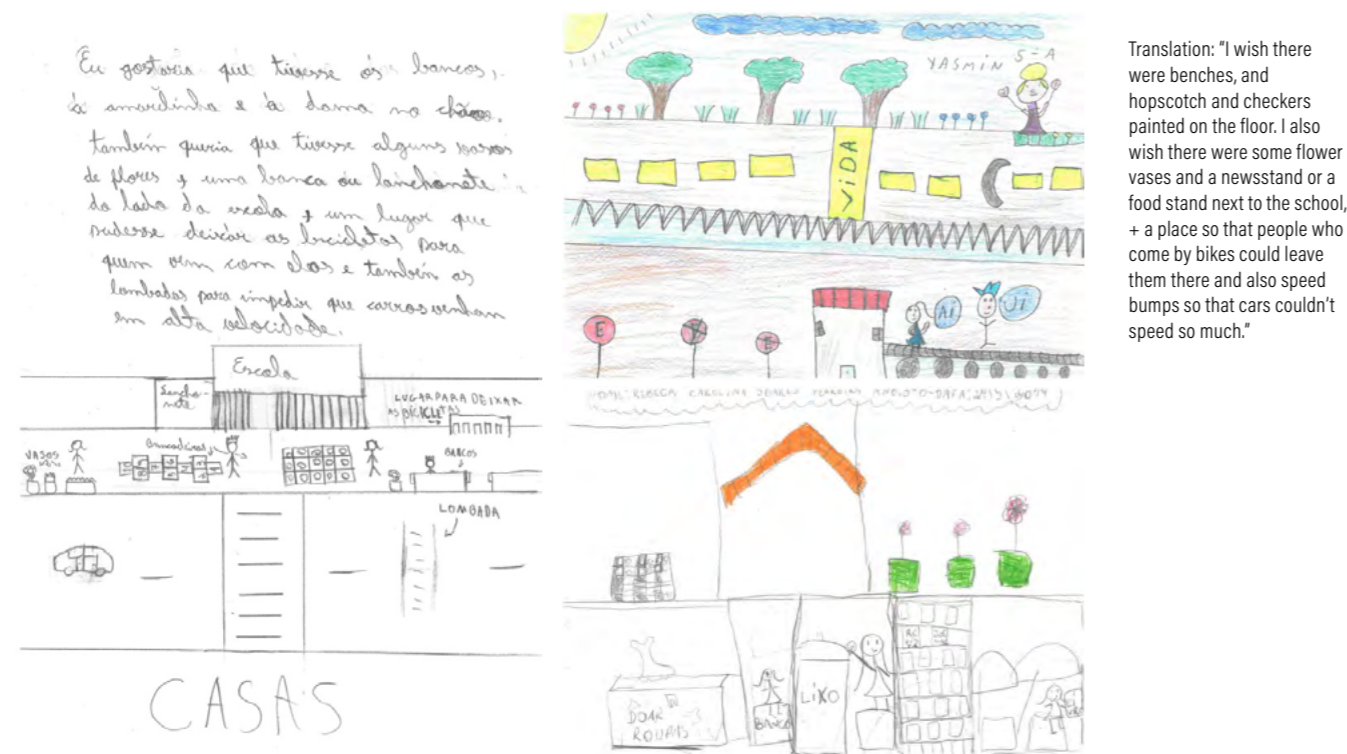
In May 2019, the Campinas Municipal Development Company (Emdec) promoted a workshop with the participation of all Emef Vicente Ráo students, in addition to the collaboration of teachers, employees, parents, and residents of Rua Custódio José Inácio Rodrigues. The approach included lectures on the concept of tactical urbanism and guided tours of the temporary project implementation site (Figure 36). During the visits, the students observed the conditions of the public space, such as circulation on the street, the quality of signage, the condition of the sidewalks, and thermal comfort. Later, in the classroom, they developed proposals to reconfigure the school surroundings (Figure 37). One of the children created a Facebook page with suggestions for the project (Figure 38). The school community had access to an exhibition installed on the school premises, with the presentation of the 246 proposals prepared by the children and the final project (Figure 39).

Figure 36 | Workshop for student participation in project development



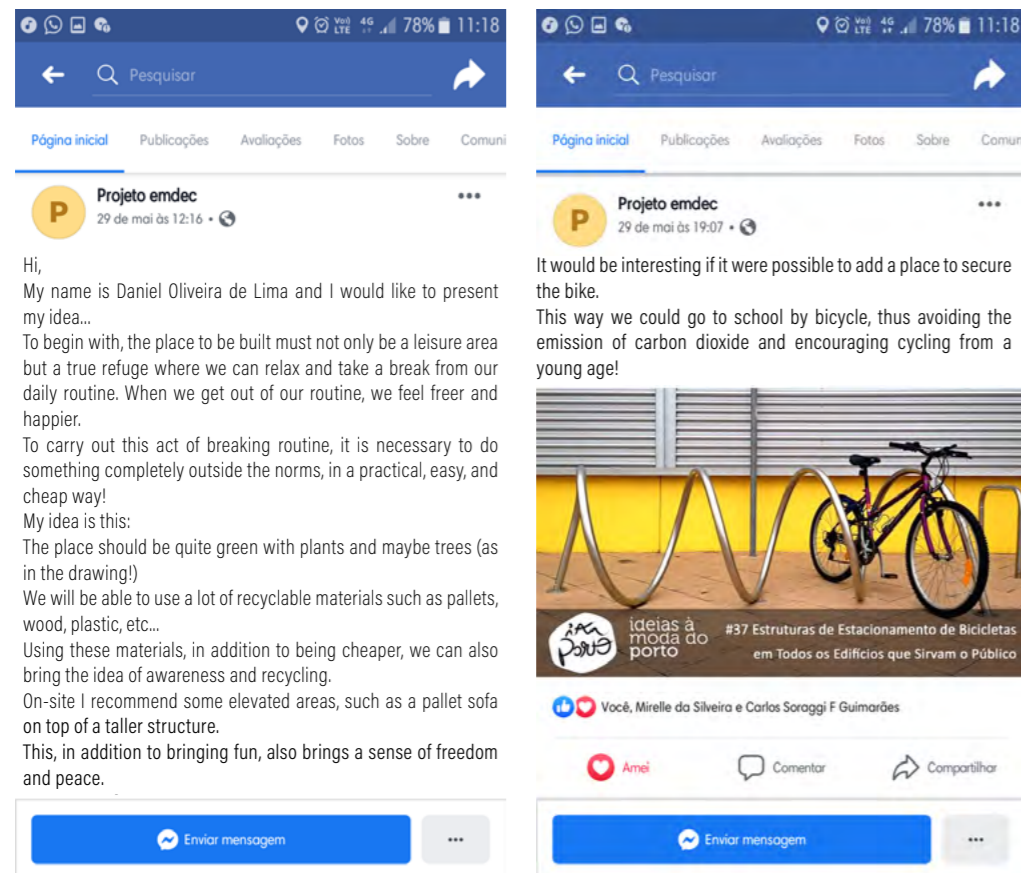
Source: Emdec.

Figure 37 | A student's proposal for intervention in the school surroundings



Source: Emdec.

Figure 38 | Facebook page with suggestions for the project, created by one of the students at the school



Source: Emdec.

Figure 39 | Exhibition of students' proposals on school premises

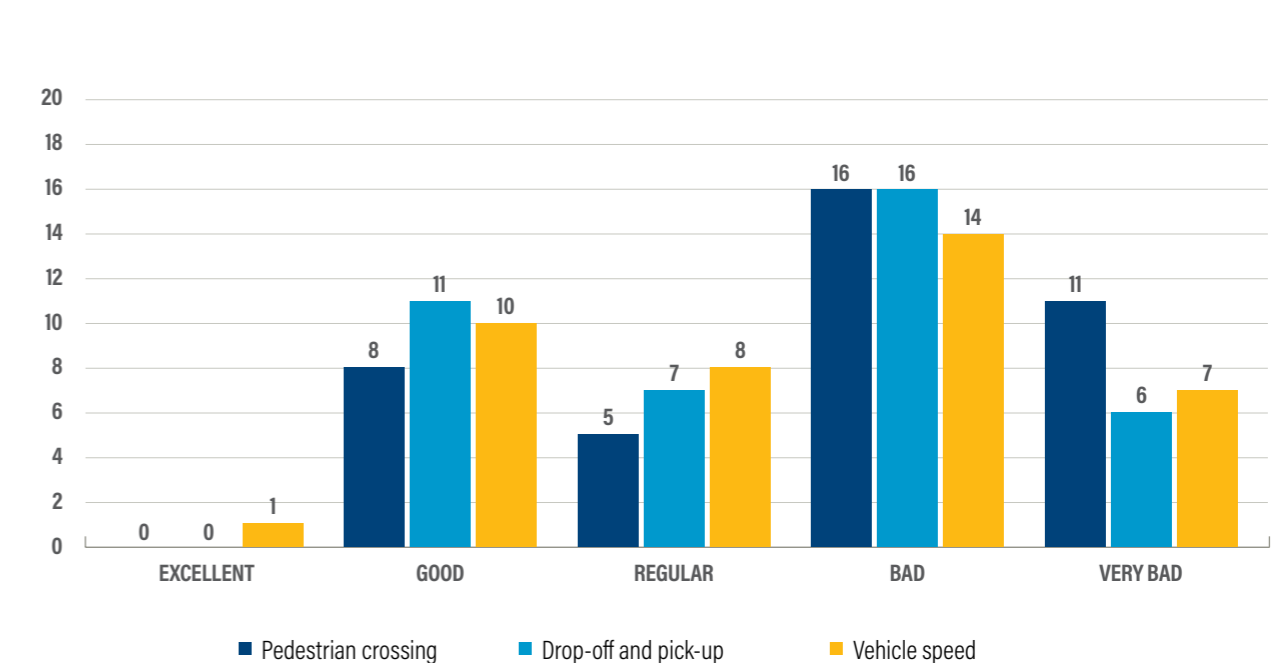


Source: Emdec.

The challenge was also launched to the students' parents and other road users such as residents and retailers. The Emdec Research Team conducted opinion surveys on the days before the intervention and the day of the workshop. Most of the respondents had a negative opinion about existing aspects of road safety on the street, such as vehicle speed, the quality of pedestrian crossings, and the conditions for drop-off and pick-up (Figure 40). They were also invited to present suggestions for improving the quality of the public space on the school's street—the highlights of the suggestions were implementing a pedestrian crossing and widening the sidewalk.

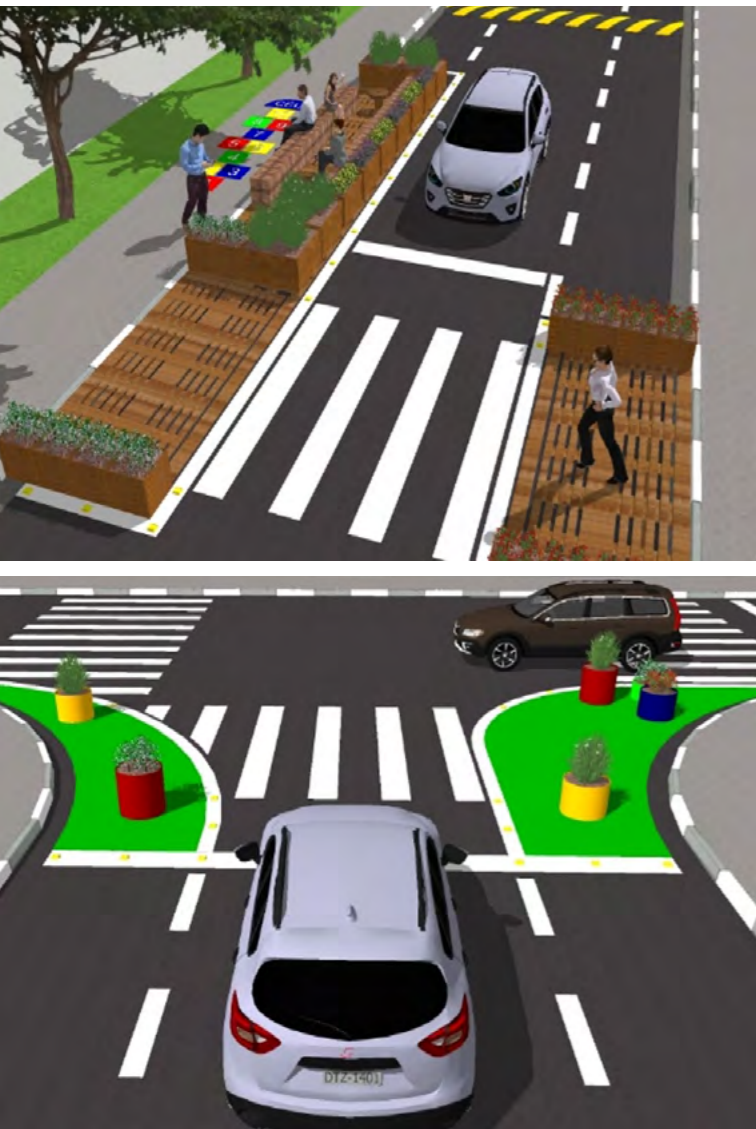
Emdec systematized the suggestions of the respondents and the drawings and texts produced by the students to develop the final project proposal (Figure 41). The project was presented to Emdec employees, municipal departments, autarchies, potential partners, and university students (of architecture and civil engineering) at the 81st Ordinary Meeting of the Municipal Council of Transit and Transport (CMTT). In these presentations, innovative ideas and strategic partnerships emerged that made the implementation of the pilot project feasible.

