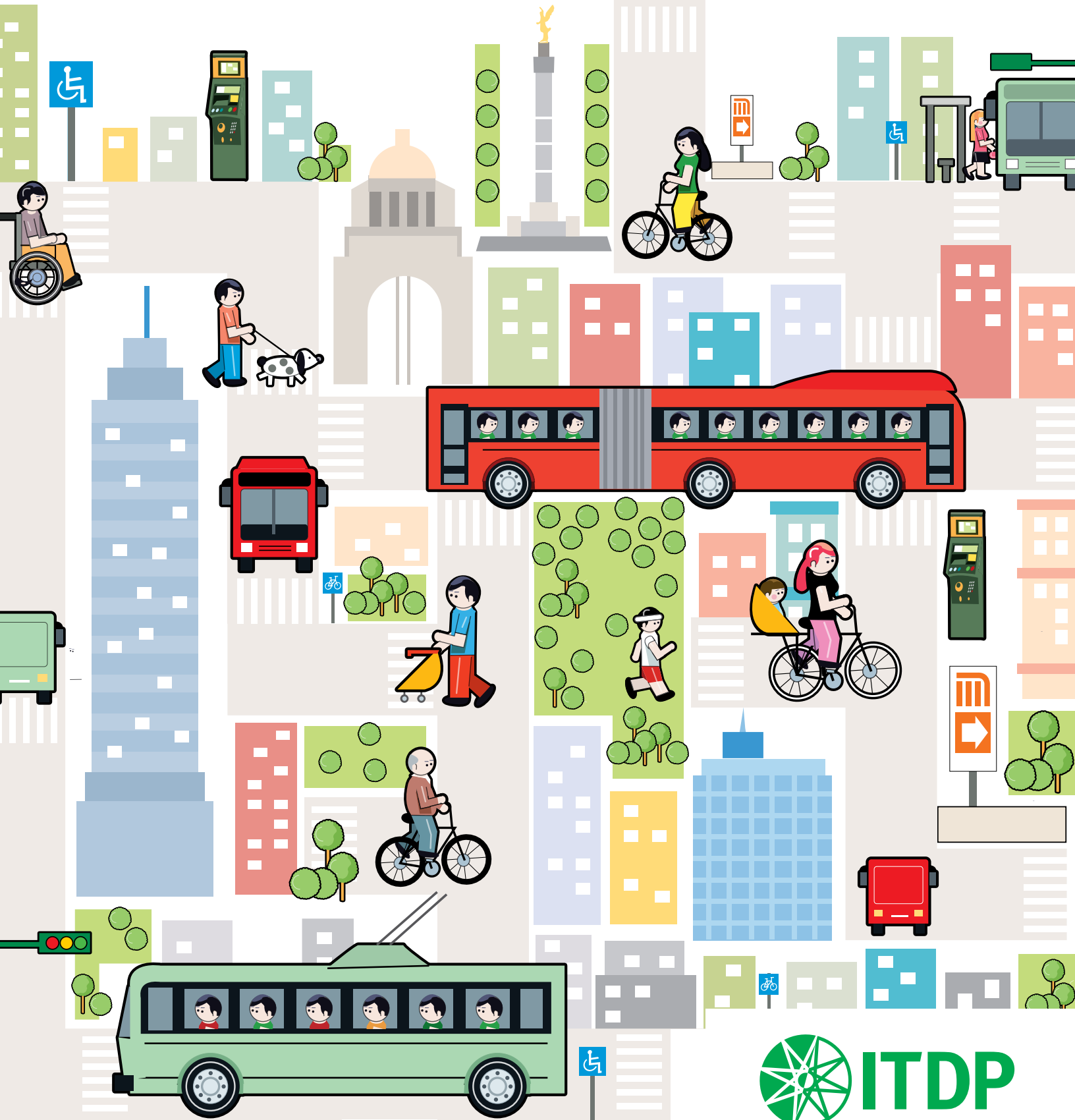


# TOWARDS A TRANSIT-ORIENTED DEVELOPMENT STRATEGY FOR MEXICO CITY

WORKING PAPER





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This document written by the Institute for Transportation and Development Policy Mexico (ITDP) was accomplished under the auspices of the British Embassy in Mexico, in the framework of the project "Low-carbon growth for Mexican cities through Transit-Oriented Development (TOD)". The project includes a series of investigations, analyses, and the creation of documents for public policy design that are specific to Mexico in order to encourage cities with low carbon emissions to help improve the quality of life of their inhabitants.

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## ABBREVIATIONS

- AEP** (as per the acronym in Spanish): Authority on Public Space.
- BRT**: Bus Rapid Transit.
- CETRAM** (as per the acronym in Spanish): Modal Transfer Center.
- COCETRAM**: Coordination of the Modal Transfer Centers of Mexico City.
- DF** (as per the acronym in Spanish): Federal District or Mexico City.
- TOD**: Transit-Oriented Development.
- ODS**: Origin-Destination Survey.
- GDF** (as per the acronym in Spanish): Government of Mexico City.
- Hab/ha**: inhabitants per hectare.
- INEGI** (as per the acronym in Spanish): National Institute of Statistics and Geography.
- INVI** (as per the acronym in Spanish): Institute of Housing.
- PGD** (as per the acronym in Spanish): General Development Program for Mexico City.
- PGDU** (as per the acronym in Spanish): General Urban Development Program for Mexico City.
- GDP**: Gross Domestic Product.
- PIM** (as per the acronym in Spanish): Integral Mobility Program.
- SCT** (as per the acronym in Spanish): Secretariat of Communications and Transport.
- SEDATU** (as per the acronym in Spanish): Secretariat of Agricultural, Territorial and Urban Development.
- SEDECO** (as per the acronym in Spanish): Secretariat of Economy.
- SEDUVI** (as per the acronym in Spanish): Secretariat of Urban Development and Housing.
- SEMARNAT** (as per the acronym in Spanish): Secretariat of the Environment and Natural Resources.
- SEMOVI** (as per the acronym in Spanish): Secretariat of Mobility of Mexico City.
- SETRAVI** (as per the acronym in Spanish): Secretariat of Transportation and Road Administration, now SEMOVI.
- SHCP** (as per the acronym in Spanish): Secretariat of Finance and Public Credit.
- SOBSE** (as per the acronym in Spanish): Secretariat of Public Works and Services.
- STC-Metro** (as per the acronym in Spanish): Collective public transport service-Metro.
- STE** (as per the acronym in Spanish): Electric Transport Systems.
- ZMVM** (as per the acronym in Spanish): Mexico City Metropolitan Area.
- ZODE** (as per the acronym in Spanish): Economic and social development area.

## LAND USES

- AV** (as per the acronym in Spanish): Green areas.
- CB** (as per the acronym in Spanish): Community center.
- E**: Equipment.
- EA** (as per the acronym in Spanish): Open spaces, sport spaces, squares, parks, gardens.
- ER** (as per the acronym in Spanish): Rural equipment.
- H**: Housing.
- HC**: Housing with commercial space on the ground floor.
- HM** (as per the acronym in Spanish): Mixed housing.
- HO**: Housing with offices.
- HR** (as per the acronym in Spanish): Rural housing.
- HRB** (as per the acronym in Spanish): Low density rural housing.
- HRC** (as per the acronym in Spanish): Commercial rural housing.
- I**: Industry.
- PE** (as per the acronym in Spanish): Environmental conservation area.
- PRA** (as per the acronym in Spanish): Rural agro-industrial production.
- RE** (as per the acronym in Spanish): Ecological rescue.

# GLOSSARY

**ACCESSIBILITY:** Ease of approaching and arriving at different destinations.

**MODAL TRANSFER CENTER:** Spaces where various modes of land passenger transport converge (individual, collective and mass) which are destined to ease the transfer of passengers from one mode to the other.

**INFORMAL TRADE:** Productive and trade activities carried out by small businesses that are not subject to VAT, and are mostly on public streets.

**POPULATION DENSITY:** Average number of inhabitants of an urban area in relation to a given area unit.

**EXTERNALITY:** It refers to the damages and benefits experienced by a third party or group of third parties due to the action of other persons or entities, which are negative when they harm a third party and positive when they are of benefit to it. Example of negative externality: the air pollution caused by a factory that harms the health of the inhabitants of a nearby settlement.

**UNEMPLOYED POPULATION:** Unemployed persons, that are actively seeking to pursue any legal economic activity.

**REUSE:** Use of spaces that are considered underutilized in order to add new functions, while still fulfilling the purpose for which they were established.

**RECYCLING:** Restoration or adjustment of already existing urban structures (buildings, cellars, ports, stations, etc.) for new uses, through renovation and construction of new elements.

**REDENSIFICATION:** Population increase in areas that previously had lost inhabitants, and therefore, had lost density.

**MINIMUM PARKING REQUIREMENT:** Regulation that establishes a minimum number of parking spaces that every new building has to have, according to the land use, line of business and square meters of the construction.

**INTELLIGENT MOBILITY SYSTEMS:** Set of technological solutions to improve mobility, such as the automatic detection of traffic violations, public transport fleet management and the planning of the traffic light network.

**LAND USE:** Activity that one is allowed to carry out in a certain plot, according to the regulations of urban development.

**MIXED USES:** Mix of various land uses (housing, trade, services, equipment) on one piece of land or one area.

**UNOCCUPIED HOUSING UNIT:** Housing that is not inhabited because it is damaged, under construction or set up as a temporary business.

**MEXICO CITY METROPOLITAN AREA:** Urban area consisting of Mexico City, 59 municipalities of the State of Mexico and one of the State of Hidalgo. According to the results of the census conducted by INEGI in the year 2010 this area had a population of around 20 million people.

**ECONOMIC AND SOCIAL DEVELOPMENT AREAS (ZODE):** Areas identified by the Government of Mexico City, that due to their location, land uses, equipment and services are subject to recovery, urbanization and redensification.

# EXECUTIVE SUMMARY

The urban sprawl of the Mexico City Metropolitan Area (ZMVM) in the last decades has been decoupled from mobility planning. As the urban development continues to grow, the same doesn't happen with the provision of quality public transport, which has mainly been restricted to Mexico City (DF).

This has resulted in two far from positive situations. On the one hand, the proliferation of poor quality licensed public transport has been allowed, such as minibuses. On the other hand, motorization and the use of automobiles have been directly encouraged, with tremendous economic, social and environmental costs for the population of the ZMVM.

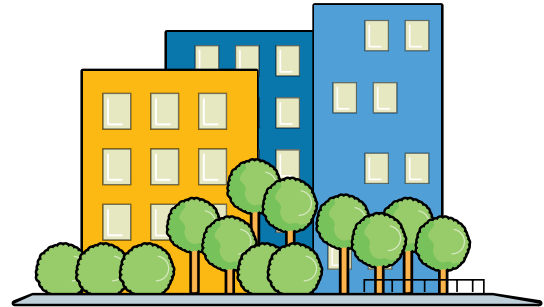
The city's road infrastructure does not have, nor will have the capacity to smoothly absorb and deliver the travels of the current large number of vehicles (5.5 million automobiles). This situation is a tremendous problem for the city, which consists in traffic jams, large amount of time for commute, pollution, loss of man hours, stress, health problems, among other things. Such negative externalities are estimated to cost around 4.6% of the GDP of ZMVM.

It is possible to solve this problem from its source, that is, the building of the city's living space. In order to do so, this document attempts to advance Transit-Oriented Development (TOD) in Mexico City as a strategy that will allow to reduce the need of traveling large distances and offer an opportunity for densification, so that travels can be done walking, using the bicycle and public transport.

This kind of strategy has been implemented in other cities throughout the world, such as Hong Kong, where 75% of the population lives one kilometer away from a transport station, or the cases of London with 53%, Copenhagen with 57% and New York with 48%. In Mexico City, 50% of the population has access to a mass transport station that is less than 1 km away from their home. However, in ZMVM this percentage is reduced to 29%, due to the limited supply of mass transport in the State of Mexico.

TOD implementation in Mexico City is possible thanks to the existence of a 442 km long quality public transport network, comprised of the Metro Collective Transport System (226 km), Metrobus (105 km), Electric Transport System (111 km), as well as the suburban rail (26 km) and me-xibus (34.5 km). At around 1004 stations (918 in DF) of the stations that compose that network, it is possible to find areas that are subject to redensification or reuse, or new areas according to the growth of the quality public transport network.

In that regard, opportunities to implement the TOD strategies in Mexico City were analyzed. It was found that within a 800 meter radius around the public transport stations there are:



**3,548** hectares around the public transport stations of low densities that affect the viability of public transport.

**163,355** unoccupied housing units around the transport stations, a housing solution for approximately 588,078 thousand people.

Other important findings were also:



Within a 400 meter radius around the metro stations, the residential use with offices reaches an average of 4.8 stories, compared to 9.3 stories in the rest of the city. If they were to be converted into residential use with offices (HO, as per the acronym in Spanish) 3,320.2 hectares would be available in order to increase the height to 4 or 5 additional stories.



The urban developments that are less than one kilometer from the mass transit stations, allocate approximately the same amount of surface area for parking (497 hectares) than for housing and commercial developments together (528 hectares).



Metro stations have building potential, because most of the times they only are one story high, whilst the authorized land uses allow for more stories.



There are mobility challenges in Insurgentes and Reforma due to the high employment level and public transport saturation, that need to be addressed in order to enable a real TOD. The northern and southern parts of the city show relevant percentages with unemployed population that are subject to implement employment and social policies, in order to decentralize employment in saturated areas.

Given this situation, a strategy is outlined to advance TOD, that on one hand requires building a new transportation infrastructure, and on the other hand, the modification of certain regulations in order to advance it. When combining both actions, it is possible to improve the orientation of the city's development towards transit. In order to achieve this, four different intervention types are being proposed: corridor development, CETRAM reuse, provision of public transport and transformation of areas that already have public transport. Altogether, these interventions have the potential of driving urban development and mobility policies towards one unique integrated TOD policy for DF.

Implementing this TOD policy requires close coordination and cooperation between the different government departments. A funding strategy is also needed, and is outlined together with this proposed strategy.

This document is only a first approach to what is involved in this kind of policy for Mexico City, and requires further and more detailed analyses that would lead the Government of Mexico City to generate TOD guidelines for the General Urban Development Program and even establish a special strategy in order to promote it.

Finally, it is worth bearing in mind that CONAPO (2012) estimates that the population in ZMVM will increase by 2 million in the year 2020. However, the projection considers that this growth will occur in the State of Mexico, and that Mexico City will even lose population. A TOD policy is instrumental in order to attract this growth towards Mexico City and avoid the expansion of the ZMVM towards areas that are not served by quality public transport. By using merely unoccupied housing units around the existing public transport, the housing needs of 29% of the population growth could be covered for the year 2020, and if one added the corridor proposals of ITDP, 34.7% could be reached.

The highest potential of a TOD strategy could be achieved if it included the entire ZMVM and the federal government was involved. If the government of the State of Mexico focuses on containing disorganized urban sprawl, and the federal government, besides funding mass transport (such as metro and mexibus) and subsidizing housing close to it, took advantage of projects such as interurban trains and the new Mexico City Airport to promote TOD, ZMVM would certainly be headed towards an equitable low-carbon growth.



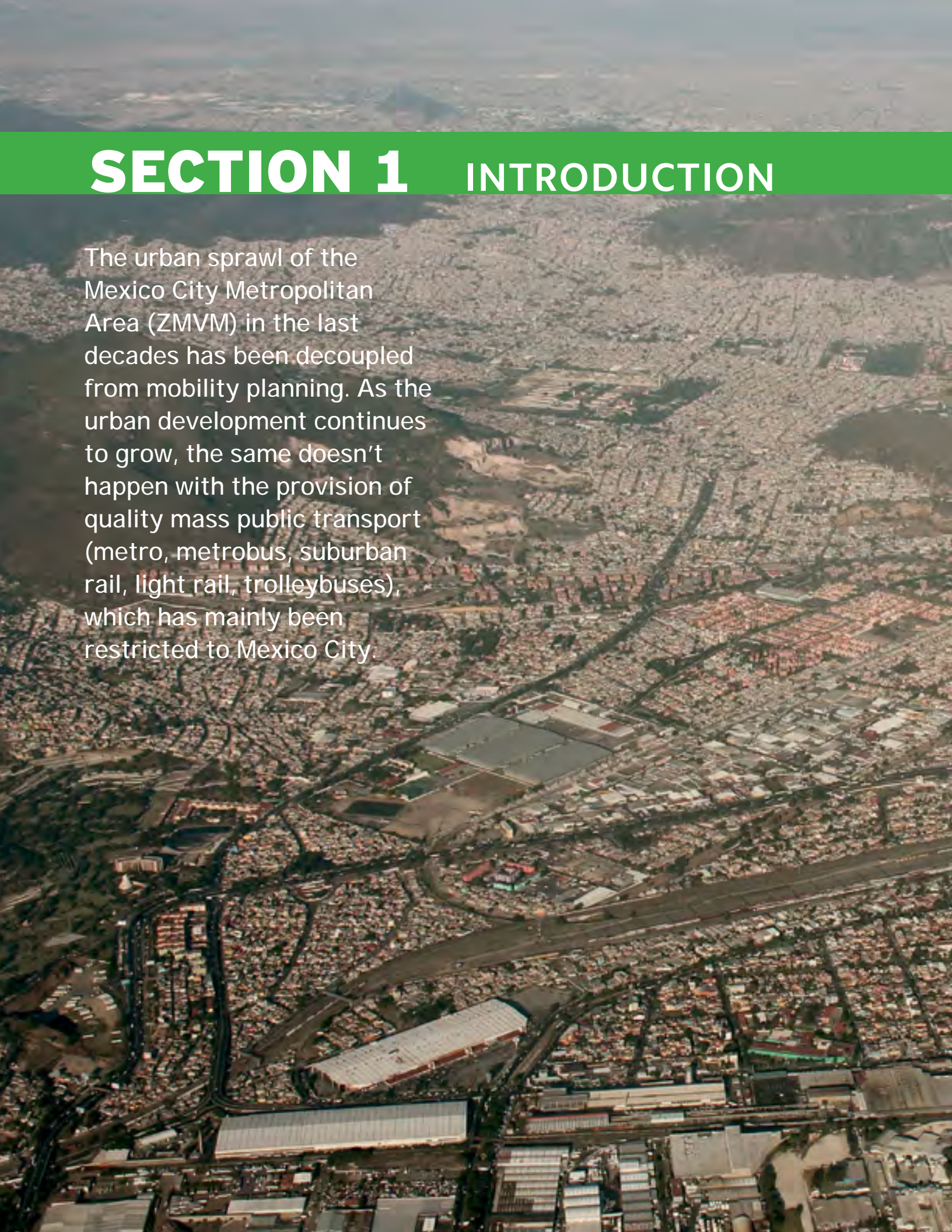


**MB** Metrobús



# SECTION 1 INTRODUCTION

The urban sprawl of the Mexico City Metropolitan Area (ZMVM) in the last decades has been decoupled from mobility planning. As the urban development continues to grow, the same doesn't happen with the provision of quality mass public transport (metro, metrobús, suburban rail, light rail, trolleybuses), which has mainly been restricted to Mexico City.

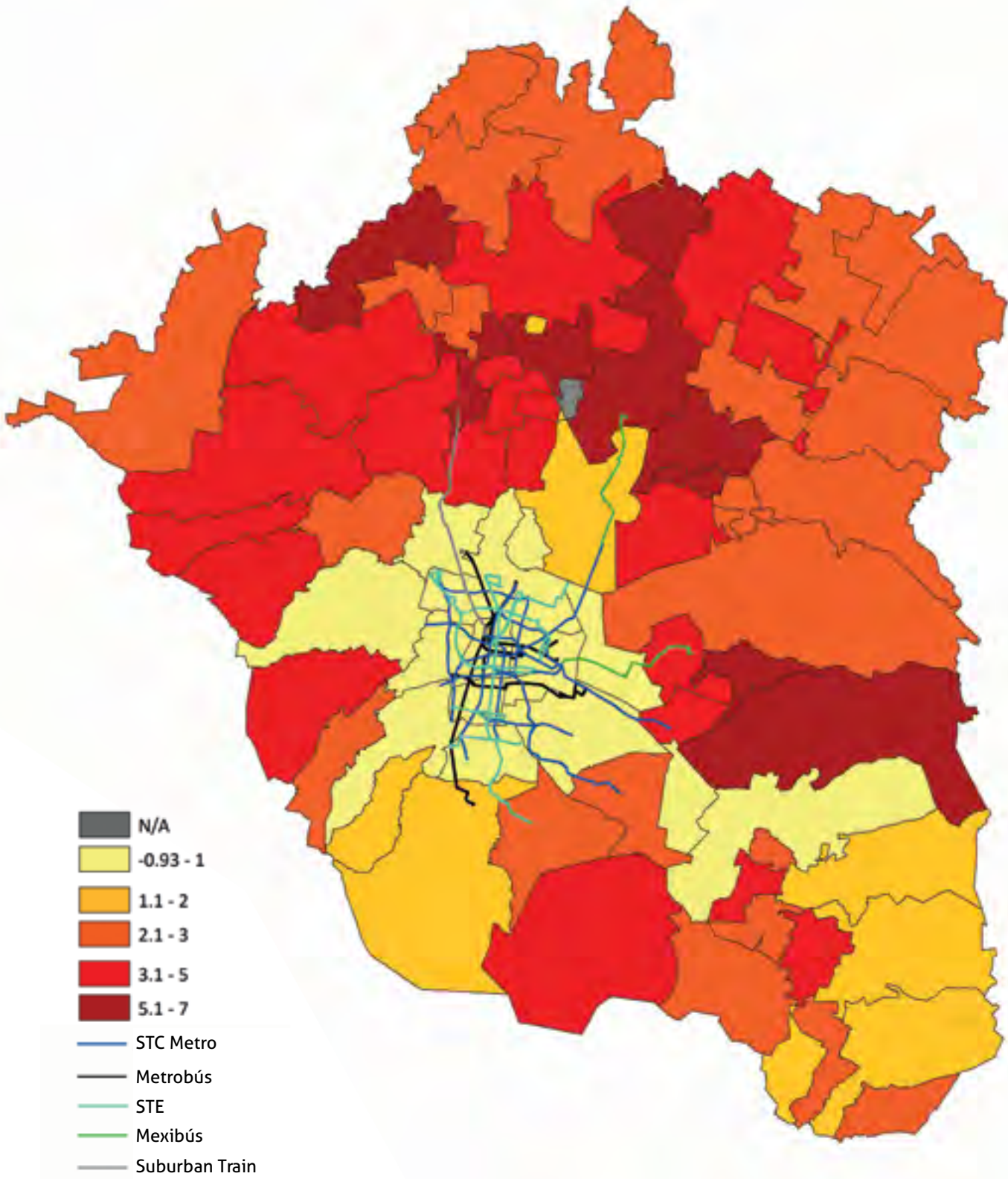








**PICTURE 1**  
**ANNUAL AVERAGE POPULATION GROWTH RATE OF THE MUNICIPALITIES IN THE ZMVM, 1990-2010**



**This** has resulted in two less than positive situations for sustainable mobility of the city. On one hand, there has been a proliferation of poor quality licensed public transport (such as microbuses) in order to address the transport demand over large parts of the urban area. On the other hand, the large distances and poor quality public transport have indirectly driven the growth of motorization and the use of automobiles. Only during the period 1990-2010, the annual growth of the number of automobiles in the ZMVM totaled 5.72% (INEGI, 2010). This increase results in tremendous social, economic, and environmental costs for the city. According to the Origin-Destination Survey (EOD) 2007 for the Mexico City Metropolitan Area (ZMVM), 20% of the trips are done by private car and 53.4% are done by microbuses.

The city's road infrastructure does not have, nor will have the capacity to smoothly absorb and deliver the travels of the current large number of vehicles (5.5 million cars). This situation, together with the chaos caused by poor quality licensed transport and cargo transportation causes tremendous problems to the city, which is reflected in traffic jams, long travel times, pollution, loss of man-hours, stress and health problems, among other things. These negative externalities cost around 4.6% of the GDP of ZMVM (Medina, 2012).

At the same time, these problems create a lot of pressure, which is attempted to be solved through strategies of more infrastructure for automobiles,

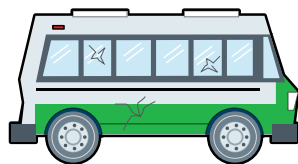
such as overpasses, parking, distributors and second stories. These solutions only exacerbate the problem in the medium term, because they encourage a greater use of automobiles (Litman, 2012).

It is possible to solve this problem from its source, that is, the building of the city's living space. In order to do so, this document attempts to promote Transit-Oriented Development (TOD) as a strategy that will allow to reduce the need of traveling large distances and offer an opportunity for densification, in a way that trips can be done walking, using the bicycle and public transport.

It is important to emphasize that historically, urban development strategies similar to TOD have been developed in Mexico City. The first experiences took place in 1969 and 1970 with the construction of office buildings of the first stations of the STC Metro. These buildings can be classified as transit-adjacent developments (see Box 1). This practice was abandoned during several decades and it wasn't until the recent building of licensed shopping centers that lead to the new use of the lands of the Multimodal Transfer Centers (CETRAM) that the model was restored.

