



**Embarque 3**

Hacia Lima y Chorrillos



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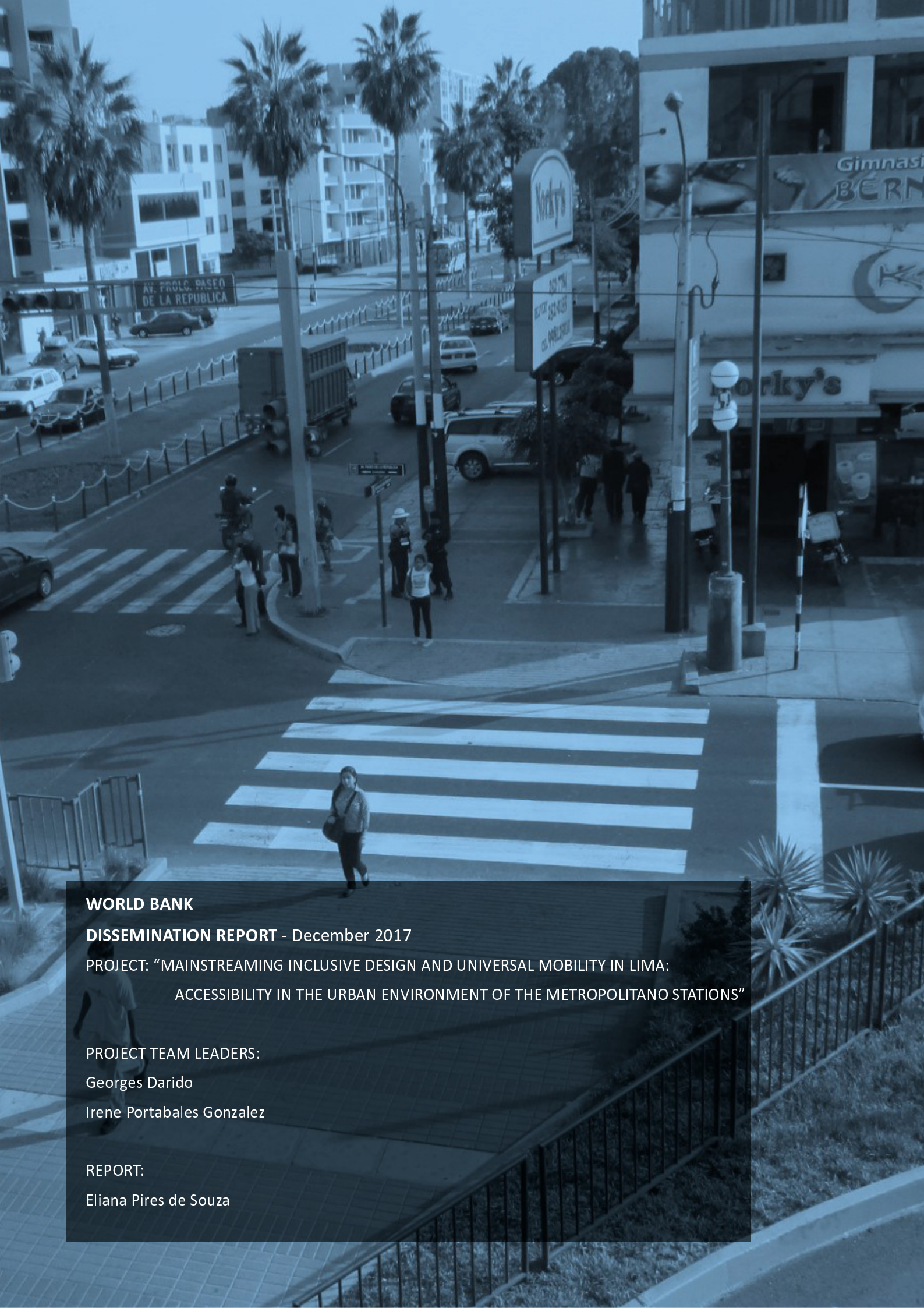
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**DISSEMINATION REPORT  
MAINSTREAMING INCLUSIVE DESIGN  
AND UNIVERSAL MOBILITY IN LIMA:  
ACCESSIBILITY IN THE URBAN ENVIRONMENT  
OF THE METROPOLITANO STATIONS**





**WORLD BANK**

**DISSEMINATION REPORT** - December 2017

PROJECT: "MAINSTREAMING INCLUSIVE DESIGN AND UNIVERSAL MOBILITY IN LIMA:  
ACCESSIBILITY IN THE URBAN ENVIRONMENT OF THE METROPOLITANO STATIONS"

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# PROLOGUE



# PROLOGUE

Accessibility is a matter of vital importance in modern and inclusive societies. People with disabilities are subjected to a daily struggle against countless obstacles and barriers at different levels, which limit their quality of life and their functionality. This has a direct impact on one in seven citizens, which is the world number of people with disabilities according to data from the United Nations Organization. It makes it difficult for them to access basic services, increasing the likelihood of experiencing adverse socioeconomic situations. Therefore, it is essential to make an effort to adapt our infrastructure, especially those that provide public transport services, so that no one is left behind.

The World Bank identified universal accessibility as one of its key pillars of work. The inclusion of disabled people and the increase in equal opportunities are two fundamental aspects of our work with the aim of building sustainable and inclusive communities, aligned with our objectives of ending extreme poverty and promoting shared prosperity. It is impossible to achieve these objectives if countries and societies do not straightly confront the causes of exclusion.

However, there is growing hope for this situation: the acknowledgment of the rights of persons with disabilities in the elaboration of the United Nations Sustainable Development Goals in 2015, made it a leading topic. The new framework is very ambitious, including five objectives that explicitly refer to people with disabilities, addressing aspects ranging from guaranteeing access to education, public transportation systems and public spaces to the promotion of their participation in the economic, social and political growth of the countries. The World Bank is straightly aligned with this agenda, working to eliminate the exclusion and stereotypes that surround people with disabilities in many of the countries in which we work.

For this reason, more and more projects in which we collaborate incorporate components that guarantee the autonomy and full functionality of people with disabilities, not only from the technical point of view in the design and construction of infrastructure, but also in those socio-cultural aspects. It is presented as a cross-cutting issue, that includes promoting the visibility of the collectives, education in respect and tolerance and awareness on the importance of the subject.

It is in this context that the Mainstreaming Inclusive Design and Universal Mobility project emerged in Lima. It incorporates the best international practices in the renovation of the urban environment of the Dos de Mayo square. The importance of this project is crucial, it is the first time that an urban intervention linked to a transport infrastructure in Lima has been carried out considering the contributions of those who have more to say on the subject: the groups of people with a disability

These contributions helped in the design of a modern, sustainable and inclusive renovation. The current Dos de Mayo square represents an example for future urban interventions in the region. For this reason, the activities carried out during the process were documented highlighting the lessons learned, so it can serve as a guide contributing to the work of other teams, both from Protransporte and external entities. This manual also includes proposals for improvement, which will improve the process for the future, achieving an effective identification and elimination of the many existing barriers in the urban environment. In short, these initiatives represent a key element in our goal of moving towards the full integration of all.



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**PROJECT**



# PROJECT: MAINSTREAMING INCLUSIVE DESIGN AND UNIVERSAL MOBILITY IN LIMA

## BACKGROUND AND OBJECTIVES

The development of sustainable cities goes through the necessary transition from a mobility model based on private transport to an effective offer of high-quality public transport. This process has been gaining ground in the last decades in Latin American cities, where investments in transport infrastructures are growing, especially in mass public transport systems of buses like the BRT (Bus Rapid Transit). There are 68 cities in this region that have a BRT system, that are accounting together more than 21 million passengers per day, which represents 61.86% of the total BRT passengers worldwide<sup>1</sup>.

The implementation of new public transport infrastructures not only favors mobility and environmental quality by promoting the reduction of motorized private traffic, but also has great implications for the urban and social development of cities. The creation of stations and stops generates new points of attraction and new pedestrian dynamics in the context of the city, increasing the influx of people and the number and diversity of activities in their immediate surroundings. Each station has a radius of pedestrian influence of approximately 500 meters, which means several kilometers of urban mesh in which it is necessary to ensure minimum conditions of safety and accessibility for pedestrians to access public transport.

The effectiveness and quality of public transport systems inevitably depend on their relationship with the urban environment. For this reason, it is increasingly necessary to address this reciprocity from the urban planning, encouraging investment in large infrastructure projects to be complemented by urban projects oriented to ensure pedestrian mobility in connection with the transport network. In this sense, accessibility is postulated as an essential subject for the promotion of inclusive and safe pedestrian itineraries. The benefits of its application favor the entire population and represent the key to the social integration of people with functional limitations.

In Lima (9 million inhabitants), the creation of Line 1 of the Metro and the Metropolitano has meant a substantial, though insufficient, change in the city's public transport landscape. The Metropolitano is a BRT (Bus Rapid Transit) system, consisting of a 28-kilometer corridor, segregated from traffic, through which high-capacity buses circulate communicating quickly and safely urban areas with high mobility demands. It connects cones north and south through the very center of the city. For this single axis called COSAC1 (Spanish acronym for "Segregated Corridor of High Occupation"), more than 630,000 people travel daily (July 2014).

But the corridor along which the articulated vehicles of the Metropolitano travel is only part of the system. At the end of the line, the so called "feeder lines" ferry thousands of passengers from the different neighborhoods into the main line via twenty auxiliary bus lines using unsegregated roads.

Once the good implementation of this new fast bus transport formula was proven, new challenges were raised to improve the quality of the trip for the different users, such as the agglomeration of travelers at

1 [www.brtdata.org](http://www.brtdata.org)





Fig. 1: Access to a Metropolitano station.

certain times, the benefits of the system and its future evolution in light of the growing demand. One of these needs is to guarantee an autonomous and equitable use to all people, regardless of their physical characteristics or disability. The number of people with disabilities (hereinafter PWD) in Lima, according to the 2012 ENEDIS<sup>2</sup> survey, amounted to 636,439, which represents 6.8% of the total population of the department of Lima<sup>3</sup>.