Figure 40 | Result of the opinion survey on road safety conditions on Rua Custódio José Inácio Rodrigues



Source: Emdec.

Figure 41 | Project proposed by Emdec to improve access to school



Source: EMDEC.

Throughout the process Emdec made several contacts with retailers and entrepreneurs in the neighborhood to collect materials, in order to involve the local community in the project. The scope of the contacts grew, and companies from other regions of the city and even from neighboring cities showed interest in the project and donated materials for the execution. In addition, the partnership with other municipal departments was essential for the execution

of the sidewalk improvement work, in particular the Department of Public Services. The Department of Education also provided support during the work and supported the school management in internal interventions motivated by the revitalization of the street, such as painting the school walls and installing a concrete gutter in the playground area to capture rainwater.

5.3 Implementation

The implementation began on October 7, 2019, about six months after the first studies. The cost was estimated at BRL 52 thousand¹⁵—and a large part of this investment was made possible through partnerships.

The intervention included sidewalk improvement, with the removal of the Portuguese pavement and the installation of a concrete floor with the stamp of a butterfly, a symbol of the project representing transformation. The sidewalk was expanded by 2 m next to the school entrance, where a parklet approximately 15 m long was installed, occupying three parking spaces. Two accessibility ramps were built, each 4 m long, narrowing the road in this section and improving safety around the recently implemented pedestrian crossing. Before the intervention, the distance between the curbs on both sides of the road was 8 m; with the new structures, the final crossing distance was reduced to just 3.6 m.

The parklet and the ramps are protected by wooden planters, where a vegetable garden was planted (Figure 42). Inside the parklet, a leisure area was created with wooden benches and tables built with coils of electrical wires. Pinewood, from the reuse of pallets, was used to build the parklet, planters, benches, and ramps, and it was chosen because it allows easy handling and quick execution, in addition to being sustainable and having good thermal performance. A hopscotch game on the sidewalk, a wooden house that serves as a community library, and trash cans complete the urban furniture next to the parklet. Inside the school premises, concrete bike racks were installed next to the entrance gate.

¹⁵\$9.93 thousand (December 2022).

Figure 42 | Students using the new parklet



Source: Emdec.

Road narrowing measures were also adopted at intersections located at the ends of the parklet area—on the corners of Rua Francisco Alves de Almeida and Rua Maria Bibiana do Carmo (Figure 43). At these two points, the sidewalks were expanded with green paint. Concrete planters and oil drums were used for landscaping and to protect people waiting to cross. The narrowing of the street reduces the crossing time for pedestrians and encourages vehicles to reduce their speeds. Removable rubber speed bumps reinforce the intention to reduce speed and alert to pedestrians. Road signs on the street and in the surrounding area were revitalized, and new preferential parking

spaces were installed next to the school access for the elderly and people with disabilities.

The inauguration of the intervention took place on October 19, 2019, during the “Vicente Ráo for Peace” event, promoted by the school to reinforce traffic peace and safety. Several activities were part of the event’s program and attracted students, parents, neighbors, partners, and municipal authorities to learn about the new space. Actions included planting seedlings in the parklet garden by students and authorities, graffiti, face painting, a trampoline, a mini transit circuit, a skateboard circuit, accessible toys, and other recreational activities.

Figure 43 | Narrowing the road on the intersections near the school entrance reduced the speed of vehicles in the area



Source: Emdec.

5.4 Short-term results

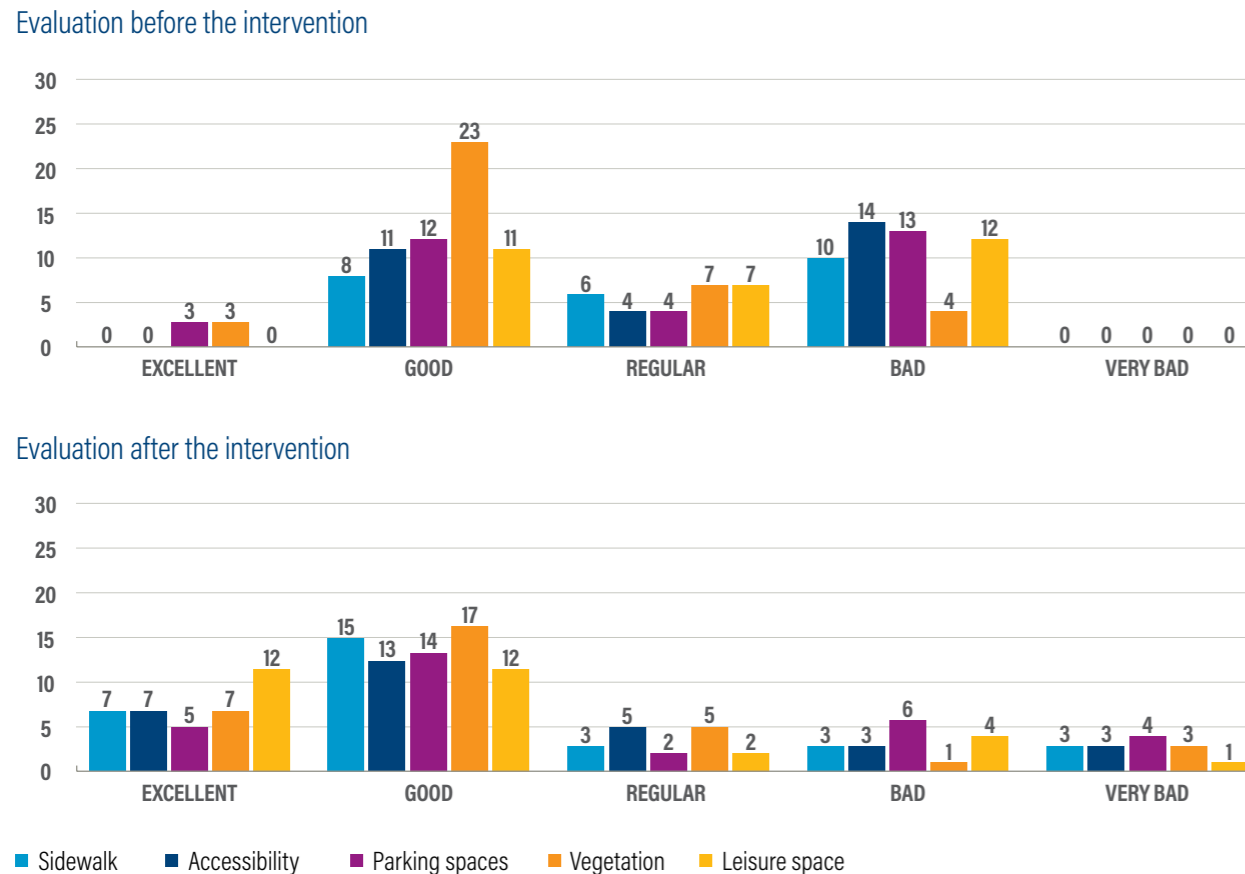
In an interview after the inauguration of the intervention, the director of Emef Vicente Ráo reported that the children liked the project so much that they started to arrive earlier at school to take advantage of the new space. She also informed that the students requested the installation of benches, seating areas, and another hopscotch inside the school, next to the parklet, since the street cannot be accessed during school hours (TV Câmara Notícias 2019). The first opinion survey carried out after the implementation indicated that 50 percent of the respondents evaluated the intervention as excellent, 41 percent as good, and 9 percent considered it fair. No respondents indicated bad or very bad opinions of the intervention.

In surveys carried out before and after the intervention (Figure 44), five qualitative aspects of the school’s surroundings were evaluated: sidewalk, accessibility, parking spaces, vegetation, and leisure space. The results reflect an improvement in all evaluated aspects. It is also important to note that in all aspects there was also an increase in the “very bad” responses, which may indicate that the action aroused the attention, critical awareness, and expectations of the respondents.

Even after the intervention, some cars still double-park to pick up and drop off students, and others eventually travel in the wrong way on small stretches of the road, showing the importance of continuous education and enforcement.

The pilot project implemented at Emef Vicente Ráo was a small-scale intervention. However, it marked the beginning of larger interventions that are being developed in Campinas. The temporary project was monitored for six months to understand what worked and what did not in the new space, listen to street users, and make the necessary adjustments. This evaluation is the basis for the development of the permanent project, which will be implemented in ten other schools around the city.

Figure 44 | The surveys show an improvement in all evaluated aspects after the intervention



Note: The first evaluation was carried out on May 27, 28, and 29, 2019, and the second at the end of October of the same year
Source: adapted from Emdec.

Figure 45 | Before and after the intervention at Emef Vicente Ráo



Photos: Marcelo Oliveira/WRI Brasil.



CASE STUDY 6

RUA CORONEL JOSÉ MONTEIRO: REVITALIZATION FOR COMMERCE IN SÃO JOSÉ DOS CAMPOS

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SUMMARY TABLE 6 | INTERVENTION AT RUA CORONEL JOSÉ MONTEIRO

DIAGNOSIS (PRE-INTERVENTION)

Functional street classification: local — characterized by non-signalized intersections, intended only for local or restricted areas access.

Context: one of the main commercial streets downtown, with narrow sidewalks that hindered pedestrian mobility and did not provide a comfortable space for circulation.

DESIGN AND IMPLEMENTATION

Objectives: to provide safety and comfort to the public that frequents the region and more visibility to businesses, by prioritizing active modes and improving accessibility and attractiveness of the street.

Financial resources: approximately BRL910,700¹⁶

Type of intervention: permanent intervention

Length: 120 m

Inauguration: December 2019

Measures implemented: widening of sidewalks; addition of new urban furniture, with parasols and leisure areas for pedestrians; ornamental lighting; removal of parking spaces.

Intervention time: 6 months

Key circumstances for the transformation of the street: planning the execution to cause the least possible impact on local businesses; articulation with the Commercial Association to engage retailers to take care of part of the urban furniture; the project being just one of several urban revitalization interventions in the city.

RESULTS (POST-INTERVENTION)

Public approval: excellent acceptance by local businesses. Several retailers signed an agreement to collectively take care of the new furniture.

Source: WRI Brasil.

¹⁶ \$173.78 thousand (December 2022).

6.1 Diagnosis

Located in downtown São José dos Campos, Rua Coronel José Monteiro is approximately 1 km long. It is one of the main commercial streets in the region, as it received the Olympic Torch in 2016, and provides access to one of the city's landmarks: the Municipal Natural Park of Banhado. Praça Cônego Lima, built in 1898, is also part of the street, next to the fig trees that became part of the city's environmental heritage in 1992. Also on the street, the Cine Teatro Paratodos, inaugurated in 1941, preserves cultural heritage and is one of the oldest buildings in the city (IBGE 2020).

Rua Coronel José Monteiro is one of the streets that cross the boardwalk of Rua Sete de Setembro. The boardwalk was considered by the study “Informe Eixos São Paulo 2018”, carried out by the Eixos Economic Observatory of Barcelona consultancy, as the second-best commercial axis in the State. According to the survey, the boardwalk has a 98.7 percent commercial utilization index, and a commercial attraction index of 85.7 percent. Of the total stores, 80.5 percent sell personal items (Alves 2019). According to the ACI (Commercial and Industrial Association) of São José dos Campos, around 12,000 people circulate, mostly on foot, through the shops in the area and around 70 percent use public transport to reach the region (FAPETI 2019a).

Poles, traffic signs, parking meters, and trash cans on the narrow sidewalks on the street hindered pedestrian mobility and failed to provide a comfortable space for circulation (Figure 46). Due to its characteristics as a commercial street, many people walk along the sidewalks with bags and packages that require larger spaces which leads pedestrians to walk on car lanes, especially at peak hours and important dates for commerce.

Figure 46 | Pictures of the street before the intervention



Photos: PMSJC.