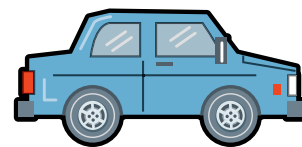
#### Mexico City Metropolitan Area, 2007

53.4%



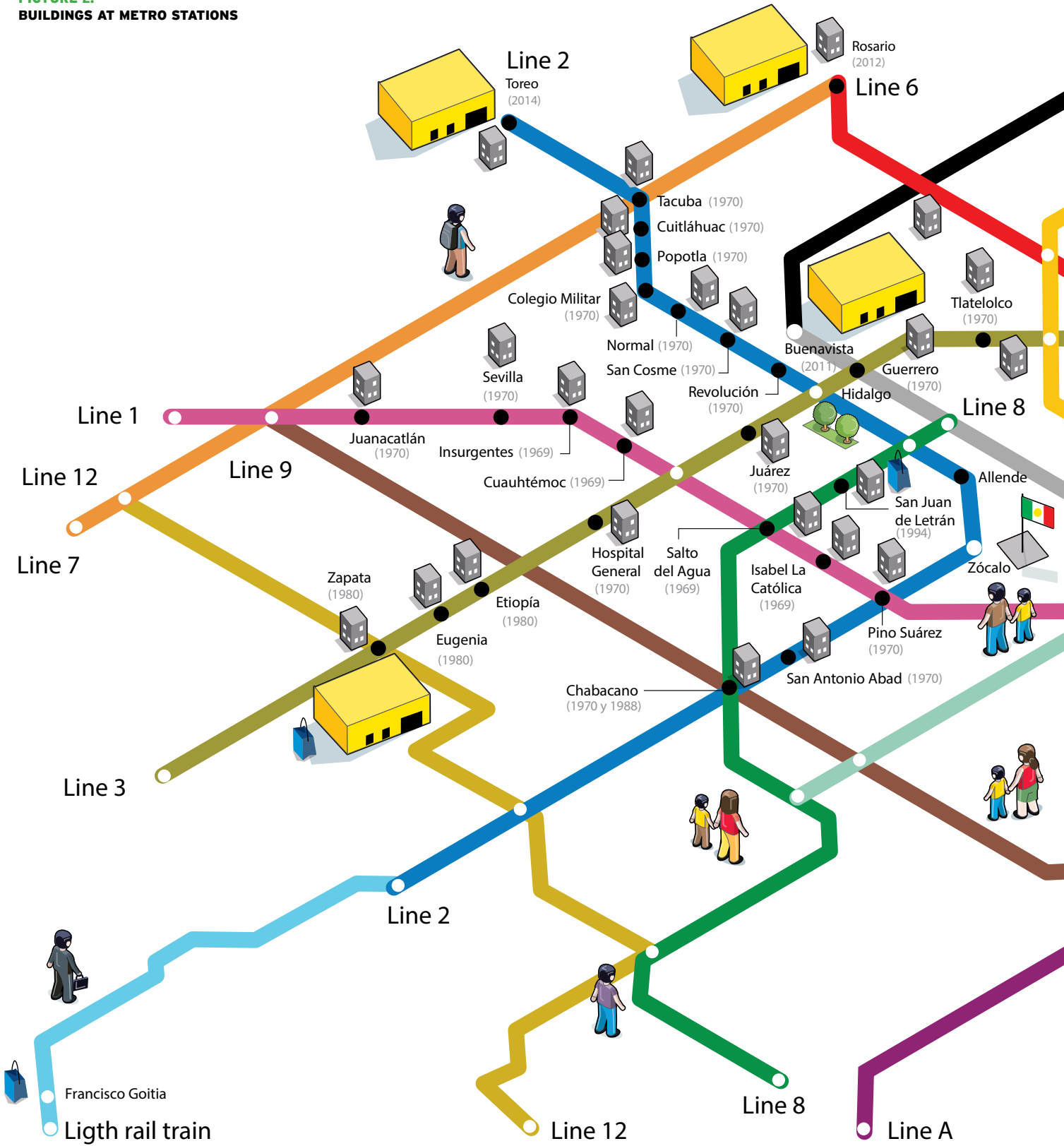
of the trips are done by microbus

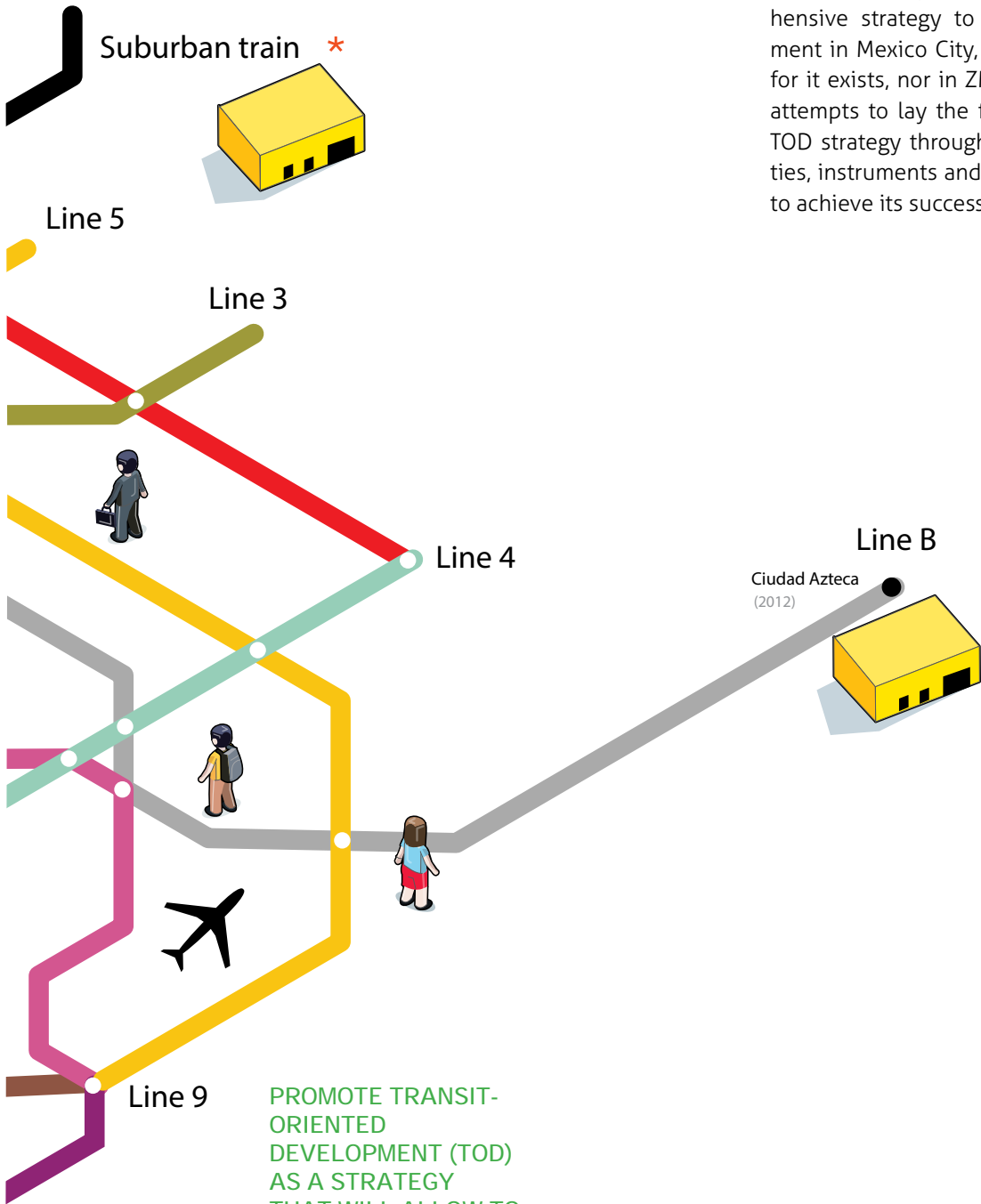
20%



of the trips are done by private car

**PICTURE 2:**  
**BUILDINGS AT METRO STATIONS**





PROMOTE TRANSIT-ORIENTED DEVELOPMENT (TOD) AS A STRATEGY THAT WILL ALLOW TO REDUCE THE NEED OF TRAVELING LARGE DISTANCES AND OFFER AN OPPORTUNITY IN A WAY THAT TRIPS CAN BE DONE BY WALKING, USING THE BICYCLE AND PUBLIC TRANSPORT.


However, this practice has not resulted in a comprehensive strategy to drive Transit-Oriented Development in Mexico City, where most of the infrastructure for it exists, nor in ZMVM. That is why this document attempts to lay the foundations for the creation of a TOD strategy through the identification of opportunities, instruments and other necessary policies in order to achieve its success.



**First**  
GENERATION  
OFFICES ADJACENT TO METRO STATIONS



**Second**  
GENERATION  
COMMERCE AND OFFICES ADJACENT TO METRO STATIONS



**Third**  
GENERATION  
SHOPPING CENTERS IN CETRAM

\* All stations count with small commercial centers.

**BOX 1**  
**TRANSIT-ORIENTED DEVELOPMENT**

It is a strategy that aims to integrate mobility and urban development in order to decrease the need for long-distance traveling and improve the accessibility to cities.

In order to achieve this objective, the TOD strives to make the neighborhoods around massive public transit compact, dense and of mixed use, to bring employment, housing, goods and services closer to each other. This way, the land is used more efficiently and it improves the habitability of the neighborhoods. The proximity to mass public transport is fundamental to TOD: it is recommended that it is located within a walking distance, not more than 800 meters<sup>1</sup>, of housing and employment.

The success of a TOD is not only guaranteed by the availability of public transport. Pedestrian and cycling mobility, as well as managing the use of parking, are also key elements of it, that will allow to discourage the use of automobiles and encourage public transport. In order to ensure that TOD has population diversity, it is important to include housing supply for different income levels.


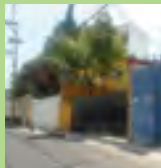
It is important to stress that TOD is more than a simple project attached to a public transport station: it is an area that surrounds a station. Creating a specific mix of land use and density within a walking distance does not necessarily make the use of public transport convenient for residents and employees. The land use mix should carefully blend together with the urban-economic function of the station and with the needs of the population that lives and works around it.

That is why creating environments with an attractive setting (placemaking, **SEE PAGE 66**) is so important for TOD, because it will result in the creation of specific areas that are integrated into public transport, that will allow to support active and sustainable communities.



<sup>1</sup> 800 meters equals to a 10-minute walk.

**TABLE 1**  
**DIFFERENCE BETWEEN TRANSIT-ORIENTED DEVELOPMENT AND TRANSIT ADJACENT DEVELOPMENT**

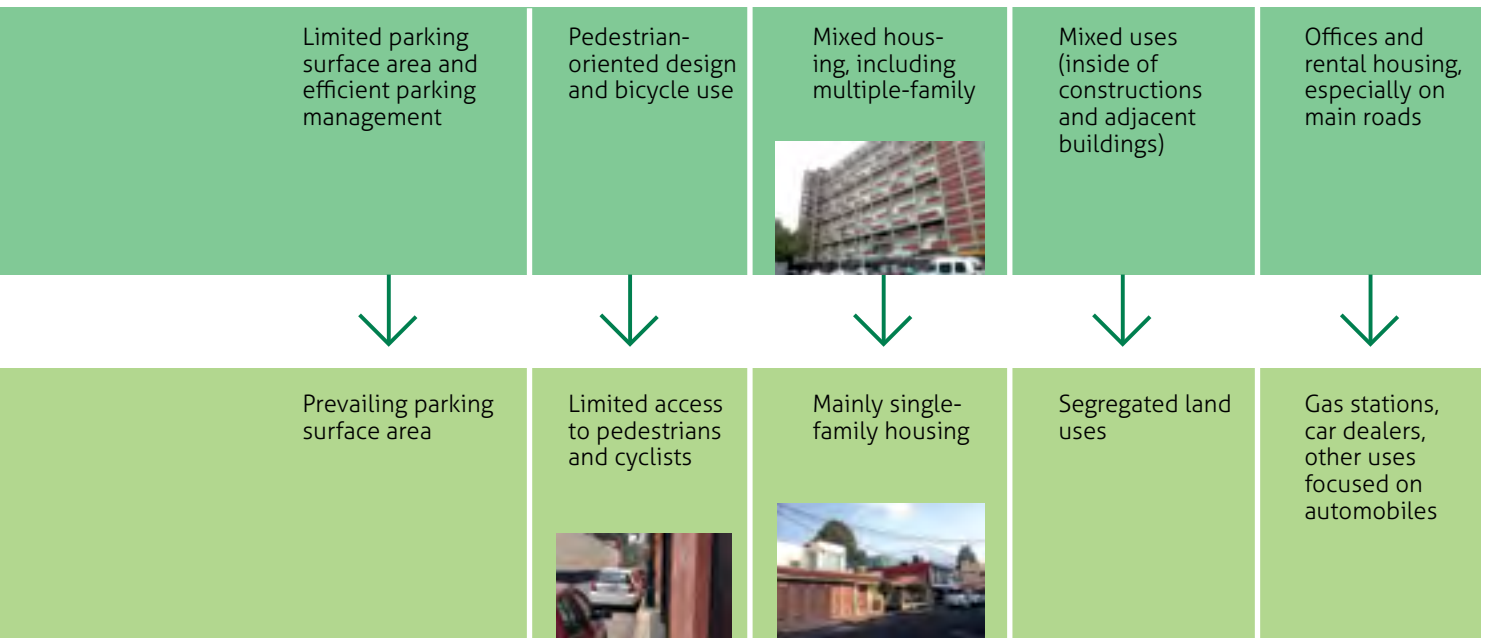
<b>TRANSIT-ORIENTED DEVELOPMENT</b>	Grid pattern on streets	High densities 	
	↓	↓	
<b>TRANSIT-ADJACENT DEVELOPMENT</b>	Suburban pattern on streets	Low densities 	

**BOX 2**  
**COMPARISON OF ACCESIBILITY TO PUBLIC TRANSPORT BETWEEN MEXICO CITY, ZMVM AND SELECTED CITIES OF THE WORLD**

The most important objective of a TOD policy is to maximize accessibility in cities in order to get the population closer to the places they visit and the activities they carry out. By reducing the traveling distances, it is easier to promote non-motorized transportation and public transport modes and thus achieve a decrease of travels by automobile. That is why the proximity of housing, employment and commerce to the public transport is a fundamental part in order to achieve the success of a TOD policy.

In cities where explicit efforts were made into orienting urban development around transport, we can see that a large part of the population is within a walking distance from it. The best example is Hong Kong, where around 5 million inhabitants live one kilometer or less





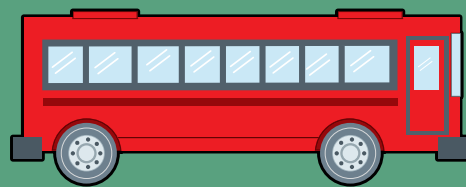
away from metro stations, which accounts for 75% of the population. This certainly helps explain the high use of sustainable transport in that city, where 84% of the inhabitants move on foot, on bicycles or by public transport.

In Copenhagen for example, where a strict compact urban growth policy exists around the rail system, 57% of the population live less than one kilometer away from transport stations. A modal distribution would not be possible without this policy, where 36% of the trips are made by bicycle.

Currently, 43% of the population in Mexico City have access to a mass transport station that is less than 800 meters away from their home. However, in the Metropolitan Area this percentage is reduced to 24%, given the limited supply of mass transport in the State of Mexico. A TOD strategy implementation both in DF as in the Metropolitan Area, would help ensure that a greater portion of the population has access to public transport.

# 43%

of the population in Mexico City has access to a mass transport station that is less than 800 meters away from their home.



City	Residents close to massive public transport (1km)
Hong Kong	75%
Londres	53%
Copenhagen	57%
Nueva York	48%
Mexico City	50%
ZMVM	29%

SOURCE: Renne, 2009.

SOURCE: LSE Cities, 2012; INEGI, 2010.

## 1.1 JUSTIFICATION

Implementing TOD strategies addresses various existing urban problems in Mexico City. The following can be specified:

### URBAN SPRAWL

The ZMVM sprawl reduces investment in DF in the short term, makes the consolidation of the markets of the entity difficult and complicates the administration of the city, having to coordinate with various entities for the provision of public services. Similarly, this reduces local tax collection, particularly the collection of property tax.

### INCREASE OF AUTOMOBILE USE AND ITS NEGATIVE EXTERNALITIES

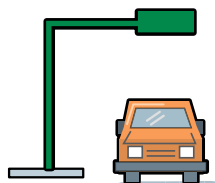
The urban sprawl of ZMVM and of Mexico City imposes high costs upon society in the form of negative externalities such as pollution, traffic, lost time during traffic jams and accidents.

### UNDERUTILIZED URBAN SPACE

Despite being the most densely populated entity nationwide, Mexico City has large areas of underutilized space that could be used for development based on TOD strategies.

### UNDERUTILIZED URBAN INFRASTRUCTURE

DF relies on a large amount of public service infrastructure, which includes transport. Redensifying the city through TOD strategies ensures that all public services will be used in the most efficient way and guarantees the financial sustainability in the long term.





URBAN FREEWAYS INCENTIVATE URBAN SPRAWL

Besides contributing to the solution of these problems, Transit-oriented development has six other main benefits and ten benefits that stem from them (**SEE PICTURE 2**). Due to these reasons governments might find it attractive to implement TOD policies. Likewise, local governments can justify a strategy of this kind because it is a self-financing measure with a high return on investment for public funds and society, as will be shown below.

It is important to emphasize that in order to achieve the full benefits, a broad institutional and

public policy coordination is needed.

All of this requires a coordination between different states and municipalities that form the ZMVM and the federation. Similarly, the strategy is only functional for those areas that already have quality public transport, or where a short-term implementation is expected, and not for the entire DF. Finally, in most cases the strategy requires years of maturing so that all the benefits are realized and it entails a follow-up of the strategy done by all the parties involved.

**PICTURE 3**  
**BENEFITS OF TRANSIT-ORIENTED DEVELOPMENT**

**MAIN BENEFITS**

**SECONDARY BENEFITS**

**1 INCREASE OF PASSENGERS AND INCOME**

**2 OPPORTUNITIES OF JOINT DEVELOPMENTS**

**3 REVITALIZATION OF NEIGHBORHOODS**

**4 ECONOMIC DEVELOPMENT**

**5 INCREASE OF AFFORDABLE HOUSING \***

**6 INCREASE OF THE LAND VALUE, RENTING, RETURN ON INVESTMENT ON REAL ESTATE \***

**A** Less car use and reduction of externalities: GHG, pollution, noise, accidents, etc. **1**

**B** Reduction of road costs and other infrastructure **1**

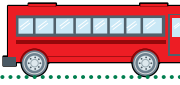
**C** Increase in retail sales \* **1 2**

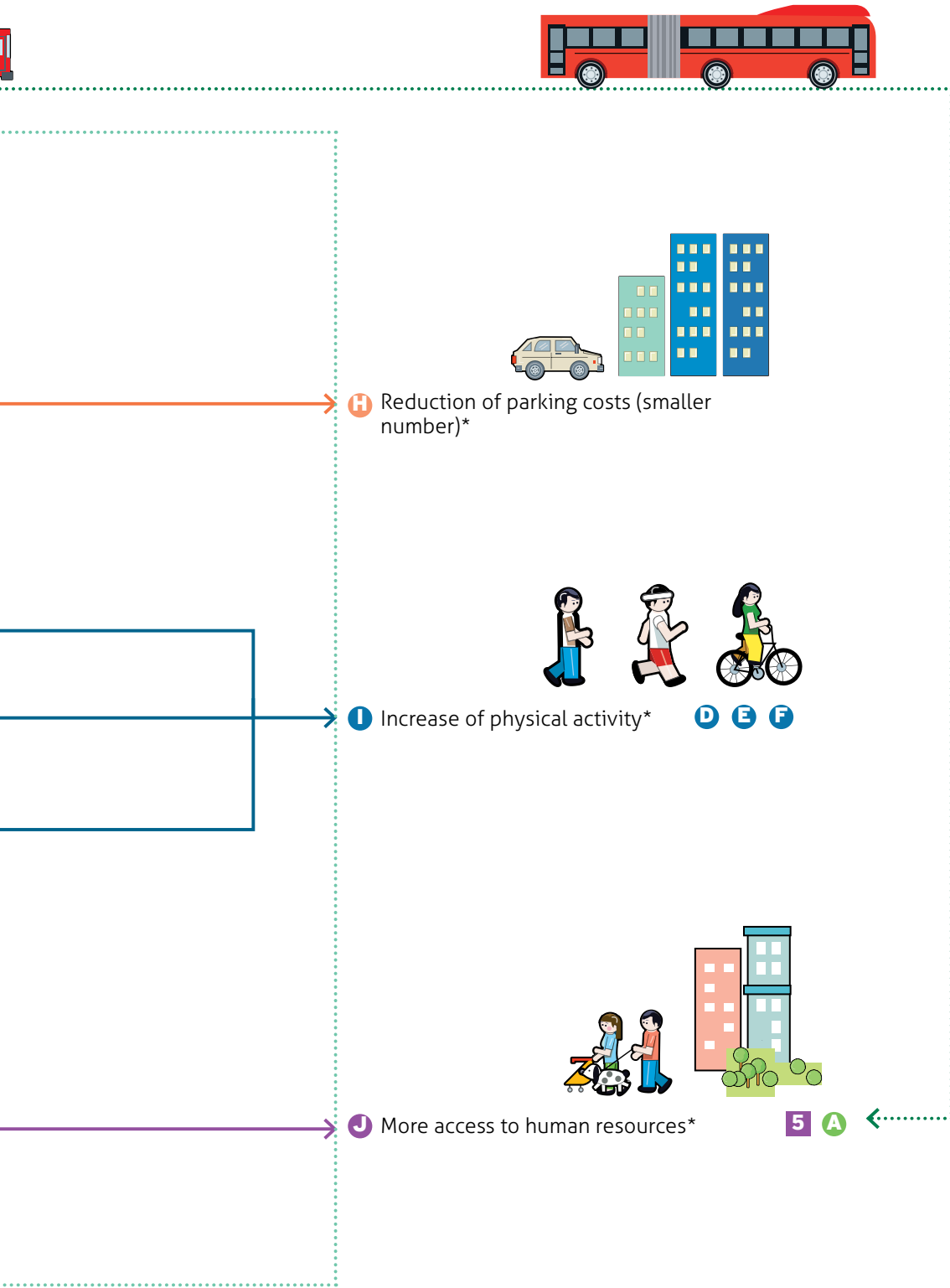
**D** Reduction of urban sprawl/conservation of open space **1 3 5**

**E** Crime reduction **3 4**

**F** Increase of social capital and public participation **3 4**

**G** Increase of tax collection **6 4**





**NOTE:**  
\*Private benefits. The remaining benefits are public. The values in brackets indicate the source of primary or secondary benefits.

# SECTION 2

Mexico City and ZMVM present significant opportunities to drive TOD, seen from different points of view. DF has a network of 431.5 km of quality public transport, consisting of the Metro Collective Transport System, Metrobus, Electric Transport Service (that operates the light rail and trolleybuses), as well as one suburban rail line.

Within a 800 m radius around the 918 stations that make up this network, it is possible to find areas that could be used for redensification, where there is potential to attract more inhabitants and employment or that could be subject to reuse, and where there is a possibility to change the use of the area (for example, from an industrial area into a mixed-use area), or new areas according to the growth of the quality public transport network.

In this section, all of the opportunities are identified, which will allow to outline a general strategy to promote TOD in the city.





# IDENTIFYING OPPORTUNITIES FOR TOD



### BOX 3

## WHY USE A 800 METER DISTANCE AROUND PUBLIC TRANSPORT?

The proximity to a public transport station is a fundamental aspect when making the decision of using or not using this mode of transportation. Guerra and Cervero (2013) have found that a greater proximity of housing and employment to public transport creates a higher number of station users. An increase of 10 per cent of the inhabitants living 800 meters from a stations equals to an increase of up to 3.5 per cent of transport users.

The zone of influence of public transport is mostly established by the willingness of users to walk the distance between the stations and their destinations. In this publication, we use a zone of influence of 800 meters for mass transport, given that it is the estimated distance that users are willing to frequently walk

in order to reach a mode of transportation. 800 meters equals roughly to a 10-minute walk.

However, the zone of influence of a specific mass transport station should not be solely established with a standard distance. It is important to consider the urban context in which the station is found, as well as the existing barriers to access it. For example, the existence of controlled access roads, large premises, parks or water bodies, can decrease the zone of influence of a station. Likewise, the existence of appropriate pedestrian and cycling infrastructure around it can offer easy access, and therefore, can expand the influence of the public transport.



Fuente: Google Maps.

The CETRAM Indios Verdes can be seen in this image, as well as the workshops of the metro (marked in red) that constitute an urban barrier that reduces the zone of influence of the metro and metrobus stations of Indios Verdes.

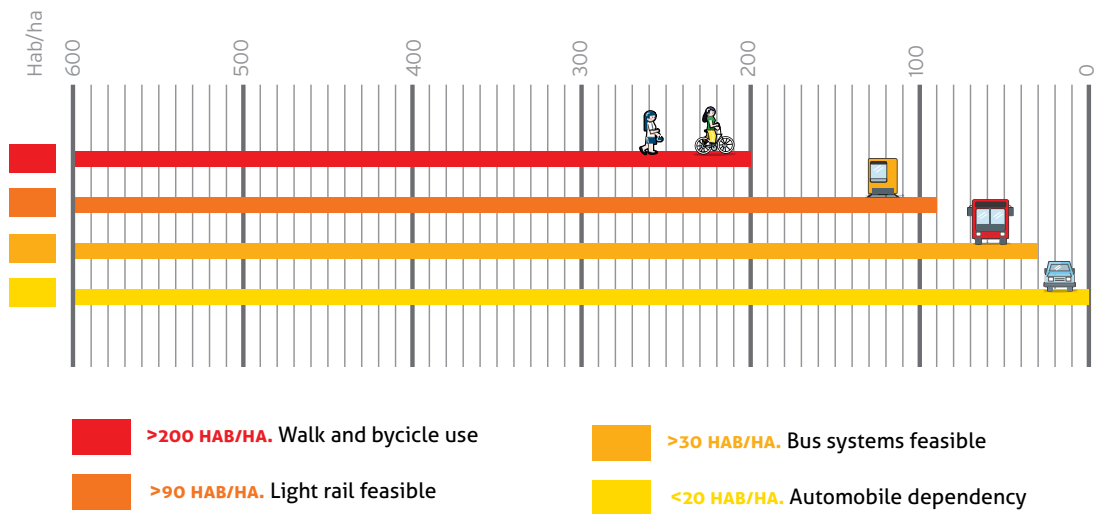


## 2.1 OPPORTUNITIES REGARDING POPULATION AND HOUSING

TOD requires a population that lives around quality public transport stations. The ideal densities should be higher than 90 inhabitants per hectare (hab/ha), because that is how the implementation of light rail or a BRT can be enabled. With densities between 30 and 90 hab/ha, public transport is still feasible, but in the form of a bus network. Below these densities, it becomes too expensive

to provide a public transport system, and it creates communities that depend on the use of private automobiles. However, there are areas in the city that exist around public transport and have a population density below 90 hab/ha, which is why it is relevant to identify these areas in order to implement redensification policies.

**PICTURE 4**  
**VIABILITY OF MODES OF TRANSPORT AND POPULATION DENSITIES**

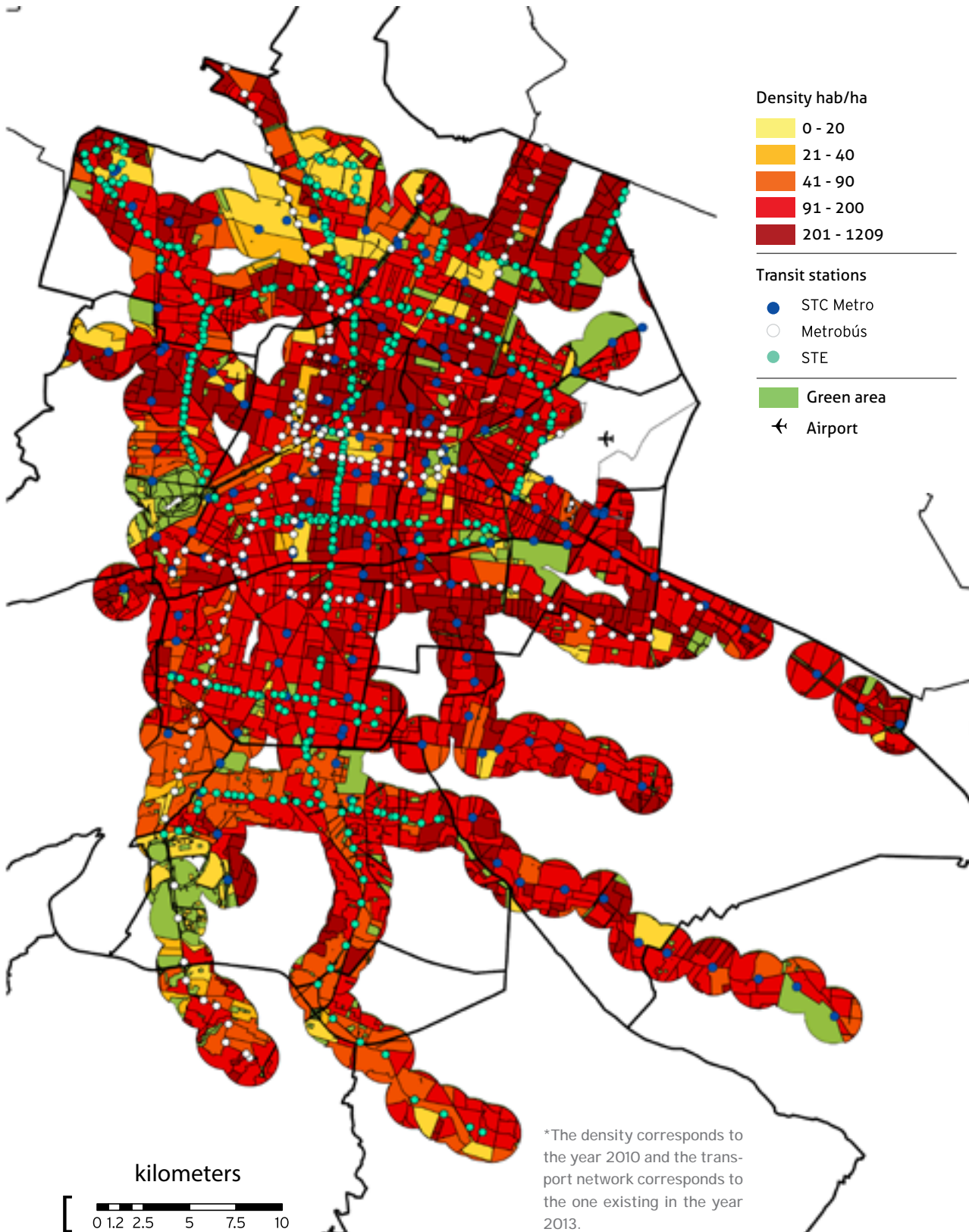


Source: It was developed based on data from UN-HABITAT (2013).

Through a geospatial analysis, it is possible to identify 3,548 hectares around public transport stations with low densities (less than 30 hab/ha), which are mainly located around metro lines 5 (in

the north) and 6 (in the west), around metrobus line 3 (in the northwest) and 4 (historic city center), as well as in some sections of the light rail and suburban rail.

**PICTURE 5**  
**POPULATION DENSITIES 800 METERS FROM PUBLIC TRANSPORT IN MEXICO CITY**



Source: prepared by ITDP with data from INEGI and SETRAVI-DF.

At the same time, it is possible to increase the densities of various areas around the public transport stations, without having to increase the built space. This is because there are areas with a large amount of unoccupied houses in the city. According to an analysis carried out with data from the 2010 Population and Housing Census, 163,355 unoccupied houses around transport stations were identified. These do not necessarily correspond to areas of low densities.

It is striking that there are areas with a high percentage of unoccupied houses that are mainly

found in the historic city center (the area with the best provision of public transport), the Reforma corridor besides the area of Polanco, as well as the southern section of Avenida Insurgentes (metrobus line 1) and Avenida Tláhuac (metro line 12).

If all houses were occupied, considering that the average population per house is 3.6 persons, this would mean that there would be a housing solution for 588,078 thousand people in Mexico City. All the above would be possible without the need to develop housing units away from quality public transport.