The system (fixed infrastructure, rolling stock and information and communication systems) is originally designed to be accessible to all these people, but in operational practice some of the conditions of use are inadequate, or insufficient, as explained later on. Additionally, the Metropolitano is inserted into a complex urban structure and is poorly adapted for use by PWD; consequently, access to stations from the transverse routes and the intermodal connection with other urban transport is inadequate. In Lima, accessibility has not been included as an essential subject when planning and developing projects for urban expansion and rehabilitation. The existing solutions in this area reveal a limited approach that considers only isolated actions, carried out after the original projects were constructed. As a result, these actions maintain the inequalities in the city mobility, limiting the possibilities of access to infrastructures for PWD.

In this context, the International Bank for Reconstruction and Development (BIRF) has donated the Metropolitan Municipality of Lima (MML) the amount of US \$ 2,500,000 from the Bank of Japan to intervene in improving urban access of the COSAC1 corridor stations. In 2012, it approved the project, PHRD TF011294, "Mainstreaming of Inclusive Design and Universal Mobility in the Lima Transport Project", which is included in the Plan of Action of the MML, and its execution is entrusted to the public municipal company PROTRANSPORTE.

The project's general objective is to **"Improve the capacity of the Metropolitan Municipality of Lima and integrate the needs of people with disabilities in the planning and implementation of public transport / pedestrian urban infrastructures"**, focusing specifically on the urban environment conditions in which the COSAC 1 corridor stations are located.

<sup>2</sup> First National Specialized Survey on Disability, carried out in 2012 by the National Institute of Statistics and Informatics (INEI) and the Ministry of Women and Vulnerable Populations (MIMP), in the urban and rural areas of the 24 departments of Peru, in addition to the Constitutional Province of Callao.

<sup>3</sup> According to the estimates and projections of the INEI, the population of the department of Lima in 2012 amounts to 9,395,149 inhabitants.

The project is proposed as a reference for inclusive mobility in Lima. Its development marks a new roadmap for accessibility in the development and planning of urban infrastructures. It also defines new design parameters, based on international references and good practices, that were not regulated before. The project introduces the needs of people with functional diversity as an intrinsic part for the development of urban projects, so that the results integrate their needs without requiring subsequent corrective actions, which involve partial solutions and additional costs. The objective of the pilot project is to create an urban area in which it is possible to experience safe and inclusive mobility, where pedestrians are the protagonists and can have met the needs inherent to their functional diversity.

## CONCEPT AND METHODOLOGY

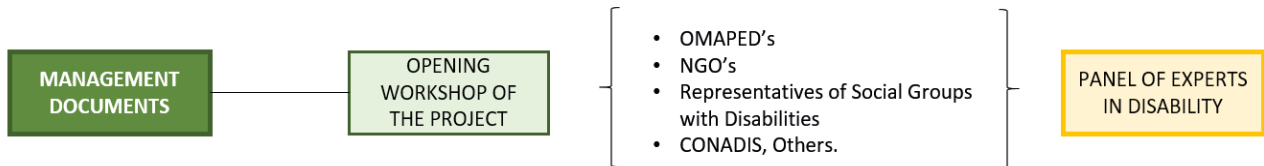
The Metropolitano is the first mode of public transportation in Lima that people with functional limitations can use independently; however, the need or importance of this project for these people raises as a consequence of the following factors:

- The streets and public spaces around the stations of the Metropolitano present serious accessibility deficiencies particularly regarding pedestrian safety. The connections with other means of mobility: bus feeder lines and others such as *combis*, coasters, taxis and private cars, pedestrian and bicycle access also pose problems of accessibility and functionality.
- The weight of people with functional limitations (disabilities and other limitations, such as carrying babies, being heavily pregnant, limbs in plaster or serious injuries, etc.) in the global mobility of Lima is unknown, and their specific needs or demands have not been sufficiently studied, nor their needs or opinions taken into account in other projects that may directly affect them.
- Peru and Lima lack of updated regulations and reference standards on accessibility for the design of urban areas, facilities and transport infrastructure.
- There are no precedents of comprehensive urban intervention projects which have taken into account the above aspects, nor is there any knowledge regarding technical and design criteria to be applied.<sup>4</sup>

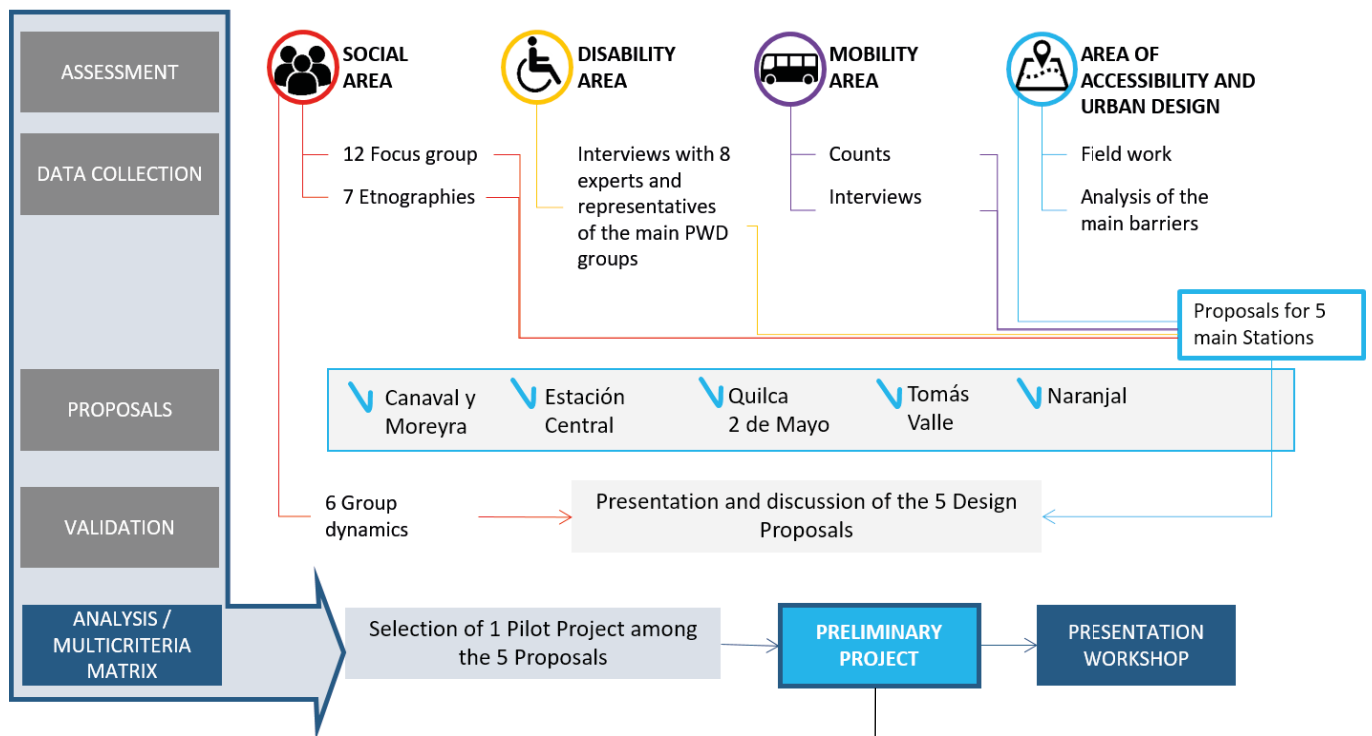


Given these needs, and with the general objective of improving the quality of the accessibility conditions for PWD in the urban access routes to Metropolitan stations, a methodology was developed in three stages:

### 1st STAGE



### 2nd STAGE



### 3rd STAGE

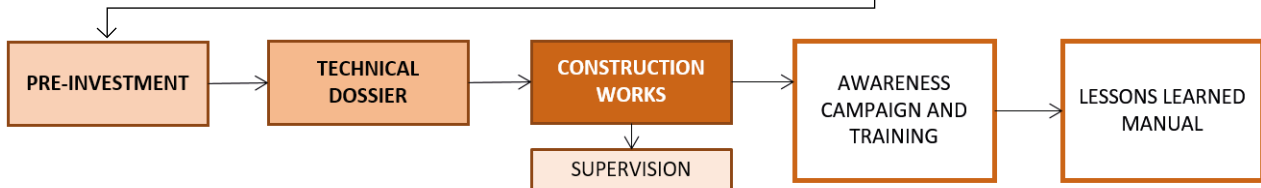


Fig. 1: Concept and methodology of the project.

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In the **1st Stage** the bases of the project are defined and the different agents involved in its development are identified. Among these agents there are public entities and associations linked to groups of people with reduced mobility. As a result of this stage, a panel of experts is created, made up of prominent members of the PWD collectives, who will support the Protransporte technicians in the follow-up of the subsequent stages.

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The **2nd Stage** addresses the development of an assessment on the four areas of interest of the project: social, disability, mobility and accessibility and urban design. Different activities are conducted to obtain the assessment information for each area:

- *Social Area*: collects information on people with functional limitations that are regular users of the Metropolitano. The information is collected through focus groups and ethnographies, with the aim of identifying the main problems faced by these people in accessing the stations, as well as their needs and proposals.
- *Disability area*: focuses on aspects related to disability, through in-depth interviews with specialists.
- *Mobility area*: in charge of identifying the demand of people with functional imitations in the use of the Metropolitano. The information is collected through interviews and interception interviews.
- *Area of accessibility and urban design*: this area identifies, through a technical analysis, the main accessibility problems and the most recurrent architectural barriers in the urban itineraries to access the Metropolitano stations.