The survey “Impacts of Urban Mobility in Retail”, carried out by the Credit Protection Service (SPC Brasil) and by the National Confederation of Store Managers (CNDL), identified a new generation of consumers concerned with issues involving accessibility, quality of life, and good occupation of public spaces.

More than half of those surveyed stated that they usually shop in places where there is access for pedestrians, bicyclists, and public transport passengers. In addition, 58.5 percent of people usually pay attention to store windows while walking through a commercial street. Feeling safe in a commercial establishment is a key factor in the purchase decision for seven out of ten Brazilians (IBOPE et al. 2018).

The road space on Rua Coronel José Monteiro is divided into four sections: (1) between Avenida São José and Rua Sete de Setembro, (2) between Rua Sete de Setembro and Rua Vilaça, (3) between Rua Vilaça and Rua Francisco Rafael, and (4) between Rua Francisco Rafael and Rua José de Alencar. The stretches have parking spaces, connections with the city's public transport system, and sidewalks that support most of the daily commutes in the region.

Most of the sidewalks on the street are already adapted according to the city's Calçada Segura Program. In 2013, the program received the Mario Covas Award as one of the 10 best innovative municipal management experiences in the state as well as the 2nd edition of the Inclusive Actions Award by the State Department for the Rights of Persons with Disabilities in 2011. In the third section of the street, there is an exclusive space for electric vehicles. São José dos Campos was the first city in Brazil to make shared electric vehicles available on public roads with a dockless system, in which users can use the vehicles throughout the city and return them to any appropriate place within the coverage area.

Like in many cities in Brazil, downtown São José dos Campos presents typical characteristics of degradation and alteration of its urban function, such as population depletion, migration of uses, real estate devaluation, insecurity, and deterioration of public assets, among others.

In 2017, Rua Coronel José Monteiro was selected for a complete street pilot project. The stretch selected for redevelopment was the second, between Rua Sete de Setembro and Rua Vilaça, and is approximately 120 m long. It was selected for the wide variety of shops and the intense movement of people.

In November and December 2017, pedestrian and vehicle flow measurements were carried out. The flow was measured on three days of the week (Tuesday, Thursday, and Saturday) so that a greater variety of situations could be recorded. The number of people, passenger vehicles, motorcycles, and trucks that traveled along the stretch from 11 AM to 2 PM (peak hours on the street, due to its commercial nature) was monitored. During this period, 2,041 people circulated on Tuesday, 1,841 on Thursday, and 2,834 on Saturday (Figure 47).

Surveys carried out before the intervention, in June 2019, allowed the diagnosis of the main existing problems and perceptions of users and retailers on Rua Coronel José Monteiro. Information was collected regarding travel patterns, considering topics such as comfort and safety, road infrastructure, and retail options.

The survey showed that people use Rua Coronel José Monteiro for different purposes: 32.6 percent of people say they use the street for work, 32.6 percent of people answered that they use the street for shopping, and 27.3 percent said that the street is not their destination. Most respondents said they walk the street daily (FAPETI 2019b).

Most people arrive by public transport, with 48.5 percent using buses or vans, 34.8 percent using private cars, and only 11.4 percent of respondents

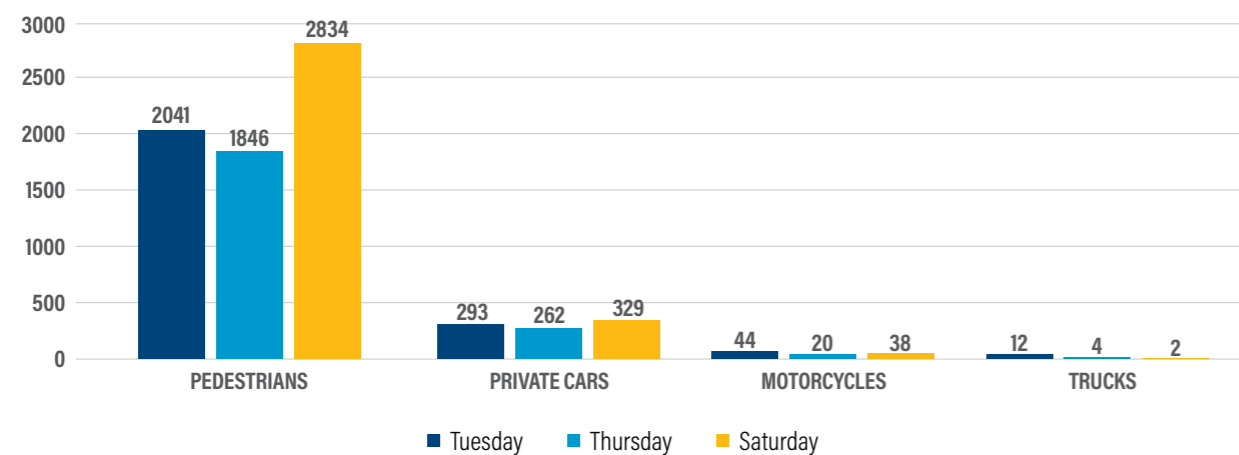
traveling on foot. The survey also identified the last transport mode used by people to reach Rua Coronel José Monteiro. Most respondents (36.5 percent) had walked, followed by 32.7 percent who used public transport, and 27.4 percent who used private cars

The survey also asked retailers what changes they would make to Rua Coronel José Monteiro: 32.2 percent of them said they would transform the street into a pedestrian street, 25.6 percent would increase policing, 15.6 percent would not change anything, 7.8 percent would widen the sidewalk, 6.7 percent would install benches, 5.6 percent would place vegetation, 2.2 percent would restrict vehicles, 1.1 percent would improve lighting, and 1.1 percent would build bike lanes.

People were also asked about their level of satisfaction with Rua Coronel José Monteiro. Respondents were satisfied with sidewalks, urban furniture, road safety, lighting, and urban cleaning; but were dissatisfied with landscape and shading, noise, and public safety. The survey also showed the presence of accessibility (ramps, tactile flooring, crosswalks, etc.), but the need to improve it.

Commerce and the diversity of available activities was the item best evaluated by the respondents, with 77.5 percent of them classifying the commerce on Rua Coronel José Monteiro as excellent..

Figure 47 | Total traffic flows measured between 11 AM and 2 PM on Rua Coronel José Monteiro



Source: PMSJC.

Figure 48 | Project perspective for Rua Coronel José Monteiro



Source: PMSJC.

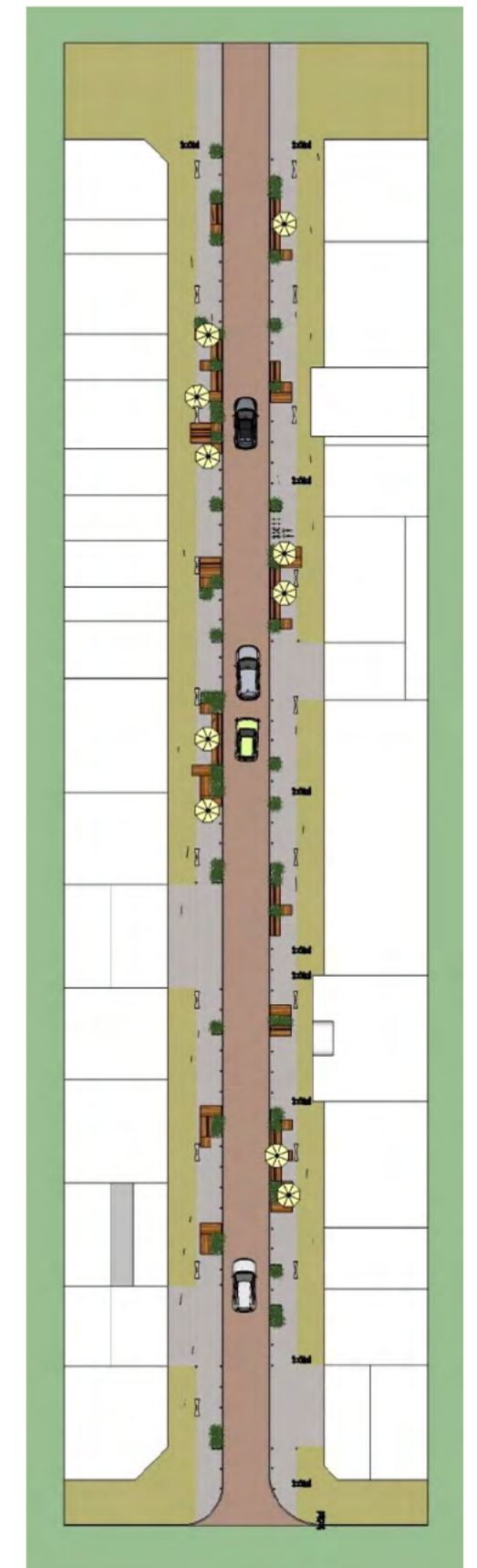
6.2 Project

The project sought to provide safety and comfort to the public that frequents the region and more visibility to businesses. The proposal for the redevelopment of Rua Coronel José Monteiro meets the policies of prioritization of active modes of travel in the municipality (on foot and by bicycle) and the concept of “City for People”, instituted through the Urban Mobility Plan (Municipal Law No. 576/2016). The project is one of six interventions for the revitalization of urban areas in São José dos Campos to provide safety and comfort to all.

In June 2017, the City Hall, Sebrae, and ACI held an event to discuss the project with the public. The objective was to gather the main perceptions and demands of retailers about the urban space and the circulation system and to present a proposal for the revitalization of that stretch of the street.

The concept of the project was to create an accessible, active, and pleasant space, where people could feel comfortable walking, shopping, talking, having a snack, or simply resting. To this end, leisure areas with benches, parasols, planters, and bike racks were proposed and implemented (Figure 48). The parking spots became spaces for the circulation of people with the widening of the sidewalks, maintaining only one car lane at low speed, with interlocked pavement, which is compatible with the large concentration of pedestrians in the region (Figure 49).

Figure 49 | Aerial view of the project



Source: PMSJC.

Figure 50 | Rua Coronel José Monteiro after the intervention, with street furniture and more space for pedestrians



Photo: Claudio Vieira/PMSIC.

The engagement of the community, retailers, entities, the secretary of urban mobility, and the mayor was essential to enable the implementation of the project.

6.3 Implementation

The redevelopment of Rua Coronel José Monteiro consisted of three stages, which added up to six months, during which access to the stores was guaranteed and pedestrian circulation was allowed, with all safety measures being taken for road users. Before the start of the intervention, the authorities carried out an alignment of activities with retailers, trying to minimize the impact on local businesses during this period. As this is an old area, some unforeseen services had to be performed, causing the demolition process to take place at a slower pace to avoid greater impacts.

In the first two phases, sidewalks on both sides of the street were widened. In both stages, a car lane was maintained, although it was occasionally shifted to ensure greater productivity and ensure pedestrian circulation on both sides of the road. The repairs were carried out during business hours and at some specific times during the night, to minimize the inconvenience for retailers and the public.

In the third and final phase of the work, the road was closed at times of less movement for minor repairs. Installation of rainwater catchment grids and paving tiles were completed and ornamental lighting and street furniture were installed.

6.4 Short-term results

From the conception of the complete street project to its execution, criteria were considered that would allow the analysis of the space related to its use: safety, protection, accessibility, diversity/versatility, attractiveness, connectivity, and resilience. The aim was to create an attractive and interesting space, considering the quality of the design and the presence of playful elements to offer surprising and positive experiences to engage street users.

As the project included umbrellas on the sidewalks (Figure 50), the authorities articulated with the ACI the responsibility for placing them during the day, removing them at night, and storing them. ACI offered this responsibility to retailers and, based on the list of those interested in such care, the layout of the seats and the positioning of the parasols were adjusted so that they were close to the businesses responsible. The use of umbrellas was highly successful, and the Department has already received a request to authorize the use of additional facilities.

The intervention began with flow measurements and interviews with street users and retailers and has been carried out in partnership with the local community and other entities in the city. The landscaping of the road will still be complemented, as it

was delayed due to the Covid-19 pandemic. The survey will be repeated after completion of the implementation, when it will be possible to better assess the impacts of the street transformation. Around BRL910,700¹⁷ were invested in the intervention.

Figure 51 | Rua Coronel José Monteiro before and after the intervention



Photos: Google Street View (before) e Claudio Vieira/PMSIC (after).
¹⁷\$173.78 thousand (December 2022).



CASE STUDY 7

RUA VOLUNTÁRIOS DA PÁTRIA: ACCESSIBILITY AND REVITALIZATION OF THE URBAN LANDSCAPE IN CURITIBA

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SUMMARY TABLE 7 | INTERVENTION AT RUA VOLUNTÁRIOS DA PÁTRIA

DIAGNOSIS (PRE-INTERVENTION)

Functional street classification: local — characterized by non-signalized intersections, intended only for local or restricted areas access.