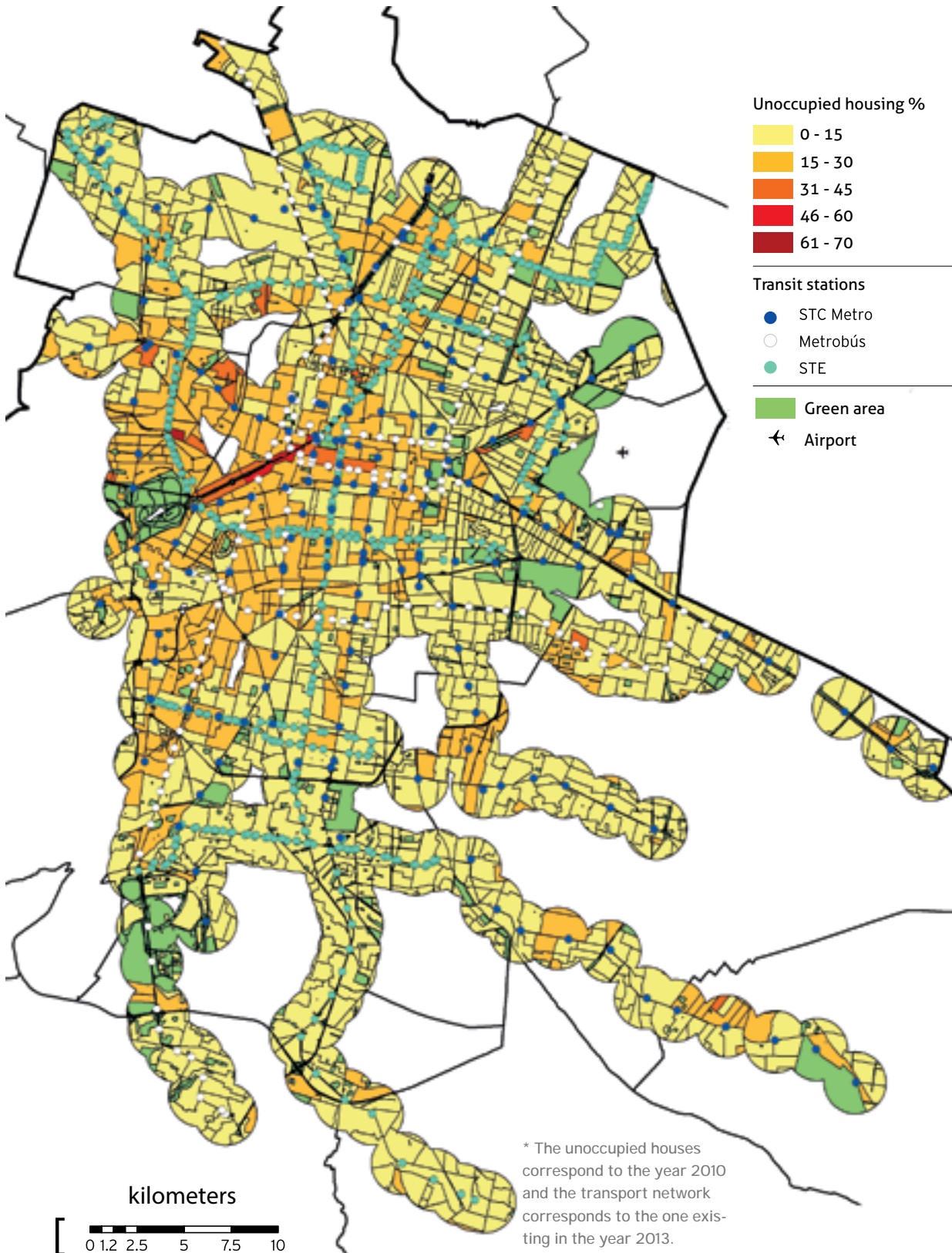


ABANDONED BUILDING IN DOCTORES NEIGHBOURHOOD

<sup>2</sup> They correspond to the year 2010 based on information from INEGI.



**PICTURE 6**  
**UNOCCUPIED HOUSING 800 METERS FROM PUBLIC TRANSPORT STATIONS IN MEXICO CITY**

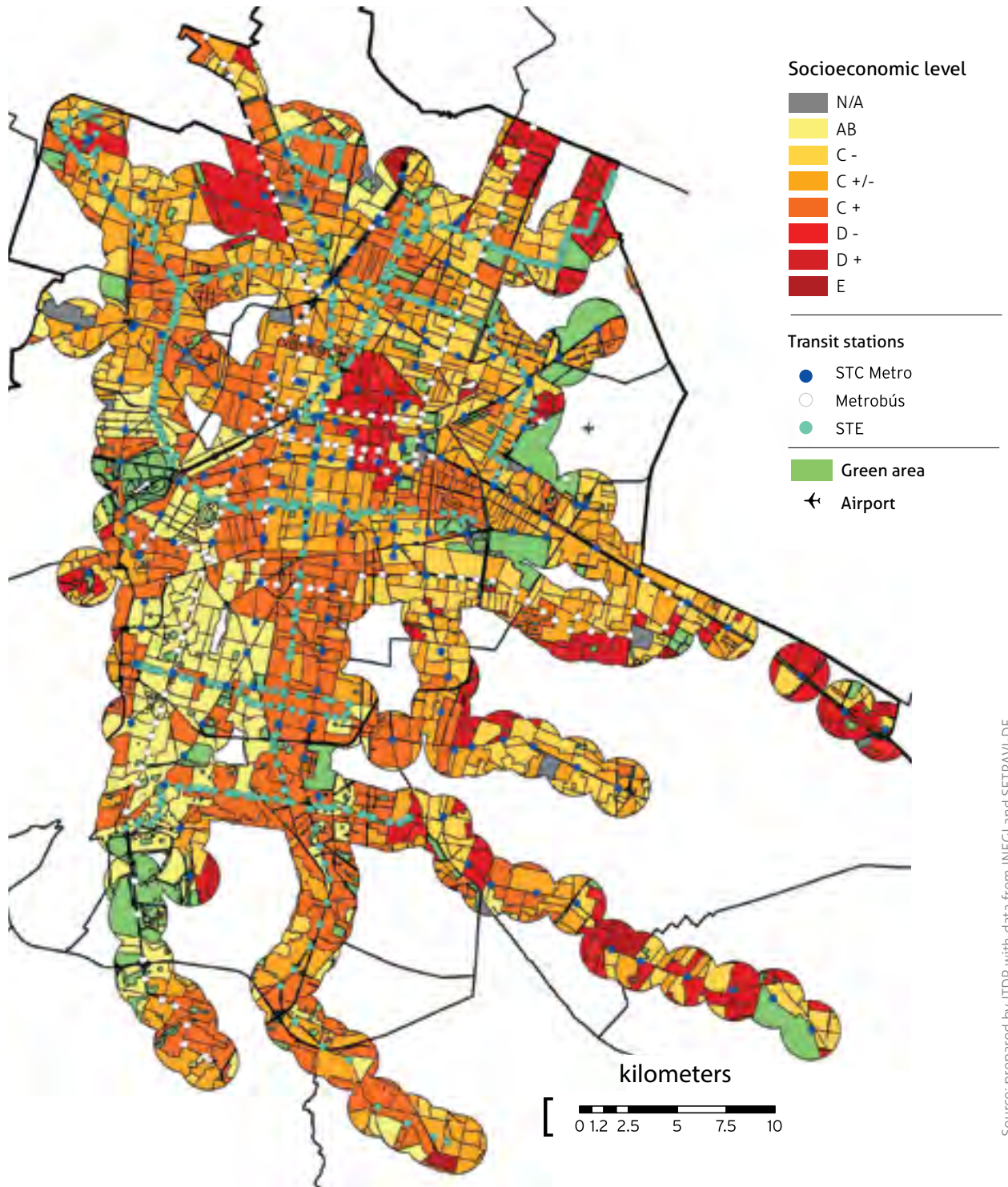


Source: prepared by ITDP with data from INEGI and SETRAVI-DF.

Another possibility is to identify the areas of the city with the lowest socioeconomic level. These are priority areas, where the population could highly benefit from TOD strategies that would

offer them more options regarding transport, commerce and services, thus reducing their transportation expenses.

**PICTURE 7**  
**SOCIOECONOMIC LEVEL 800 METERS FROM PUBLIC TRANSPORT IN MEXICO CITY**



Source: prepared by ITDP with data from INEGI and SETRAVI-DF.



## 2.2 OPPORTUNITIES REGARDING EMPLOYMENT

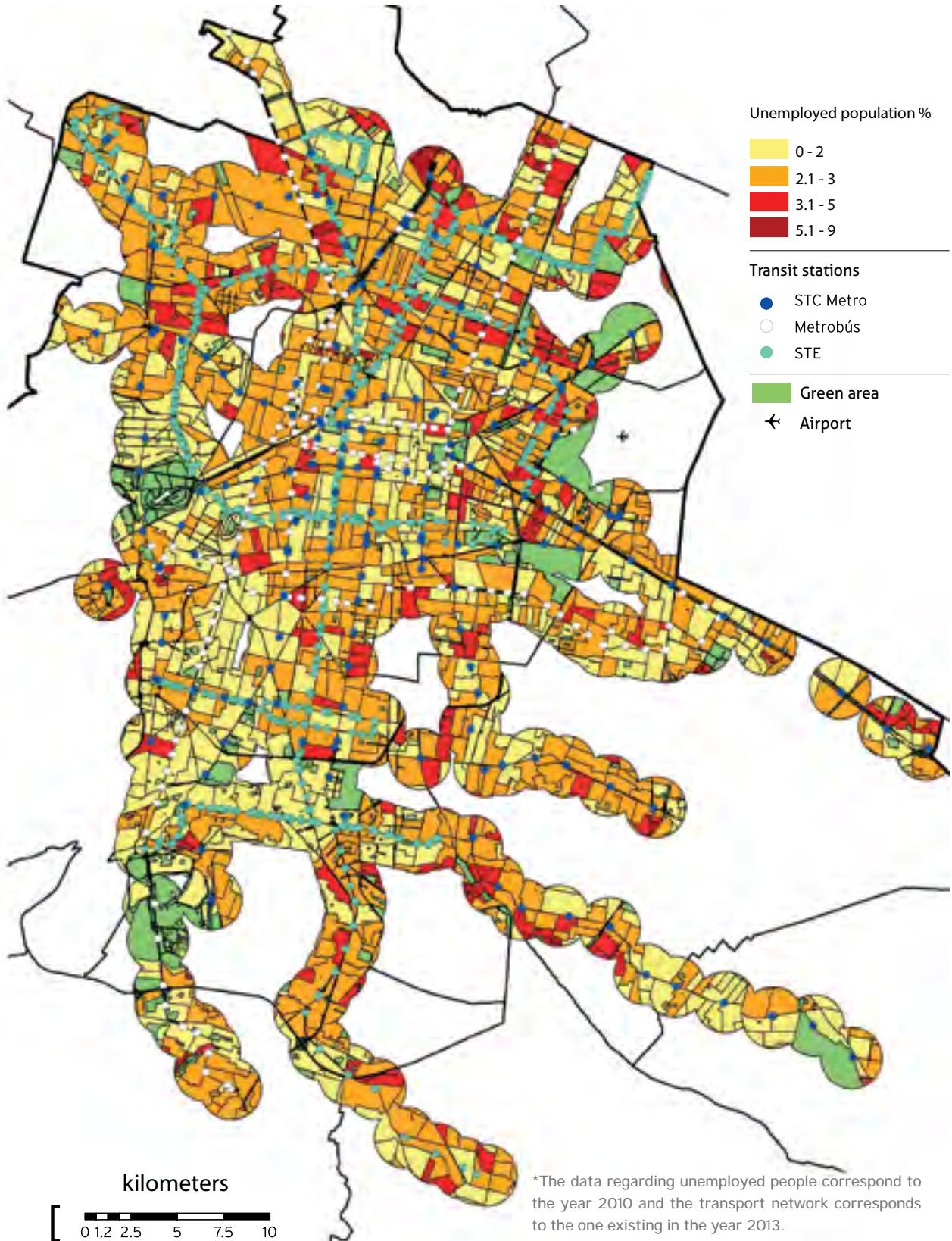
Identifying areas that have a high rate of unemployed population also allows to recognize areas that are subject to land use diversification, in order to invigorate the local economy and thus create employment. It should be noted that this diversification should be complemented by other social policies that strengthen the creation of job positions and the use of existing human resources in that area. Only allowing the opening of micro-enterprises for commercial purposes does not guarantee the creation of a dynamic economy that will generate jobs, and certainly not in areas with high unemployment rates that entail a low level of consumers.

It is possible to identify that the areas with less working population are distributed throughout the city, with a high concentration in the south. That is where a higher number of mixed-use developments can be promoted, which would decrease the pressure from the real estate sector in the city center area, that increases the land prices and prevents its redensification. This way, the number of travels to that area would decrease and the infrastructure would be used in a much more efficient manner.



ZERO-EMISSION TROLLEYBUS CORRIDOR AND ECOBICI ARE USED BY WORKERS OF THE ZONE

**PICTURE 8**  
**UNEMPLOYED POPULATION 800 METERS FROM PUBLIC TRANSPORT STATIONS IN MEXICO CITY**



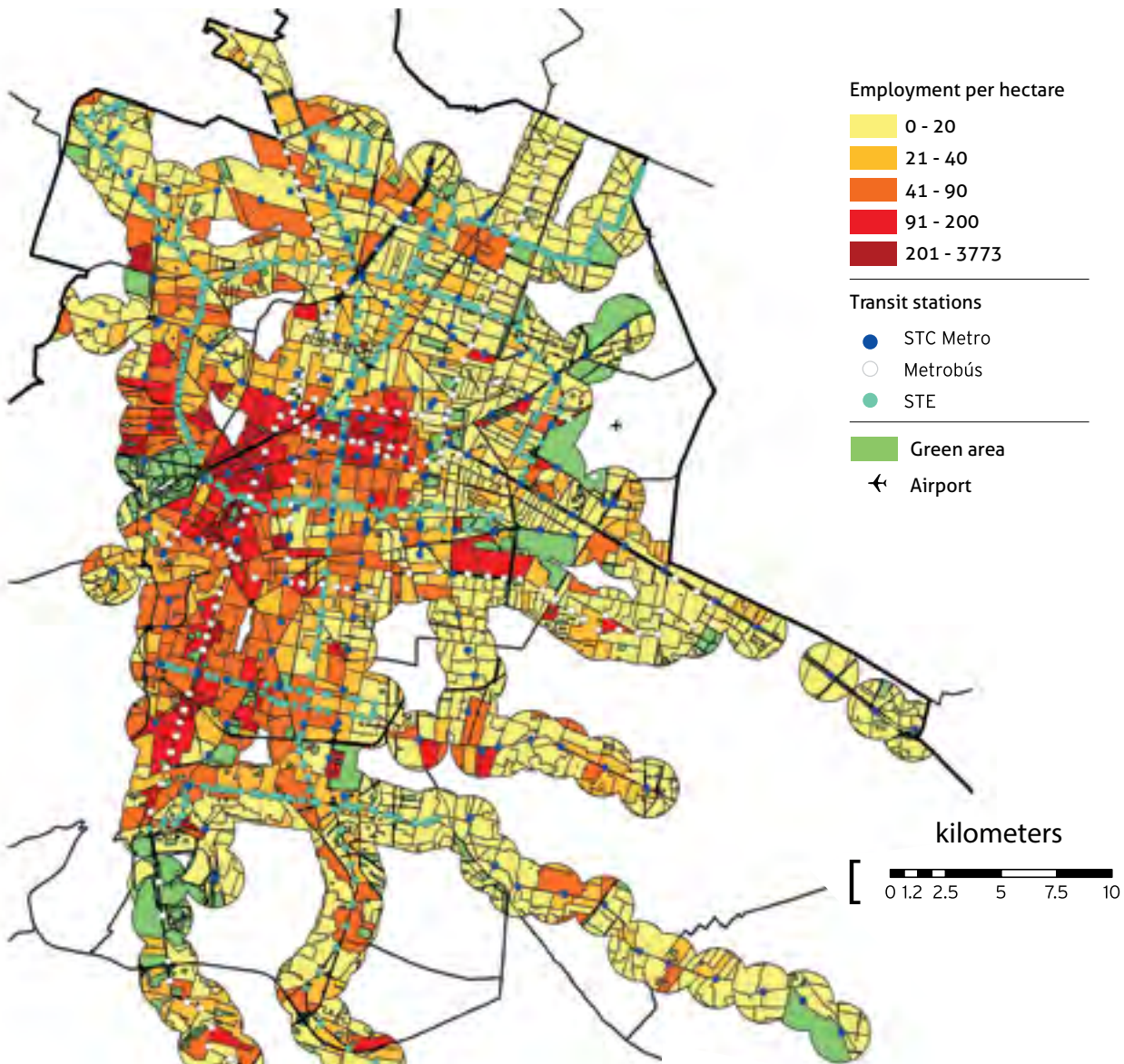
Source: prepared by ITDP with data from INEGI and SETRAVI-DF.



On the other hand, it is possible to identify areas with a large number of jobs around public transport stations. These are mainly concentrated in the delegaciones Cuauhtémoc and Benito Juárez, around the metro line 1 and the Insurgentes corridor. More than opportunities, these areas present

challenges because they require maintaining the housing supply, or social housing policies, to avoid that the land use for business and commercial purposes stimulates the depopulation of the areas as well as gentrification.

**PICTURE 9**  
**EMPLOYMENT 800 METERS FROM PUBLIC TRANSPORT STATIONS IN MEXICO CITY**



\*The data regarding jobs correspond to the year 2010 and the transport network corresponds to the one existing in the year 2013.

**NOTE:** Due to the methodology used in economic censuses, the sum of the employed staff of an institution or company includes all of its employees, even if they work at a different location from where the census was taken. That is why the number of jobs that are close to transport is only an approximation.



## 2.3 OPPORTUNITIES REGARDING UNDERUTILIZED SPACE

One of the greatest opportunities of implementing TOD strategies is identifying areas where the building potential is not utilized to its full capacity, although the law allows it, or where there is available space that has not yet been developed and is in the hands of the government.

It is possible to identify the first case by comparing the allowed land use with the real use around public transport stations. As an example of the second case, all spaces that are in the hands of the government linked to public transport stand out, and particularly large areas dedicated to CETRAM.

### 2.3.1 BY LAND USE

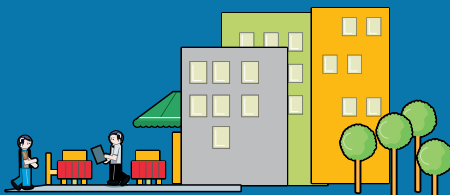
According to the numbers of PUEC-SETRAVI (2013), the most common land use within a 400 meters radius around the STC-Metro stations is housing (with an average height of 3.4 stories), followed by housing with commercial space on the ground floor (with an average height of 4.2 stories). The

third place is taken by mixed housing (with an average height of 4.5 stories) and the fourth is the use for equipment. Although these uses have an average height that is greater than the city's average, it is clear that they have stories of relatively low heights.

**TABLE 2**  
**NET SURFACE ARE BY TYPE OF LAND USE IN MEXICO CITY AND AROUND STC-METRO**

Total land use	Mexico City			Within a 400 meter radius around metro stations		
	Area (Ha)	%	Average of stories	Area (Ha)	%	Average of stories
AV	1,733.7	2.8	0.4	49.7	0.8	0.0
CB	516.0	0.8	2.5	81.0	1.2	3.2
E	5,752.8	9.2	1.6	826.4	12.7	2.9
EA	2,493.2	4.0	0.0	410.8	6.3	0.0
ER	399.2	0.6	0.1			
H	22,362.0	35.9	2.9	2,100.6	32.3	3.4
HC	9,597.5	15.4	3.2	1,817.2	27.9	4.2
HM	4,763.6	7.6	4.0	947.6	14.6	4.5
HO	239.8	0.4	9.3	20.9	0.3	4.8
HR	2,508.2	4.0	2.1			
HRB	2,478.9	4.0	2.0			
HRC	623.3	1.0	2.0			
I	1,361.2	2.2	0.0	257.7	4.0	0.0
PE	3,350.3	5.4	0.0			
PRA	2,165.7	3.5	0.0			
RE	1,960.0	3.1	0.0			
<b>TOTAL USE</b>	<b>62,305.5</b>	<b>100.0</b>		<b>6,511.9</b>	<b>100.0</b>	

Sources: SETRAVI-PUEC, 2013.



**AV.** Green areas, **CB.** Community center, **E.** Equipment, **EA.** Open spaces, sport spaces, squares, parks, gardens, **ER.** Rural equipment, **H.** Housing, **HC.** Housing with commercial space on the ground floor, **HM.** Mixed housing, **HO.** Housing with offices, **HR.** Rural housing, **HRB.** Low density rural housing, **HRC.** Commercial rural housing, **I.** Industry, **PE.** Environmental conservation area, **PRA.** Agro-industrial rural production and **RE.** Ecological rescue.

Particularly, the housing use with offices stands out because it only takes 0.3% of the surface area around metro stations and reaches an average of 4.8 stories, compared to 9.3 stories in the rest of the city. In this sense, and given the city's economy took a turn towards the service sector, the opportunity lies in fostering the housing land use with office and aiming to achieve the average stories of the rest of the city. It is particularly important to implement that plan around all stations, because that land use has the greatest potential

and is the least abundant of all. As an example, if the housing use (H) and the housing use with commercial space on the ground floor (HC) were transformed into housing use with office space (HO), there would be 3,320.2 hectares available to increase the height from four to five stories.

Among all the metro lines, the line 4 stands out, with a concentration of housing land use with office space that is due to the legislative area of San Lázaro, which is not mixed-use.

TABLE 3  
NET SURFACE AREA BY TYPE OF LAND USE IN A RADIUS OF 400 METERS FROM THE METRO LINE

Line	AV	CB	E	EA	H	HC	HM	HO	I	Total area (Ha)
1		5.8	100.2	19.1	146.7	206.7	147.5	1.1	0.8	627.9
2	8.2	8.2	90.5	45.8	348.9	171.7	94.8		21.7	789.9
3	17.7	1.2	67.1	38.9	295.5	141.5	51.9			613.8
4			31.5	22.5	32.8	179.2	11.7	13.6	23.8	315.1
5			97.9	8.0	88.0	173.4	0.9		15.7	383.9
6		2.6	38.7	5.0	16.9	78.5	40.2		94.3	276.1
7	3.0	5.3	12.1	61.1	167.7	87.1	41.2	1.0	9.4	387.9
8	0.1	0.4	40.0	24.4	217.8	147.9	90.0		35.0	555.5
9			18.4	61.7	68.8	81.1	30.3			260.4
12		8.7	56.2	20.6	397.0	5.8	121.9			610.2
A		8.5	27.8	2.1	56.0	26.8	97.8			219.0
B	20.8	19.1	25.5	33.3	61.2	123.1	17.8		18.5	319.3

TOTAL AREA (Ha)	49.7	59.7	605.9	342.5	1897.5	1422.7	746.2	15.8	219.3	5359.2
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Line	AV	CB	E	EA	H	HC	HM	HO	I	Sum (%)
1		0.9	16.0	3.0	23.4	32.9	23.5	0.2	0.1	100.0
2	1.0	1.0	11.5	5.8	44.2	21.7	12.0		2.7	100.0
3	2.9	0.2	10.9	6.3	48.1	23.0	8.5			100.0
4			10.0	7.1	10.4	56.9	3.7	4.3	7.6	100.0
5			25.5	2.1	22.9	45.2	0.2		4.1	100.0
6		0.9	14.0	1.8	6.1	28.4	14.5		34.1	100.0
7	0.8	1.4	3.1	15.7	43.2	22.5	10.6	0.3	2.4	100.0
8	0.0	0.1	7.2	4.4	39.2	26.6	16.2		6.3	100.0
9			7.1	23.7	26.4	31.1	11.6			100.0
12		1.4	9.2	3.4	65.1	1.0	20.0			100.0
A		3.9	12.7	1.0	25.6	12.2	44.7			100.0
B	6.5	6.0	8.0	10.4	19.2	38.5	5.6		5.8	100.0

SUM (%)	0.9	1.1	11.3	6.4	35.4	26.5	13.9	0.3	4.1	100.0
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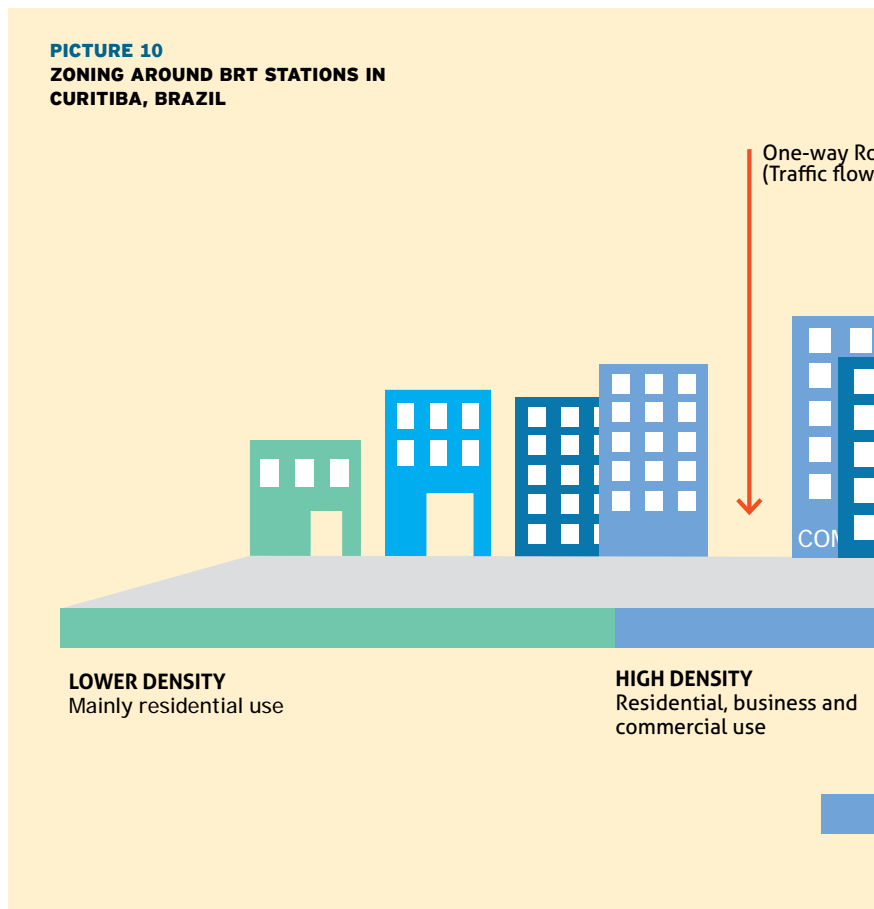
Sources: SETRAVI-PUEC, 2013.



AV. Green areas, CB. Community center, E. Equipment, EA. Open spaces, sport spaces, squares, parks, gardens, ER. Rural equipment, H. Housing, HC. Housing with commercial space on the ground floor, HM. Mixed housing, HO. Housing with offices, HR. Rural housing, HRB. Low density rural housing, HRC. Commercial rural housing, I. Industry, PE. Environmental conservation area, PRA. Agro-industrial rural production and RE. Ecological rescue.

In the case of metrobus and electrical transport (trolleybuses and light rail) there is no public and available information about the net surface area of the land uses. However, it is possible to compare the ideal zoning layout of allowed land uses with the real uses around some stations of the metrobus and trolleybus corridors.

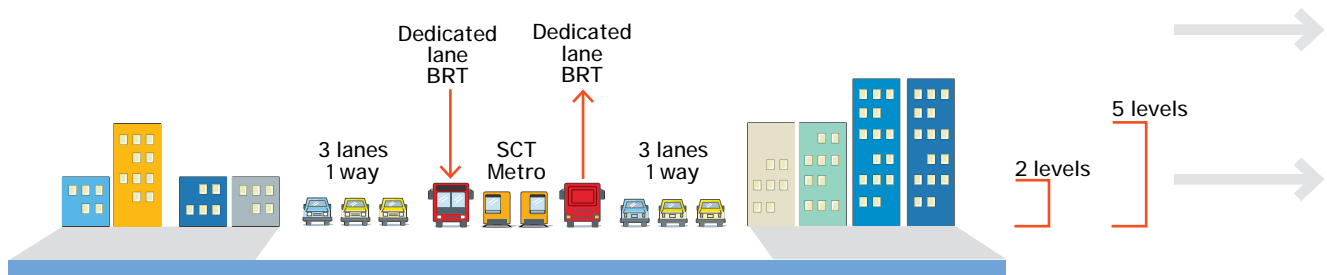
The ideal layout refers to a combination of high densities, mixed uses and greater heights close to public transport stations, as can be seen in the Curitiba Case (SEE PICTURE 8). As the distance to transport increases, the height decreases and transforms mainly into low density land uses.