Once the information has been collected and the assessment finalized, the area of accessibility and urban design is responsible for preparing proposals for the improvement of accessibility and pedestrian mobility in the urban environment of the five main stations identified in the 1st Stage. These proposals are validated with the groups of people with functional limitations through the realization of five group dynamics in which the designs for the environment of each station are presented and agreed.

The 2nd Stage also includes the development of a decision support tool based on a Multicriteria Matrix. This matrix collects the information from the assessment, the proposals and the validations, in order to objectively obtain the selection of a pilot project among the projects developed for the environment of the five main stations.

Once the pilot project has been selected, the accessibility and urban design area develops the preliminary draft for the proposal. The 2nd Stage concludes with a public presentation of the results obtained and the pilot project selected as the result of the Multicriteria Matrix.

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The **3rd Stage** consists of developing the pre-investment project and technical dossier for the pilot project. It includes the development and supervision of the construction works. This stage also provides complementary activities such as awareness campaigns and user training on the needs of people with reduced mobility in the access and use of the Metropolitano, in addition to the elaboration of the lessons learned manual.

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# CHAPTER 1



# CHAPTER 1: PROJECT HIGHLIGHTS

## 1.1. SOCIAL COMPONENT AND CITIZEN PARTICIPATION

The methodology of the study was designed to collect the perspective of the different groups of PWD and with other functional limitations throughout the different phases of the project. These groups are heterogeneous, so are their needs in relation to the urban environment and access to means of transport. In order to collect contributions representative of the functional diversity of people using the Metropolitano, the project has had participants with visual, hearing, motor and intellectual disabilities, as well as seniors and mothers who carry their children in arms, whose mobility is also limited by the environmental barriers. Their opinions and experiences of these groups were part of the process in the assessment, as well as in the review of the proposals developed by the consultant team (concept test) in the second part of the work, and in the final participatory workshop. The elements of this methodology are summarized in the following table.

The project was part of an empowerment process for the groups of people with disabilities, encouraging the participation of a sector of civil society usually excluded from local public life and decision-making.

The contact with the external consultants responsible for the second stage of the project has also been assessed as a positive component, once they were able to learn about these experiences in terms of accessibility and inclusion carried out in other countries. However, once the second stage of the project was completed and the participation of the Expert Panel concluded, no effective communication channels were established between Protransporte and the collectives, associations and organizations of PWD that participated in the first two stages. As a consequence, misinformation about the reasons for the delay in the beginning of the works generates uncertainty and distrust in civil society.



Fig. 2: Ethnographies carried out during the 2nd Phase of the project.



## 1.2. URBAN DESIGN AND ACCESSIBILITY

The urban assessment reveals that the pedestrian itineraries to Metropolitan stations are highly conditioned by the unequal distribution of space between vehicular and pedestrian routes, especially at the crossings. As often happens in other large Latin American cities, in Lima the motorized vehicles are the clear protagonist in the city. Meanwhile pedestrians are exposed to situations of great insecurity. Existing accessibility solutions are insufficient and not very functional, since the majority are basically limited to ramps at corners. Among the most common problems, highlights the constant exposure of pedestrians to risk at intersections between pedestrians and motorized vehicles itineraries.

The design of the proposals for the urban environment of the five main stations (Canaval y Moreyra, Central Station, Quilca-2 de Mayo, Tomás Valle and Naranjal) started from this analysis, that also oriented the development of some recommendations on urban design and accessibility. These recommendations aim to unify the urban design and accessibility criteria used by Protransporte in future urban actions. In the same way and in response to the social demand identified in the focus groups, recommendations were made to improve accessibility and social communication inside the stations.

Three years after the end of the 2nd Stage of the project, which included the participation of an external team of accessibility and urban design experts, the improvements in accessibility both inside the stations and in the urban itineraries of access to some of them is remarkable. The design recommendations provided have been incorporated into all the actions carried out since then by the Protransporte. This reveals the existence of a built legacy of the project, which citizens can enjoy long before the completion of the work of the Plaza 2 de Mayo pilot project.

Accessibility is a cross-cutting subject, which makes its implementation complex. The professionals responsible for the design and planning of urban environments tend to have little knowledge about the functional needs of people in relation to the built environment. This knowledge is usually limited to standards and regulations, however, the regulated parameters, in the same way as the standard solutions offered in this project, are not enough. The complexity of urban environments and the imbalances in the distribution of space between pedestrian and vehicular mobility requires an integrated approach among pedestrian-scale solution and urban planning and design, something that is often lost in the application of standardized solutions. In this sense, only training can promote an integral change in the way technicians approach accessibility in their designs and projects.

Two strict applications of the recommendations are identified. Both of them present improvable results, what corroborates the need for capacity building:

**The application of tactile signage on the pavement:** in the new interventions, the recommended logic of combining tactile orientation and warning pavement in pedestrian crossings and sidewalks is applied. However, the design and orientation of the tactile signage demonstrates a poor understanding of how blind people move and orient themselves in the city.

**Redistribution of the available space for the benefit of the pedestrians:** although the identified interventions correctly apply the recommended solutions for accessibility, they do not propose a redistribution of the space at the crossing point. Interventions to improve accessibility must guarantee safe pedestrian mobility, which requires the revision of the vehicular layout in order to restore hierarchies favoring pedestrian routes.

Considering the difficulties faced in the subsequent development of the project, the proposal of a training day that integrates technicians from other sectors and departments of the Municipality (Urban Transport Management - GTU, Urban Development Management - GDU, EMILIMA, etc.) and of other Municipalities crossed by the Metropolitano would have facilitated the integration of the urban design recommendations and the approval processes of the pilot project.



Plaza 2 de Mayo ●

Accessibility improvements inside all stations ●

Accessibility improvements in the urban environment: stations UNI (28), Honorio Delgado (29), Ramón Castilla (25), Quilca (23). ○

COSAC 1 —

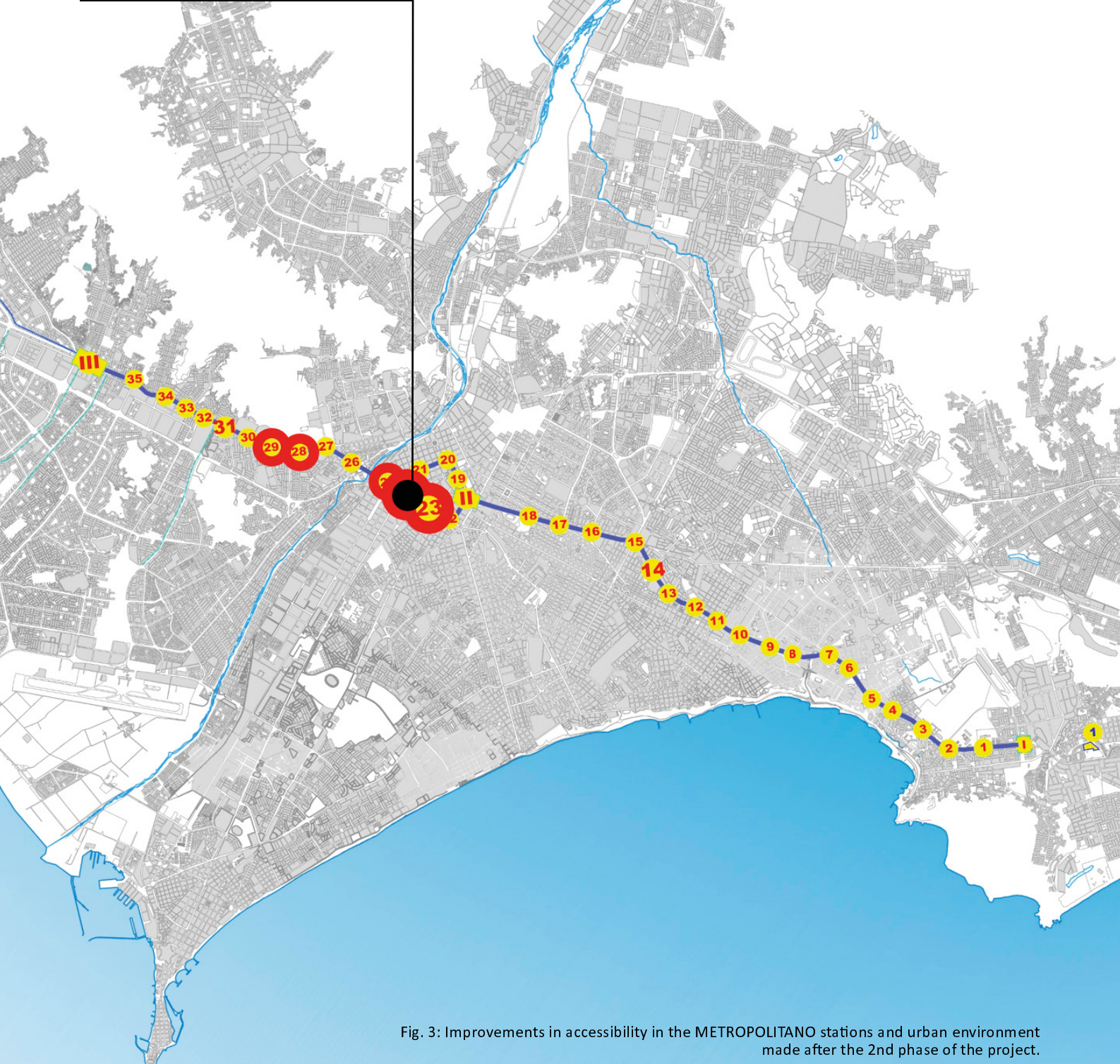


Fig. 3: Improvements in accessibility in the METROPOLITANO stations and urban environment made after the 2nd phase of the project.