Context: a street that connects two important areas of the city, with commercial establishments, a hotel, office buildings, and an important public school. The sidewalks, in Portuguese pavement, were narrow for the large flow of pedestrians and were deformed by constant maintenance.

DESIGN AND IMPLEMENTATION

Objectives: to qualify the public space; prioritize pedestrians; improve local accessibility, public lighting, and road drainage.

Financial resources: approximately BRL1.29 million¹⁸

Type of intervention: permanent intervention

Length: 330 m

Inauguration: February 2020

Measures implemented: widening of the sidewalks, with the addition of an accessible lane in concrete and revitalization of the Portuguese pavement, elevation of the pavement in cobblestone to reduce the speed of vehicles, underground wiring, urban furniture, planting of trees, and new LED streetlights for pedestrians.

Intervention time: 7 months

Key circumstances for the transformation of the street: the revitalization of the street was a demand of the local retailers. The city had the financial resources for the intervention, from the collection of fines, license fees, and trade fees, among others..

RESULTS (POST-INTERVENTION)

Quality of life: the public survey assessment of the post-intervention scenario was postponed due to the Covid-19 pandemic, but it is possible to mention the observed increase in the circulation and permanence of people in public spaces and the improvement of accessibility.

Source: WRI Brasil.

¹⁸\$250 thousand (December 2022).

7.1 Diagnosis

Rua Voluntários da Pátria, in downtown Curitiba, was selected in 2018 as one of the revitalization axes of the Rosto da Cidade Program (Figure 52), and to become the first complete street in Curitiba. It is a strategic connection between Rua XV de Novembro, the first pedestrian street downtown, and Praça Rui Barbosa, which features an important public transport terminal serving Curitiba and the metropolitan region (Lindau et al. 2010).

Rosto da Cidade is a city hall program that aims to reclassify and enhance downtown Curitiba, strengthening tourist, commerce, and leisure activities. In an established area of 2.6 km², six axes and complexes were prioritized, composed of 457 properties (IPPUC 2019). The program foresees the painting of buildings facades and revitalization interventions in traditional streets, with proposals that include the following aspects:

- sustainability, through the preservation of stone paving with original and historic designs;
- security, with the installation of pedestrian lighting;
- identity, through the preservation and enhancement of the urban landscape; and
- living spaces, with the creation of leisure and gathering areas for the public.

Figure 52 | Map of the Rosto da Cidade program



- Stage 1 - Municipal public properties
- Stage 2 - Largo da Ordem and Rua São Francisco
- Stage 3 - Praça Tiradentes and Praça Generoso Marques
- Stage 4 - Barão - Riachuelo Axis
- Stage 5 - Rua Trajano Reis
- Stage 6 - Rua Voluntários da Pátria/Praça Osório/Praça Rui Barbosa
- Delimitation Rosto da Cidade Program

Source: IPPUC, 2018.

Rua Voluntários da Pátria is 650 m long, of which a stretch of 330 m was selected for redesign—from Praça Rui Barbosa to Praça Osório, where Rua XV de Novembro begins (Dudeque 2010). The street is characterized by the constructions in the building alignment, with several commercial establishments, a hotel, office buildings, and an important state public school. The sidewalks on Rua Voluntários da Pátria were too narrow for the intense flow of pedestrians, with the presence of several poles, which made circulation difficult. The Portuguese pavement, with historical designs, was already deformed by constant maintenance. The street had only one car lane, vehicle parking on one side, areas for loading and unloading, and access to two underground parking lots (IPPUC 1992) (Figure 53).

7.2 Project

Local retailers have been demanding the revitalization of Rua Voluntários da Pátria since 2012. To speed up the process, in 2016 they contracted a topographical survey that made it possible to start the project in 2018, developed by the Institute of Research and Urban Planning of Curitiba (IPPUC), and presented and discussed with retailers.

Figure 53 | Rua Voluntários da Pátria before revitalization



Source: IPPUC, 2016.

Figure 54 | **Simulation of Rua Voluntários da Pátria after the revitalization**



Source: IPPUC, 2017.

The main objectives of the project (Figure 54) were to develop the public space and prioritize pedestrians. The parking lane was removed to allow for the widening of the sidewalks. The change included the implementation of an accessible lane in concrete and preserved the Portuguese pavement and its historic designs. A new LED street lighting system was installed to provide more safety for pedestrians.

The car lane was raised in cobblestone, to 5 centimeters below the level of the sidewalks. At the intersection of Rua Voluntários da Pátria and Rua Emiliano Pernetá, an elevated crossing was implemented.

To provide leisure areas, public spaces were created with benches exclusively designed for the street, garbage bins, and the planting of trees of the crape myrtle species (*Lagerstroemia indica*) that provide shade and flower in the summer months, with protection to allow for drainage and guarantee the safety of tree roots.

7.3 Implementation

The execution of the intervention on Rua Voluntários da Pátria lasted seven months (from July 2019 to February 2020) and involved an approximate investment of BRL1.29 million¹⁹. This resource came from the Sidewalk Recovery Fund (Funrecal), under Municipal Law No. 11,596/2005, whose revenues come from the collection of fines, license fees, and trade fees, among others.

The initial action was aimed at implementing a new drainage system (Figure 55), with a robust stormwater gallery, due to episodes of flooding in the region. Subsequently, all paving was removed to mark the new location of the curb. The process continued with the placement of the cobblestone, construction of the accessible lane in cast-in-place concrete, installation of lamp posts aimed at pedestrians, planting of trees, placement of tree protectors, and the laying of Portuguese pavement on the sidewalks, in black and white, restoring the original design (Figure 56).

¹⁹\$250 thousand (December 2022).

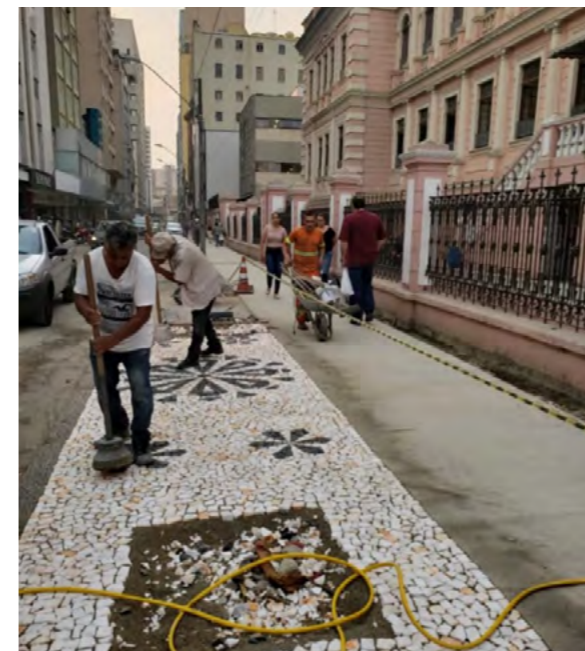
Figure 55 | **Start of the intervention on Rua Voluntários da Pátria**



Source: IPPUC, 2019.

As there was already an underground electricity infrastructure in the area, it was possible to remove the telephone poles and aerial cables, contributing to the reduction of visual pollution.

Figure 56 | **Laying of the Portuguese pavement in the intervention of Rua Voluntários da Pátria**



Crédito: IPPUC, 2019.

On the corner of Rua Voluntários da Pátria and Rua Emiliano Pernetá, there is one of the most historic educational institutions in the state, Instituto de Educação do Paraná Erasmo Pilotto, inaugurated in 1876. Due to its relevance, it

received full painting with funds from the Rosta da Cidade Program, enhancing the landscape of the urban environment.

7.4 Short-term results

At the time of writing this publication, it had not yet been possible to carry out an on-site survey to assess people's perceptions of the modifications on the street as a result of the Covid-19 pandemic. However, among the observed impacts, the increase in the circulation and permanence of people in the public space and the improvement of accessibility conditions is notable. Wheelchair users were observed circulating on the sidewalks, which now have adequate accessible pavement and conditions.

The transformation of Rua Voluntários da Pátria shows that Curitiba continues to value its heritage and qualify urban structures to promote greater inclusion and belonging among the population. Actions like this are also a socio-economic development strategy for the city, as they favor the downtown dynamics and its commercial character, in addition to making it possible for people to enjoy the urban space.

Figure 57 | **Rua Voluntários da Pátria after revitalization, at night**

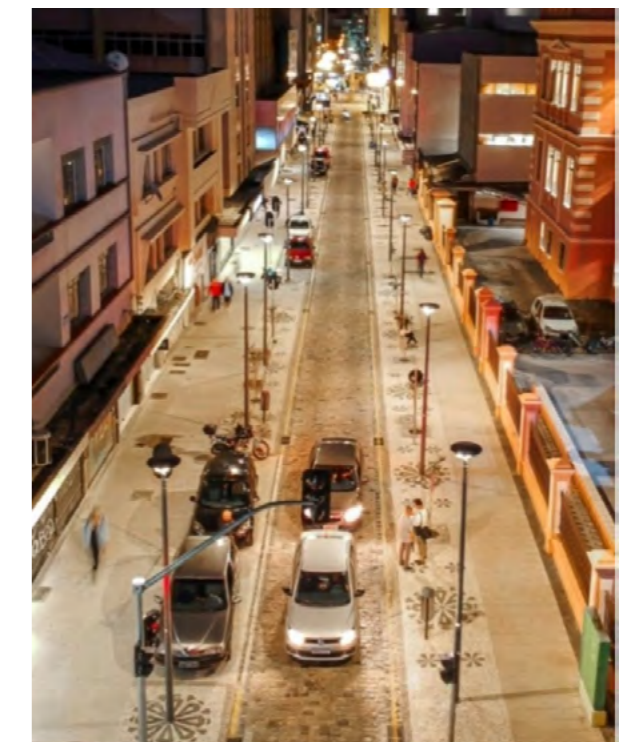


Photo: Daniel Castellano, 2020.

Figure 58 | Before and after the intervention on Rua Voluntários da Pátria



Photos: WRI Brasil.





CASE STUDY 8

AVENIDA MARQUÊS DO PARANÁ: ROAD TRANSFORMATION AND RESILIENCE IN NITERÓI

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SUMMARY TABLE 8 | INTERVENTION AT AVENIDA MARQUÊS DO PARANÁ

DIAGNOSIS (PRE-INTERVENTION)

Functional street classification: arterial — characterized by intersections generally controlled by traffic lights, with accessibility to neighboring lots and secondary and local roads, allowing traffic between the city's regions.

Context: one of the most important axes for structuring urban mobility in the city, with significant potential for the circulation of bicyclists and pedestrians commuting between densely populated, predominantly residential neighborhoods.

DESIGN AND IMPLEMENTATION

Objectives: to promote greater quality for the street and make it safer, livelier, and more humane; encourage active and collective modes; improve road safety; create and upgrade public leisure areas; and improve public lighting and urban drainage.

Financial resources: approximately BRL12 million²⁰

Type of intervention: permanent intervention

Length: 600 m

Inauguration: June 2020

Measures implemented: improvement of sidewalks, including widening and the installation of furniture, landscaping, and urban lighting; implementation of a bidirectional bike lane and a bus lane; implementation of complementary solutions for drainage, with draining gardens, permeable floors and rainwater collection reservoir for automated irrigation of the new landscape; implementation of LED street lights for pedestrians and bicyclists; and implementation of horizontal and vertical road signs.

Intervention time: 10 months

Key circumstances for the transformation of the street: resources obtained through an urban planning instrument based on the application of Municipal Law nº 3061/2013.

RESULTS (POST-INTERVENTION)

Reallocation of the road space: 35 percent increase in the road space previously designed for private vehicles to public transport, an addition of 20 percent to the areas dedicated to pedestrian circulation and permanence, and a 67.9 percent increase in tree planting along the road. Expansion of almost 300 percent of the permeability rate due to the replacement of concrete paved areas by garden areas, expanded from 595 m² to 2,300 m².

Source: WRI Brasil.

²⁰\$2.29 million (December 2022).

8.1 Diagnosis

Niterói is one of the 21 municipalities in the Metropolitan Region of Rio de Janeiro, it was the state capital, and is the most important in the Metropolitan East. Avenida Marquês do Paraná is one of the most important organizing axes of urban circulation in the city, being an almost mandatory passage in the connection of the regions of Pendotiba, Oceânica, East, and Praias da Baía with Downtown, the Rio-Niterói Bridge, and the Highway Niterói-Manilha (BR-101) (Figure 59).