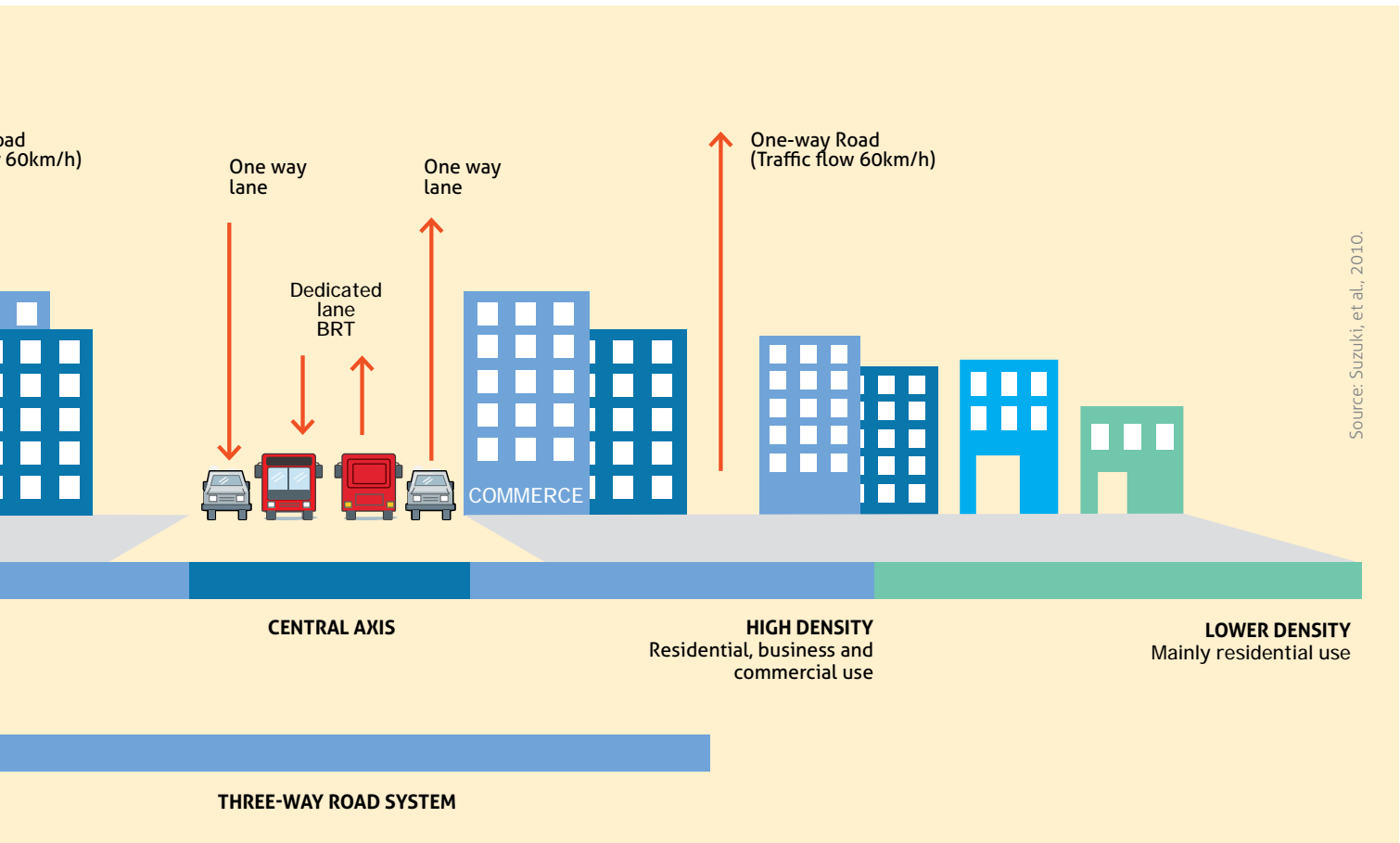


In the case of the Insurgentes Metro and Metrobus stations, the allowed uses have a layout with a greater height than the current one, which would allow for greater densities and other uses (SEE PICTURE 11). Even though the potential layout does not come close to the ideal scenario proposed in Curitiba, Brazil.

**PICTURE 11**  
**CURRENT AND POTENTIAL LEVELS AROUND METRO-METROBUS STATIONS INSURGENTES IN MEXICO CITY, 2014**

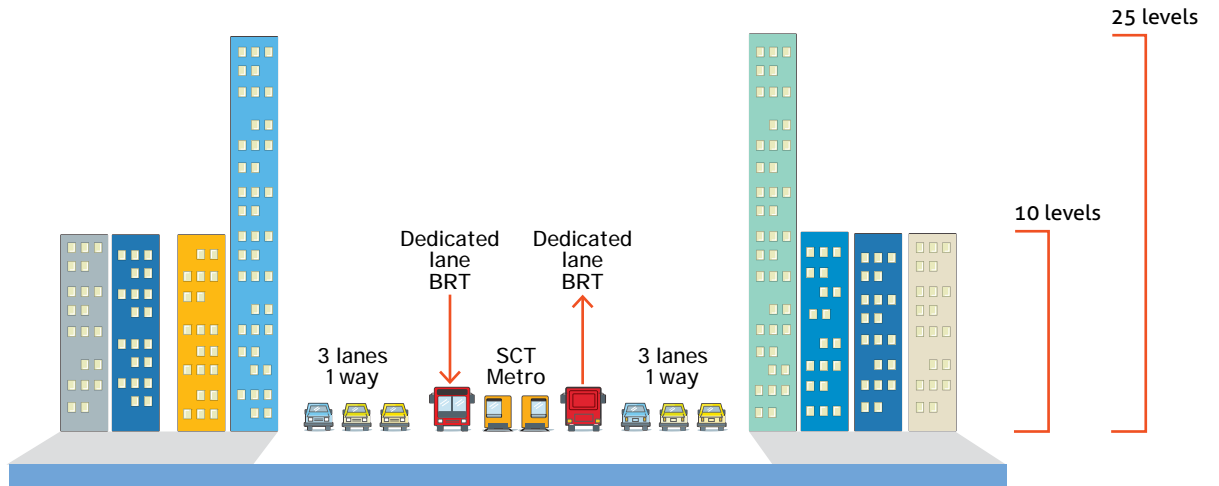
 Insurgentes  
**CURRENT USE**





Source: Suzuki, et al., 2010.

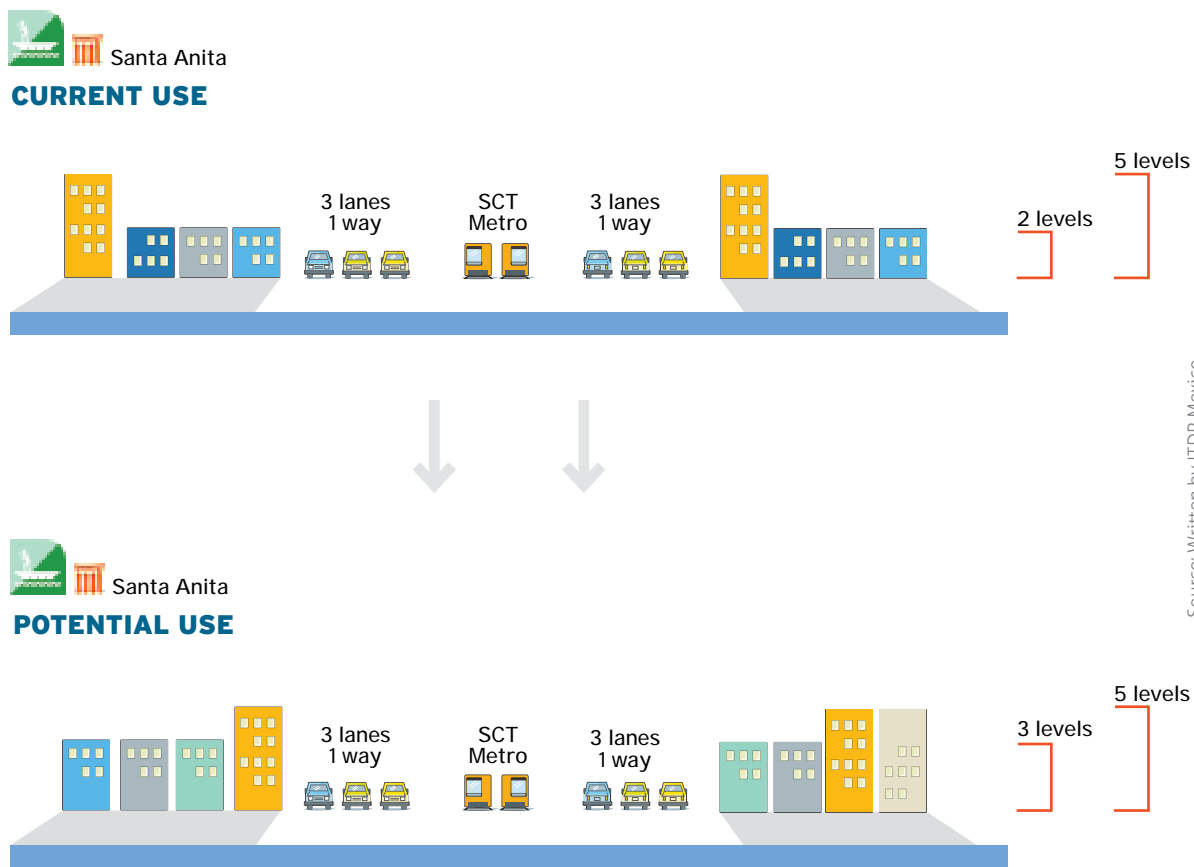
 Insurgentes  
**POTENTIAL USE**



Source: Written by ITDP Mexico.

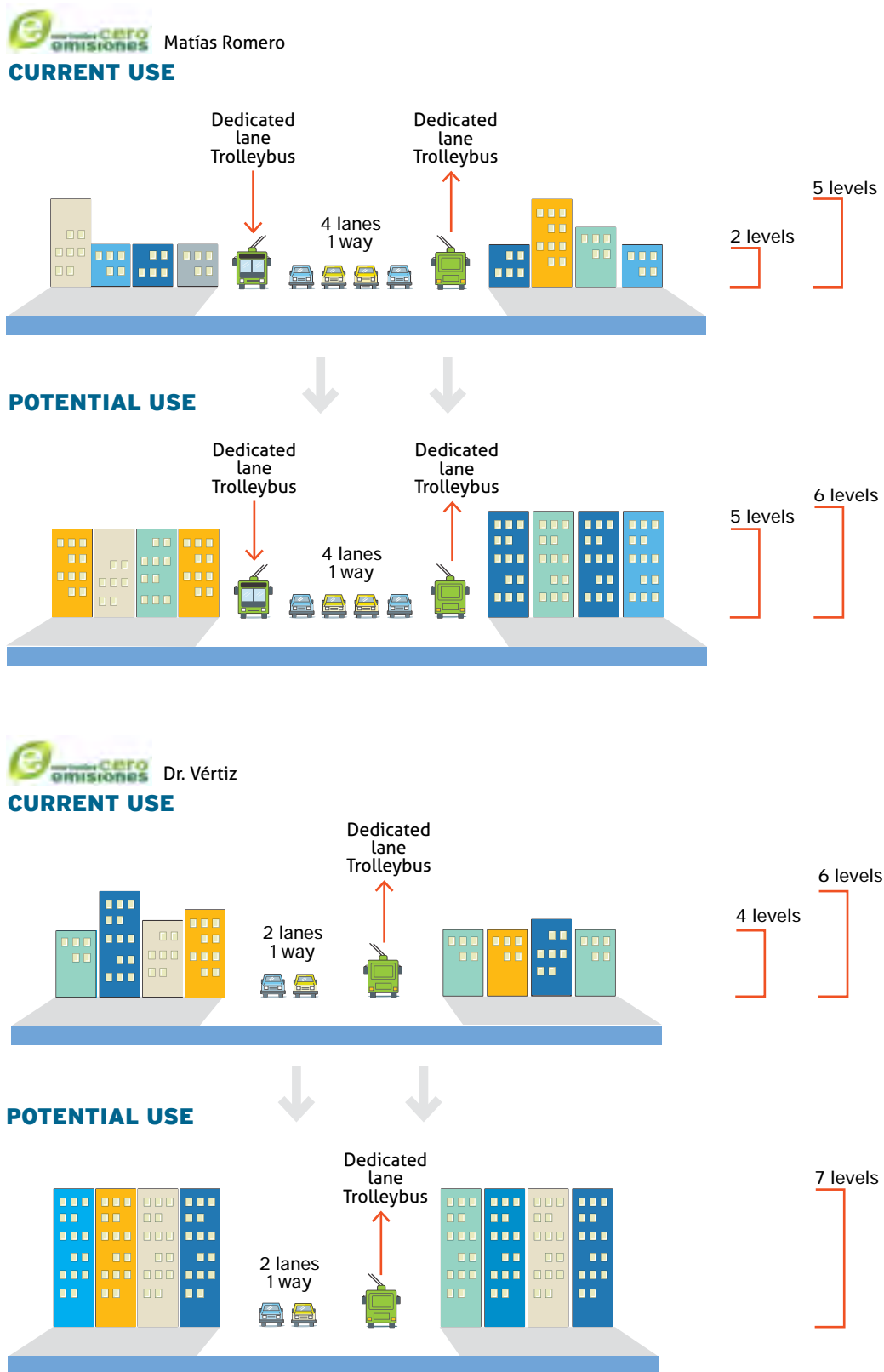
A similar case is the one of the Santa Anita station of the metro line 4, that also presents an ideal layout with greater heights, even though they are still low (**SEE PICTURE 12**). However, given that this line is the one with the lowest influx of the metro, it is clear that a layout with a low height would not revert this situation, which is why this potential is also far removed from the ideal scenario of Curitiba.

**PICTURE 12**  
**CURRENT AND POTENTIAL LEVELS AROUND THE METRO STATION SANTA ANITA IN MEXICO CITY, 2013**



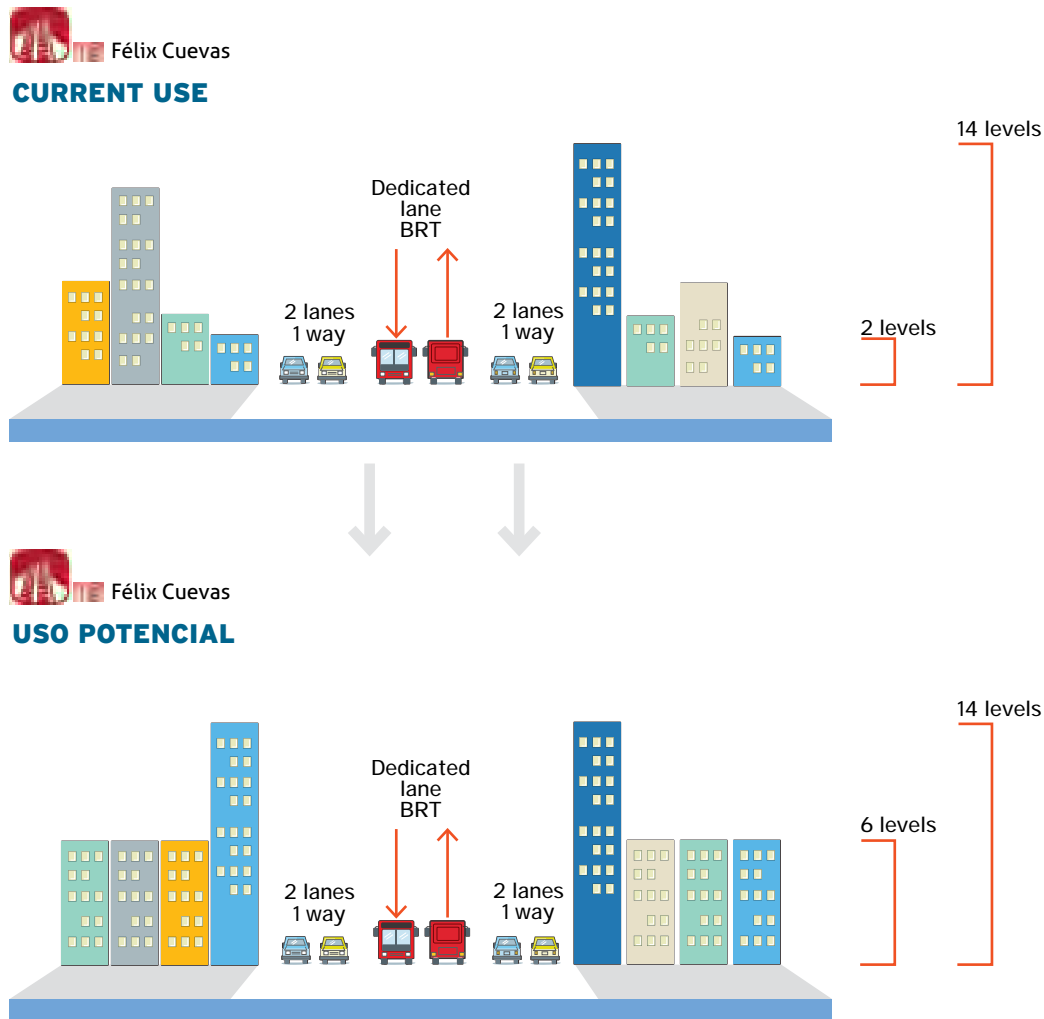
In the case of the zero-emissions corridors 1 and 2, both at the stations Matías Romero and Dr. Vertiz, the potential height that the buildings can attain also surpasses the current height (**SEE PICTURE 13**), although as in previous cases, without a defined logic such as in Curitiba.

**PICTURE 13**  
**CURRENT AND POTENTIAL LEVELS AROUND THE STATIONS OF THE ZERO-EMISSIONS CORRIDOR IN MEXICO CITY, 2013**



In the case of the metrobus, we find potential layouts that can also attain greater heights (**SEE PICTURE 14**). However, it is clear that the potential layouts lack a sense of proximity to public transport and to the possibility of having greater densities because of them. The greater real height and potential that is attained in Félix Cuevas is due to the fact that the “General Regulations on Management” of Mexico City allow greater heights when the lands are adjacent to a primary road. This means that a greater height is allowed based upon an infrastructure that is dedicated to automobiles and not to public transport.

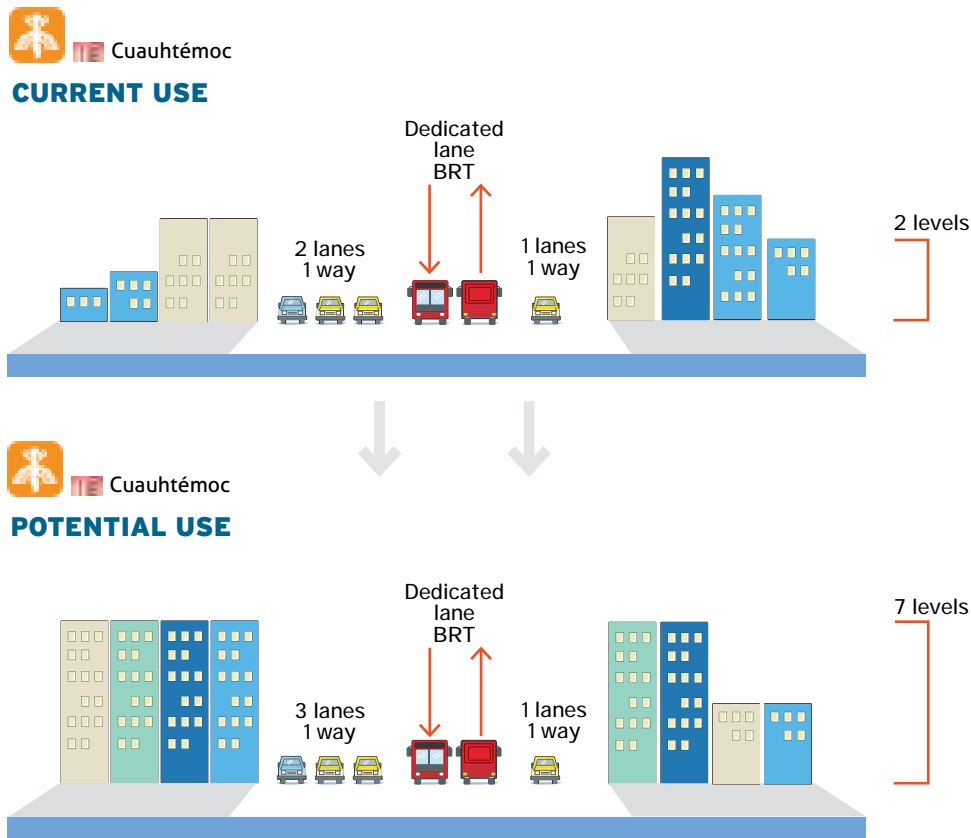
**PICTURE 14**  
**CURRENT AND POTENTIAL LEVELS AROUND THE METROBUS STATIONS FÉLIX CUEVAS AND CUAUHTÉMOC IN MEXICO CITY, 2013**



Source: ITDP Mexico.

<sup>3</sup> Regulation 10. Maximum heights on roads are based on the surface area of the premise and the bottom and lateral building restrictions.





Source: ITDP Mexico.

It is also important to emphasize the amount of space dedicated to parking in the proximity of public transport. Current building regulations require the provision of a minimum amount of parking, based on land use and the built area, without considering the proximity to transport. This regulation promotes traveling by automobile towards areas that are already served by public transport and prevents the use of valuable urban space for housing, commerce, services or equipment.

Sañudo (2014) found through a revision of real estate projects subject to urban impact studies, that the developments built less than a kilometer from mass transport stations allocate approximately the same surface area for parking (497 hec-

tares) than housing and commerce together (528 hectares). While some of the reviewed projects built parking spaces beyond the specified minimum, approximately one quarter only built the number of parking spaces required by the regulation.

A regulatory change that reduced the minimum amounts of parking and even established a maximum amount of areas close to public transport would allow the advancement towards TOD frameworks, since it would decrease the use of automobiles, promote the use of sustainable modes and allow to have more space devoted to housing and productive uses.

<sup>4</sup> These figures only consider architectural projects of constructions subject to urban impact assessment from 2009 to 2013. Therefore, the amount of surface area devoted to parking has been severely underestimated since it is not a review of all existing developments in the city. For more information, refer to Sañudo (2014).

## 2.3.2 OWNED BY THE GOVERNMENT

The local government owns a great number of lands in areas close to public transport. This is mainly in: a) buildings located throughout the metro lines 1, 2 and 3, and the lands where the metro stations are built upon and b) the lands where the Multimodal Transfer Centers are built upon (CETRAM).

### BUILDINGS AND METRO LINES

Metro stations have building potential, becau-

se most of the time they only are one story high, whilst the authorized land uses allow for more stories. Thus, they could be developed in order to serve as housing, office or commerce, depending on the opportunities of each one. These projects can be carried out jointly between the government and private investors, generating income for the metro that could be invested in its maintenance and expansion (**SEE BOX 9**).

**TABLE 4**  
**COMPARISON BETWEEN CURRENT AND POTENTIAL HEIGHTS OF BUILDINGS OF THE STC-METRO**

Stations	Line	Number of stories		Allowed height		Potential	
		Building 1	Building 2	Building 1	Building 2	Building 1	Building 2
Juanacatlán	1	6		3		-3	0
Sevilla	1	5	0	5		0	0
Cuauhtémoc	1	6	1	7	1	1	0
Insurgentes	1	0	0	25		25	0
Salto del Agua	1	7		0	10	-7	10
Isabel La Católica	1	5	3	12	0	7	-3
Pino Suarez	1	6	0	0	0	-6	0
Tacuba	2	5	0	5	10	0	10
Cuitláhuac	2	6	5	10	10	4	5
Popotla	2	6	1	3	3	-3	2
Colegio Militar	2	6	0	3	3	-3	3
Normal	2	6	0	3	3	-3	3
San Cosme	2	5	4	6	4	1	0
Revolución	2	5	0	10	NA	5	
Allende	2	1	2	0	0	-1	-2
Pino Suarez	2	6	0	0	0	-6	0
San Antonio Abad	2	2	2	12	12	10	10
Chabacano	2	2	2	12	3	10	1
Tlatelolco	3					0	0
Guerrero	3	3	3	1	2	-2	1
Juárez	3	6	6	16	10		4
Hospital General	3	1		7		6	0
Etiopía	3	0	0	4	4	4	4
Eugenia	3	0	0	4	4	-1	-1
Zapata	3	5	0	6	3	1	3
San Juan de Letrán	8	0	5	6	8	6	3

**NOTE:** potentials with a negative sign indicate buildings that exceed the allowed stories by the current zoning. This is probably due to the fact that they were built before the current regulation was published.

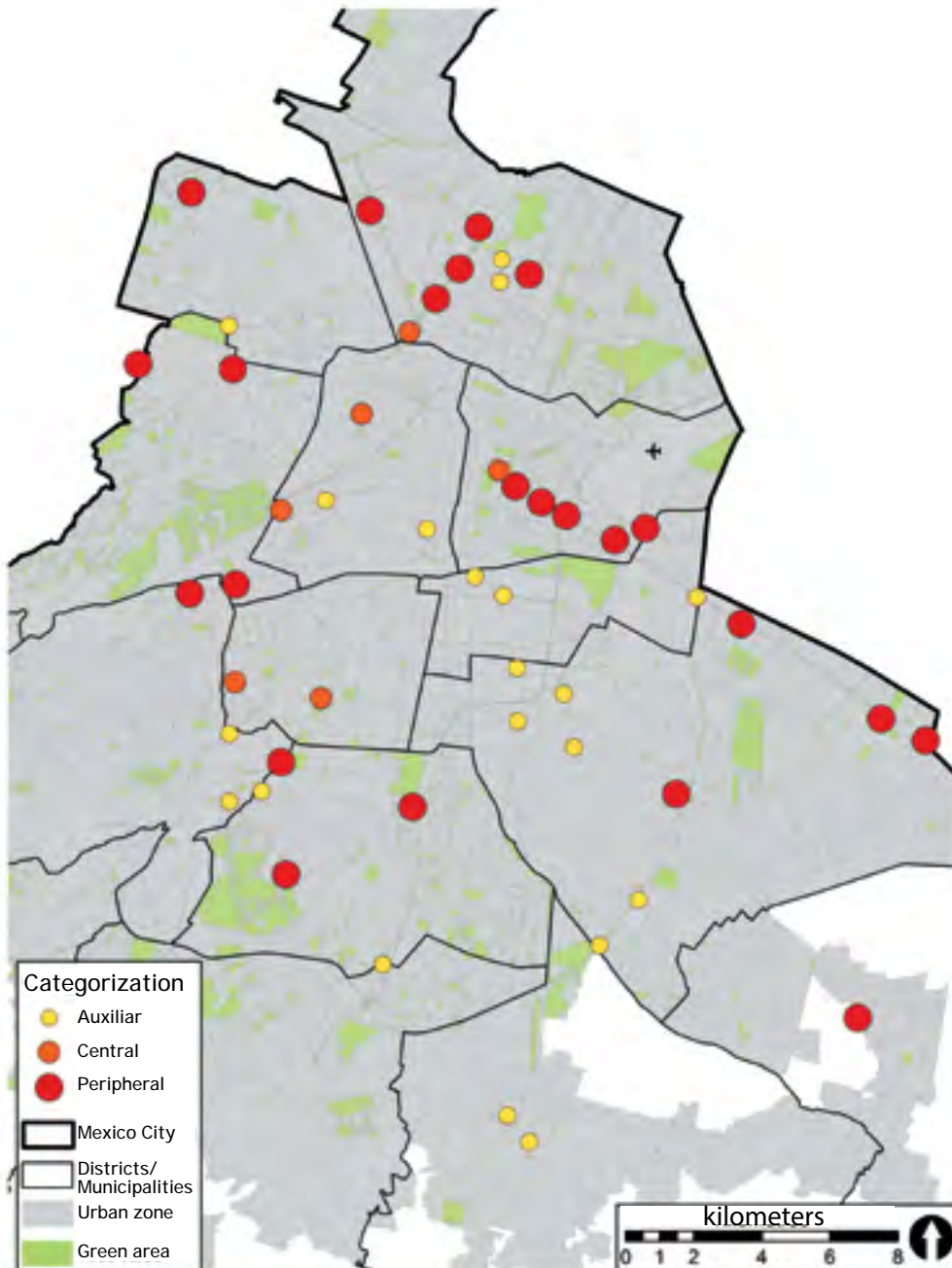
Source: Written by ITDP Mexico.

**MODAL TRANSFER CENTERS**

The best opportunity of implementing TOD projects on behalf of the government are probably at CETRAM. The city has 47 equipments of this kind, which occupy a total area of 70 hectares, where 20.6 million transfers are being made on a daily basis.

CETRAM SHOULD BE TRANSFORMED INTO MIXED-USE PROJECTS THAT ALLOW THE REUSE OF UNDERUTILIZED SPACES, IMPROVE MOBILITY, AND ACCESSIBILITY, PROVIDE SECURITY TO PASSENGERS AND DRIVE URBAN DEVELOPMENT OF THE AREA OF THE CITY THEY ARE IN.