**BEFORE**  
Assessment phase, 2014.



**AFTER**  
Lessons learned, 2017.



**BEFORE**  
Assessment phase, 2014.



**AFTER**  
Lessons learned, 2017.



CANAVAL Y MOREIRA  
Lessons learned Manual- 2017

- Improvement in the visual signaling inside the stations.
- Incorporation of tactile signage on the pavement (guidance and warning).
- Awareness signage on the preferential use of lifts for people with functional limitations.



UNI  
Lessons learned Manual- 2017

- Improvement in the visual signaling inside the stations.
- Incorporation of dynamic visual signaling (light signal indicating waiting time at each stop).
- Awareness signage on the preferential use of lifts for people with functional limitations.



## 1.3. SELECTION OF ALTERNATIVES: MULTIPLE CRITERIA MATRIX

For the selection of the pilot project, the application of a Multicriteria Matrix is adopted. It is a decision support methodology that allows to quantify data obtained from the different work areas, also including subjective aspects extracted from citizen participation.

The results were subsequently integrated into this mechanism to optimize solutions in order to best select the station where the intervention is well founded and is suitable from the different points of view considered: the transport needs of people with functional limitations, equal opportunities, safety and comfort in the use of public space and access to the Metropolitano.

The resulting classification of multi-criteria analysis, according to the need for intervention in the urban environment of the stations, would be:

**1º QUILCA – 2 DE MAYO**

2º TOMAS VALLE

3º NARANJAL

4º ESTACIÓN CENTRAL

5º CANAVAL Y MOREYRA

The multicriteria matrix is considered a useful methodology for the selection of the urban area to which the donation would be destined. The selection process based on a scientific method, using the information collected and analyzed in the assessments, contributes to the transparency of the process. In addition to this, the fact that the decision makers were the external experts allowed the process to be conducted completely independently of the preferences from technical and managerial positions of Protransporte. This is an important point, once the project has gone through municipal elections and several administrative changes from its first stage to the completion of the works.

The choice of the Plaza de Mayo reveals some issues that could have been considered in the development of the matrix. These issues refer to administrative aspects prevailing for the process of approval of the technical dossier and the obtaining of work licenses. They should be considered in the future when using this methodology to decide the destination of a donation:

## 1.4. PROJECT MANAGEMENT

The innovative profile of the project in the context of Lima represents a managing challenge for Protransporte. The demands of efficiency in the management of the project caused most of the problems identified in its development process. The transversality of the Metropolitan and the interdependence among different administrative departments regarding to interventions in the urban environment of the COSAC1 stations make this process even more complex.

The main administrative challenges faced from the first stage to the implementation of the pilot project are:

**The administrative changes in Protransporte.** A long-term project is subject to political and administrative changes that may occur in the municipal entity that leads it. In this regard, once the second stage of the project was completed, the renewal of key positions in Protransporte was a challenge for the continuity and compliance with the work plan initially established.

**The decision making on the supervision of the project and works.** Despite starting from a well-structured methodology, which bases every decision from each stage in objective studies, the project design has suffered changes until the works conclusion. Some of these changes, with the exception of those generated while obtaining licenses with other sectors and departments of the Municipality, could have been avoided. Providing the project with technical autonomy within the administrative structure of Protransporte would avoid having to practically start over when administrative and political changes take place.

**The technical team of Protransporte.** In the context of Protransporte, the instability of technical positions also makes it difficult to prepare a long-term project, developed in fragmented stages. The technical team that worked in the first two stages of the project has not been maintained until the end of the project, which has made it very difficult to take the project to its final stage.

Altogether, the management of the subcontracted tasks for the elaboration of the diagnosis, technical dossier and construction works was satisfactorily developed. The management of Protransporte in obtaining authorizations and permits for projects and works is also considered adequate, taking into account the political and administrative changes that took place in the entity





# CHAPTER 2

## CHAPTER 2: LESSONS LEARNED

### **LESSON 01: Civil society participation and specifically people with disabilities contributes to creating a legacy for the project.**

- The participation of people with functional limitation made it possible to identify precisely the main problems in their access of to the Metropolitano, and to know their needs in relation to the urban environment.
- In the local context, the promotion of a participatory project contributed to the strengthening of civil society. This was possible through their inclusion in the decision-making process, in addition to the exchange of experiences with consultants from other countries.
- The methodology favored the strengthening of the associative network and of the different civil organizations that participated in the project activities.
- A relevant aspect to consider in future projects is that the leading local entity must maintain a communication channel with the organizations and associations of PWD until the end of the project. Through this channel the target groups can be informed of the subsequent stages until the completion of the works. This will improve the image of the institution among these groups, favoring the transparency of the project development and its dissemination.

### **LESSON 02: Knowing in detail the PWD demand for the infrastructure to find out the impact of future improvements in accessibility.**

- In addition to citizen participation, counts and surveys are useful tools for knowing the specific demands of PWD. These data complement the general travel demand information from local agencies that is already available.
- These tools allow establishing a baseline that will favor the review of the impact of actions to improve accessibility.

### **LESSON 03: The assessment stage and the design of solutions favor the creation and consolidation of accessibility criteria that can be used in projects to improve the urban environment and the stations interior.**

- In developing countries, it is common to identify the lack or insufficiency of standardized accessibility parameters for the design of urban interventions. In this sense, the assessment stage is absolutely crucial to identify the main problems for accessible pedestrian mobility in the urban routes of access to stations. And so is the subsequent development of design recommendations to solve de main problems identified.

- The joint work between external accessibility experts and the local entity technicians guarantees the institutional strengthening. In the same vein, the participation of local technicians, together with civil society, in the workshops where the design proposals are validated contributes to capacity building.

#### **LESSON 04: The recommended accessibility criteria respond to the local urban reality and to the needs of civil society with functional limitations.**

- The design recommendations provided for the project respond to the main problems identified in the assessment stage. In this sense, although the recommended parameters are based on good practices regulated internationally, they were adapted to the reality of local streets. This adaptation responds to local aspects such as the link between vehicular and pedestrian traffic, uses and presence of activities in the streets, in addition to the environmental and landscape characteristics, use of materials and construction methods.
- The project has offered tailored solutions which have also been validated by civil society with functional limitations and disability. The recommended criteria are adapted to both the characteristics of the urban environment and the functional and use needs of the local population.
- These characteristics favor the later creation of a technical accessibility guide, agreed among the different departments and sectors of the Municipality. The development of a technical guide allows to unify criteria and technical parameters, speeding up the consensus in the approval of licenses and internal coordination.

#### **LESSON 05: Accessibility training is a useful tool for strengthening local competences and consolidating criteria on this subject in the municipality.**

- The knowledge transmitted during the development of the second stage of the project to the local entity technicians is not enough. The information on accessibility guidelines and regulations is often decontextualized from the aspects related to urban planning and design. In this sense, training is essential to ensure that these professionals are able not only to repeat standardized criteria, but to implement solutions adapted to the local reality and the specific functional needs of the population.

#### **LESSON 06: The multicriteria matrix is consolidated as a reliable tool to choose the projects to which the available resources should be allocated.**

- The multicriteria methodology collects information from different areas of interest for the project (citizen participation, urban assessment, mobility demand, administrative management), establishing a reliable and transparent basis for decision making regarding the destination of public resources and donations.
- The social, mobility, urban and accessibility assessments are essential to establish the data that will feed the matrix. This need encourages decision-makers to be external consultants, increasing the impartiality of the selection process.
- The selection processes must consider the administrative procedures, attributing the proportional weight in the matrix according to the volume of available resources and the impact of the intervention.
- The selection processes must also consider the singularity of certain urban environments as a factor that can influence the time of approval and execution of the project, once they determinate the need for licenses and consensus with different departments of the Municipality.



**LESSON 07: The planning of the project and its stages must anticipate the impact of political and administrative changes.**

- The development of the project in terms of compliance with objectives and deadlines may be affected by various political and administrative changes in the local entity. While it is inevitable that such changes may alter the initial forecasts, it is important to provide the basis of the agreement with tools that allow guaranteeing the follow-up of the process with some independence.
- These tools can be oriented to streamline presentations and understanding of the project by the new positions, in order to make it clear that they are incorporated into a process already underway.

**LESSON 08: The strength of the methodology applied to the project must prevail over institutional changes to ensure compliance with deadlines and objectives.**

- In line with the previous lesson, the technical or administrative changes that occur in the entity should not influence the technical development of the project. The steps defined in the methodology propose a sequence of actions justified by previous studies and technical assessments, so this chain should not be broken by decisions unrelated to the preset process.
- Changes in the project that disregard studies prepared in previous stages must be duly justified, once the studies that support them are also part of the investment.

**LESSON 09: The unification of urban design criteria at the municipal level would facilitate administrative procedures in obtaining licenses.**

- In the local territorial context, the unification of criteria for urban interventions in terms of accessibility would facilitate the procedures for approval and consensus by the different areas and departments affected.
- The elaboration of a consensual technical guide, which includes parameters, constructive techniques and materials, would be of great help for all the urban projects developed around transport stations in the city.

**LESSON 10: The tender for the works execution must consider the proportionality among the guarantees required, the budget and the scope of the work.**

- The centralization of more projects in the same call would have facilitated the tender for the works execution.
- The situation brought to a second call deserves the revision of the initial criteria, adapting them proportionally to the contract scale and cost.

**LESSON 11: The adequate fulfillment of the program and the objectives of the project depends on the existence of a unified technical follow-up from the first stage to the completion of the works.**

- A fragmented project in different stages requires continuous monitoring by the same technical team from the entity. The management and detailed knowledge of each phase of the project until its execution are essential for the fulfillment of the objectives.
- The Project Operations Manual must include the need to guarantee the technical leadership of the project by the same team, so that possible political and administrative changes do not detract from the development sequence of the project.