The selected stretch of Avenida Marquês do Paraná, between Avenidas Roberto Silveira and Avenida Ernani do Amaral Peixoto, registers the largest load of private and collective vehicles in the city, especially in the direction Downtown/Bridge/Manilha, which reinforces its importance in the metropolitan connection. It is also an important circulation axis for bicyclists and pedestrians who commute between densely populated, predominantly residential neighborhoods —Icaraí and Santa Rosa—and downtown. This stretch also features some important destinations, including two hospitals, a supermarket, and a social and sports club. The street is characterized by mixed-use buildings with active frontage on the ground (Figure 60).

Avenida Marquês do Paraná gained importance and traffic volume after the inauguration of the Rio-Niterói Bridge in 1975. Since then, there has been an increase in traffic volume because of the expansion of the city based on a modernist model of urban planning. This model, combined with the traditional approach to transport engineering, resulted in the predominance of private vehicles and the decline in the quality of public spaces intended for pedestrians, bicyclists, and public transport passengers.

Still in the 1970s, Avenida Marquês do Paraná and its continuation, Avenida Jansen de Melo, were widened, a stretch that goes from the descent loop of the Rio-Niterói Bridge to Avenida Ernani Amaral Peixoto, the main road axis in the area. Over the following decades, measures were implemented to change the direction of traffic and divert traffic, to improve circulation between the area and other regions.

Figure 59 | Location of Avenida Marquês do Paraná and the project area



Source: Prefeitura de Niterói.

Figure 60 | Project area of Avenida Marquês do Paraná with identification of important destinations



Source: SMU/ Niterói City Government.

In 2013, the Ngela Fernandes Tunnel was inaugurated, which, in practice, is the burial of a stretch of Avenida Marquês do Paraná. The project, part of the Lerner Plan (2011), had the objective of improving the flow of traffic on the axis but ended up causing problems in the road layout, especially due to the narrowing at the corner of Rua Doutor Celestino, the main exit axis from downtown towards the neighborhoods which caused a significant retention point in the afternoon rush.

Avenida Marquês do Paraná was chosen to receive the complete street pilot project in Niterói because it represents a potential for positive and significant change in the quality of the municipal public space. The set of solutions adopted in the project was guided by good national and international practices, in line with the concept of complete streets (WRI Brasil 2017b).

8.2 Project

The main objective of the intervention was to establish an urban design that would promote greater quality for the street, with attributes to make it safer, livelier, and more humane. The actions were guided by the democratic ordering of public space functions and the redistribution of circulation spaces, prioritizing areas intended for pedestrians, bicyclists, and public transport users, using as a reference the strategies that make up the concept of complete streets (Pedler and Paulley 2000; Cervero 1998).

Targets were set to achieve these objectives, and they showed the technical, political, and financial challenges that the city faced to succeed:

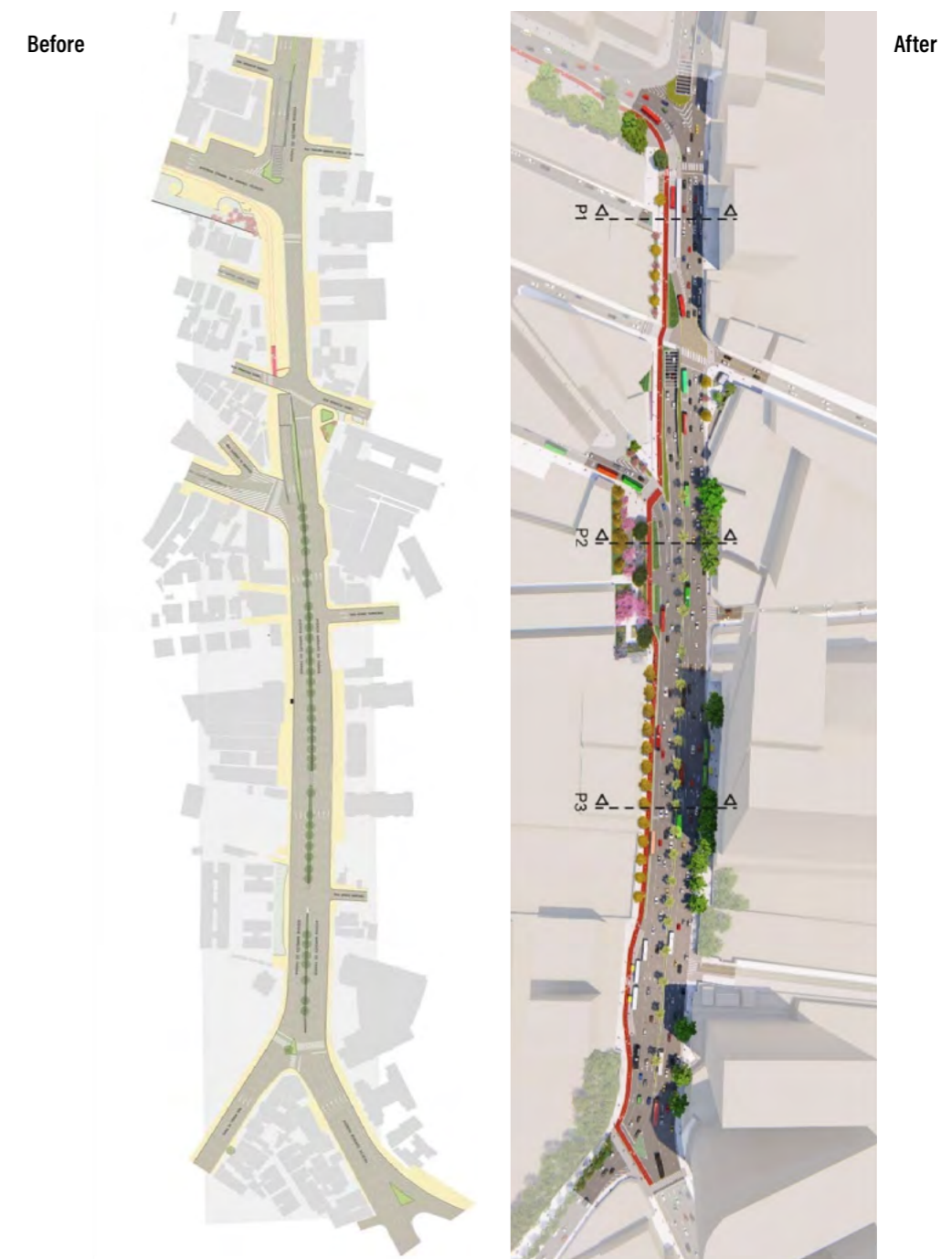
- Qualify sidewalks for pedestrian circulation and offer, whenever possible, high-quality public spaces for outdoor permanence, by widening and renovating sidewalks; applying universal accessibility standards; and installing furniture, afforestation, and urban lighting.
- Encourage active mobility, especially by bicycle, with the implementation of a bidirectional, fully segregated bike lane, connecting the existing bike lanes on Avenida Roberto Silveira and Avenida Ernani do Amaral Peixoto to Estação das Barcas, in Araribóia Square, where the municipal bike parking is located.

- Improve the efficiency of public transport with the creation of a bus lane in both directions of the road, by moving the median lane and expropriating one side of the road. The bus stop in front of Antônio Pedro Hospital was also relocated to a location that would allow for the separation of public transport from other vehicles and the implementation of a bus station along the lines of a local corridor.
- Improve safety conditions and traffic flow for public and private transport. For this, the street was widened towards Downtown/Bridge/Manilha at the level of Antônio Pedro Hospital, and the axis of the road was shifted near the tunnel. Another widening was carried out on the corner of Rua Doutor Celestino, the main exit axis towards the neighborhoods, a change that required the expropriation of more than 50 properties, including the total demolition of three residential buildings.
- Reduce flooding through the implementation of complementary solutions to the traditional drainage system. The changes resulted in a hybrid system consisting of draining gardens, permeable floors, and a rainwater collection reservoir for automated irrigation of the newly implemented landscape.
- Improve degraded public spaces and create areas for socializing through landscaping, including the installation of street furniture; LED streetlights for pedestrians and bicyclists; and the planting of native species resistant to the urban environment, with seasonal flowering in different colors.
- Ensure road safety for pedestrians, bicyclists, public transport users, and drivers through the implementation of horizontal and vertical road signs for regulation, warning, and direction, per current regulations and following a visual identity.

The project (diagnosis, preliminary project, basic project, and executive project) was prepared by the Municipal Department of Urbanism and Mobility of Niterói (SMU) in 2018, with a working group including professionals from different sectors: SMU; NitTrans; Municipal Company of Housing, Urbanization and Sanitation (EMUSA);

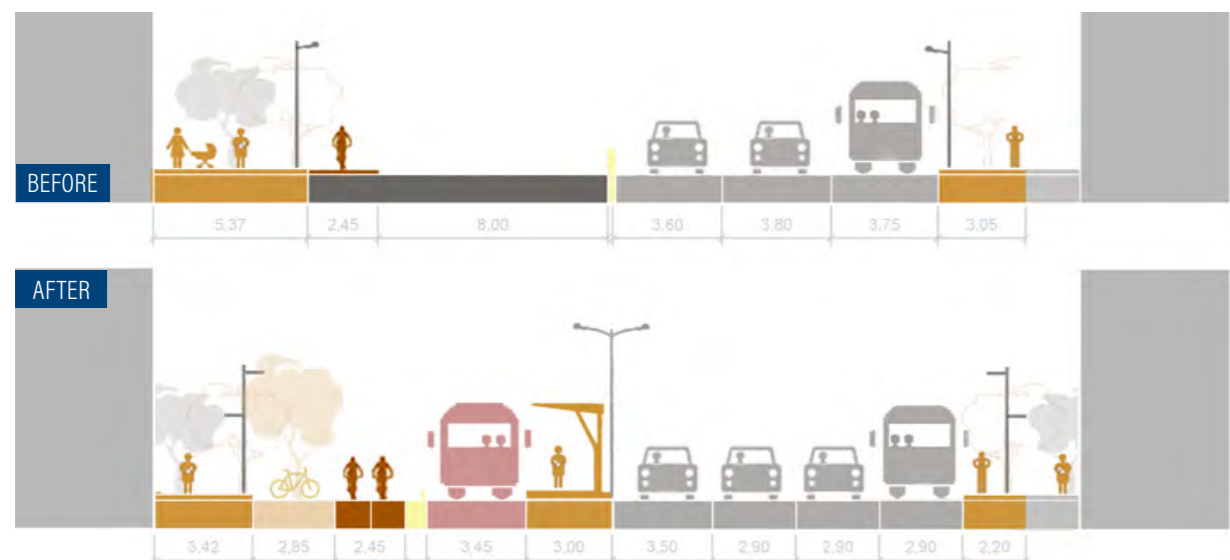
Department of Conservation; Department of Infrastructure; Department of Planning; Niterói Bicycle Coordination; Executive Project Office; Construction Consortium; Mayor's Office; Strategic Management Center; Department of Water and Sanitation; Enel Concessionaire; CEG Concessionaire; Telephone Concessionaires; Municipal Attorney General; and Treasury Department.

Figure 61 | Floor plan of the project stretch identifying the condition of Avenida Marquês do Paraná before and after the intervention



Source: SMU/ Niterói City Government.

Figure 62 | Road Profile Section 1



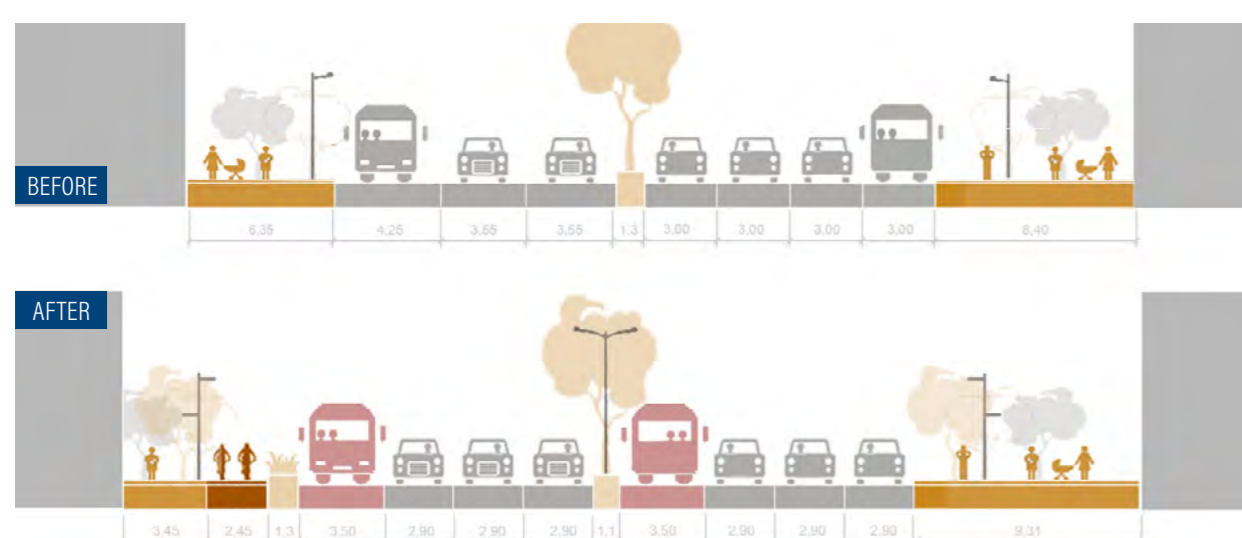
Source: SMU/ Niterói City Government.