**PICTURE 15**  
**MODAL TRANSFER CENTERS AND CATEGORIZATION, 2013**



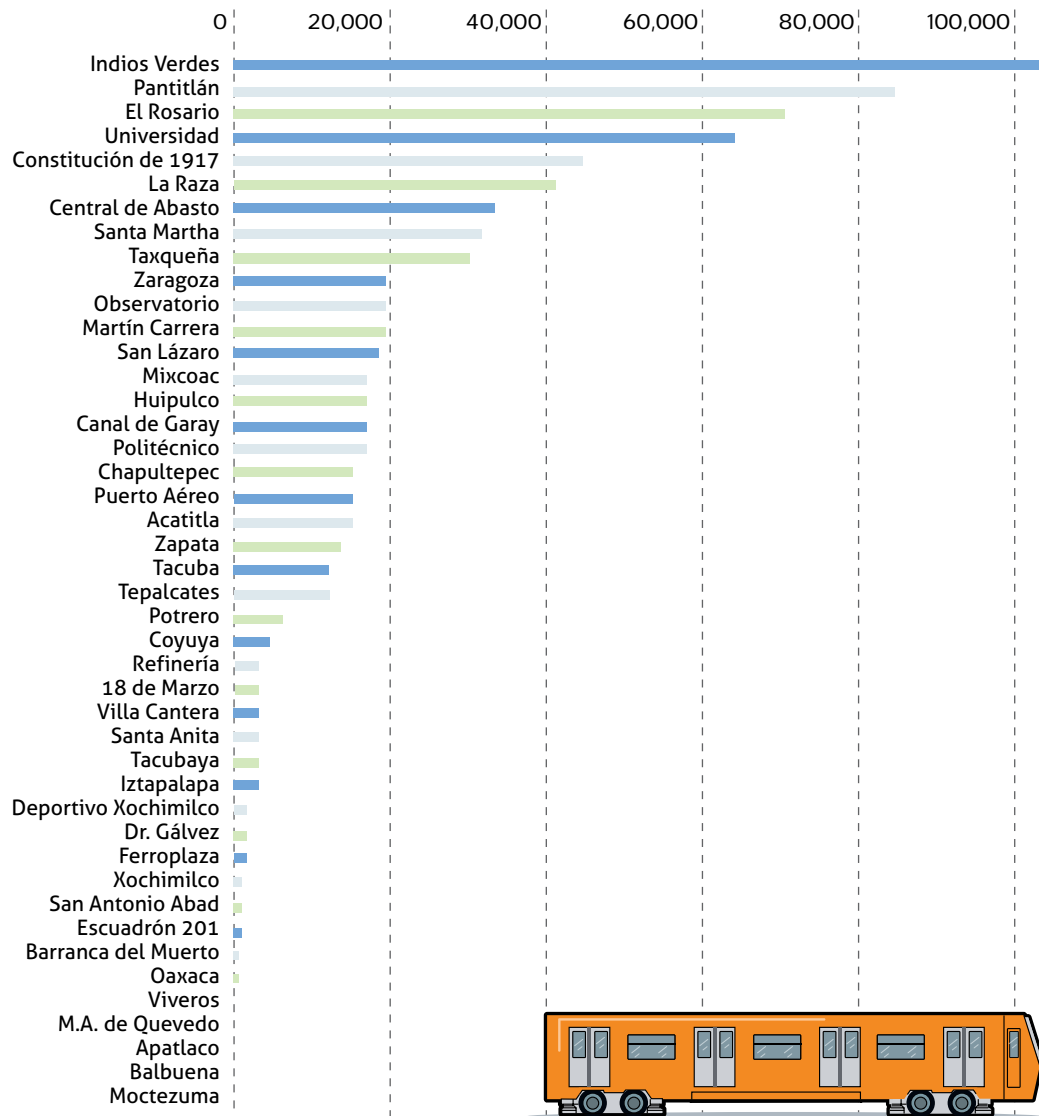
Source: ITDP Mexico.

Most of these CETRAM have underutilized space, and are also used as switch yards and parking for minibuses and autobuses. Moreover, most of the time they are not linked to the urban environment and they sometimes include areas with high insecurity rates.

Therefore, it would be ideal to transform CETRAM into mixed-use projects, that allow to reuse underutilized spaces, improve mobility and accessibility, provide security to the passengers and drive urban development of the area of the city they are in.

It should also be noted that the available amount of space of each CETRAM varies greatly. There are CETRAM that don't have their own space and exchanges are realized by the roadside, and there are some that have surface areas above 80 thousand square meters. Likewise, it is important to stress that most of the CETRAM don't have significant built structures, with the exception of CETRAM Zapata (with 4,500 m<sup>2</sup>) and El Rosario (45,000 m<sup>2</sup>). This causes those CETRAM with the largest surface to be the ones with the most underutilized land, and therefore, the most eligible to start implementing TOD strategies (**SEE CHART 1 AND 2**).

**CHART 1**  
**SURFACE AREA OF MODAL TRANSFER CENTERS, 2008 (m<sup>2</sup>)**



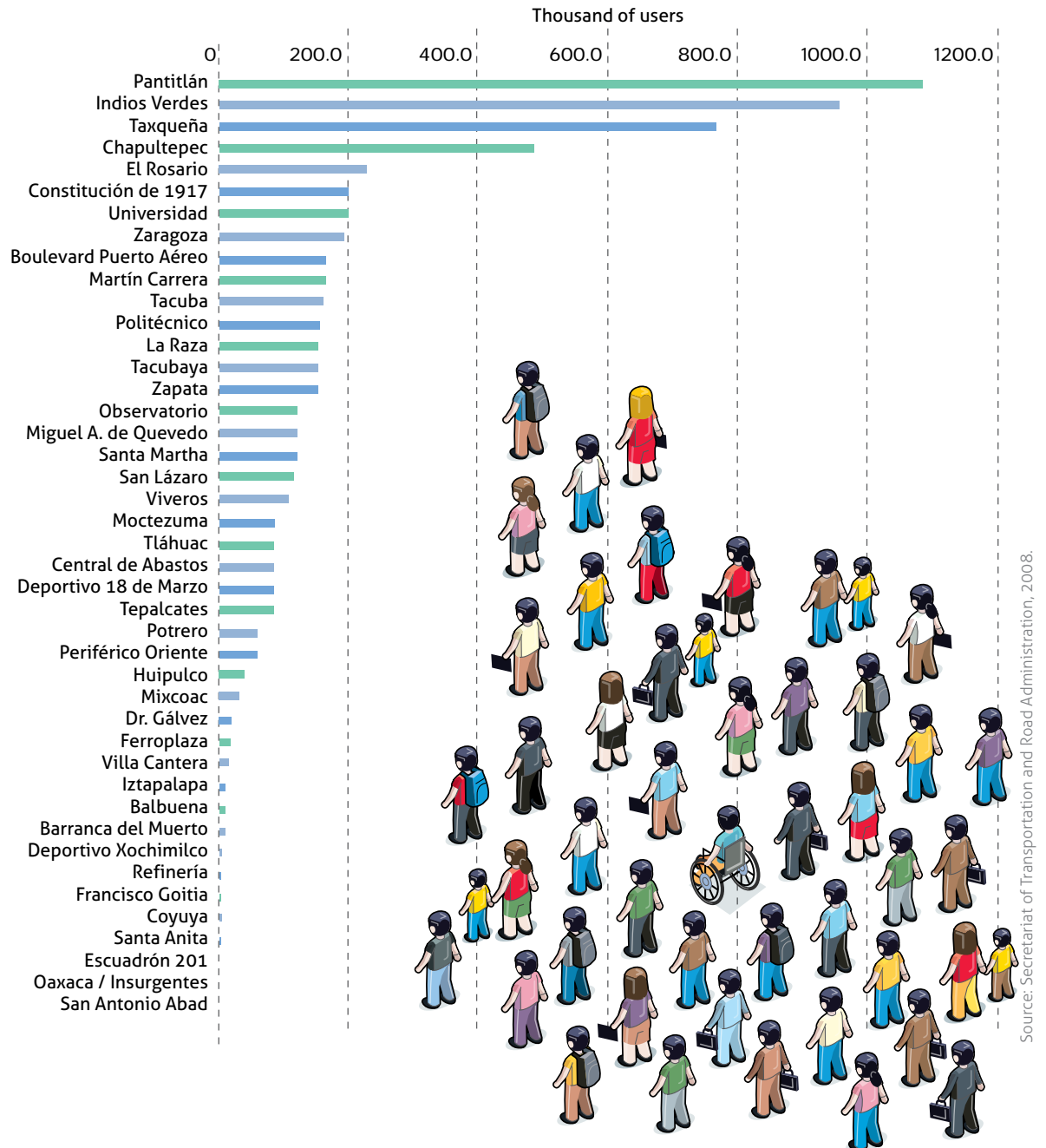
Source: Secretariat of Transportation and Road Administration, 2008.

<sup>5</sup> It may therefore be advisable to consider the relevance of some CETRAM.

In the same way, it is important to stress that those with more available space are metropolitan CETRAM that have a large number of users, such as Indios Verdes, El Rosario or Pantitlán (SEE CHART 2). Developing TOD projects in these locations would greatly benefit not only the areas of the city where they are located, but also the whole metropolitan

area. Therefore, it is important that the reuse of CETRAM is accompanied by a comprehensive revitalization strategy in order to trigger an improvement in the area of the city they are located. So far, CETRAM projects have not been successful in that sense, since they have only been focused on internal commercial development (Medina, 2013).

**CHART 2**  
**DAILY AVERAGE PASSENGERS IN MODAL TRANSFER CENTERS, 2008**



Source: Secretariat of Transportation and Road Administration, 2008.

## 2.4 OPPORTUNITIES REGARDING NEW TRANSIT INFRASTRUCTURE AND REVITALIZATION OF AREAS

In the coming years, various investments are planned in order to develop quality public transport networks, as well as the revitalization of areas of the city, which will create many opportunities to drive TOD strategies.

### 2.4.2 BY PLANNED OR SUGGESTED CORRIDORS

Through a modeling effort of Mexico City's public transport, ITDP developed a proposal to expand the Metrobus and Mexibus network in the city by

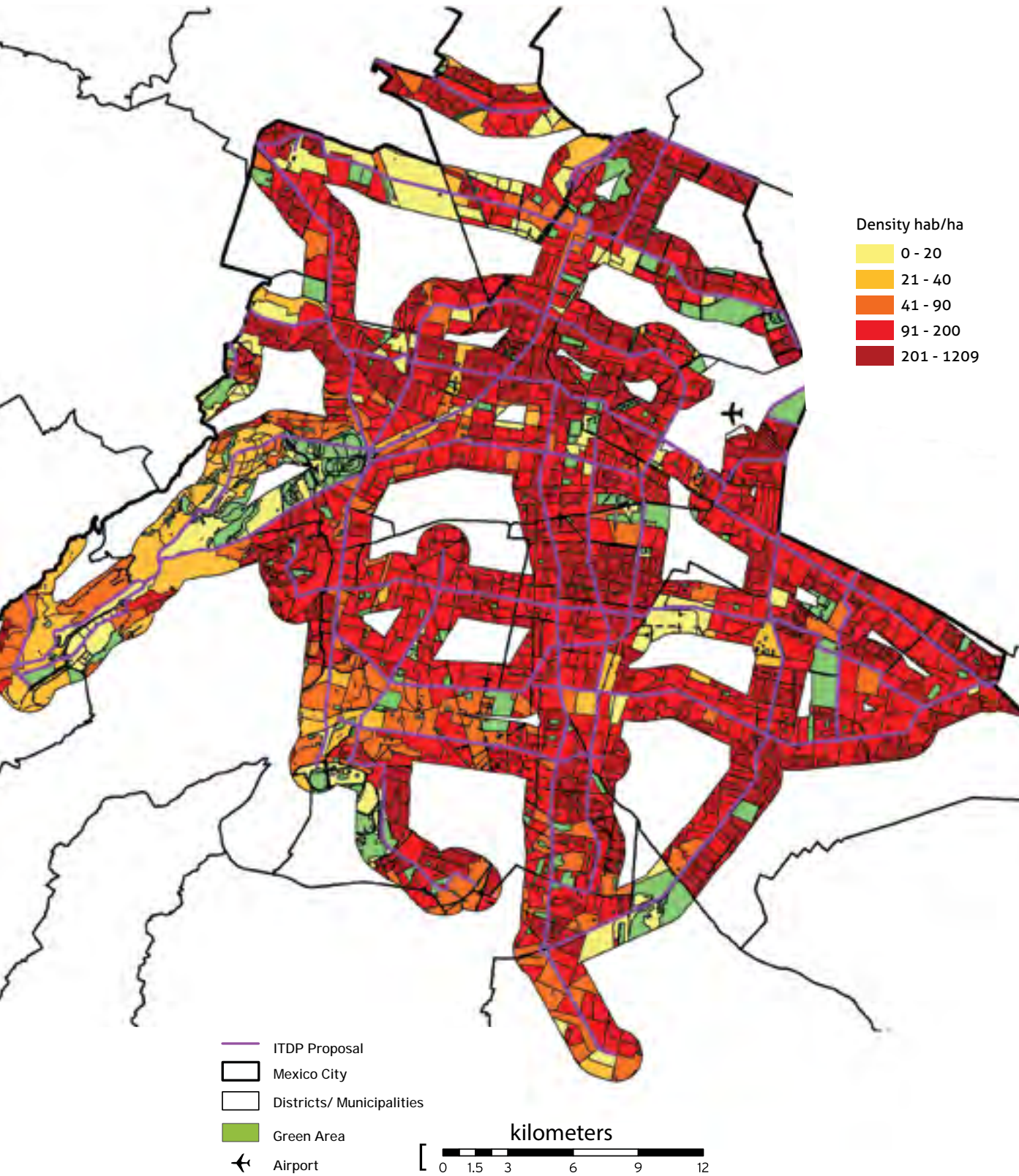
implementing 29 additional lines over the next 11 years 2013-2014 (ITDP, 2014). If this proposal gets implemented, the public transport network would increase by 99% in DF reaching 883 km (986 km in the ZMVM). Moreover, the connectivity of the network would improve and transport availability in the city would increase, since 800 meters around these new lines there are 980,138 people living in DF (2,383,947 in ZMVM), who would additionally have the ability to transport 7.5 million passenger a day.



PROPOSAL OF METROBUS LINE 6 IN MONTEVIDEO AVENUE



**PICTURE 16**  
**PUBLIC TRANSPORT PROPOSALS BY ITDP (2013–2018) AND POPULATION DENSITY (2010)**

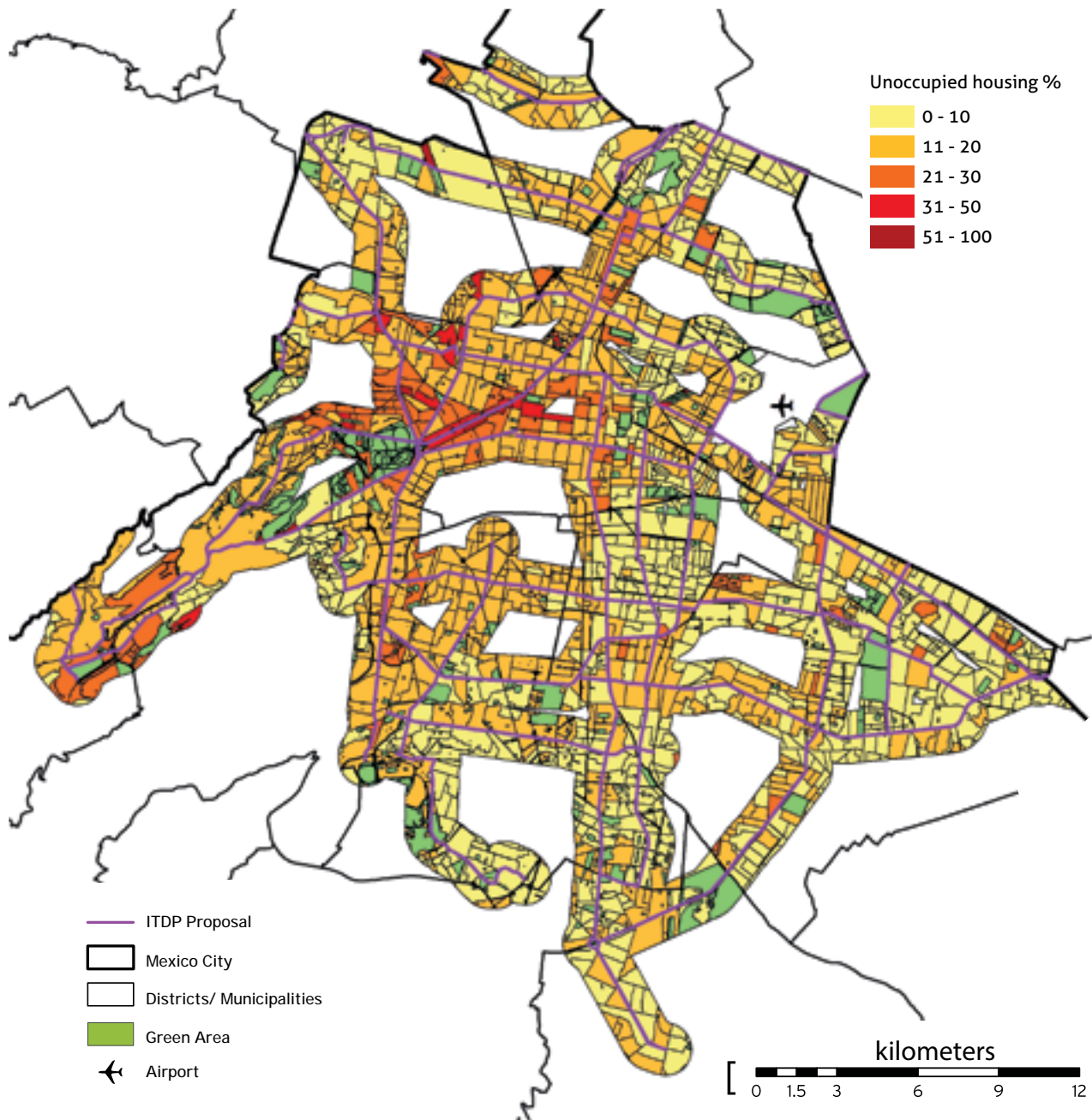


This way, opportunities to drive TOD across the city could be created, since there would be approximately 1,657 additional hectares with low densities around public transport in DF, where new developments could be undertaken. This represents an increase of 62% in the available surface within the current network.

Also, there are areas with a high percentage of unoccupied houses around the proposed transport

corridors. These can mainly be found in the historic city center, avenida Reforma in the section between the city center and Bosque de Chapultepec, the colonias Polanco and Granada and the Santa Fe area. If the proposal was implemented in its entirety, 800 meters from these areas there are 28,847 other unoccupied houses where 115,388 additional people could be housed in DF.

**PICTURE 17**  
**PUBLIC TRANSPORT PROPOSALS BY ITDP (2013-2018) AND UNOCCUPIED HOUSING (2010)\***



Source: prepared by ITDP with data from INEGI and SETRAVI-DF.

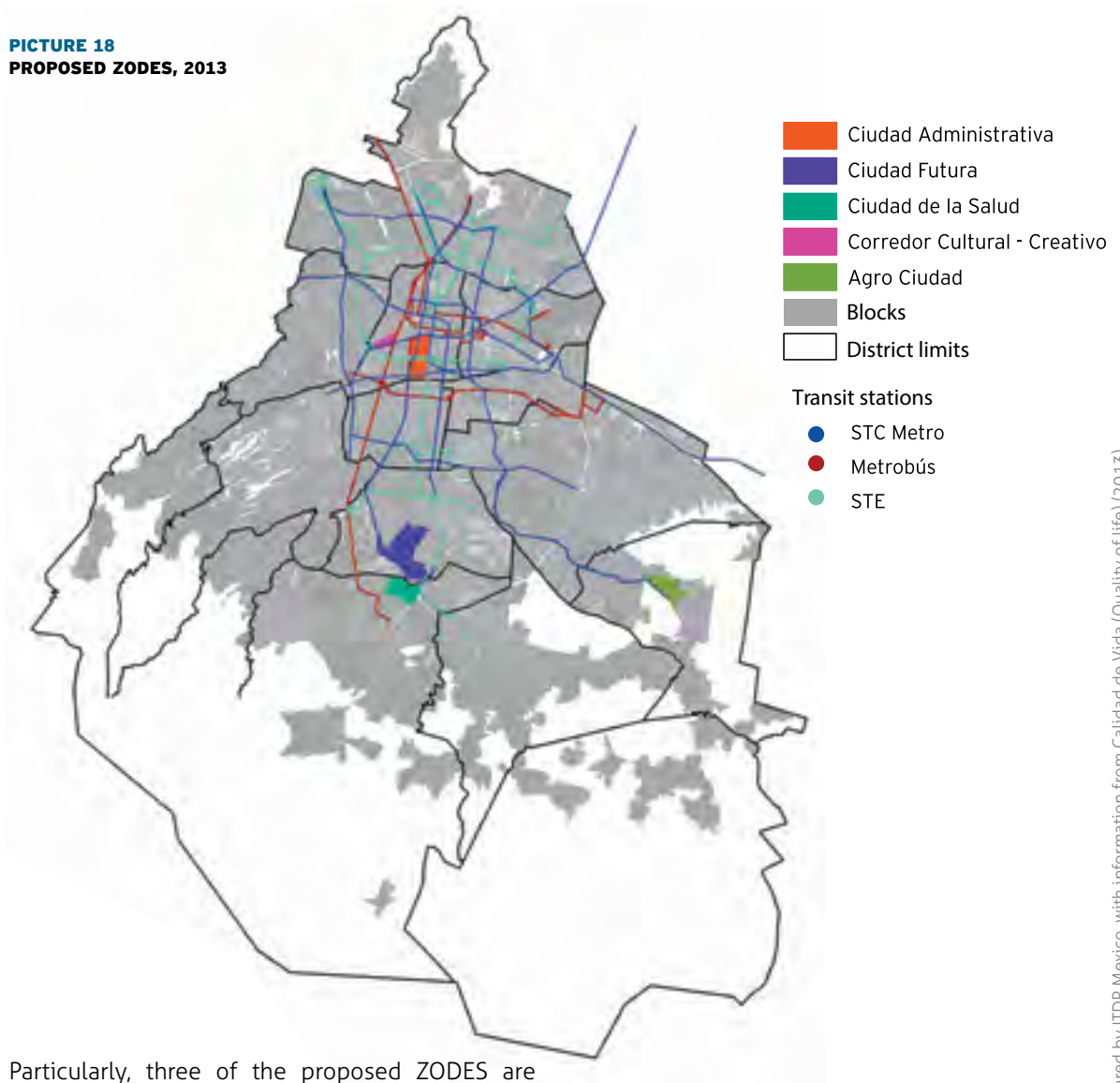
### 2.4.3 BY AREAS

The GDF has outlined the implementation of economic and social development areas (ZODES, as per the acronym in Spanish) that propose the revitalization and transformation of entire neighborhoods of the city through public-private investment and special instruments for promotion. The goal is to create an economic specialization (economic cluster) and densify these areas. These ZODES represent a great opportunity to create transit-oriented developments, whether it is by taking advantage of the existing transport infrastructure

or by creating a new one, with the goal of triggering development in those areas.

So far, the GDF state-owned company Calidad de Vida (2013) has proposed five: Ciudad Administrativa y Judicial (administrative and judicial city) (Col. Doctores), Corredor Cultural-Creativo (cultural-creative corridor) (Avenida Chapultepec), Agrociudad (agrocitcity) (Tlahuac), Ciudad del Futuro (city of the future) (Pedregal de Santo Domingo, Tlalpan) and Ciudad de la Salud (health city) (Tlalpan).

**PICTURE 18**  
**PROPOSED ZODES, 2013**



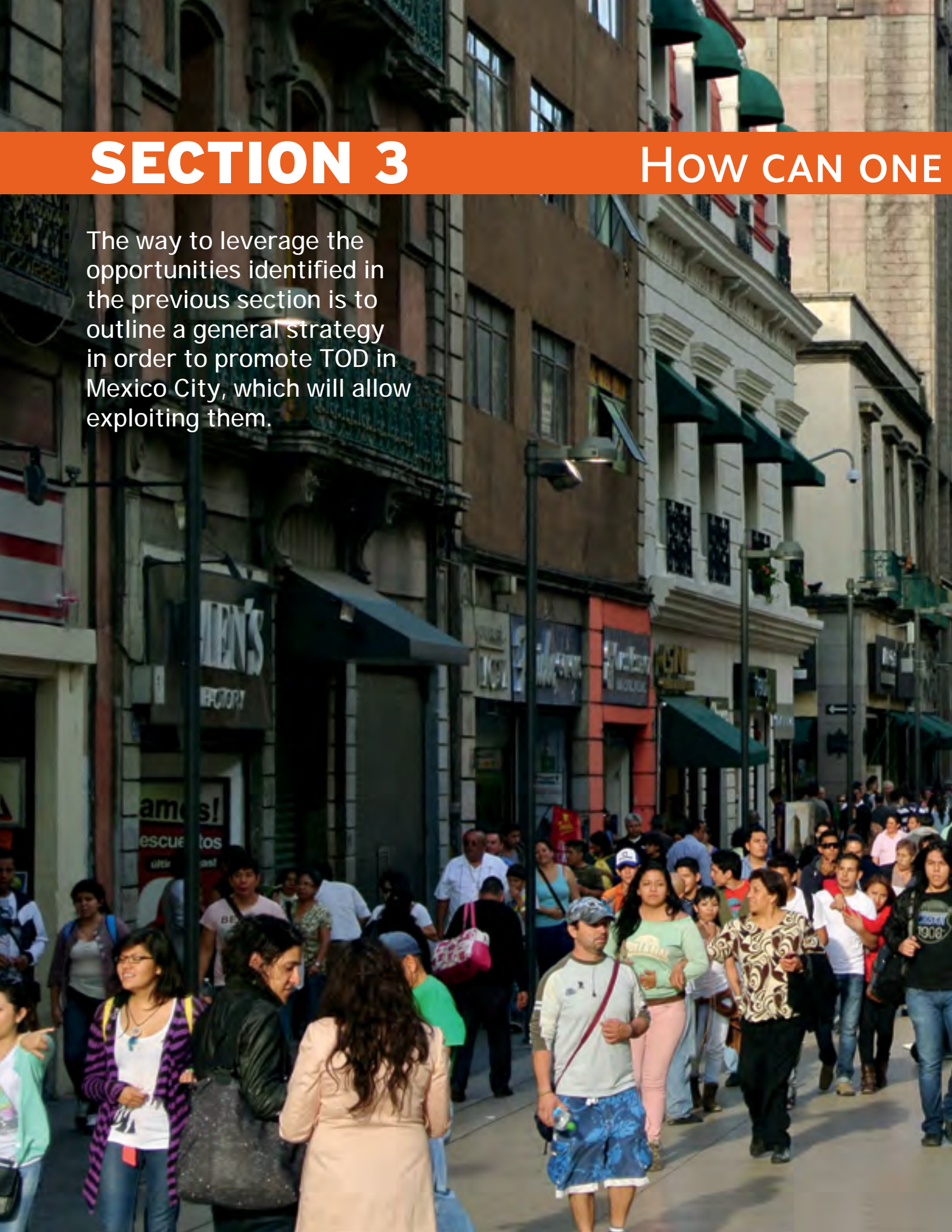
Particularly, three of the proposed ZODES are areas with TOD potential due to their proximity to quality transport: Ciudad Administrativa y Judicial, Corredor Cultural-Creativo and Agrociudad.



# SECTION 3

# HOW CAN ONE

The way to leverage the opportunities identified in the previous section is to outline a general strategy in order to promote TOD in Mexico City, which will allow exploiting them.





TAKE ADVANTAGE OF THE OPPORTUNITIES?



### 3.1 OUTLINING A GENERAL STRATEGY

The general strategy should aim at avoiding or reducing the need to travel long distances in Mexico City, by providing accessibility to goods and services that the inhabitants need. In order to achieve this objective, the strategy must include at least three elements:

- A** Encourage compact and mixed development of the city
- B** Discourage the use of cars
- C** Increase the use of public transport, bicycles, and walking

These goals have already been expressed in various development planning instruments, both at the federal and local levels (see Annex A). These goals in particular are already part of the General Development Program for Mexico City, which establishes a road map during the current administration. On the other hand, there are two additional programs that should set more specific goals and actions in order to manage the policies of the city. These are Programa General de Desarrollo Urbano (General Urban Development Program) (PGDU) and Programa Integral de Movilidad (Integral Mobility Program) (PIM), prepared by SEDUVI and SEMOVI, respectively. In a coordinated manner, these are the ones that can gear urban development and mobility policies towards a transit-oriented development.

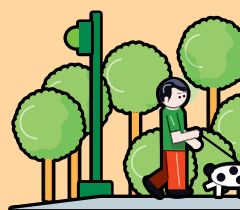
#### BOX 4

#### GENERAL DEVELOPMENT PROGRAM FOR MEXICO CITY, COMPREHENSIVE PROGRAM FOR MOBILITY AND ITS RELATIONSHIP TO TRANSIT-ORIENTED DEVELOPMENT

The General Urban Development Program for Mexico City recognizes the importance of “articulating employment and housing with public transport networks and developing the territorial proximity, hence promoting healthier lifestyles and a greater collective coexistence” (GDF, 2013).

Within the concept regarding “habitability and services, public space and infrastructure”, there are three goals that specifically outline a transit-oriented development policy. The first two focus on improving the current pattern of territorial occupation:

- 1** “Orient urban development towards a compact city [...] in order to achieve a pattern of efficient occupation which will lead to the redistribution of the population to areas that combine different land uses, improve public infrastructure, bring employment and housing closer to public transport and contribute to territorial equity.”
- 2** “Regenerate and redensify localized areas both in central areas with recycling potential, as well as areas that can capture additional population, have a more intensive and diverse use and offer conditions for sustainability and profitability”.