**LESSON 12: The lessons learned from the project are an opportunity for the integration and dissemination of inclusive design and universal mobility, although this depends on the realization of continuity actions.**

- The project for the integration of inclusive design and universal mobility in Lima has managed to incorporate criteria of universal design and accessibility to urban actions developed by Protransporte. Because of this, the impact of the project transcends the pilot carried out in the Plaza 2 de Mayo, and manages to integrate the developed criteria in other areas of the city through the Metropolitano.
- The dissemination of the criteria developed in the project through other urban actions is an opportunity to improve the capacity of the Metropolitan Municipality of Lima to integrate the needs of people with disabilities in the planning and implementation of urban pedestrian infrastructure. This opportunity is given through the recognition of a new way of inhabiting the urban space by the population, with new guidelines for the relationship between vehicular and pedestrian traffic.
- For this opportunity to become effective it is necessary that the project's proposals have continuity from two essential actions: dissemination actions, awareness and road reeducation in order to give visibility to the needs of pedestrians and especially the population with functional limitations in relation to urban mobility; training actions and the development of technical documents to unify the intervention criteria in terms of accessibility throughout the city.



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# CHAPTER 3

# CHAPTER 3: RECOMENDATIONS FOR UNIVERSAL MOBILITY

## 3.1. URBAN DESIGN CRITERIA

Any intervention project in the physical urban space should come based on a broad perspective of the street / neighborhood / city context grounded with general and technical criteria.

Once the lessons learned have been collected, the technical criteria adopted in the project are summarized below. The intention is taking advantage of this experience to promote greater and better accessibility for people with functional limitations to the Metropolitano transport system.

These criteria, which were used in the design of the proposals for the environment of the five main stations, may also serve as a reference for the development of future projects promoted by Protransporte. In terms of accessibility, for a city to be inclusive, it must have a catalog of unified solutions, recognizable in its different sectors and neighborhoods due to its characteristics of use and design. The pilot nature of these proposals and the lack of regulation on this matter at the municipal level validates the convenience of having a set of criteria (approaches, arrangement, use of equipment, parameters) that can be reproduced in other parts of the city.

The criteria, in a differentiated way, should be useful for the different agents involved in the improvements: users, officials from local administrations (from different areas such as roads, infrastructure, works, human development ...), neighborhood representatives, architects, designers and even construction companies.

The coordination in terms of intervention criteria (how to design, build, manage the urban space) should enhance the use of public space in a functional and orderly manner by all people, with special emphasis on those with some type of disability or functional limitation.

One of the key parameters in this type of guide-criteria is the normative adopted as reference.

In the Peruvian case, there are specific regulations for the design and construction of buildings, such as NORMA A.120 ACCESSIBILITY FOR PERSONS WITH DISABILITIES AND ELDERLY from the National Urban Planning Department. Accessibility conditions for the urban public spaces are determined by the municipalities, through specific regulations. But there are no unified criteria at the state level to establish a common reference guide.

The use of technical guides seems not widespread and, apart from the document prepared by Arq. Jaime Huerta (Disability and Accessibility), published in 2006, no new documents have been located.

In view of this situation, international legal or technical documents such as the Spanish Ministerial Order VIV 561/2010, and the international technical standard ISO 21542 were used as reference.

## A. TYPES OF CRITERIA

The criteria presented below reflect and adapt to the reality of Lima the technical solutions and good international practice in the field of accessibility and inclusive mobility. It has been synthesized in two sections:

1. General urban design criteria
2. Specific accessibility criteria

### 1. GENERAL URBAN DESIGN CRITERIA:

The urban design criteria for improving accessibility in pedestrian access routes to the Metropolitan stations start from the concept of “accessible mobility chain”. This concept derives from the need to think about accessibility in a cross-cutting way, starting from a sequence of “links” that must be accessible one by one to guarantee the accessibility of the whole chain. This idea of chain adapts to different project scales. In terms of planning and urban design, as expressed in the graphic below, it means that, in a city, any person, regardless of the functional limitations that may arise, must be able to leave her/his home, move through streets, avenues, squares and parks, access public transport and buildings in a safe and accessible way, with the greatest possible autonomy and free of barriers.



Fig. 4: Accessible mobility chain. Source: Aceplan Accesibilidad S.L.

The objective is start thinking pedestrian mobility as a sequence of actions, each action is a link in the chain and if one of them breaks, there is no universal accessibility. In public transport, for example, the accessible mobility chain can be translated with the actions shown in the following chart:



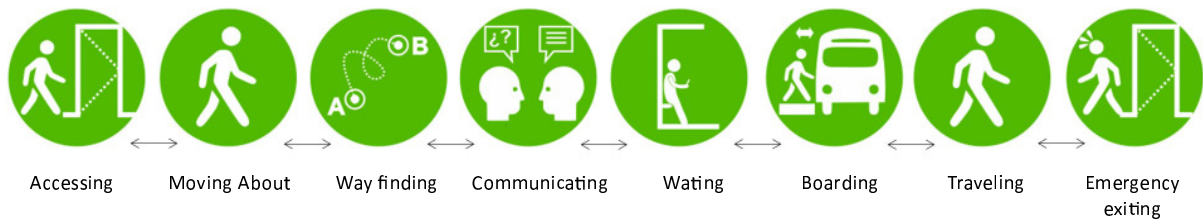


Fig. 5: Accessible mobility chain in public transport. Source: Aceplan Accesibilidad S.L.

The accessible mobility chain is a global concept. Its implementation depends on the development of tools and design instruments that allow it to be translated into parameters and design criteria. One of these instruments has been adopted in the assessment of the urban environment accessibility around the COSAC1 stations. The idea was considering the need of Accessible Pedestrian Routes (hereinafter APR) in the access to the Metropolitano stations. APRs “are accessible pedestrian routes that guarantee the non-discriminatory use and an autonomous and continuous mobility for all people”<sup>4</sup>. El concepto de IPA recoge la necesidad de generar en la ciudad un elemento vertebrador de la movilidad pThe concept of APR reflects the need to generate a mainstreaming element for pedestrian mobility in the cities. It also claims to a greater balance in the relationship between pedestrians and vehicles, and the organization, redistribution and redesign of urban space.

1. *Promoting a network of Accessible Pedestrian Routes (APRs), to access the stations, which, as a general rule, will pass along the facade.*
2. *Improving road safety at intersections between pedestrian and vehicular routes:*
  - a. Alignment of pedestrian crossings and its main elements: pedestrian ramps, central traffic islands, etc.
  - b. Improving visibility from the sidewalk to the vehicle carriageway and vice versa.
  - c. Improving signalling: painting pedestrian crossings, vertical Pedestrian crossing signal, and adjustment of alignment and orientation of the pedestrian traffic lights.
3. *Formalizing existing improvised pedestrian routes that were identified as viable routes in the assessment stage.*
4. *Shortening the walkable distance on road in the pedestrian crossings.*
5. *Adjusting the dimensions of vehicular lanes, starting from the identification of leftover spaces resulting from oversized width of lanes, parking areas and vehicle’s turning radius.*
6. *Unifying design criteria:*
  - a. Vehicle turning radius: 6 m in the lane axis.
  - b. Vehicular lane width: 3 m (applicable to streets that have at least 2 traffic lanes).
  - c. Width of pedestrian crossing in streets up to 3 lanes with light traffic flow: 6 metres.
  - d. Width of pedestrian crossing in streets up to 4 vehicle lanes with moderate flow: 8 metres
  - e. Width of pedestrian crossing in streets over 4 lanes with intense vehicular flow: 10 metres

<sup>4</sup> Source: Spanish Ministerial Order “VIV 561/2010, de 1 de febrero por la que se desarrolla el documento técnico de condiciones básicas de accesibilidad y no discriminación para el acceso y utilización de los espacios públicos urbanizados de España”.

7. *Expansion of sidewalk space through gaining the residual spaces existing on the vehicular road.*
8. *Alignment of street furniture on the outer edge of the sidewalk.*
9. *Replacing the pavement in bad condition.*

## 2. SPECIFIC ACCESSIBILITY CRITERIA:

### a. PEDESTRIAN CROSSINGS

1. *Design criteria for the construction of accessible pedestrian ramps.*
  - Pedestrian ramps of 1 slope, with lateral protection.
  - Maximum slope 12%
  - Side protections on pedestrian crossings without a traffic light: trash can and vertical signal of pedestrian crossing.
  - Side protections on pedestrian crossings with semaphore: garbage bin and pedestrian traffic light.
  - Ramp width in relation to the width of the pedestrian crossing:
    - 6 m wide pedestrian crossings: 4 m wide pedestrian ramp
    - 8 m wide pedestrian crossings: 6 m wide pedestrian ramp
    - 10 m wide pedestrian crossings: 8 m wide pedestrian ramp

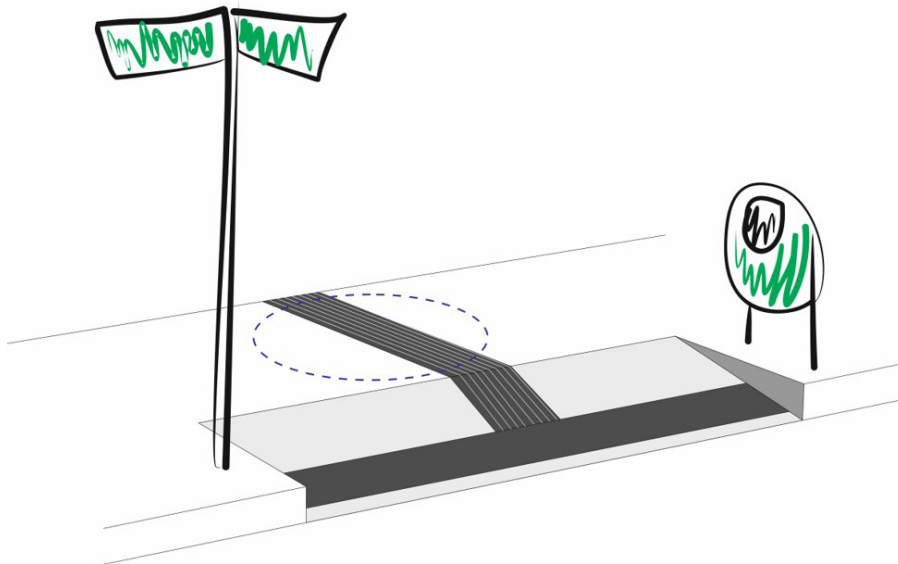


Fig. 6: Schematic drawing representing a pedestrian ramp of one slope, with protection elements on both sides and tactile signage on the pavement.