Figure 63 | Road Profile Section 2



Source: SMU/ Niterói City Government.

Figure 64 | Road Profile Section 3



Source: SMU/ Niterói City Government.

8.3 Implementation

The bidding process, held in July 2019, was based on the executive project. The execution began in August 2019 and was completed and delivered to the public in June 2020, amid social isolation due to the Covid-19 pandemic. The creation of the working group, under the coordination of SMU, made it possible to offer quick responses to all the challenges that came along the way.

The actions were planned to generate the least possible impact on the urban dynamics since it is a street with a high degree of sensitivity to interference, mainly concerning the flow of vehicles at peak times and the circulation of pedestrians and bicyclists. Once the road interventions were completed, the subsequent stages—paving, landscaping, vertical and horizontal signaling, lighting, in addition to the implementation of the new bus station over the Ngela Fernandes Tunnel—were carried out gradually to reduce impacts on the street's dynamics.

The intervention for Marquês do Paraná was the first in Niterói that was made possible with resources obtained through the urban instrument of the Onerous Grant of the Right to Build, with the application of Municipal Law nº 3061/2013.

The main challenges during the implementation phase where the mitigation of road impacts, the compatibility between the new and old underground urban infrastructure, and the demolition of neighboring buildings due to the flow of pedestrians stand out.

It was necessary to carry out the total or partial expropriation of some existing properties on one of the sides of the avenue to widen the street, make the new road geometry viable, and accommodate the redistribution of public spaces. All parties easily reached an agreement and no lawsuits were necessary. The real estate appraisals carried out by the city hall were made in accordance with market values, quickly ratifying the agreements between the parties without affecting the schedule.

8.4 Short-term results

Possibly the greatest positive impact of the project was the inversion of priorities in the distribution of road space: a street previously dedicated primarily to cars became a favored area for pedestrians, bicyclists, and public transport. This change represents a substantial gain in terms of environmental quality and humanization of the road (Martins et al. 2004; Banister 2008).

This stretch of Marquês do Paraná originally allocated 14,300 m² to the circulation of private vehicles; after the intervention was completed, this space was reduced by more than a third, to 9,210 m². It has relocated more than 35 percent of the area to dedicated public transport lanes and pedestrians and bicyclist circulation. Thanks to the necessary expropriations for the project and the use of the previously unused area above the Ngela Fernandes Tunnel, there was also an increase in the area for pedestrian circulation and permanence of more than 20 percent. It is important to emphasize, however, that it is not just a question of allocating new spaces to pedestrians, bicyclists, and public transport; more than that, the process involved the development of these spaces to allow them to be used in a safe, comfortable, and accessible way (WRI Brasil 2018).

The first positive impact came from the improvement of road safety conditions through the reduction of conflict points between vehicles and pedestrians. This was achieved through the implementation of safe crossings, signaling, and lighting posts dedicated to pedestrians and bicyclists; essential aspects so that the street could be better appropriated by these users and become more dynamic at night as well as during the day.

Comfort was increased by the implementation of landscape which included the planting of 98 medium-sized trees along the road—an increase of 67.9 percent—to shade the sidewalk and create positive impacts on the microclimate of the area in the medium term. Another significant change was the almost 300 percent increase in the road permeability rate. Concrete paved areas were replaced by garden areas, which increased from 595 m² to 2,300 m². An underground reservoir for capturing rainwater was also installed, with

a capacity of 60 cubic meters (m³), contributing to the reduction of flooding in the area and generating positive impacts in terms of safety, environmental health, and urban landscape.

Tables 5 and 6 show the data collected by SMU regarding the distribution of road space between the different means of transport, the areas of permeable soil, and landscaping. The “after” scenario has approximately 1,000 m² more public space.

Table 5 | **Better distribution of the road space on Avenida Marquês do Paraná after the intervention**

NOVA MARQUÊS DO PARANÁ: SPACE REDISTRIBUTION				
Road Space	Before (m ²)	After (m ²)	%	Criterion
Pedestrian space	4.760	5.830	22,48	Sum of walkable spaces (sidewalks and squares)
Segregated bicycle space	0	1.540	-	Area of the new bike lane
Dedicated bus space	0	3.450	-	Sum of the areas of the new dedicated lanes
Space for other vehicles	14.300	9.210	-35,59	Sum of lane areas, except dedicated to buses

Source: SMU/ Niterói City Government.



Table 6 | **More vegetation and permeability on Avenida Marquês do Paraná and surroundings after the intervention**

AFFORESTATION			
Trees			
	Before (unit)		After (unit)
Removed	45	New*	98
Kept	33	Kept	33
Total:	78	Total:	131

Result: increase of 67.9%

Shrub and undergrowth vegetation	
Before (m ²)	After (m ²)
595	2023*

Result: increase of 240%

PERMEABILITY			
General			
	Before (m ²)		After (m ²)
Total area	25.180	Total area	25.180
Permeable area	595	Permeable area	2.300
Permeability rate	2,36%	Permeability rate	9,13%

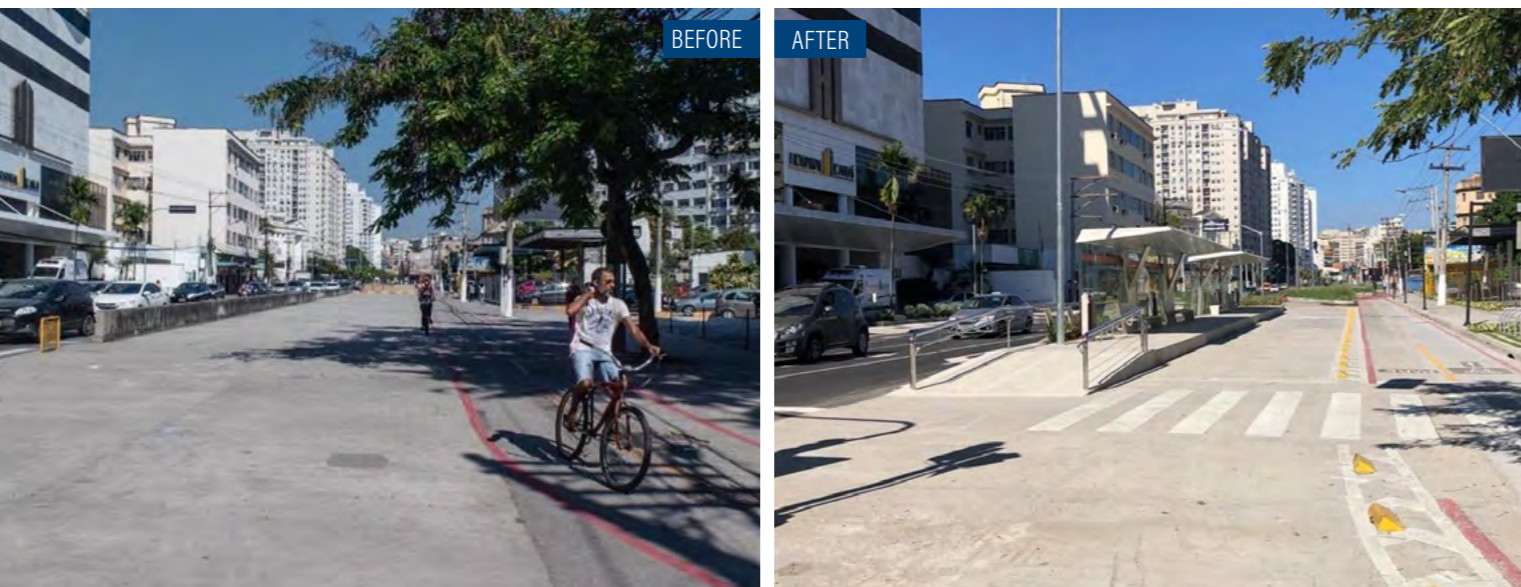
Result: increase of 287%

Praça R. Dr. Celestino			
	Before (m ²)		After (m ²)
Total area	1.495	Total area	1.495
Permeable area	0	Permeable area	608
Permeability rate	0,00%	Permeability rate	40,66%

*210m² of gardens, considering the installation of one tree every 5m = 42.

Source: SMU/ Niterói City Government.

Figure 65 | Before and after the urban qualification on the Angela Fernandes Tunnel



Source: SMU/ Niterói City Government.

Figure 66 | Before and after the urban qualification on the corner of Rua Doutor Celestino and Avenida Marquês do Paraná



Source: SMU/ Niterói City Government

Figure 67 | Before and after the urban qualification: competition for space in a degraded and hostile environment has been replaced by more comfort and road safety for people



Source: SMU/ Niterói City Government.

Figure 68 | Before and after the urban qualification: based on a new alignment of the road, it was possible to implement a new bidirectional and segregated bike lane, and to expand and upgrade the sidewalks



Source: SMU/ Niterói city government.

It is worth mentioning that the intervention on Avenida Marquês do Paraná was inaugurated while this report was produced, that the recent easing of the isolation imposed by the Covid-19 pandemic has allowed for the evaluation of some of the positive impacts presented here. The project numbers analyzed in this

publication already show significant gains in terms of humanizing and democratizing the space. As the public returns to the streets of Niterói after the restrictions imposed by the virus, it will be possible to see the broader benefits of this new complete street.



SECTION IV

CONCLUSION

Complete street projects start from the recognition of the local context, with a holistic view of the street as a public space: they respond to challenges that go beyond mobility. At first, the process of implementing the concept can be challenging, but once implemented, the benefits can be seen and proven—pioneering initiatives pave the way for new complete streets and, with it, a gradual change in the city. This process is part of the paradigm shift proposed by the concept of complete streets.

How to implement complete streets in Brazil?

The case studies presented in this publication have different scales, but they all seek a common goal: the transformation of streets to meet the mobility needs, comfort and safety of all users, and to encourage coexistence in public spaces. Some lessons can be learned from the processes of the first streets inaugurated by the Complete Streets Program in Brazil, which can inspire and guide other cities that may want to apply this concept.

In most of the cases presented, the political leadership of mayors and municipal secretaries was essential for the successful coordination of different actors, as well as ensuring an integrated process during the elaboration of the project. The cases of São Paulo and Juiz de Fora are examples of this premise, integrating external and internal actors in municipal management. The interdisciplinary character of complete streets requires these projects to be prioritized by government leaders for successful implementation so that it is clear that the relevant sectors within the city hall have a common objective and are working together. The development of projects in Salvador, Porto Alegre, and Niterói started with the creation of working groups made up of different departments, which ensured the implementation of integrated projects that benefitted more people.

A complete street project begins with the recognition of the local context. It is not possible to design a complete street from afar, as this concept does not work with a standard street model. It is necessary to know how the street works on a daily basis, who are its users, and what is its character in order to successfully design and implement a complete street. A well-made diagnosis is crucial for this understanding. To do so, it is necessary to collect quantitative data (such as traffic flows, speeds, traffic accidents, and land use, as Porto Alegre did) and qualitative data (such as people's perception of the quality of the road and their impression about safety, as was done in Salvador, Porto Alegre, São Paulo, and Juiz de Fora).

Community consultation and participation throughout the different phases of the project are also essential. As highlighted by Salvador's experience, social participation can lead to

public acceptance of more daring and innovative proposals. The engagement of those who will be directly impacted by the project is encouraged at different stages of the process. The first step is to bring them in so they can express local demands, which helps in the diagnosis. The concept of complete streets and the project proposal must be presented to the public so that they can understand the short and long-term changes and benefits. The cases of Campinas and Porto Alegre show the importance of also involving the public in the project execution phase. In both cities, students participated in painting the street and designing street furniture. This participation generates a sense of belonging and contributes to the support of the spaces when the work is completed. Establishing partnerships with the community to assist in street care is also a possible and beneficial measure. In São José dos Campos, retailers are responsible for managing part of the street furniture, recognizing the benefit for their customers.