Specifically in terms of regenerating and redeveloping, goals are set to revitalize on one hand strategic nodes and corridors, and, on the other hand, depressed areas in the central city that already have sufficient public transport infrastructure. The purpose here is that these projects “promote different kinds of land use, productive activities, the recovery of public spaces, green areas and equipments, as well as the strengthening of infrastructure networks”.

Meanwhile, the third TOD-related goal focuses on automotive transportation:

- 3 “Establish public policies to reduce the use of automobiles in order to guarantee a better quality of life and reduce the negative externalities that are associated to its use.”

Within this objective, there are goals for reducing the need to travel by automobile and others for promoting more efficient means of transportation. Specifically, it sets out to “boost redensification through land uses and sustainable transit-oriented development in the planning process” and “to reduce the parking requirements in areas of high connectivity and access to mass public transport”.

The policy program for urban development is the General Program of Urban Development. However, the PGDU currently in force was published in 2003, which is why it is not aligned with this land-use regulation policy, which was established in the PGD for the period 2013-2018. SEDUVI is currently working on updating the program that will include these general guidelines, which shall be adopted subsequently in the district government and partial programs regarding urban development.

In terms of mobility, the sectoral program is Programa Integral de Movilidad (Integral Mobility Program) (PIM) conducted by SEMOVI. In PIM 2013-2018, transit-oriented development is one of their six strategic focuses. Thus, from the early stages there is a coordination between SEMOVI and SEDUVI to integrate land-use planning with transport infrastructure planning. The TOD strategy included in PIM considers the following lines of action, each of them with different specific actions, that need to be developed during the administration:

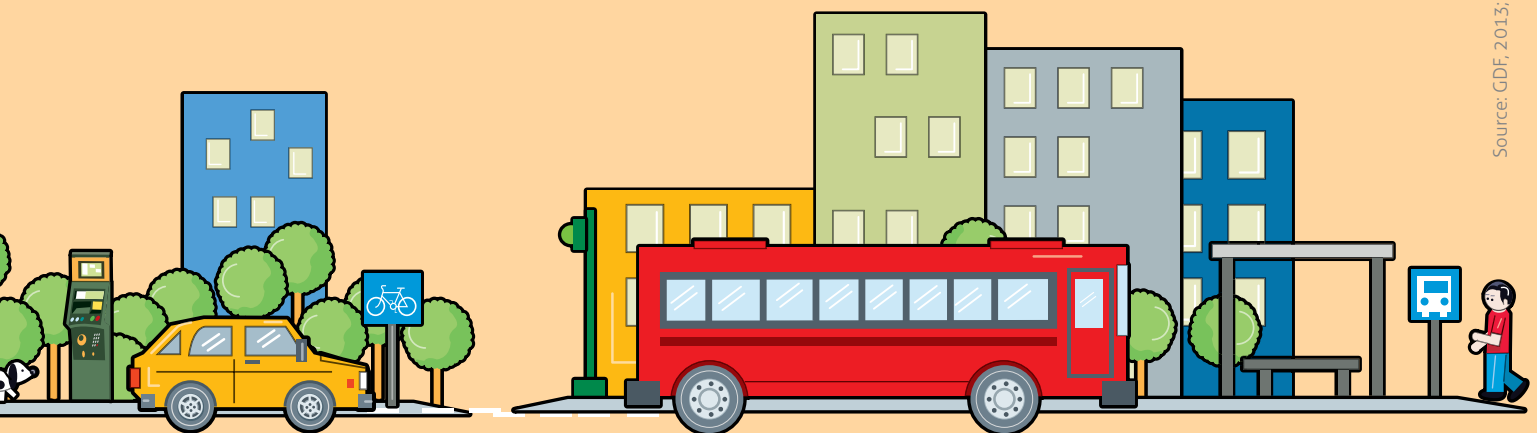
**Advance and improve transport stops:** Redesign and consolidate Modal Transfer Centers and their surroundings in order to guarantee intermodality, safety and accessibility for pedestrian, people with disabilities and cyclist.



**Orient the housing and service development around high-capacity transport stations:** Foster the population density around public transport stations and corridors, by updating rules and technical guidelines, in order to boost the economic and social life in neighborhoods.



**Strengthen the connectivity to efficient transport in development hubs:** Connect areas with high levels of development through mass public transport.



## 3.2 OUTLINING SPECIFIC STRATEGIES BASED ON OPPORTUNITIES

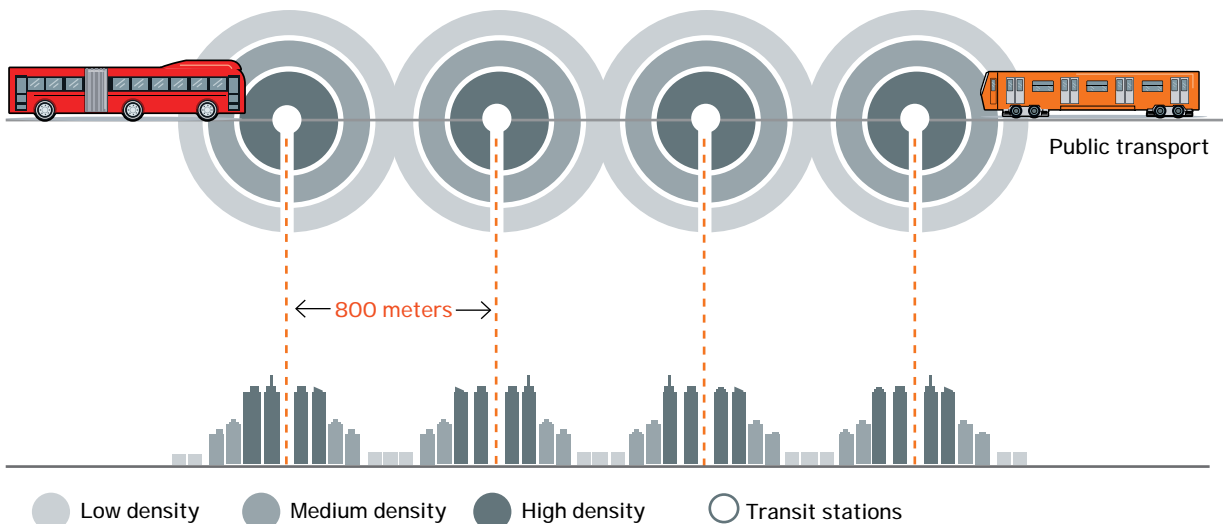
According to the identified opportunities and based on the general objective, it is possible to establish four specific strategies.

### 3.2.1 CORRIDOR DEVELOPMENT FOCUSING ON DENSIFICATION AND LAND USE CHANGES

This strategy considers the densification within a 800 meter radius of mass public transport

corridors and stations , with emphasis on areas with low densities and a high number of unoccupied houses. Areas of low employment are of particular interest. It is important to consider the level of public transport service, if it is saturated or not, and how the situation could be solved.

**PICTURE 19**  
**TRANSIT-ORIENTED DEVELOPMENT IN MASS TRANSPORT CORRIDORS**



<sup>6</sup> In the case of trolleybuses and zero-emissions corridors (except for the Eje Central corridor, which can be considered mass public transport, because it moves 98 thousand passengers a day) a 500 meter influence radius is considered, given the lower capacity of the system. This can be compensated by increasing its capacity with articulated and biarticulated trolleybuses as the ones that exist in Zurich, Vancouver or Bologna.



This densification strategy involves modifying the district government or partial urban development programs in order to allow that the land uses around the transport stations become mixed-use, that is, with land uses HC, HM and HO, and in order to allow the construction of more stories. In the same manner, an efficient use of the land has to be emphasized through the reduction or removal of minimum parking requirements in areas close to public transport. A maximum parking limit could even be implemented for developments and areas that are close to it.

### 3.2.1 REUSE/RECYCLING OF CETRAM AND OTHER FACILITIES

This strategy consists in recycling or reusing the land of the CETRAM for the development of com-

mercial, office, cultural and/or housing space. This particular strategy requires the creation of attractive places and environments (placemaking) and the integration with its urban surroundings. It also needs to be complemented with redensification and mixed land uses in its 800 meter influx radius (**SEE BOX 6**).

According to SETRAVI (now SEMOVI), the greatest opportunities are found in the CETRAM listed in **TABLE 5**, due to the fact that they combine a number of characteristics that would allow for its development, such as the available space, the number of users and its location.

**TABLE 5**  
**CETRAM WITH THE GREATEST POTENTIAL FOR DEVELOPMENT**

CETRAM	SURFACE AREA (M <sup>2</sup> )	TYPE	DAILY PASSENGERS	PASSENGER PERCENTAJE FROM OTHER ENTITIES
Politécnico	15,625	Metropolitan	120,000	82.5%
Indios Verdes	108,062	Metropolitan	950,000	97.6%
Martín Carrera	19,102	Metropolitan	135,000	99%
Chapultepec	14,416	Central	500,000	8.6%
Tacubaya	5,550	Metropolitan	115,000	4.5%
Mixcoac	16,095	Central	15,000	0%
Taxqueña	26,900	Metropolitan	750,000	N.A.
Zaragoza	19,235	Metropolitan	185,000	70%
Santa Martha Acatitla	28,410	Metropolitan	80,000	3.8%
Constitución de 1917	45,500	Metropolitan	200,000 <sup>1</sup>	N.A.

N.A.: Not available

Fuente: PUEC-SETRAVI (2013) y estimaciones de pasajeros de COCETRAM a 2014.

It is important to stress that the process of granting licenses of various CETRAM started in February 2014. SEDUVI, the Secretariat of Finance and the Oficialía Mayor (administrative office) issued the statement of the need to grant licenses for the use, leverage, exploitation and management of the CE-

TRAM Constitución de 1917, Indios Verdes, Santa Martha, Martín Carrera and Politécnico. This statement is the first step towards the implementation of a number of projects in CETRAM that could turn into transit-oriented developments.

**BOX 5**  
**THE CASE OF AMETZOLA, SPAIN**

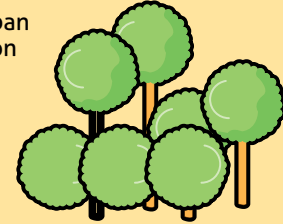
The recycling of the Ametzola station in Bilbao, Spain is the result of the urban development plan Bilbao Ría 2000. This recycling included transforming the Ametzola station from transporting goods to transporting passengers, turning it into an important transport node. This work, which started in 1994 and was completed in March 2007, was geared towards the "improvement of the quality of life in a total sense", for which the urban framework was recovered through underground routing of passenger stations and railway tracks. This allowed the recovery of an area of 110,000 m<sup>2</sup> for urban regeneration, and not only a fraction of it.

The project included the construction of an urban park of 36,000 m<sup>2</sup>, a housing development of 900 houses (150 devoted to social housing), an underground parking (550 spaces), as well as new roads. In the same manner, free public elevators were incorporated to connect the underground parking with the housing area and a pneumatic waste collection system (Bilbao Ría 2000). In other words, this area was consolidated as a housing neighborhood with public spaces, in order to create a natural connection between the southern and central part of the city, with the train station being an additional service in this urban recycling.



**110,000m<sup>2</sup>**

area for urban  
regeneration



The project was conducted under a public limited company, Bilbao Ría 2000 S.A., made up entirely of public capital (public institutions or companies). In order to fund this project, the shareholders transferred lands they owned, while at the same time the authorities changed their land use. Thus, the public limited company invested in the urbanization of reclassified lands and commercialized them in a way that the desired works could be funded. That is to say, their financing method is the capture of added value generated by the selling of public lands and new developments. It is worth noting that Bilbao Rías is subsidized by the European Union and has reached up to 9% of the company's total budget. Moreover, as a public company, it reinvests 100% of the profits they might make, in new projects.

Fotografías cedidas por BILBAO Ría 2000

Source: Medina, 2013 and Bilbao Ría, 2000.



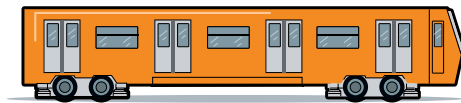
PROPOSAL OF METROBUS IN REFORMA AVENUE

**3.2.3 PROVISION OF PUBLIC TRANSPORT** (ADDITIONAL CAPACITY FOR AREAS THAT REQUIRE IT AND FOR NEW CORRIDORS)

There are transport corridors that are beyond their optimum use capacity, due to their high demand.

Implementing TOD strategies in these corridors could increase the user demand and saturate the transport system, making it very inefficient. This is the case of the metro lines 1, 2 and 3, as well as metrobus line 1.

**TABLE 6**  
SUPPLY OF PLACES AND PASSENGER DEMAND ON A BUSINESS DAY BY METROBUS AND STC-METRO



Metro Line	Supply of places	Passenger demand
1	763,470	785,492
2	691,560	912,405
3	679,320	776,116
4	186,660	86,041
5	374,850	256,955
6	239,700	153,908
7	405,450	311,104
8	514,080	402,103
9	602,820	389,935
A	297,840	280,041
B	497,250	496,245
12	419,220	255,934



Metrobus Line	Supply of places	Passenger demand
1	372,160	446,935
2	218,400	169,042
3	178,720	137,055
4	66,200	765

This can be solved by increasing the transport capacity and supply towards those corridors, while generating TOD areas throughout the city. This would help reduce the distance traveled, encour-

aging the use of non-motorized transport modes and decreasing long-distance travels of the more saturated corridors.

An interesting case in this sense is metro line 3 that is at maximum capacity. However, between the stations Hidalgo and Eugenia there is a great potential for development, which has been partly possible and could be supported by public transport, since the metrobus line 3 travels along the

same route, increasing the supply of public transport. This example shows why there should be no opposition to transport systems that cover the same route, as long as they are accompanied by TOD objectives.

**TABLE 7**  
**SUPPLY OF PLACES AND PASSENGER DEMAND ON A BUSINESS DAY FOR LINE 3 OF STC-METRO AND METRO-BUS**

	Supply of places	Passenger demand
<b>Metro line 3</b>	679,320	776,116
<b>Metrobus Line 3</b>	178,720	137,055
<b>TOTAL</b>	<b>858,040</b>	<b>913,171</b>

Source: PUEC-SETRAVI, 2013.

The creation of new public transport corridors or the extension of the existing ones generates new opportunities to implement TOD. Therefore, it is important to complement the new infrastructure creation policy with an urban development policy, that would also require specific urban policy instruments, which are discussed below.

has 8 metro stations, 5 metrobus stations and two zero-emissions corridors. Only the ZODES located in Tlalpan don't have access to mass public transport 800 meters away.

### 3.2.4 ADOPTION OF A TOD STRATEGY IN ZODES

Even though ZODES plan mobility strategies under implementation of computer systems (called Intelligent Mobility Systems - SIM, as per the acronym in Spanish), these don't consider wider objectives regarding sustainability in urban mobility, such as discouraging the use of automobiles.

In this way, the first three ZODES have a high potential to easily turn into TOD areas, particularly colonia Doctores, given its wide range of public transport (see Box 5). In the case of the ZODES located in Tlalpan, it should first involve the expansion of the mass public transport to them and then the establishment of TOD strategies. Otherwise, they would not contribute to the creation of a sustainable development that discourages the use of automobiles.

In principle, three ZODES could easily adopt a TOD strategy, due to the availability of mass public transport. The Tláhuac ZODE has a CETRAM, the ZODE on avenida Chapultepec has 3 metro stations, 2 trolleybus lines and one metrobus line. Meanwhile, the one located in colonia Doctores

It is recommended that each ZODE adopts an integral mobility strategy, intended to generate TOD areas. This means that each area has to make a large amount of changes, from allowing mixed-uses and higher densities up to improving the pedestrian, cycling and mass public transport conditions. It is also important that ZODES adopt strategies to reduce the use of automobiles, especially measures regarding parking management such as installing parking meters and adopting maximum limits.



**BOX 6**  
**ZODE IN COLONIA DOCTORES**

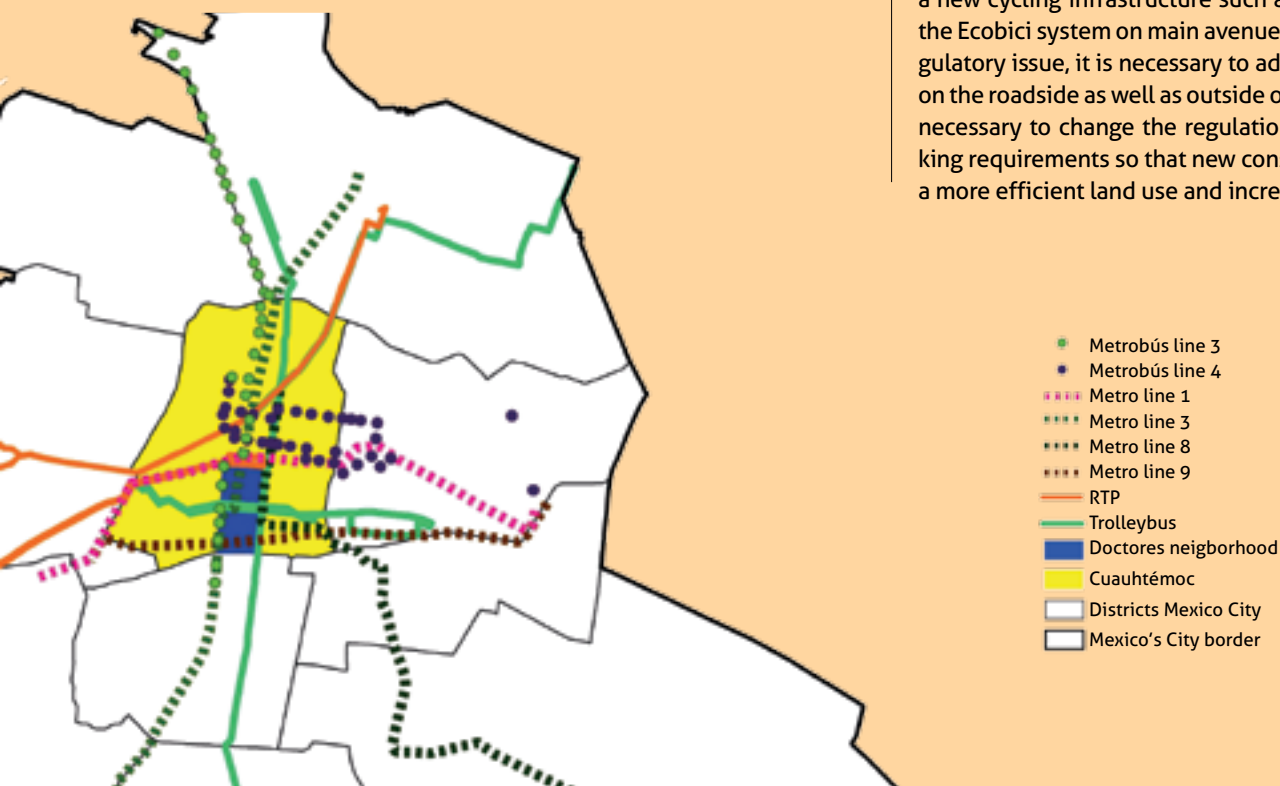
The colonia Doctores is in a privileged location in the center of the city and already has a wide range of public transport. These characteristics make it the perfect area to make regulatory and infrastructure improvements that attract activity and people, thus concentrating the population in a central area of the city that already has public transport services and urban equipments.

This potential has already been identified by the Government of Mexico City. The colonia Doctores has been designated as the ZODE that will turn into an Administrative City and the plan calls for building new government offices and houses for their employees, as well as recovering abandoned buildings and public spaces. The construction of government offices aims to create a new administrative area in the colonia, developing the lands that are currently owned by the GDF. The project provides for nine areas of action: Puerta Vértiz, Finanzas, Tribunal, Puerta Buenos Aires,

Centro MX, as well as the modernization of two markets and the restoration of parque Lázaro Cárdenas and Jardín de las Artes Gráficas.

ITDP conducted an investigation on the colonia Doctores and its opportunities to become a TOD area. The following are some key elements to consider in order to achieve this objective. In terms of infrastructure, it is important to ensure, on one hand, that new development opportunities favor social housing in order to ensure a diversity in income in the colonia and avoid the displacement of the lowest income population towards the outskirts of the city. On the other hand, the developments carried out in lands owned by Mexico City have to consider regulations that guarantee mixed-uses, active fronts, street orientation and favor the use of public and non-motorized transport.

In terms of mobility, Doctores could include new mass transport options, such as bus-bike lanes in the confined lanes of trolleybuses, better pedestrian spaces by redesigning crossings and traffic appeasement, and a new cycling infrastructure such as the expansion of the Ecobici system on main avenues. Regarding the regulatory issue, it is necessary to address parking, both on the roadside as well as outside of it. It is particularly necessary to change the regulation of minimum parking requirements so that new constructions can have a more efficient land use and increase their densities.



## 3.3 OUTLINING PERFORMANCE PRINCIPLES

### 3.3.1 PRINCIPLES OF URBAN MOBILITY

The urban form and development patterns, as well as the proximity to a station are essential in order to have a transit-oriented development that enables the use of sustainable transport. In order to be successful, the TOD strategy should be based on certain minimum principles that ac-

knowledge the independence of transport, the urban form and land use. ITDP and Gehl Architects have suggested eight principles of transport in urban life, that are based upon the best international practices:

**PICTURE 20**  
**PRINCIPLES OF SUSTAINABLE URBAN MOBILITY**

1

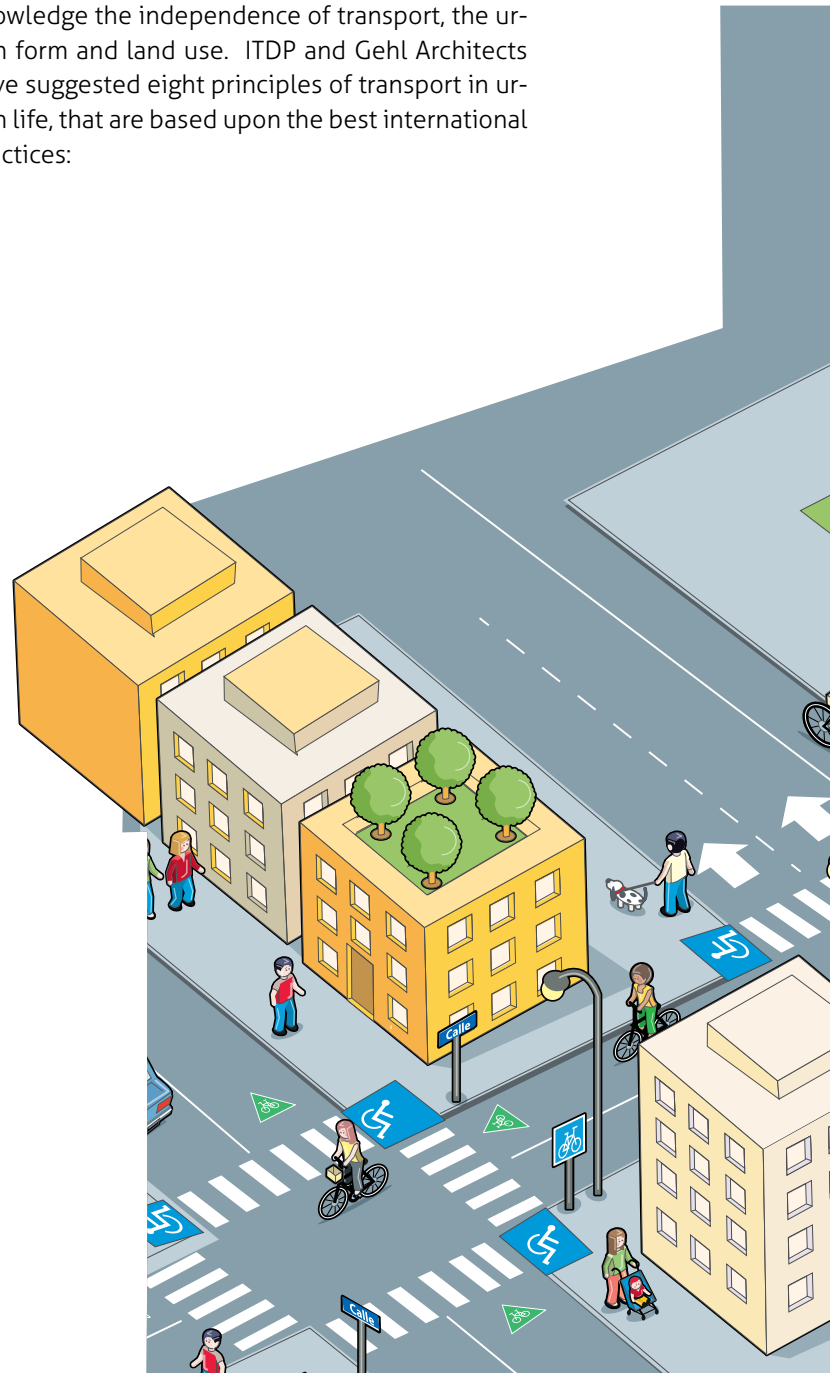
#### WALK

Develop neighborhoods and communities that promote walking, closing roads crossings, emphasizing the safety and convenience of pedestrians, creating public space and promoting activities at ground levels, at street level.

2

#### BIKE

Prioritize bicycle network, designing streets that emphasize safety and convenience of cyclists, offering secure bikeparking for private and public bikes.



3

**CONNECT**

Create dense patterns streets and walkways that are very accessible for pedestrians, cyclists and vehicular traffic; create carfree streets, alleys and green ways to promote non-motorized travel .

4

**TRANSIT**

Promoting a high quality public transport that ensures a frequent, fast and direct service, in addition to locating transit stations, homes, jobs and services at walking distance between them.

5

**MIX**

Planning for mixed land uses with an optimum balance between housing, commerce, parks, open spaces accessible and services.

6

**DENSIFY**

Match density population with the capacity of the mass transit system.

7

**COMPACT**

Creating compact regions with short commuting trips, reducing urban sprawl focusing development on adjacent to existing development and surrounding areas, as well as locating homes and workplaces at close range.

8

**SHIFT**

Increasing mobility by reducing parking and regulating the use of the roads; limiting parking to discourage car use during peak hours; implement fees for car use by hour and destinations.



Each of these principles is a set of objectives that encourages transit-orientation of cities. Therefore, it is best to adopt these objectives while creating a strategy of transit-oriented development for Mexico City. These are the following objectives:

## WALKING



The pedestrian network is safe and complete: in

- order to protect pedestrians from vehicles, there must be sidewalks or shared spaces where vehicles travel at slow speeds. Likewise, these spaces should not have obstacles and pedestrians should be able to walk freely. Intersections should reduce the risk of accidents and be accessible to all users.

The pedestrian environment is active and vi-

- brant: in order to encourage people to walk, due to its usefulness or for pleasure, there must be an interaction between the public space, the buildings and the surrounding usages. Streets with commerce, doors and windows that adjoins the pedestrian environment, create a sense of safety, that make the streets more active and give them a more vibrant atmosphere.

The pedestrian environment is warm and

- comfortable: protecting pedestrians against the weather is key to encourage them to walk. Trees provide a natural shade and portals, cornices, and awnings protect pedestrians against the sun as well as against the shade.



## CYCLING

- The cycling network is safe and complete: segregated ciclovías (bicycle lanes) must be provided on higher speed roads, while secondary roads can be shared spaces where bicycle traffic mixes with traffic from motorized vehicles that travel at a low speed.
- The bicycle parking facility is safe and adequate: using bicycles can only be an attractive option if there is available parking at the

destinations that are visited and if it is safe enough.

## CONNECT

- Pedestrian and cycle routes are short, direct and varied: the pedestrian network should offer enough connections in order to minimize the distance that pedestrians and cyclists have to cover in order to get from public transport to their destinations. The pedestrian network must be clear in order to encourage people to walk.
- Pedestrian and cycle routes are shorter than the routes for motorized vehicles: the major deviances affect deciding upon which mode of transportation to use. At pedestrian and cycling speed, traffic detours are much larger than traveling by car. Therefore, the network must allow and favor the routes for non-motorized modes of transportation.



## TRANSPORT

- High quality transport is accessible on foot: the distance between people and public transport can influence their decision to use it or not. Therefore, it must be located at a walking distance from most houses and jobs of a TOD area, to ensure a higher number of users.

## MIX

- The travel distances are decreased when providing various and complementary uses: having different uses in the same space reduces travels between destinations and they can be made on foot or bicycle. Moreover, having different activities on the street attracts more people, guarantees that the streets are occupied at all times and helps businesses thrive. Cities with more vitality combine housing and offices in buildings with commercial ground floors.





- Short trips for lower-income groups: people with lower incomes benefit from having shorter trips and greater access to public transport, since their transportation expenses decrease. Furthermore, having a population with a variety of incomes makes the TOD areas more socially diverse and more equitable.

## DENSIFY

- Housing and employment densities are enough to maintain high quality transport: successful transport systems depend on a concentration of jobs and residents that are close to stations that feed users to the system. However, the density must be related to the capacity of the modes of transportation in order to make them more efficient.

## COMPACTAR

- The development is in an existing urban area: most part of the cities have underutilized land that can be leveraged to create new urban centers. Cities should promote the development of the land first, before expanding the urban area. A compact development strategy decreases the cost of providing public transport.
- Traveling around the city is convenient: an interconnected city, with good pedestrian, cycling and public transport networks offers people the opportunity to access all the goods and services without the need for cars.