2. *Construction of pedestrian crossings raised to sidewalk pavement level (these elements also act in reducing the vehicle speed).*

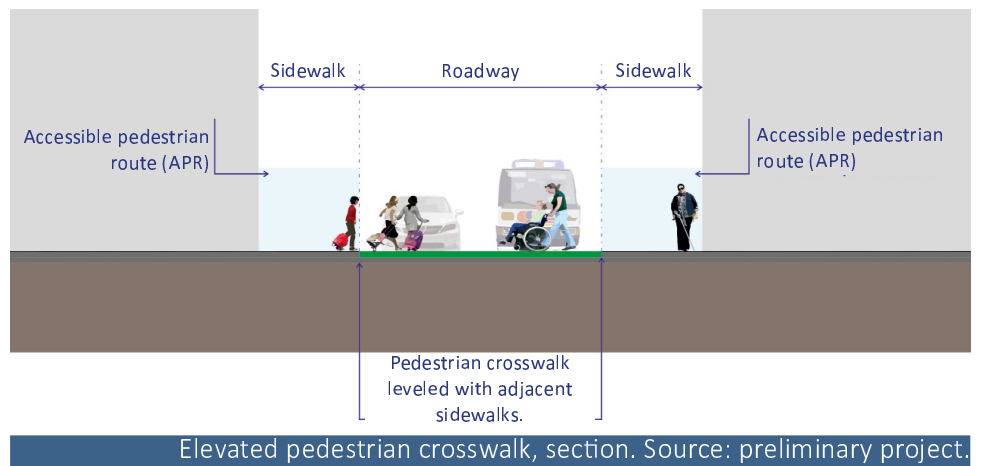
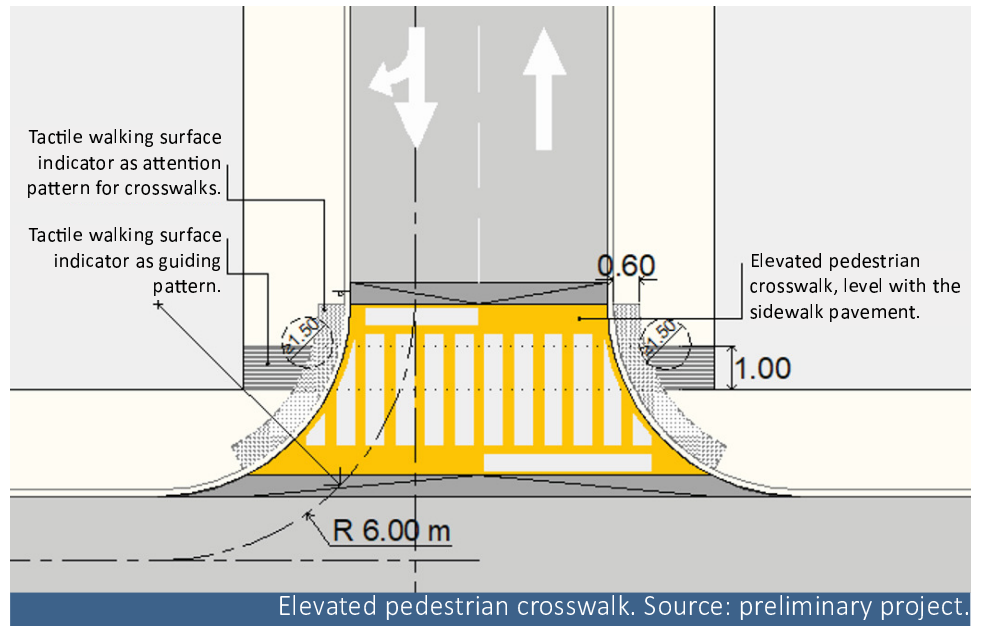
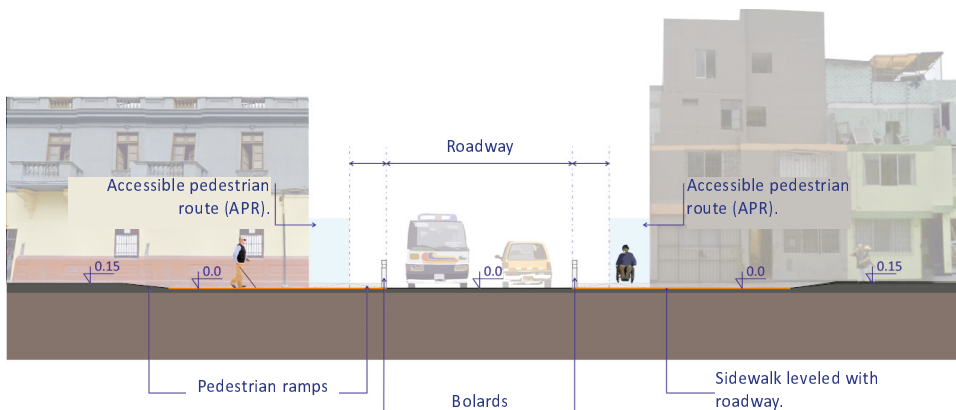
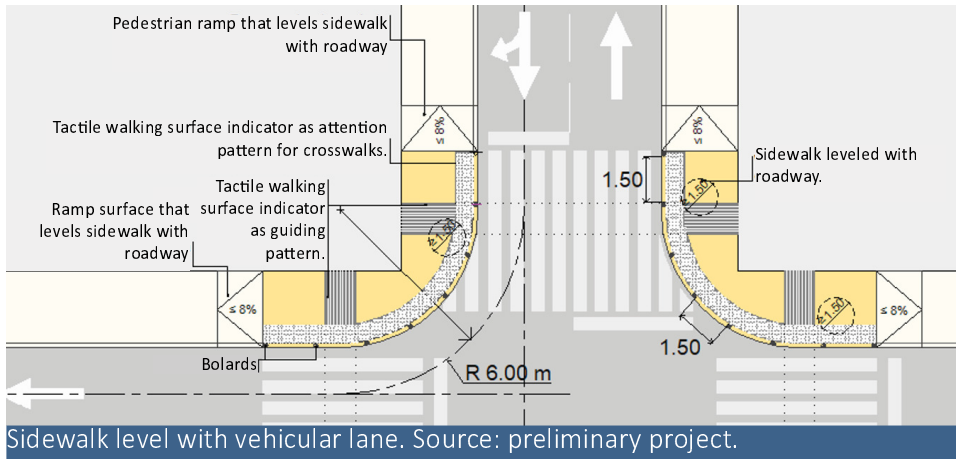


Fig. 7: Elevated pedestrian crosswalks



*Construction of pedestrian crossings with the pavement at the same level as the vehicle lane in cases where it is advisable for the characteristics of the urban network and / or the use of the road.*

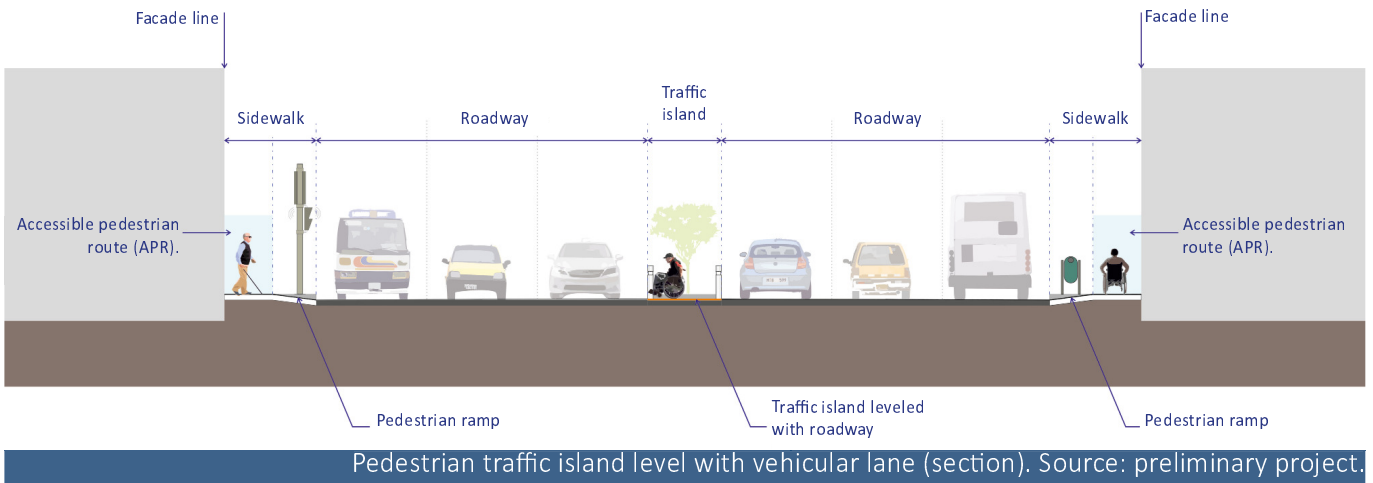
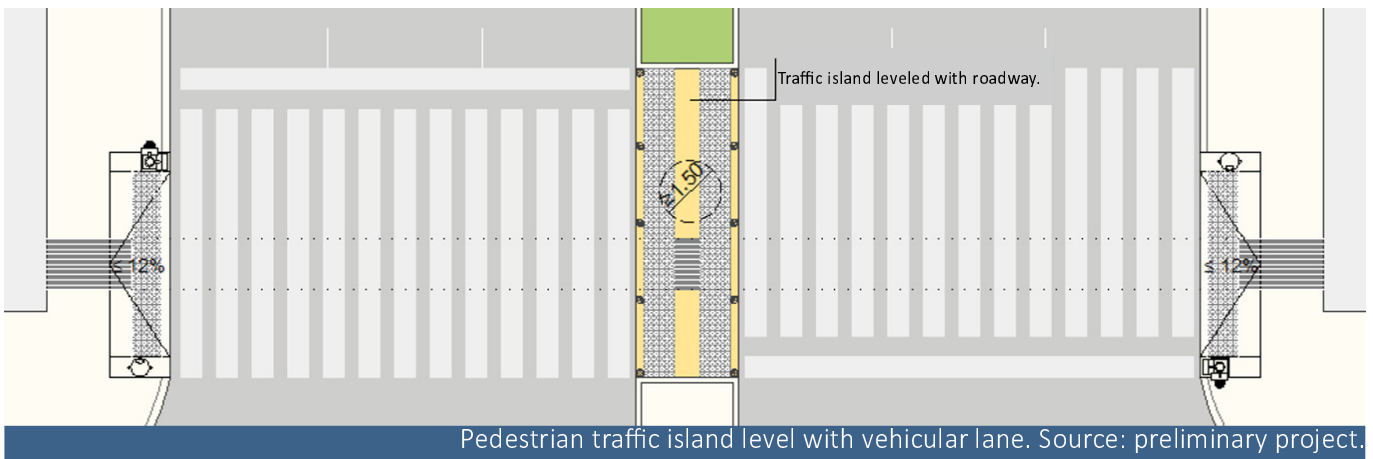