It is necessary to **be attentive to the opportunities** for the implementation of complete streets. As it is characterized as an unusual process within city halls, the total readjustment of a road is generally not foreseen in the budget and internal procedures. To obtain resources for their complete streets, Salvador, Curitiba, and Niterói took advantage of current urban infrastructure investment programs, absorbing the principles of complete streets in the rehabilitation of roads. In addition, everyday road maintenance—such as asphalt replacement, drainage, and painting of horizontal signs—can also be used as opportunities to rethink the design of the entire street, allowing adjustments to be made to benefit all users.

The **tactical urbanism** strategy can be an extremely important tool for some cities to implement their complete street. The application of a new street model can raise doubts and insecurities both for municipal management and for the affected community. Thus, the alternatives made possible by tactical urbanism—intermediary, with quick implementation and low cost compared to more complex intervention—become important tools for the implementation of pilot projects and convincing politicians and the public. In most cases, these are interventions that use low-durability materials—and therefore must envision regular maintenance or replacement by permanent materials. However, it is precisely

this flexible nature of the materials that allows the authorities to test more innovative designs, especially in critical points in terms of road safety or with an intense flow of pedestrians and bicyclists. Tests carried out through tactical urbanism also allow improvements to be identified prior to the permanent implementation phase of the structure. Widening the sidewalk with paint, bollards, and raised pavement markers was a solution used on the streets of São Paulo and Porto Alegre—and allowed the impacts to be recognized by the authorities and the benefits to be quickly felt by the public.

One of the main objectives of the concept of complete streets is to promote a paradigm shift in traditional road planning—that is, to invert the importance we give to private cars and, comparatively, to active and public transport. Although a complete street project seeks to benefit all road users, **most attention must be given to pedestrians, bicyclists, and public transport users**, as they are the ones who suffer from the prioritization of cars on the streets. Two of the decisive factors to serve these users are road safety and universal accessibility. Regarding road safety, case studies prove the efficiency of different actions, such as traffic calming measures and the reduction of speed limits—the main risk factor for fatal accidents (Welle et al. 2018). Universal accessibility allows everybody, regardless of their abilities, to exercise their right to experience the city—which is evident in the case of Curitiba, where the readjustment of the sidewalks had a positive impact on the presence of wheelchair users on the street.

Complete street projects take a holistic view of the street as a public space: **they respond to challenges that go beyond mobility.** The case studies show concern with the creation of spaces for coexistence, as well as with environmental issues that require specific measures. The street must be inviting so that people stay in the space, not just pass through it. It should encourage interaction and allow the enjoyment of the public space. Most complete streets presented here have spaces for coexistence with appropriate street furniture. Some case studies, such as the one in Niterói, also show the potential of implementing solutions that favor thermal comfort and rainwater management, with the implementation of elements such as rain gardens, draining floors, and shading areas. Urban furniture and vegetation are elements that make the street more beautiful and pleasant.

The different scales of the case studies show that **every complete street intervention is important, regardless of its size.** Small and strategic interventions also have the potential to generate significant impacts, if they are located at critical points and have a clear objective. Intersections, for example, are more conflictive and potentially accident-prone points, which is why Porto Alegre defined the first intervention of its complete street in an intersection—and the impacts on road safety were clear. Campinas, in turn, chose the area in front of a school, and likewise, the results go beyond traffic planning. In addition to ensuring more safety for the children at pick-up and drop-off, the project involved the



school community and generated a significant change in the children's behavior; they now have an affectionate relationship with the street: they feel welcomed and want to experience the space and are more likely to care for the public good in the future. Other locations can also receive initial interventions for entire streets, such as around hospitals and stations, where changes have the potential to benefit many people. Often, a small intervention is the first step to engaging both municipal management and the community in a large-scale change.

Any first trial of the complete street concept—such as a pilot project—must measure results to justify investing in new, similar projects. Comparing the situation before and after the intervention is only possible when impact measurement is defined as an essential part of the project. All case studies presented seek to understand the effect of each intervention in different ways. The streets of Porto Alegre, São Paulo, and Salvador already obtained more reliable results on the impact of their interventions, since they measured the same indicators in a control street, and disregarded effects unrelated to the changes on the complete street to avoid mistakes. For this, the indicators must be related to the objective established for the project and need to be defined and measured before the beginning of the project, as part of the explanation of the diagnosis. Measuring the same data after the intervention makes it possible to understand whether the project supported the character of the street and what the public's perception was. Measurements on the complete street in São Paulo, for example, show that it is more in line with its character, but that the design can still be improved to ensure greater safety for pedestrians.

The case of São José dos Campos helps us to remember that **the period of road repair can bring inconvenience** to those who live, work, or travel in the area. It is important to consider the impacts of the time required to conclude the complete street, especially on streets with a strong commercial character. This is also another aspect that should be worked on with the community.

It is safe to say that the first projects with an innovative concept and process tend to be the most difficult to implement (McCann and Rynne 2010). They require **alignment efforts between different actors**, in addition to the time and work required for a new concept to be understood by the population. This is particularly true of complete street projects, which take a multimodal approach and, in many cases, involve taking excess space away from vehicles and relocating it to people. Such changes to the road space can generate intense discussions in affected communities and reluctance from politicians. However, after the projects are implemented, the benefits appear and can be seen—and pioneering initiatives pave the way for new complete streets and, with that, a gradual change in the city.

This process is part of the **paradigm shift** proposed by the concept of complete streets. Changes in cities take time because it is first necessary to change people's understanding of the best investment alternatives. Many projects, for example, spend more time planning than being implemented. Others never get off the ground, sometimes due to a lack of data to support their viability and benefits. Thus, all people working with cities, whether government leaders or technicians, must invest time and effort to build paradigm shifts.

How to expand complete streets in Brazil?

The case studies presented in this publication report the completion of the first complete streets implemented during the period in which the National Network for Low Carbon Mobility was in operation. However, for this kind of urban transformation to benefit even more people and cities, the network needs to grow—both on municipal and national scales. In Brazil, the National Urban Mobility Policy (PNMU), Federal Law No. 12,587/2012, is the main document that guides mobility planning in cities. Its guidelines seek to prioritize sustainable modes of transport and emphasize the need for a more humanized look at the transport system. **The concept of complete streets is in line with these guidelines and is a tool with a high potential for contributing to the implementation of the PNMU.**

Around the world, more cities systematize the multimodal approach of complete streets in urban planning by incorporating the concept into public policies. The creation of a new street classification—offering a balance between the functional classification, the adjacent uses, and the needs demanded by all modes of transport—was the strategy adopted by Boston to enable a gradual adaptation of its system road. The streets, previously classified as local, collectors, and arterials, received **new classifications, which say more about the importance and role they play in the neighborhood or the city than just their position in the street hierarchy.** The innovative classification system defined the streets as Downtown Commercial, Downtown Mixed-Use, Neighborhood Main Street, Neighborhood Connector, Neighborhood Residential, Industrial, Shared Streets, Parkways, and Boulevards (City of Boston 2013). The most important point of this new classification is the allocation of infrastructure requirements that benefit all road users. These requirements make designers analyze not only the space for vehicles, but also for pedestrians, bicyclists, and public transportation, which are met according to the requirements established for that type of street. With this new approach, at every opportunity, new complete streets appear in the city forming a network of streets that seek to meet the safety, comfort, and mobility demands of all users.

National guidelines such as guides, norms, and decrees facilitate the adoption of good design practices by municipalities, especially those that have little or no technical capacity to develop integrated projects such as complete streets. At the municipal level, the inclusion of complete streets in planning methods such as master plans, mobility plans, urban design manuals, or even the creation of exclusive policies, is a way to

systematically replicate pilot projects throughout the city. With the **institutionalization of complete streets through public policies and their methods of implementation**, every opportunity for physical change in the street (such as drainage works or new paving) can be used to rethink the street as a whole, to make it safer and more comfortable for all users. Complete streets transform routes and neighborhoods into more lively places, with more people walking and bicycling, and strengthen the community connection with the place they live. The more complete streets there are in a city, the more safe, accessible, and humane spaces are available to people.

Finally: **universities also play a key role in changing the car culture.** Students of architecture, transport engineering, and related areas are future thinkers and urban planners. The inclusion of the concept of complete streets in their education allows the continuous transformation of cities into healthier places.



APPENDIX: THE COMPLETE STREETS PROGRAM IN BRAZIL

The Complete Streets Program was created in 2017, in a joint effort by WRI Brasil and the National Front of Mayors (FNP), to spread the concept of complete streets in Brazilian cities. Promoting such dissemination in a continental-sized country—and thereby initiating a change in the way streets are planned—required a communication strategy that had to be precise and comprehensive, as well as a back-and-forth creation process between cities in different regions of Brazil.

Figure 69 | Logo developed for the Complete Streets Program



Source: WRI Brasil.

The National Network for Low Carbon Mobility

Given the growing list of challenges faced by cities, the movement to share experiences—to understand what works or not elsewhere—has become key to the development of projects and public policies. These peer networks allow city planners to exchange challenges and lessons learned, helping each other to overcome local problems and deliver better solutions. Acting as a group also allows these professionals to develop projects more quickly by encouraging each other and acting as a team focused on a shared vision of improving their cities.

WRI Brasil and the FNP launched in 2017 the National Network for Low Carbon Mobility (RNMBC) to disseminate the concept of complete streets throughout the country. Through the development and implementation of pilot projects for complete streets, the cities in the network had the opportunity to exchange experiences on national best practices in terms of urban projects, a dynamic that favored the improvement of quality of life and social inclusion.

A rede começou com 11 cidades e, em 2020, completou seu terceiro aniversário com 21 municípios integrantes. O sucesso de coalizões como a RNMBC depende principalmente de dois aspectos. Primeiro: é importante manter a rede engajada. A proposta de pequenas missões comuns, como o desenvolvimento de projetos-piloto ou a apresentação de boas práticas em seminários online, fortalece o comprometimento entre as cidades do grupo. A comunicação de conquistas ao público recompensa o bom trabalho e cria ciclos de retornos positivos.

The network started with 11 cities and, in 2020, completed its third anniversary with 21. The success of coalitions like the RNMBC depends mainly on two aspects. First, it is important

to keep the network engaged. The proposal of small missions, such as the development of pilot projects or the presentation of good practices in online seminars, strengthens the commitment among the cities of the group. Communicating achievements to the public rewards good work and creates positive feedback loops. Second, it is necessary to develop a good governance structure. The relationship between the participating cities and the organization that coordinates them must be fluid. Setting up frequent online follow-up meetings, creating an easily accessible platform to share experiences, and organizing annual face-to-face meetings to allow for more informal connections all help people feel connected and motivated. Building trust among network members is essential to enable a continuous flow of information between different actors and achieve tangible results.

A brief history of the National Network for Low Carbon Mobility

The work of publicizing the network began with the opening of a call for cities to register. Applications for admission to the RNMBC took place during the Regional Preparatory Meetings for the Assembly of Municipalities with Sustainable Development (EMDS), an event promoted biannually by the FNP. In 12 of these meetings, WRI Brasil presented the network's objectives and selection criteria. To apply, cities needed to have more than 250,000 inhabitants (or be part of a metropolitan region with that population), have a technical team to develop complete street projects, and be able to implement a pilot project. Based on these criteria, 11 out of 36 cities were selected.

The selected cities were announced in April 2017, during the IV EMDS in Brasília. The formalization of the network happened in a full-size complete street section built inside the Mané Garrincha Stadium, demonstrating the urban elements that can compose a project (Figure 70). Thanks to this action, the various participants of the event—mainly decision-makers in the cities—could experience the concept.

Figure 70 | Complete street prototype in 1:1 scale on IV EMDS



Source: WRI Brasil.

Niterói, Porto Alegre, João Pessoa, Campinas, Joinville, Salvador, São Paulo, Juiz de Fora, Recife, Fortaleza, and Brasília were the first participants of the network (six of them with case studies presented in this publication). During the event, the first meeting between representatives of the cities, WRI Brasil, and FNP also took place. The launch of the RNMBC and the activities planned for 2017 were publicized nationally by the press.

Throughout 2017, WRI Brasil and FNP promoted training workshops with municipal managers and technicians in the 11 cities of the RNMBC. Authorities from surrounding cities were also invited to send technicians for training. In total, 336 professionals from 65 municipalities were trained. The training covered the presentation of the concept of complete streets, project parameters, and the benefits of implemented cases. Participants also had the opportunity to put the concept into practice,

preparing project proposals in multidisciplinary groups with members from different departments and city halls. As a product of the workshop, the city had a set of solutions and road profiles for the transformation of one of its streets into a complete street.

After training, the 11 cities began to develop the pilot project for their complete streets. At the same time, they continued to exchange experiences and hold discussions on the challenges and solutions for adopting the concept in the Brazilian context. Additionally, the concept also continued to be disseminated among other key actors for the execution of complete streets. During the Sobratema Summit, in 2017, an event promoted by the Brazilian Association of Technology for Construction and Mining, a full-scale prototype of a complete street was used to attract different actors related to the construction area (Figure 71).