## SHIFT

- The occupied land by motorized vehicles is minimized: space devoted to parking in public areas and on construction sites have a significant influence on people's decision

to use the car and therefore on the resulting traffic jams.

It is important that these objectives are measurable in order to quantify if the proposed policies in the TOD strategy really contribute to the integration of mobility and urban development. In order to measure these principles and objectives, ITDP has developed the TOD standard (**SEE BOX 7**).

### BOX 7 TOD STANDARD

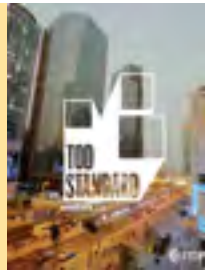
This tool recognizes urban development projects that are located at a walking distance from a mass public transport station and that have specific characteristics regarding urban design and land uses. This tool recognizes the development that is proactively oriented towards public transport, instead of just being adjacent, based on 8 principles of sustainable mobility, developed by ITDP and Gehl Architects (ITDP, 2011). The Standard proposes 21 indicators to measure the characteristics of the real estate developments and areas around transport stations that foster, facilitate and prioritize the use of public transport and travels by foot, bicycle and other means of non-motorized transportation. Its main objectives are:

Assess the orientation towards public transport of constructed urban development projects.

Assess projects at the planning and the design stage to identify gaps and areas of opportunity.

Guide the policy and relevant regulations towards urban, transport and land use planning, urban design and parking.

Source: ITDP, 2013b.



### 3.3.2 ATTRACTIVE SURROUNDINGS OR PLACEMAKING

The creation of emblematic places or placemaking is an essential strategy for improving the public spaces at CETRAM and in areas close to public transport that will turn into TOD. Placemaking, however, is not simply the recovery of public spaces but a collaborative process with the community, to plan, design and maintain these public spaces in the long term, and that are characterized by generating social activities and connections (Project for Public Spaces, 2013).

In order to achieve the success of a public space, it is important to understand and favor the social context and function it has for the users. This way, the placemaking efforts would not be focused only on design but on creating destinations that people go to and decide to stay in, in order to enjoy the available activities and services. In that sense, public places must have easy access and be physically integrated with their surroundings. Therefore, a TOD strategy must consider maximizing the access to public spaces, placing them near transfer centers and TOD areas where the access to the population can be extended.

Attractive public places provide services and a wide range of activities for users. Project for Public Spaces (2012) proposes that a successful public space must have at least ten activities or reasons to visit it, to ensure that it is interesting and that visitors will want to come back to visit. These ten elements can be, for example, places to sit, cultural events, businesses selling food, playgrounds for children, historic elements, sports activities, community activities, etc. Also, it is important that public spaces are safe and comfortable, in order to guarantee that everyone can have access to it. In this sense, the more access, activities and opening hours they offer, the more "eyes on the street" can be maximized, making them safer.

Besides the creation of public spaces in TOD areas, it is on one hand important to guarantee that new developed constructions are oriented towards these public spaces and enrich them. On the other hand, public access spaces within new developments must follow these principles.



ITDP PROPOSAL FOR  
DOCTORES  
NEIGHBORHOOD

### 3.4 FINANCING AND INSTRUMENTATION OF THE TOD STRATEGY

A Transit-Oriented Development policy inevitably needs to consider a financing and instrumentation strategy to make the implementation of projects in an area viable, both regarding mobility, as well as urban development.

The first step towards its establishment is to define the needs to turn an area into a transit-oriented area and define the costs. In general, one can identify three aspects that require funding:

Urban and transport infrastructure, such as pedestrian and cycling infrastructure, public transport systems, modal transfer centers, among others.

Land or space for development.

Development of real estate for housing, commerce and services.

It is important to consider that, in some cases, it is necessary to fund the construction of urban and transport infrastructure in the first place, in order to create the basic conditions to attract investment into the area. That is why it is useful to have a critical path in order to define in what order to implement different projects to sustain the development of housing, commerce and services.

However, in order to establish the best way and to what extent the existing or planned urban infrastructure could attract the development, the real estate context must be assessed. The growing (stronger) real estate markets have better chances

PUBLIC ACTIONS, SUCH AS PROGRAMS AND PLANS, LAND USE REGULATIONS AND INFRASTRUCTURE INVESTMENTS THAT PROMOTE TOD INCREASE THE LAND VALUE IN THE AREA, DUE TO ALLOWING MORE PRODUCTIVE USES AND PROVIDING GREATER ACCESSIBILITY.

for financing than the weaker ones and this has to be taken into account in the strategy (EPA, 2013).

In the same way, it is essential to identify the actors that will implement the mobility and urban development projects in the area, whether they are public entities (for example, SEMOVI, SEDUVI, Calidad de Vida, SEDECO, Secretariat of Finance, Oficialía Mayor, Housing Institute, etc.) or private companies that are interested in investing in the area. These are the actors that will play a strategic role in the funding of the projects.

In general, there are two ways of funding the projects: implementing them as the funds become available or through financial arrangements or loan schemes. With the first option, the projects are only implemented when there are sufficient resources to cover the total cost. However, with credit, the projects are paid before enough resources become available, usually through debt financing based on future profits arising from the project (EPA, 2013).

With a financing strategy where the full amount of the funds is required prior to implementation, various funding sources may be used. On one hand, public funds such as the following could be used:

- Public transport fees<sup>7</sup>.
- Available resources that the government departments of Mexico City has available to implement investment projects.
- Federal funds<sup>8</sup>.
- Resources from the development bank, which can be non-repayable funds.

It is also possible to use private resources, through public-private partnerships. For example, a concession or a build-operate-transfer project may be granted. With the first option, the private sector is in charge of operating and managing public services and assumes all related costs during the concession period. However, in a build-operate-transfer, the government grants the company the right to develop new infrastructure and operate it during a certain period of time. During this period of time, the private company is the owner and upon termination of the agreement, the infrastructure becomes the property of the state. This model has been used in Mexico mainly in the construction of road infrastructure, but the possibility of using it for sustainable urban transport could be explored, as with the case of CETRAM El Rosario.

On the other hand, a credit financing strategy places debt, either with stock markets, or through commercial or development banking. Another possibility is structured finance, which has been used in San Francisco and in Denver to exclusively fund TOD projects. These funds draw their resources from government sources, private banking and foundations, and are made available for government departments and private developers that need credit for studies, acquisition of property and construction of TOD developments, with great emphasis on the development of social housing (EPA, 2013; Seifel Consulting, 2013).

When credit is used in a financing strategy, it is important to consider how the projects create value so that in the future, projects can regain this

value and cover the investment with it, either for the repayment of the credit obtained or for the government to reinvest in other areas.

An alternative to the placement of pure debt to be considered, is the financing of infrastructure through securitization of the expected revenues arising from the project. In other words, the placement of bonds on the stock market are backed by the future earnings of the project (which is paid with that bond) and will allow to earn income in order to develop the project, or once it is in place, in order to pay the debt contracted with its development.

All the necessary elements for TOD have the potential to create added value to the area where they are implemented. However, it is important that several conditions are met. In terms of infrastructure, it creates value if the projects go beyond transport infrastructure, extending towards their influx area. In other words, it isn't only about building a mode of transportation (the lanes and stations for a BRT, for example), the infrastructure with universal accessibility and improvement of the public space is also required, which will allow the users to travel in a safe and fast manner within the urban space.

Regarding the land, it must be strictly regulated in order to have control over the created value and the type of urban development that is desired. The land use changes, for example, create value if they are directed towards more productive uses, even though this is not always desirable in certain social contexts. On the other hand, the development of new commerce, housing and services encourages the use of transport infrastructure, creating more value for an area.

Despite the fact that infrastructure, land and development all can create value, it must be defined how this value can be used to pay the debt that arises from building it. Usually this refers to

<sup>7</sup> It should be noted that the fees are an ex post resource and that they would only regain part of the investment, especially in the case of DF where public transport needs to subsidize the use of public transport.

<sup>8</sup> For further information about available federal funds to finance mobility and accessibility projects, see Garduño, 2013.





MEXIPUERTO CIUDAD AZTECA

the future revenue arising from the project. For example, for public transport, the revenues may derive from the fees paid by users, leasing commercial space inside the stations, advertising contracts, and even, in the case of the metro, air space for mobile telephony.

However, in the case of land and development, the incomes arising from the project are not necessarily public, so it is important to adopt a value capture strategy which will help recover the initial investment.

Public actions such as programs and plans, land-use regulations and infrastructure investments that promote TOD, increase the land value in that area, allowing for more productive uses and enabling increased accessibility. **This capital gain is not due to the owner's actions but to the improvement of the environment implemented by the government.** The added value may be withheld by the owner or may be recovered by the government to be used for public benefit. Since the price increase on properties resulted from a use of public resources, the government can collect the capital gains resulting from the project and use them to pay debt related to the project or to implement new projects (EPA, 2013; Smolka and Furtado, 2001; Gihring, 2009). The value capture may be conducted regardless of how the infrastructure was financed in the first place. Therefore, it is a mechanism whose sole purpose is not only to recover the investment costs of projects, but also to obtain resources in order to continue implementing the TOD strategy.

The value capture can take place in three ways, depending on the type of instrument that is being used.

Creation of new taxes or contributions.

Use of new resources collected through an existing tax.

Public/private agreement where the government obtains resources from a sale or the use of public property.

In the first case, new taxes or contributions are created to capture value, either from specific or general public actions. Contributions can be requested from developers in exchange for a regulatory change that will allow them more rights on the development, such as a more productive land use or a density bonus. In this case, the change is conditional upon making the contribution (Zhao et al., 2012). Another possibility is to create a "contribution for improvements" scheme, where owners that live near a certain designated infrastructure shall pay a certain percentage of it, through tax collection. The "contribution for improvement" is a separate tax, that is paid once and that depends on the proximity to the infrastructure work (CONAVI, 2010). Another new tax that can be created is the one taxing the land value; however, this one can also be introduced as a reform of the existing property tax. A land use tax could on one hand capture the capital gain resulting from public actions, and on the other hand, discourage speculation, since it is more expensive to withhold underutilized land (Gihring, 2009).

## BOX 8

### NATIONAL AND INTERNATIONAL EXAMPLES OF THE CREATION OF NEW TAXES AND CONTRIBUTIONS IN ORDER TO OBTAIN CAPITAL GAINS

#### Contributions from developers

There is an instrument in Great Britain called Planning obligations, that allows local authorities to demand certain requirements from developers of a premise in order to guarantee that the development, which otherwise would not have obtained a building permit, complies with the urban development policies imposed by the local government (Department for communities and local governments, 2006). The imposed conditions are negotiated between individuals and authorities, and can have a variety of purposes. The status of the development can be negotiated (for example, turn it into mixed use or even social housing); compensate against a loss caused by the construction (for example, if public space was lost); or the impact of the development can be alleviated (for example, if more transport infrastructure or new schools are needed). Developers may fulfill their obligations contributing in kind or money, either as a one-time or multiple payments. And in the case of infrastructure that will not exclusively be intended for the development, the local government may contribute a part of the funds.

#### Contribution for improvements

There is a form called contribution for improvements in Mexico City. This one applies to new construction works, expansion, or major remodeling of basic services (water, sanitation facilities, lighting), roads and equipment. The instrument contemplates that up to 50% of the cost of these works may be funded by collecting capital gains resulting from properties that are located up to 1.2 km away from the works (depending on the type). This contribution may be used to solely pay costs related to the works and initial financing costs, and cannot be collected until it is finished. The collection is made one time only, but the owners have the possibility of paying within a period of up to 48 months.

#### Land value tax

During the nineties, the city of Mexicali decided to transition towards a property tax collection model based exclusively upon land use and not a combination of land use and construction value. In reforming their property tax this way, Mexicali strengthened its municipal tax collection and therefore its ability to fund projects without depending on federal funds. Fiscal participation of the land tax in the finances of municipalities doubled, going from 3.48% of revenues to 7.62%. During the first year, the revenues collected through property tax increased by 150% (Perló and Zamorano, 2001).

#### Shares in capital gains

Another example of recovering capital gains through tax collection is Colombia and their shares in capital gains. This instrument taxes, at a rate between 30 and 50%, the resulting price increase of government shares. However, unlike other instruments that request the payment made over the land value, either consistently or in a single payment, having shares in capital gains only requests the payment under certain conditions: when there is an application for a construction license or a change of land use or when there is a transfer of the domain ownership of the property. The payment can be in cash or in kind, transferring a part of the land to the government. The resources collected through share in capital gains may be used for a wide variety of projects across the city. They can be used for transport infrastructure works; other public services and equipments; to buy lands for social interest project; for public space projects, and for mass transport systems (Maldonado, 2006).

In order to capture value through the use of new resources collected through an existing tax, the instrument Tax Increment Financing" (TIF) can be used. This is already used in the United States and the United Kingdom and is a way of channeling resources to deteriorated areas of the cities that the government plans to regenerate (Core Cities Group and PricewaterhouseCoopers, 2008; British Property Foundation, 2008). As public projects are being carried out in those areas and attract more jobs and more housing, the increase on the collected taxes will be greater. When there are no available resources to conduct public projects, a regeneration area is designated and it is estimated what would be the increase in tax revenue resulting from the regeneration of that area. Given that the increase in tax revenue are funds that the local government can assure that it will receive in the future, certain public investments are made, and bonds may be issued in that amount in order to finance the regeneration. Debt is paid in the long term and only with the revenues resulting from that same area.

Another way of capturing value is through a public private agreement where the government obtains resources from a sale or the use of public property. This joint development is usually specifically for a real estate development project around public transport stations or may even be a part of them (Cervero and Murakami, 2008). The joint development implies that the government captures value

directly through a payment made by developers. There are two ways of doing this exchange, the first is when the government sells or leases the public property. In the first case, the payment from developers is a one-off payment, and it allows the government to invest immediately in the development of new infrastructure. In the case of the leasing, the income is constant and may help the government pay recurrent operating costs. Furthermore, the leasing allows to renegotiate the incomes collected if the property value increases (Zhao, *et al.*, 2012).

The second way of carrying out a joint development is when the government grants the rights to develop public property, either permanently or temporary in exchange for a payment. In this way, government agencies promote the development of housing, commerce and services on their property without having to invest directly, since the investment is made by the private sector, and they receive income in exchange for granting development rights. Under these profit-sharing schemes, the government can even obtain part of the profits arising from the developments. The revenues obtained may be used to finance the transport infrastructure that adds value to the properties (Zhao, *et al.*, 2012). The best example of this type of joint development is Hong Kong and its "Rail + Property Development" model (**SEE BOX 9**).



## BOX 9

### HONG KONG'S "RAIL + PROPERTY DEVELOPMENT" MODEL

The TOD model from Hong Kong is recognized worldwide for its focus on the development of the urban rail system and real estate properties. At the same time a station is being built, a real estate development is being built, in such a way that the revenue obtained from development is used to pay the construction of the infrastructure. In this way, public transport may be provided to Hong Kong without incurring increased government expenses. At the same time, this model creates nodes of highly ac-



TSING YI STATION, HONG KONG

cessible transport with varied uses and attractions, that guarantees that residents, employees and consumers use the public transport.

The Hong Kong metro system is managed by Mass Transit Railway Corporation (MTRC), a mixed company, but the transport department from Hong Kong is the main shareholder. MTRC is also involved in the real estate development around stations, including design, construction and sometimes managing properties.

MTRC is a company listed in the Hong Kong stock exchange, that generates profits, hence does not receive any monetary public subsidy. However, it uses value capture to finance the investment in metro systems. The Hong Kong government grants land to MTRC at a low price and gives the company exclusive developments rights for it. MTRC sells those rights to private developers at a much higher price (considering the price that these lands will have when they have a metro station). Furthermore, the company negotiates in order to receive a part of the future revenues arising from real estate development.

MTRC has developed twenty five metro stations located in large housing, commercial and entertainment compounds that include 70,000 residential units and 15 million cubic meters of commercial space. Moreover, MTRC owns 12 shopping centers, five office buildings and co-owns the 88-stories skyscraper International Financial Center.

Source: Cervero and Murakami, 2008 and Medina, 2013.

Besides financing, it is essential that the Government of Mexico City has the right tools for the instrumentation of a TOD policy. We already mentioned in this section a variety of possible instruments in terms of financing and value capture of mobility and urban development projects. However, it is also necessary to have instruments

that allow the city's government to plan and regulate, acquire land, control and promote development, as well as manage projects. The legal framework of Mexico City currently has a variety of these instruments that may be used to promote transit-oriented development (Benlliure y Gómez del Campo, s/a):



**Planning and regulating:** urban development programs, fields of action, management standards, and areas of strategic management.

**Acquiring land:** expropriation and reparable.

**Controlling the development:** zoning and transfer of potentialities.

**Fostering development:** administrative facilities and fiscal stimulus.

**Managing projects:** public/private partnerships, areas of action, actuation system for cooperation and trusts.

However, it must be emphasized that it may be necessary to modify existing instruments to encourage TOD. For example, it is necessary that the urban development programs, both the general as well as from delegaciones and partial, include a focus about densification around transport. On the other hand, the transfer of potentialities can be encouraged to be preferably in areas around public transport, in order to promote densification.

It is also possible to create instruments specifically designed to promote transit-oriented development. For example, a management standard could be created specifically for this purpose, which will allow for a greater density and less parking requirements in lands up to 800 meters from public transport, if requested. In terms of land acquisition, a land bank could be implemented, favoring the close location to public transport as a criterion in the purchase of lands. Given that the government can buy lands at a low cost before starting infrastructure works, a land bank can be created around the mass transport stations, and can later be used for public benefit by promoting TOD projects. An example of such a strategy is Curitiba: before building the corridors for transport, the city bought lands around them and used them to build social housing, thus guaranteeing that people with lower incomes had access to the transport system.

Given that, so far, the contribution for improvements is the only method for the capture of cu-

VALUE CAPTURE CAN BE CARRIED OUT REGARDLESS OF HOW THE INFRASTRUCTURE WAS FINANCED AT FIRST. THEREFORE, IT IS A MECHANISM, NOT ONLY TO RECOVER THE INVESTMENT OF THE PROJECTS BUT ALSO FOR RESOURCES TO CONTINUE IMPLEMENTING THE TOD STRATEGY.

urrent value within the legal framework of Mexico City, it is necessary to bring in new instruments, such as the ones outlined before, that will enable the funding of infrastructure works resulting from a TOD policy.

With regards to instrument creation, there is also a need for clarity about how revenues are obtained, whether they result from contributions, selling or leasing of public property and recovered capital gains, as well as what they are used for. Ideally, the funds obtained from a Transit-Oriented Development policy should be specifically labeled in order to continue funding public and non-motorized transport infrastructure that will enable more development in TOD areas. Similarly, these funds may be used to develop social housing and hence ensure an equitable development.

In order to achieve clarity over these resources, an institutional structure dedicated to funding TOD projects is needed. This could be a trust, or even a government agency. In this sense, Calidad de Vida can take the role of a development agency, since it is a majority state-owned company that has the possibility of entering into agreements with the private sector to conduct projects. Calidad de Vida has already acted as such in the construction of the CETRAM Rosario and it will surely continue doing so with the development of ZODES across the city. Meanwhile, the planning and implementation should be borne by other departments, such as SEDUVI and the Secretariat of Public Works.

## 3.5 COMPLEMENTARY POLICIES TO MAXIMIZE THE SUCCESS OF TOD

Besides the necessary policies needed to implement a TOD, there are others that, if implemented simultaneously, could strengthen the actions regarding mobility and urban development, and improve the quality of life of TOD areas.

### TRANSPORT REGULATION AND INTEGRATION-

Even though TOD strategy has a focus on mass public transport, it is important to consider that 60% of the trips are made with low-quality public transport (poor quality), such as autobuses and microbuses. In that sense, it is essential to improve regulation and increase the licensed public transport through the creation of an Integrated Transport System. This can benefit different areas of the city such as helping to organize spaces and flows from the public transport to the inner space of the CE-TRAM, a situation that would allow for a better use of spaces within them and make them eligible for an improved reuse or recycling for TOD projects.

Currently SEMOVI is working on the creation of an Integrated Transport System (SIT, as per the acronym in Spanish) for Mexico City that, through proper coordination with the rest of the actors involved (**SEE SECTION 3.6**), will contribute to a TOD strategy.

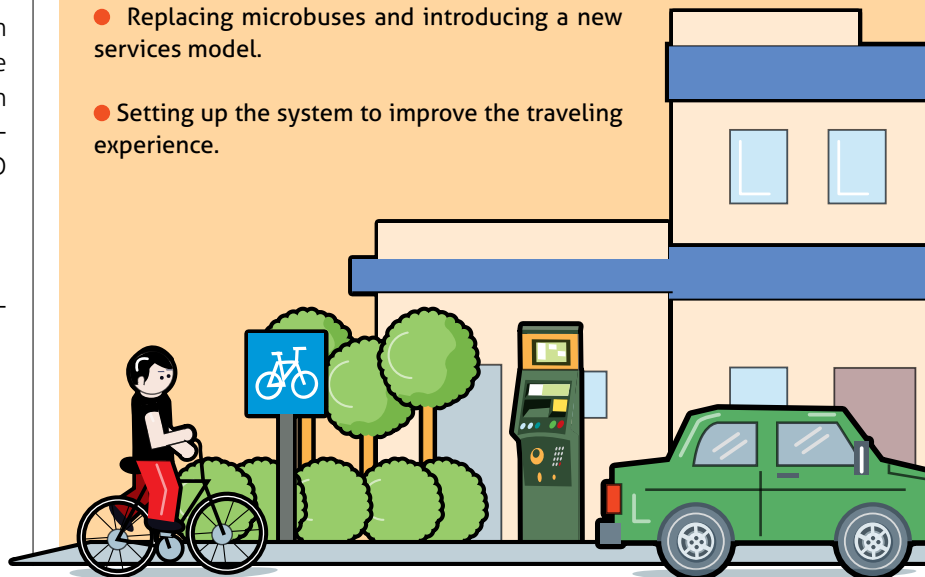
### HOUSING POLICY

The GDF housing policy is also essential in achieving the fostering of a TOD with mixed uses, densities and revenue mix. GDF can encourage the construction of accessible housing through different existing instruments. In the first place, it is possible to focus financing on the Housing Institute of the Fede-

#### BOX 10 INTEGRATED TRANSPORT STRATEGY FROM SEMOVI AND RELATIONSHIP WITH TOD

Within the PIM 2013-2018 framework, SEMOVI developed a strategy to turn the current transport system of Mexico City into an integrated system. This refers to different modes of transportation of the city being integrated both physically and with a single payment method, and also carrying out an integrated planning of the services. An integrated system assures that the quality and efficiency of transport is homogeneous across the different services, improving the travel experience of users. In order to achieve an integrated system, SEMOVI proposes several lines of action:

- Planning services according to the needs of the users, conducting studies and assessments that will allow the improvement of the service.
- Replacing microbuses and introducing a new services model.
- Setting up the system to improve the traveling experience.



- Expanding networks and modernizing roads, stations and stops.
- Having a single payment method.
- Implementing intelligent transport systems, that may offer real-time information and improve reliability, consistency and frequency of the services.
- Assessing and structuring a healthy financial scheme to guarantee the sustainability of the transport system and increased transparency in the use of the resources.
- Fostering institutional strengthening, through institutional coordination mechanisms for the implementation of the integrated system.

The Integrated Transport System strategy is complementary to the TOD policy in three areas. The first one is the integration of various modes of transportation in CETRAM and their improvement; seeing these centers as nodes, more than just an exchange of transport, they provide services to the users. Secondly, the improvement of the public transport quality, even if it is not mass transport, and the integration of non-motorized modes promotes the use of efficient modes of transportation and provides the basis for improving areas that are well served by transport. Likewise, the expansion of the mass transport network coverage increases the amount of people and jobs having access to quality transport and offers the opportunity to create new corridors of dense and mixed-use urban development.



Source: SEMOVI, 2014.

ral District (INVI, as per the acronym in Spanish) in the TOD areas. Moreover, using federal sources of funding can enable the development and the construction of new housing as well as the improvement of existing ones, hence improving the housing stock. Finally, the possibility of acquiring idle land around urban transport stations in order to develop social housing, must not be ruled out.

### POLICY FOR REDUCING CAR USE AND PARKING POLICY

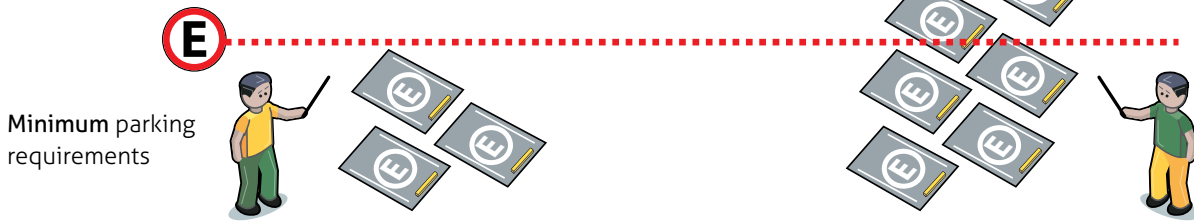
Rather than considering it complementary, it is an integral part of any TOD strategy and can determine the success or failure of the implemented policy. The most important element is the generation of direct incentives in order to decrease the use of private automobiles, especially in areas where TOD is being promoted. Thus, the following supporting strategies are proposed:

**Strategies based on parking** In any TOD strategy, the parking control is crucial because the construction of more parking spaces does not solve the parking problems, but instead, amplifies them (**SEE PICTURE 20**). Parking policy can be focused on three strategies: **a)** implementing parking meters, **b)** modifying minimum parking requirements for new constructions, either by eliminating them, offering discounts or establishing maximum requirements for every construction or zone or **c)** removal of parking spaces from the street, by extending the public space for pedestrians and bicycle users. It is also possible to prompt developers to implement shared parking in complementary time schedules or conducting mobility management programs that include incentives to use efficient modes of transportation or a car sharing scheme, instead of building parking spaces.

**PICTURE 21**  
**PARKING REGULATION WITHOUT A SENSE OF SUSTAINABLE MOBILITY**

The rules of construction requires new developments to build parking spaces, regardless of their location and their effects on mobility . This situation encourages car use, regardless of the alternatives available in each area.

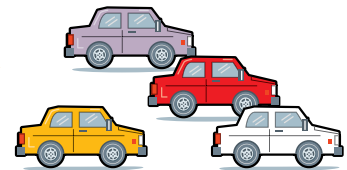
**Impact of parking requirements**



If you want constuir fewer parking places, the regulation does not allow it. Therefore, the development became expensive, distant locations are searched (without transit) or to the project is not constructed.

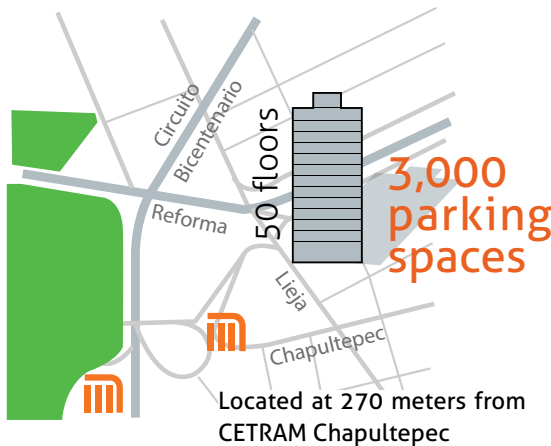
If a developer wants to build more parking spaces than the minimum despite having good public transport, no regulation allow it. This attracts more cars to development.

Parking space requirements only increases the cost of housing, goods and services and causes an oversupply of parking spaces which promotes car use.