Sidewalk level with vehicular lane implemented in the surroundings of Plaza 2 de Mayo.

Fig. 8: Pedestrian crossing with sidewalk level with vehicular lane.

3. *Pedestrian crossing with intermediate traffic island (central island) leveled with the vehicle carriageway.*

- The waiting area on the traffic island must be a minimum of 1.50 m in diameter.
- The traffic island should have elements of pedestrian protection (bollards), to prevent cars from entering the pedestrian area.
- The bollards must be arranged so that they leave a minimum distance of 1.50 m between each other.



Pedestrian traffic island level with vehicular lane implemented in the surroundings of Honorio Delgado station.

*Fig. 9:* Pedestrian traffic island level with vehicular lane.



*Unified criteria for the application of tactile pavement on pedestrian crossings:*

- Blister tactile paving: warning.
- Directional tactile paving: guidance.

The guidance pavement is preferably applied in those areas where there is no facade or vertical wall that serves as a guide for people with visual impairment. It is also used to guide the pedestrian to a safe area in the crossing, through its transversal placement to the flow of pedestrians on the sidewalk.

Expansion of the pedestrian area in traffic islands, so that at least one circle of 1.50 m in diameter can be inscribed in its surface.

- Traffic island flushing at the level of vehicular lanes in the entire width of the pedestrian crossing.
- Warning drivers of the presence of a pedestrian crosswalk through the installation of vertical signs in crossings where there is no traffic light.
- Installing pedestrian traffic lights with acoustic signaling.

## **b. SIDEWALK SECTIONS**

La propuesta aquí recogida intenta responder a una de las principales barreras identificadas en la etapa de The proposal presented here tries to respond to one of the main barriers identified in the assessment stage, which refers to the lack of a clear order in the sidewalk, in which the space destined for the circulation of pedestrians can be identified. This is due to the presence of urban furniture and other urban elements poorly located. The local use of the sidewalks, with a strong and disorganized presence of street vendors, also ends up interrupting the APR.

To ensure the continuity of the accessible pedestrian routes (APRs) in the sidewalks, it is necessary to maintain minimum dimensions of width and height of passage throughout its development. In addition, the pedestrian routes must have an element that favors the orientation of people with visual disabilities. Normally this element is the built line itself, although in many cases the route next to the facades of the buildings is impractical, due to the constant presence of commercial elements attached to the walls.

Considering the characteristics of the urban environments of the stations in question, we have two possibilities for the arrangement of the APRs in the sidewalk:

1. APR aligned to the built line: it is essential that there are no protruding elements attached to the façade, below 2.20 m in height measured from the ground, that could hinder pedestrian circulation.
2. APR located in the center of the sidewalk: to facilitate the orientation of people with visual impairment with respect to the APR, it is necessary to recreate the building line starting from the installation of a strip of indicator tactile pavement.

The application of both situations to the sidewalk sections of the proposals is included in the following sections.



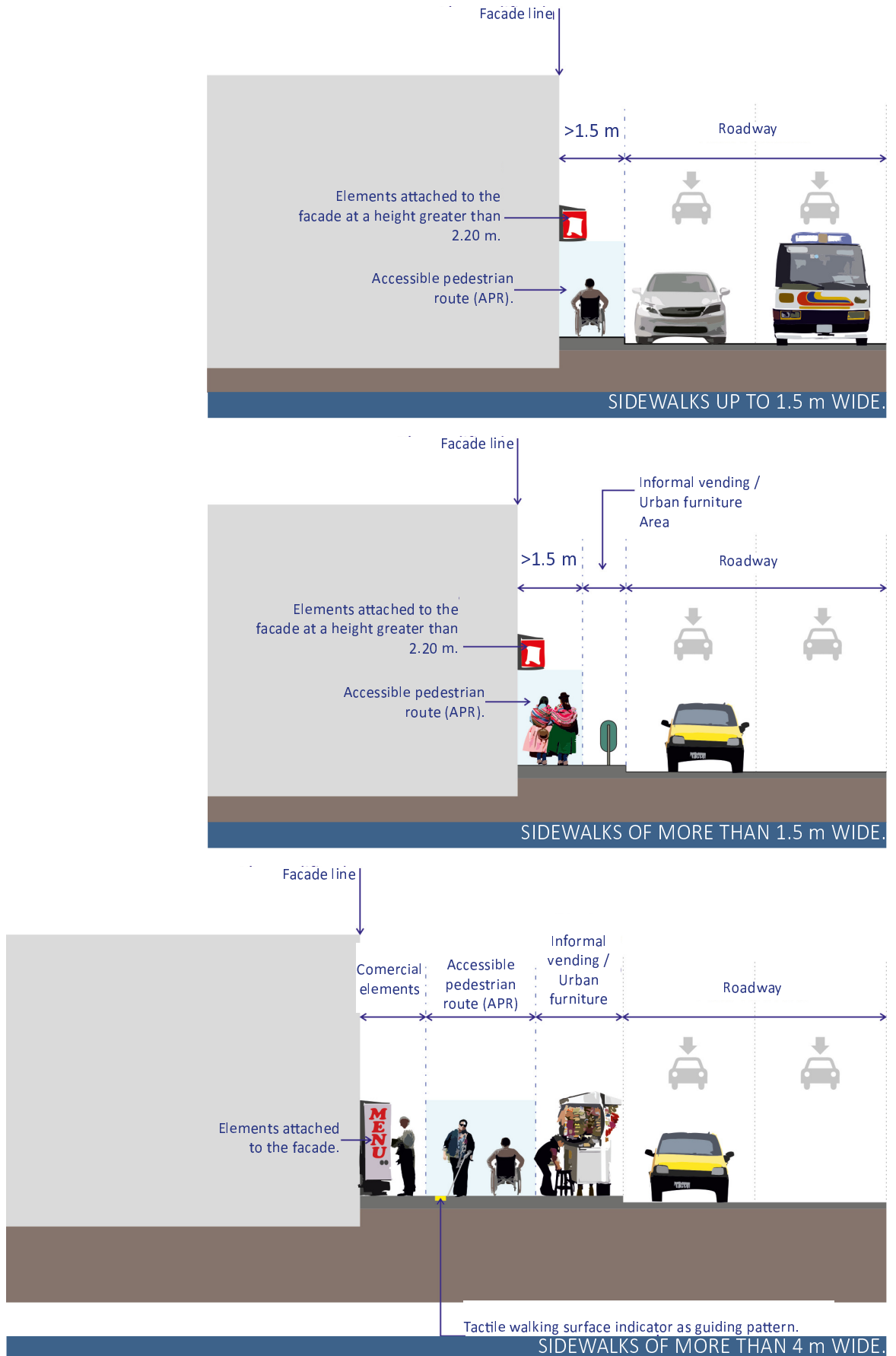


Fig. 10: Accessible pedestrian route (APR) location according to sidewalk width.

## 3.2. PUBLICITY AND AWARENESS IN ALL PHASES OF THE PROJECT

The participatory activities carried out during the project make it possible to identify the need to also work on attitudinal barriers that hinder and / or inhibit the full access of people with disabilities to the transport network. These barriers can manifest themselves in inappropriate attitudes towards PWD, both from other users of the transport infrastructure and from drivers and service supervisors.

Although the legacy of the project is clear in terms of physical barriers, both in the urban environment of the stations and in its interior, the necessary actions have not been carried out to inform and raise awareness among the population about the needs of people with functional limitations in relation to the urban environment and means of transport.

One of the main demands of the consulted groups is also the need to raise awareness among the population in general about the driver - pedestrian relationship. There is a need to carry out educational and informative campaigns so that everyone can understand and feel included in the accessibility improvements. It's about making civil society understand that universal accessibility improves urban environment for everyone, not only for PWD.