Figure 71 | Complete street prototype during the Sobratema Summit, 2017



Source: Daniel Hunter/WRI Brasil, 2017.

Figure 72 | **Fifth meeting of the RNMBC**



Source: WRI Brasil.

RNMBC Meetings

The face-to-face meetings of the RNMBC were essential for strengthening the network and for the progress of the projects (Figure 72). In these meetings, the cities presented their project updates and discussed the challenges with the group. Also on these occasions, participants received training on various topics related to the development of complete street projects, through lectures and panels with national and international experts (Table A-1).

By the end of 2019, the RNMBC had 21 cities: Niterói, Porto Alegre, João Pessoa, Campinas, Salvador, São Paulo, Juiz de Fora, Fortaleza, Rio de Janeiro, Curitiba, Porto Velho, Rio Branco, São José dos Campos, Santo André, São Caetano do Sul, Goiânia, Palmas, Mesquita, Brasília, Guarulhos, and Recife (Figure 73).

Figure 73 | **RNMBC Participating Cities in 2020**



Source: WRI Brasil.

Table A-1 | **Summary of the RNMBC meeting**

	FIRST MEETING	SECOND MEETING	THIRD MEETING	FOURTH MEETING	FIFTH MEETING
DATE	November 2017	May 2018	November 2018	April 2019	August 2019
EVENT WHERE THE MEETING WAS HELD	72nd FNP General Meeting	73rd FNP General Meeting	74th FNP General Meeting	-	Urban Transformations event, organized by WRI Brasil
LOCAL	Recife, PE	Niterói, RJ	São Caetano do Sul, SP	Online	São Paulo, SP
ACTIVITIES DEVELOPED WITH THE CITIES	Presentation (lecture) and discussion of the pilot projects prepared throughout the year	Update (lecture) on the status of the project since the last meeting	Presentation (posters) and discussion of pilot projects developed throughout the year	Presentation of recently implemented projects in Porto Alegre and Juiz de Fora	Debate dynamics on the beginning of the project and its evolution, as well as the evolution of the concept of complete streets within the city
TRAINING AND DISCUSSIONS	Lecture: the concept of complete streets; successes and challenges of American cities – National Complete Streets Coalition Discussion table: ways of financing complete streets – Sérgio Avelleda, Municipal Secretary of Transport and Mobility of São Paulo; Martha Martorelli, Director of Projects at the Ministry of Cities; Leonardo Letelier, CEO of Sitawi Finance for Good; Manoela Obino, Founding Partner of Urbe.me.	Panel: The importance of a collaborative process for the construction of Complete Streets – Cristina Mendonça, C40; Aureliano Rodrigues Jr., Comptroller General of Brazil; Zuleica Goulart, Rede Nossa São Paulo; Márcia Peres, Comptroller General of the Municipality of Rio de Janeiro; Carlos Siegle, Deputy Secretary for Institutional Relations of Porto Alegre. Panel: Impact measurement methodology – Victor Andrade, professor at UFRJ and researcher at LABMOB; Marcela Kanitz, LABMOB researcher.	Panel: The role of laws in the systematic implementation of complete streets – Rozangela Bertolo, Court of Auditors of the State of Rio Grande do Sul (retired); Andrea Vizzoto, Porto Alegre City Attorney (retired).. Panel: How to implement complete streets using the tactical urbanism strategy – Erik Cisneros, Mexico City consultant.	At this meeting, the cities of the network were able to learn the step-by-step process used in the implementation of the projects in Porto Alegre and Juiz de Fora, which used tactical urbanism.	Panel: Evaluation of the impact of urban interventions within the scope of complete streets – Sérgio Lazzarini, InsuperMetrics; Victor Andrade, UFRJ; Erik Cisneros, CDMX, Jaime Holguín, CAF Discussion on Public Policies for Complete Streets – Pólce Neto, councilor of São Paulo Revision of the Complete Streets Program strategy.
PARTICIPATING CITIES	Niterói, Porto Alegre, João Pessoa, Campinas, Joinville, Salvador, São Paulo, Juiz de Fora, Recife, Fortaleza, and Brasília	Niterói, Porto Alegre, João Pessoa, Campinas, Salvador, São Paulo, Juiz de Fora, Recife, Fortaleza, and Brasília	Niterói, Porto Alegre, João Pessoa, Campinas, Salvador, Recife, Fortaleza, Rio de Janeiro, Curitiba, Guarulhos, and Porto Velho	Niterói, Salvador, Fortaleza, Guarulhos, Campinas, Recife, Porto Velho, Palmas, Brasília, Rio de Janeiro, and Mesquita	Niterói, Porto Alegre, João Pessoa, Campinas, Salvador, São Paulo, Juiz de Fora, Recife, Fortaleza, Rio de Janeiro, Curitiba, Porto Velho, Rio Branco, São José dos Campos, Santo André, Goiânia, Palmas, and Mesquita

Source: WRI Brasil.

Dissemination of the complete street concept

Disseminating the concept of complete streets as a new vision, conceiving the streets as public spaces, is essential to obtain the support of the community and to the ideation of complete streets throughout the cities of the RNMB. It must be widely developed, going beyond the scope of public power. Thus, as of 2018, three work fronts were established for the inclusion of complete streets in the context of urban planning in Brazilian cities:

1. strengthening support to the cities in the network for the implementation of pilot projects;
2. disseminating the concept of complete streets through strong communication with the project's target audiences; and
3. fostering public participation in projects and consolidating partnerships with civil society organizations and universities.

For the first work front, the established objective was to assist the cities in the network until the completion of their pilot projects, offering support in the most diverse challenges of the implementation phase. The projects were discussed in virtual and face-to-face meetings, according to the specificities for the progress of the project in each city—from support in the development of local partnerships to incentives to increase the scale of the pilot for the entire city, through a guide for drafting a legal framework.

The communication plan was designed with the aim of engaging strategic actors to disseminate the concept of complete streets. The process was aligned with technical support activities offered in each city of the network and included the monitoring of the progress of each project. Thus, the elaboration of many of the pilot projects for complete streets began to be reported by the local press in the cities involved and new possibilities for partnerships at the local and national levels began to emerge.

In the second work front, a comprehensive communication strategy was developed to identify the main actors to be influenced and the correct approach to engage each one. The plan included holding a series of online seminars, presentations at technical and academic events, building full-size street sections in exhibitions, and national media coverage at pilot project launch events.

The series of online seminars, held throughout 2018, involved presentations by Brazilian organizations that study and advocate for the development of sustainable cities. The eight seminars contributed to expanding the reach of the complete streets concept, reaching 792 participants from 164 Brazilian cities.

The third work front focused on the necessary governance for implementing projects in a participatory manner, involving the public directly affected by interventions and civil society actors who could support the project in some way. Local partnerships had functions such as the development of urban furniture projects, surveys to measure the impact of projects, obtaining data for communication with traders and residents, involving children in recreational activities during interventions, and donation of materials and services.

Among the various social, private, and public organizations involved in the projects, the academy played a relevant role in consolidating complete streets as a new vision of road design and disseminating the concept and its technical guidelines with excellence.

Although this publication brings the report of eight pilot projects, the other cities of the network also made advances in other initiatives related to the concept of complete streets. Recife and Brasília made progress in inserting the concept into public policies. João Pessoa, Fortaleza, and Mesquita also carried out works on complete streets, and Guarulhos brought together very creative projects to the Complete Street Project Contest.

BOX 3 | NETWORK OF UNIVERSITY PROFESSORS FOR COMPLETE STREETS

When planning and implementing urban projects, engineers and urban planners tend to apply what they learned during their academic training: designing roads to maximize the flow of motor vehicles, disregarding human vulnerability in the road space, and the importance of the urban environment in the quality of life of people. Although not a rule, this is the line of education offered by most undergraduate courses related to urban planning, following the city development trends over the last few decades. As a consequence, the professionals responsible for the design of cities often only discover the need for sustainable urban development and the tools to apply it much later, during the practice of their craft.

In 2019, to engage academic professors in the exchange of knowledge and good teaching practices on the planning of complete streets in different Brazilian realities, WRI Brasil and FNP launched the Network of University Professors for Complete Streets. The network has two main objectives: to contribute to the training of urban planning professionals with a modern view of the functions of urban roads, to make the Brazilian cities of the future safer, healthier, and more democratic; and to bring academia and local governments closer together, so that they work for the qualification of complete street projects.

The academy has researchers and studies that can support decision-making by municipal administrations, while cities generate essential databases for the quality of these studies. The exchange of knowledge between these two sectors can make sustainable urban development a reality.

The Network of University Professors for Complete Streets began to grow organically after the launch. At the beginning of 2020, there were already more than 80 professors from around 60 higher education institutions across the country. One of the factors that triggered this growth was the holding, throughout 2019, of the series "Online Seminars on Complete Streets and Universities", presented by university professors who are members of the network.

Source: Authors.



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GLOSSARY

Public space: Public space is considered to be of common use and owned by all. Understanding the city as a place of encounters and relationships, the public space presents a decisive role in its environment.

Street space: part of the public space intended for mobility, including access to public and private lots and facilities, where different road users travel by different modes of transport.

Active frontage: corresponds to the occupation of the facade located in the alignment of public sidewalks for non-residential use with open access to the public and opening to the patio.

Frontage zone: a strip of the sidewalk destined to access the lots, where elements referring to this occupation are installed..

Throughway zone: sidewalk lane intended for pedestrian circulation; must be kept clear of obstructions.

Furnishing zone: a strip of the sidewalk intended for the installation of elements such as urban furniture, vegetation, poles, signage, and others.

Urban furniture: a set of elements that can occupy public space.

Level of service: a quantitative measure to evaluate the performance of road infrastructures, such as sidewalks, car lanes, and bike lanes, according to the volume of users.

Parklet: expansion of the sidewalk through the installation of a platform over the area previously destined for parking spaces, which may contain elements for the enjoyment of the space, such as furniture and vegetation.

Interlocked pavement: pavement formed by interlocking concrete blocks.

Control street: in impact measurement, a control street must have similar characteristics to the street that received the intervention. The same indicators collected on the street that received the intervention should also be collected on the control street for a comparative analysis that helps to rule out external effects.

Horizontal signaling: a set of traffic signs applied to the pavement itself to organize the flow.

Vertical signaling: a set of traffic signs installed vertically, such as signs installed on the lanes or roadsides.

Tactical urbanism: a planning approach that allows low-cost interventions to be implemented in a phased manner, testing and evaluating changes before implementing them permanently.

Arterial road: avenues with a higher flow of vehicles that connect different regions of the city.

Collector road: intended to collect and distribute traffic that needs to enter or exit the fast or arterial roads.

Local road: local access streets, normally not signalized.



ACKNOWLEDGMENTS

WRI Brasil thanks the many partners who were with us in different phases of the Complete Streets Program, without whom it would have been impossible to achieve so many positive results. In particular, we would like to thank the National Front of Mayors, which developed, in partnership with WRI Brasil, the entire Complete Streets Program, from 2017 to 2020. We thank Itaú for its support in preparing this publication.

WRI Brasil also thanks all the university professors and technicians from city administrations who offered their time and knowledge in writing the case studies presented.

Finally, we thank the reviewers of the publication for accepting the invitation and for sharing their knowledge to qualify it.

WRI reviewers: Anna Bray Sharpin, Diogo Lemos, Guillermo Petzhold, Lara Caccia, and Robin King.

External reviewers: Carolina Cominotti, Gabriela Tenório, Hannah Arcuschin Machado, and Silvia Toso.

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Cover: Alan Henrique Rodrigues da Silva; TOC, pg.4, 16: Victor Moriyama/WRI Brasil; Foreword: Rodrigo Capote/WRI Brasil; pg. 2, 11, 22, 46, 65, 109: Daniel Hunter/WRI Brasil; pg. 5: Joana Oliveira/ WRI Brasil; pg. 7, 18, 21, 115, 121: Mariana Gil/WRI Brasil; pg. 12, 104: Rafael Tavares-Octopus Filmes/WRI Brasil; pg. 26: Pedro Mascaro/ WRI Brasil; pg. 34: Rafael Martins/WRI Brasil; pg. 54: Daniel Kener Neto/WRI Brasil; pg. 66: Emdec/Prefeitura de Campinas; pg. 76: SMU/PSJC; pg. 84, 91: Daniel Castellano; pg. 92: Renato Barandier; pg. 107: Nereu Jr./WRI Brasil.

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doi.org/10.46830/wrirpt.19.00106en