In this sense, it is recommended to carry out information, dissemination and awareness actions to raise awareness among the population about how to treat PWD, the elderly and those with temporarily reduced mobility. Some examples of recommended actions are:

- Campaigns through advertisements, posters, videos, etc., with a clear message in favor of the visibility of the rights of people with disabilities and / or functional limitations in the use of public transport (preference in access, use of reserved seats, etc.).
- Seminars with drivers and service supervisors of stations and stops, both from COSAC1 and feeder lines, in which they are trained in the proper treatment of people with disabilities and functional limitations.
- Promotion of “topical days” on accessibility and disability in the context of the use of public transport, in which Protransporte can count on the collaboration of associations, NGOs, OMAPED's or other PWD organizations.
- Establishment of communication channels between Protransporte and the organizations of PWD to promote a dynamic exchange of information on the accessibility improvements carried out in the Metropolitano stations and their urban surroundings, as well as in stops and vehicles of the feeder lines. With this initiative, while promoting the use of the Metropolitano by the PWD, Protransporte will count on the associations and organizations as agents of diffusion of the investments made in the matter of accessibility. In addition to this, the entity may obtain useful information on the effectiveness of the actions and the identification of high priority points from the PWD groups.

## 3.3. MAINTENANCE OF THE INFRASTRUCTURE

The implementation of an intervention to improve universal accessibility implies a new approach to urban mobility in the city. The hierarchies among different modalities of displacement (motorized vehicle, bicycle, pedestrian) are restructured in a crucial node for the vehicular and pedestrian traffic of the city. The reconfiguration of space is a great step for this restructuring, but it may be insufficient if complementary measures are not taken to guarantee the correct use and maintenance of the infrastructure.

From now on, the drivers, bikers, cyclists and pedestrians that move around in the Plaza 2 de Mayo will be affected by the changes in the layout and redistribution of the space. This is part of the process of traffic reeducation that the project proposes. It means that the city educates the citizen in new forms of coexistence, in new ways of occupying and moving around in the urban environment. In this case the renewed plaza 2 de Mayo is advocating the safety of pedestrians and the inclusion of people with functional limitation in transportation and public life. To reinforce this intentionality of the project, it is advisable to carry out complementary actions as described below:

- Vehicular traffic control: all the pedestrian crossings around the plaza were redesigned and some public transport stops were relocated. The natural tendency of drivers and motorists will be to reoccupy the spaces that now do not belong to them. So that control actions are necessary to order the road traffic in the first days after the completion of the works. These actions have the main objective of guaranteeing road safety for all, especially for pedestrians and cyclists.
- Sort the location of the street vendors: the informal sale activity around the Metropolitan station is intense. To guarantee the integrity of the Accessible Pedestrian Routes (APRs), it is essential to organize the disposal of the vendors and all the ephemeral elements in the vicinity of the square, so that they do not obstruct the pedestrian routes and access to the station.
- Removing protruding elements from the facade: another of the frequent obstacles for the pedestrians' mobility, especially blind people, are the objects hanging from the facades. Blind people who use a cane have the facade of the buildings as a reference to orient themselves in the sidewalks, until they find the tactile pavement that will guide them on the pedestrian crossing. For this reason, it is important to raise awareness among retailers that they must maintain the facades of the buildings free of products and exhibitors below a height of 2.20 m measured from the ground level.
- General maintenance: ensuring accessibility for people with disabilities requires a commitment to detail. A protrusion caused by a piece of unfixed pavement, by a tree root that alters the sidewalk surface, by the lack of an installation cover or by the uncontrolled growth of the plants can mean a severe barrier. For this reason, it is important to guarantee the general maintenance of the infrastructure, especially the good condition of the pavement, plants and signag.





**FINAL REMARKS**

# FINAL REMARKS

Transport infrastructures can be an opportunity for the improvement of the urban scene at the pedestrian scale. Due to their scope and function, public transport corridors favor the performance of combined actions that positively affect and improve urban environments dispersed by different sectors of the cities.

Through the promotion of complementarity between the major transport corridors and pedestrian mobility, accessibility in the city can be disseminated and mainstreamed. All this contributes to creating more inclusive cities, which guarantee the universal right to autonomous and safe displacement for the entire population. From the inclusion of people with functional diversity perspective, it can also mean an opportunity for the social inclusion of traditionally marginalized groups, such as the elderly or disabled population.

The results recorded and the lessons learned in the project developed around the stations of the Lima's Metropolitan BRT corroborate these statements. The overall impact of the project development can be found in the actions carried out by Protransporte as of the end of the 2nd Stage. Accessibility has increased in urban environments and also in Metropolitan stations. The actions carried out based on the project's recommended criteria represent an opportunity for the dissemination of a new way of intervening in the city urban areas, using criteria that prioritize accessible and safe pedestrian mobility.

The lessons learned reveal that, beyond the completion of the work of the pilot project, its positive results are supported by the development of a well-founded methodology, which allowed expanding the impact of the project to civil society and design practices. This means that, considering the objective of integrating inclusive design and universal mobility in Lima, the development process was as relevant as the completed works.

This is mainly due to the implementation of a novel project in a context in which there are no regulated parameters on accessibility. The process of assessment, analysis and development of customized solutions has favored the consensus and integration of the proposals.

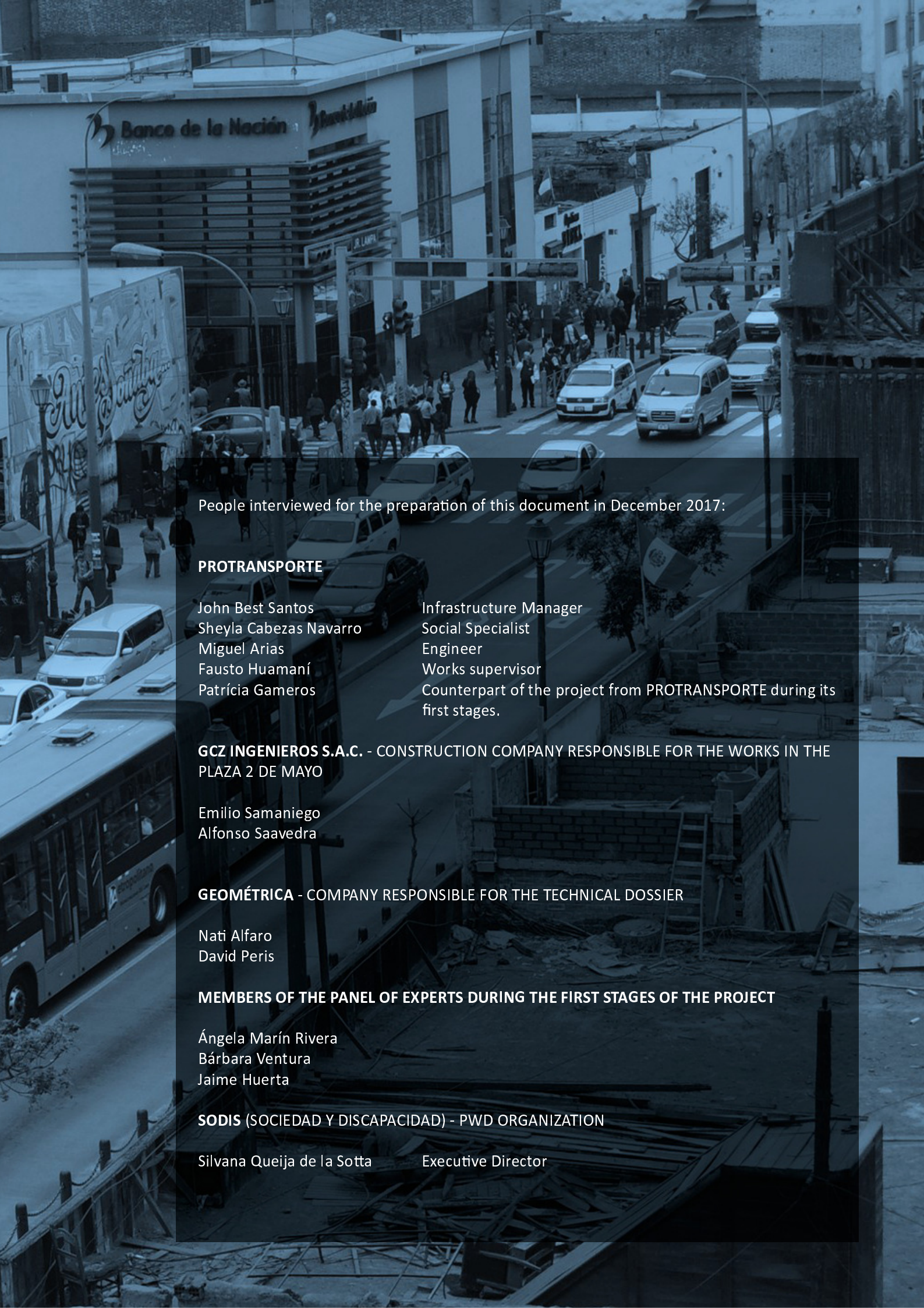
This process vision should serve, in future opportunities, to also integrate in the stages prior to the pilot project, instruments to facilitate the tasks of management and administrative consensus with other departments and areas of the Municipality. The inclusion of these departments in the initial debate on the project would have avoided many of the delays caused during the obtaining of licenses.

Finally, the technical references that constitute the legacy of the project, if collected and agreed upon in a technical guide, can serve as a basis for the development of other urban projects linked to transport infrastructures that will take place in the city.









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PROJECT:

“MAINSTREAMING INCLUSIVE DESIGN AND UNIVERSAL MOBILITY IN LIMA:  
ACCESSIBILITY IN THE URBAN ENVIRONMENT OF THE METROPOLITANO STATIONS”

DISSEMINATION REPORT

- December 2017 -