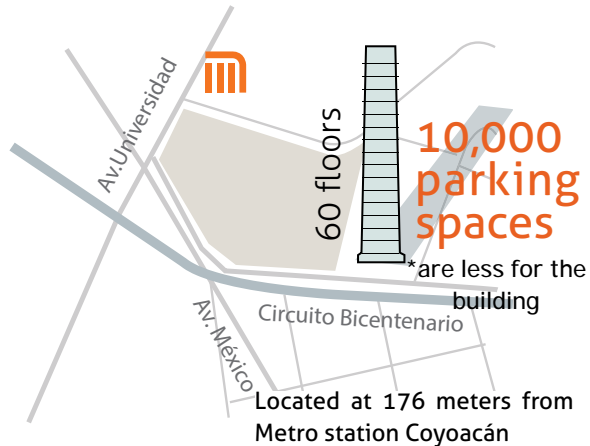


**In Mexico City**

**Torre Bancomer OFFICE BUILDING**



**Mitkah MIXED-USE BUILDING**

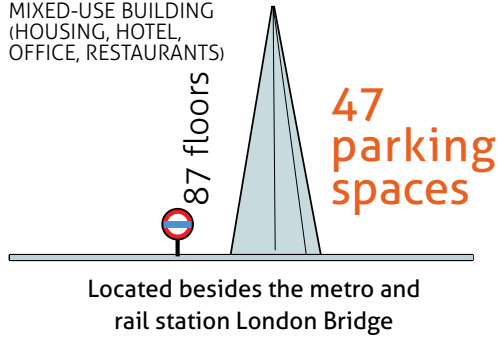




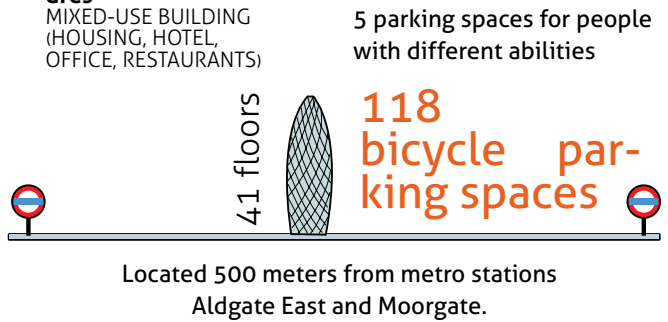
## This situation is different in other parts of the world

### London, United Kingdom

**The Shard, Londres**  
MIXED-USE BUILDING  
(HOUSING, HOTEL,  
OFFICE, RESTAURANTS)

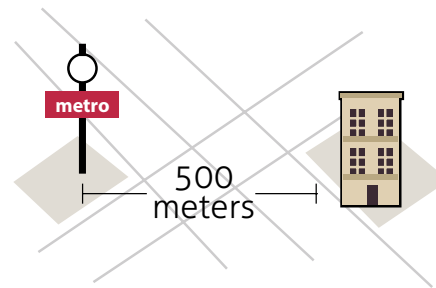


**The Gerkhin, Londres**  
MIXED-USE BUILDING  
(HOUSING, HOTEL,  
OFFICE, RESTAURANTS)



### Paris, France

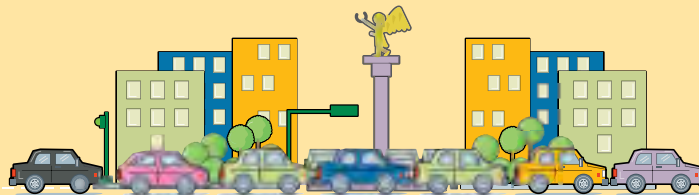
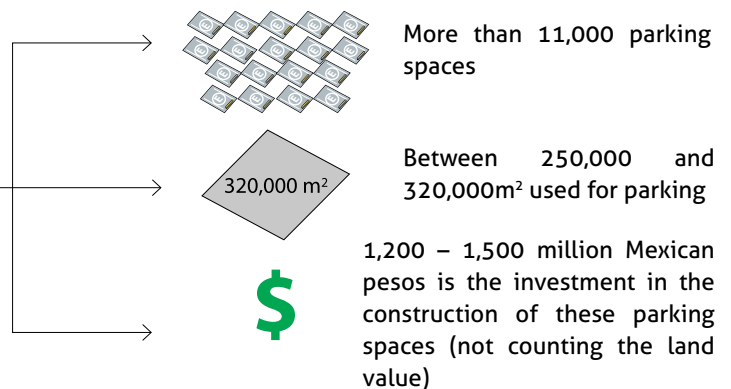
If a new building is located 500 meters from a metro station, the building of parking is not required, even though it may be built.



In Mexico City, it is estimated that more than

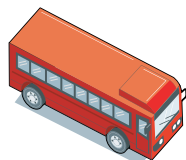
**330,000m<sup>2</sup> of office space**

will be built on the Reforma corridor between 2014 and 2017. Class A/A+, which means: (Only corresponding to those works)



This could mean 11,000 more cars entering and exiting the area that is currently saturated and that already has public transport and cycling infrastructure.

It is not about not wanting Reforma to grow nor leverage the building potential it has, but rather allocating the resources for parking to mitigation measures:



Metrobus Reforma



Strengthening cycling and pedestrian infrastructure



Improving the conditions of nearby metro stations

**Strategies to improve accessibility** These are focused on increasing accessibility and safety when traveling on foot or bicycle, in order to discourage traveling by car. In that case, strategies are recommended that address traffic-calming, shared space and pedestrianization of the streets on secondary roads, as well as a strategy of complete streets on primary roads.

Traffic calming involves a variety of strategies and design criteria that aim at reducing the traffic volume and speed on a particular road. These include changes of one or both directions of traffic, expansion of sidewalks, reduction of lanes, creation of median strips or traffic islands and speed reducers such as pedestrian level-crossing, roundabouts, textured pavement, traffic diverters, among others.

**PICTURE 22**  
**TRAFFIC CALMING MEASURES**



- 1** Change from one to two ways
- 2** Sidewalks extention
- 3** Lane reduction
- 4** Traffic island
- 5** Roundabout
- 6** Bicycle lane

**Efficient automobile use.** This set of strategies makes car use more efficient, since it is not only used for individual trips. These most notably include two measures of particular interest: promotion of car sharing and car lending systems.

An efficient car use through a car sharing system and one lending cars is currently being promoted in Mexico City. On one hand, there is the company Aventones that has a software through which subscribers plan within their companies, education institutions and government agencies to share trips by car. Also, there is a car sharing system called Carrot, which offers their subscribers intelligent electronic cards to access the vehicle, reservations by phone or online, parking spaces in selected areas and maintenance.

**Regulation of informal trade**

Public transport stations and spaces with high pedestrian traffic attract informal trade. As a matter of fact, a major part of metro stations and CETRAM have problems due to a strong presence of informal trade, that often blocks passenger flows and poses public safety risks.

It is important to note that informal trade is not, in itself, a bad thing, since it responds to the needs for provision of goods and services at affordable prices that could not be met otherwise. Likewise, with an adequate offer, emblematic places could be generated within the city that would allow the creation of destinations, develop businesses (by reducing the market entry barrier) and offer a variety of cultural activities.

In this sense, the entire TOD strategy, particularly regarding the CETRAM, has to consider informal trade, in order to transform it into a formal and orderly trade that will not become a barrier for the mobility and accessibility of people with different abilities or pose public safety risks. This policy has to enable both maintaining employment of people who practice it, as well as offering goods and services at affordable prices.



- 6** Speed reducers, bumps and crosswalks
- 7** Chicane
- 8** Traffic diverts
- 9** Pavement textures

Source: Medina and Veloz, 2012.

## BOX 11

### INDIA'S NATIONAL POLICY ON INFORMAL TRADE

Faced with a situation where 2% of the population in the cities practices informal trade, India's Ministry of Urban Development and Poverty Alleviation implemented a national policy in 2004, to address this population. The objective of this policy is to provide an enabling environment so that people conduct their economic activities to support their livelihood, eliminate congestion of vendors and maintain hygiene in public spaces.

The policy recognizes that street vendors are an integral part of the commercial sector and that they address public needs through a wide distribution system. Therefore, the policy encourages cities to legally recognize vendors, by offering them spaces where they can trade, and it even recommends that urban development plans acknowledge areas for



them to get installed and that they become designated authorized places for them.

The policy emphasizes that all recovery projects of public spaces must involve vendors as an integral part of urban interventions. In case that forbidden areas get designated for street commerce, this designation must be done in a consensual manner between the municipal authorities, trade associations and street commerce associations.

Regarding regulation, a voluntary registration of vendors, not a licensing system is proposed. However, it is contemplated that if there is vendor saturation in a specific public space in the city, access may be regulated through a fee. The space regulation is made based upon the before mentioned urban development plans.

The regulation and monitoring is conducted at a municipal level, through a committee that specializes on the matter. The policy also proposes the expansion of social security schemes for sellers, as well as financial services so they can have access to credit. Education and training programs are also contemplated, so they can improve their business.

The policy was designed on a national level, and since India is a federal state, it must be adopted by the states. Currently 7 states and 25 cities have implemented the policy and they have started to modify their regulations accordingly.

Source: WIEGO, 2011.

## POLICY FOR CITIZEN PARTICIPATION

It is highly recommended to turn to citizen participation when making decisions about land use and transport policies. Considering the opinion of affected groups enables citizens to own the strategy and be co-responsible for its achievements and goals.

## BOX 12

### HANDBOOK ON CITIZEN PARTICIPATION

ITDP and the Civic Collaboration Center prepared the Handbook on citizen participation in urban mobility policies in order to address the challenge of effectively including the diversity of voices of society during urban decision-making processes. This handbook is a comprehensive tool on establishing mobility and development policies for the city, including society through



### OTHER SOCIAL DEVELOPMENT POLICIES

Mexico City and ZMVM have populations with significant socioeconomic differences. In particular, there is a population with different types of high levels of marginalization. For this reason, TOD policies need to be complemented with other social policies that will enable the reduction or elimination of marginalization in intervened areas, through employment, education and/or cultural programs.

THE EXISTING INFRASTRUCTURE THAT IS ALREADY LOCATED WITHIN A 1 KM RADIUS OF PUBLIC TRANSPORT STATIONS COULD BE A CATALYST FOR IMPROVING ACCESSIBILITY TO THE AREAS THEY SERVE.

#### BOX 13

#### SOCIAL POLICIES AIMED AT PROMOTING SOCIAL AND ECONOMIC DEVELOPMENT IN TOD

The government of Mexico City has a wide variety of social programs that can be coordinated with transit-oriented development policies in order to improve the quality of life of transport users and the population of TOD areas.

The local government manages, through different Secretariats, a large number of equipments: Institutes of secondary and higher education (Institutos de Educación Media Superior) (IEMS), a large network of hospitals, markets and community kitchens. The construction of new facilities of this kind, if necessary, could be done in the areas chosen as redensification areas close to public transport. On the other hand, the existing infrastructure that is already within a 1km radius from these public transport stations could be a catalyst for improving accessibility to the areas they serve.

The Secretariat of Culture currently has two cultural centers that are directly linked to a metro station: The Centro Cultural José Martí at the Hidalgo station and Centro Cultural Xavier Villaurrutia at glorieta Insurgentes. These centers could be the beginning of a wider policy where cultural events are offered at spaces that are usually used for mobility, serving populations that do not necessarily have access to them. On the other hand, Fábricas de Artes y Oficios (FARO) Indios Verdes and Oriente, that seek to provide a space for cultural development, are already close to metro stations, therefore any project at the nearby transport lines should take into account how to integrate them.

more accessible participatory mechanisms. This way, the government and citizens can jointly tackle urban mobility challenges.

This document offers authorities a review of the best practices, the benefits and challenges of participation, as well as the legal framework that governs participation in the country. It also describes step by step how to conduct a participatory process and

offers various tools or techniques to develop them. Furthermore, follow-up mechanisms are outlined, as well as key elements to carry out any type of process.



An emblematic example of social policies carried out jointly with a transit-oriented development strategy is the policy of cultural public spaces that was implemented in Medellín and Bogotá, Colombia. The construction of public libraries close to public transport stations brought cultural, educational and community development projects to marginalized areas that did not have these services before.

#### BOX 14

#### PUBLIC SPACES, URBAN DEVELOPMENT AND MOBILITY: BOGOTÁ AND MEDELLÍN, COLOMBIA

In Bogotá, Colombia, a public library system called BiblioRed has been developed, comprising 20 libraries that are strategically placed around the city. The largest ones are close to the public transport system Transmilenio, while the rest are located at the centers of the neighborhoods (barrios). In addition to being spaces with cultural activities, the libraries have turned into information and service centers for the community, since they also host education and community development projects. Therefore, the network of libraries helps reducing travels, because it brings services closer to communities, improving the accessibility for more than 4 million people who use it (McDermott, 2010).

This library model was replicated in Medellín, where a network of nine library parks were built in margina-

lized areas of the capital. These compounds consist of libraries that are surrounded by public spaces and, together with the public transport system Metrocable, they have contributed to the revitalization of informal settlement areas of the city. The libraries were built by renowned architects and have therefore also become touristic attractions of the city, which has helped increasing the amount of people visiting marginalized areas of the capital and improving security. The libraries are now community centers and meeting points, particularly for students, who make up 70% of the visitors (Gates Foundation, 2009). As is the case in Bogotá, library parks serve as a platform for other government programs in the area, such as health fairs and the payment of social transfers.



BIBLIOTECA ESPAÑA, MEDELLÍN.

## 3.6 INSTITUTIONAL MANAGEMENT AND COORDINATION

Given the complexity of pursuing an intersectoral policy within a specific territory, the implementation of a transit-oriented development should be a shared task between the different Secretariats and legislative bodies, both from Mexico City as well as at the federal level. The role of each participant is outlined below:



### SECRETARIAT OF URBAN DEVELOPMENT AND HOUSING

SEDUVI is definitely the leading Secretariat for the definition of TOD topics, since it is in charge of preparing the urban development programs of the city (PGDU, from delegaciones and partial). The PGDU must include, as a response to the PGD approaches, a strategy on densification and orientation towards mass transport; however, SEDUVI can take another step forward and create a specific strategy on this issue. In addition, the Secretariat has the power to design and implement the necessary urban development instruments to promote redensification of the city around mass transport. On the other hand, it can design housing programs and foster investment in real estate, which will help promote the efficient location of the built properties. SEDUVI is also responsible for establishing urban impact studies and granting permits for development. These capacities can help promote TOD criteria in construction projects. In terms of parking regulation, it has the capacity to establish installation areas of parking meters and operate the ecoParq system.



### SECRETARIAT OF MOBILITY

SEMOVI has the power to design and conduct policies and programs regarding mobility, from public and non-motorized transport to schemes of rational car use. The available instrument to do so is PIM, which, as mentioned before, already includes a TOD proposal. Its role within a TOD policy is the expansion of mass public transport on one hand, and the design and regulation of transport stops, on the other hand. SEMOVI has the capacity to establish criteria for the expansion of public transport, therefore it promotes corridors according to the scheme of a complete street, which enables densification. The power that SEMOVI has to issue policies and regulations regarding stops allows it to have direct interference in the planning of CETRAM, which are key elements of the TOD strategy. Likewise, it has regulatory powers regarding public parking, which is essential in a strategy that discourages car use in TOD areas.

### LEGISLATIVE ASSEMBLY OF MEXICO CITY (ALDF, AS PER THE ACRONYM IN SPANISH)

In addition to legislating on all matters included in a TOD strategy, ALDF is a key player for TOD due to its capacities regarding urban development. More specifically, the Assembly is responsible for approving all urban development programs implemented by SEDUVI and the delegaciones. In the same way, this legislative body must analyze, decide on and approve planning instruments proposed by SEMOVI and specifically designating areas of strategic management.



### SECRETARIAT OF THE ENVIRONMENT

The Secretariat of the environment is in charge of the strategy regarding mobility on bicycle in Mexico City and the Ecobici system. This system has become an important link to mass public transport and therefore improves its access. The installation of Ecobici zones in central areas of the city is an opportunity to expand the coverage of public transport and promote the use of non-motorized transport in areas that are already served with transport infrastructure. Likewise, a strategy of cycling infrastructure provision such as segregated bicycle lanes and parking for bicycles at public transport stations can complement the TOD policy.



### SECRETARIAT OF PUBLIC WORKS AND SERVICES (SOBSE, AS PER THE ACRONYM IN SPANISH)

This Secretariat is in charge of two key elements of the TOD policy. On one hand, it is responsible for conducting projects and construction works of the Metro Collective Transport System and the public transport corridors above ground, such as Metrobus, therefore carrying out complete streets is part of their capacities. On the other hand, SOBSE has the power to update regulations applicable to constructions in Mexico City. This allows the Secretariat to have direct interference in the parking regulation policy off the roadway, since the building code is the regulation that establishes the minimum parking requirements for every land use.



### OFICIALIA MAYOR AND THE COORDINATION OF THE MODAL TRANSFER CENTERS OF MEXICO CITY

This department has two roles. It is in charge of managing the properties of the DF, including CETRAM, therefore it plays an important role in carrying out public or private projects, since the ultimate ownership of these spaces is borne by this department. One of its decentrali-



zed agencies is the Coordination of Modal Transfer Centers in Mexico City (COCETRAM, as per the acronym in Spanish). This department is in charge of the planning and implementing of CETRAM infrastructure works and equipment, as well as the management and operations and is therefore a key player in the TOD policy. In this sense, the agency has the opportunity to promote comprehensive projects regarding transport, housing, offices and commerce at the CETRAM in the city, in coordination with other government departments, as well as organizing public transport spaces and flows inside the CETRAM.

### SECRETARIAT OF FINANCE

This secretariat is in charge of managing the income policy, tax administration and programming the GDF public budget, as well as collecting taxes, contributions for improvements and other income that the government may have. Its participation is thus essential for the financing scheme of every TOD project, either by using public funds, resorting to credit mechanisms, or implementing the necessary instruments for a value capture strategy.



### AUTHORITY ON PUBLIC SPACE

Authority on Public Space (AEP) has the power to propose policies related to public space; it can therefore help develop a policy of placemaking that joins in the efforts of other departments. AEP can also plan, design and implement these works and take part in the planning of transport and road works, and is therefore able to strategically collaborate in order to improve public spaces outside of the public transport stations and areas designated as TOD.



### CALIDAD DE VIDA AND SECRETARIAT OF ECONOMY (SEDECO)

Calidad de Vida is a company with a majority public shareholding. Due to this nature it can dynamically take part in private-sector investment schemes.





Therefore it can act as a means to fund projects of social benefit in the city, coordinating the private sector with the DF government and facilitating their interactions. SEDECO can also promote investment projects in specifically designated areas of the city (area of economic development) through incentives granted by the GDF. These areas could be designated areas for TOD.

### INSTITUTE OF HOUSING OF MEXICO CITY (INVI)

INVI, together with SEDUVI, propose a housing policy. The Institute has the possibility to favor housing construction for low-income populations of the DF in areas that are close to public transport, in order to guarantee that their inhabitants have access to it. INVI also consists of an urban land and real estate stock for real estate development, therefore it would be desirable if that stock included the close location to public transport as one of their criteria.

### DISTRICTS

Districts are part of the TOD policy, both in terms of transport as well as urban development. With regards to transport, they are in charge of taking care of secondary roads, hence they are responsible for the accessibility and traffic-calming measures. In terms of urban development, delegaciones are responsible for participating, together with SEDUVI, in preparing and modifying programs related to delegaciones and partial programs. Moreover, they are responsible for compliance monitoring of those programs.

### FEDERAL GOVERNMENT

Besides the local government, SEDATU, SCT, SEMARNAT and SHCP may be strategic actors in the implementation of a TOD strategy in Mexico City. The recently created SEDATU has a wide variety of funds that the local government or individuals relating to mobility, public space and housing can have access to. The Habitat and Renovation of Public Spaces funds finance various pedestrian and cycling interventions and in public spaces. On the

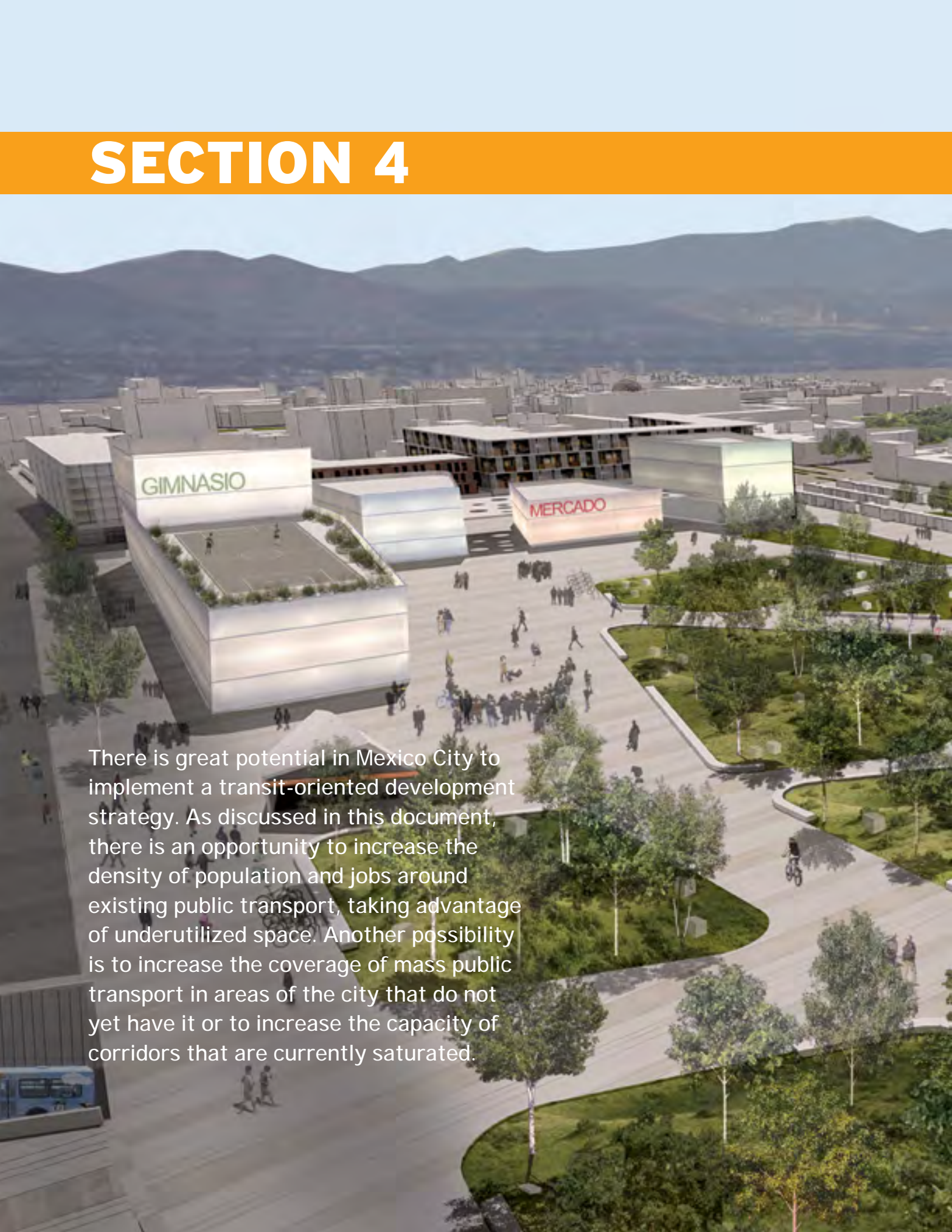
other hand, there are subsidies for social interest housing and the program of nature reserves, that grant support to social housing construction with high densities in central areas of the cities.



SCT has two important mass transport projects in Mexico City: the train Mexico City-Toluca and Mexico City-Queretaro. The construction of these trains offers the opportunity to trigger development around their stations and improves the public spaces of the terminals or CETRAM that they get to. In addition to these projects, SCT has entered into agreements on decentralization and reallocation of resources that has enabled the construction of transport infrastructure such as the Metro line 12. This form of financing may be used to continue expanding the network of mass transport in ZMVM, such as metro lines A and 4, as well as new mexibus lines or even an aerial cable car system for the State of Mexico.

Finally, SHCP may be an important actor for the funding of TOD projects, either through a public budget, or helping with their experience, by creating a sustainable financial scheme for Mexico City.

# SECTION 4

An architectural rendering of a transit-oriented development in Mexico City. The scene is viewed from an elevated perspective, showing a large, modern building complex. The building on the left is labeled 'GIMNASIO' in green letters and features a rooftop tennis court. To its right is a building labeled 'MERCADO' in red letters. The buildings are connected by a central courtyard area with a paved plaza where many people are walking. To the right of the plaza is a landscaped area with green grass, trees, and a winding path. In the background, a cityscape is visible, and further back, a range of mountains under a clear blue sky. The overall atmosphere is bright and modern.

There is great potential in Mexico City to implement a transit-oriented development strategy. As discussed in this document, there is an opportunity to increase the density of population and jobs around existing public transport, taking advantage of underutilized space. Another possibility is to increase the coverage of mass public transport in areas of the city that do not yet have it or to increase the capacity of corridors that are currently saturated.



# FINAL COMMENTS



VISIÓN DE CETRAM TACUBAYA. ARQUITECTURA 911SC +ITDP

The proposed strategy in this publication to promote TOD in DF contemplates, on one hand, the construction of new transport infrastructure, and, on the other hand, the need to modify certain regulations regarding urban development and construction in order to promote development. When combining both actions, it is possible to improve the orientation of the city towards transport. In order to achieve this, four different intervention types are being proposed: the development of corridors, the reuse of CETRAM, the provision of public transport and transforming areas that already have public transport. Altogether, these interventions have the potential to drive urban development and mobility policies towards one single integrated TOD policy for DF.

Implementing this TOD policy requires close coordination and cooperation between the different government departments. The joint work between SEDUVI and SEMOVI is especially important in that matter, in order to reconcile the mobility policy with the urban development guidelines of the city.

This document is a first approach to what entails a TOD policy for Mexico City. However, the government of Mexico City must develop guidelines of transit-oriented development in the General Program of Urban Development and even establish a special strategy to promote it.

CONAPO (2012) estimates that the population in ZMVM will increase by 2 million by the year 2020; however, the projection considers that this growth will occur in the State of Mexico, and that Mexico City will even lose population. A TOD policy is instrumental in order to attract this growth towards Mexico City and avoid the expansion of the ZMVM towards areas that are not served by public transport. Using merely unoccupied housing units around existing public transport, the housing needs of 29% of the population growth could be covered by the year 2020, and if one added the corridor proposals of ITDP, 34.7% could be reached

Finally, the highest potential of a TOD strategy could be achieved if it included the entire ZMVM and the federal government was involved. If the government of the State of Mexico focuses on containing disorganized urban sprawl, and the federal government, besides funding mass transport (such as metro and mexibus) and subsidizing housing close to it, took advantage of projects such as interurban trains and the new Mexico City Airport to promote TOD, ZMVM would certainly be headed towards an equitable low-carbon growth.





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# ANNEX

## ALIGNMENT OF THE TOD STRATEGY WITH VARIOUS PLANNING INSTRUMENTS

The strategy outlined in this document is supported by various planning instruments, both federal as well as local, that recognize the need for a more sustainable urban development and mobility in Mexican cities. These planning instruments are the National Development Plan, the National Urban Development Plan, the National Climate Change Strategy, and the General Development Plan for Mexico City. The inclusion of urban deve-

lopment and mobility in these documents allows the competent government agencies to devote their efforts towards programs and actions that promote Transit-Oriented Development.

Below are the objectives and lines of action related to Transit-Oriented Development that are included in every instrument.

### NATIONAL DEVELOPMENT PLAN 2013-2018

In its two goals, Mexico Incluyente and Mexico Prospero, PND includes topics regarding urban development, housing and mobility, and proposes the following objectives and lines of action:



#### GOAL II. MEXICO INCLUYENTE (INCLUSIVE MEXICO)

**Objective 2.5:** Provide an adequate environment for the development of a dignified life.

**Strategy 2.5.1:** Transition towards a sustainable and intelligent urban development model that provides dignified housing for Mexicans.

**Strategy 2.5.2:** Responsibly reducing the housing backlog through the improvement and expansion of existing housing and through the promotion of acquiring new housing.

#### GOAL IV. MEXICO PROSPERO (THRIVING MEXICO)

**Objective 4.9:** Having a transport infrastructure which brings down costs of conducting economic activities.

**Strategy 4.9.1:** Modernizing, broadening and preserving the infrastructure of different modes of transportation, as well as improving its connectivity according to strategic and efficient criteria.



## NATIONAL CLIMATE CHANGE STRATEGY VISION 10-20-40

Urban policies are contemplated in this strategy within the section devoted to emission mitigation policies and an entire strategic focus is dedicated to them. Three lines of action are included, one dedicated to sustainable urban development and two dedicated to mobility:

**Strategic focus M3:** Transitioning towards sustainable city models with mobility systems, integral waste management and low carbon footprint buildings.

**Line of action M3.1:** Increasing controlled and efficient use of the territory by decreasing urban expansions and guaranteeing access to intra-urban land, promoting mixed-use and vertical buildings, favoring densification before launching new reserves on the outskirts, integrating urban forests and defining the growth limits of cities.

**Line of action M3.3:** Promoting the evolution towards clean, low-carbon, accessible and comfortable public transport systems by strengthening regional and national interconnectivity through the creation of efficient multimodal networks with the support of the federal government, as part of a comprehensive policy on urban development and mobility that will reduce traveling time and distance.

**Line of action M3.7:** Creating incentives, infrastructure and programs that favor non-motorized transport, articulated within the integrated transport systems, where pedestrians and cyclists are given priority in order to create immediate environmental and health benefits.

## NATIONAL PROGRAM FOR URBAN DEVELOPMENT 2014-2018

The TOD strategy for Mexico City is also justified in this program, since it is directly included in one of its objectives, strategies and lines of action.

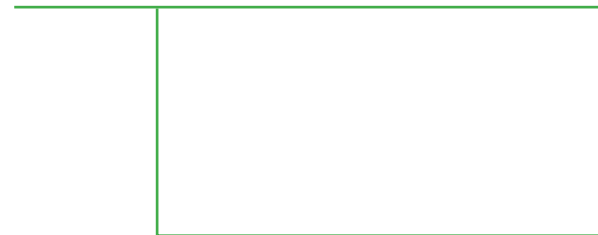
**Objective 4.** Promoting a sustainable mobility policy that increases quality, availability and accessibility of urban trips.

**Strategy 4.2.** Strengthening and expanding technical abilities of local administrations for the planning, management and implementation of sustainable mobility projects.

**Line of action 1:** Promoting the adoption of the Transit-Oriented Development model as an urban model for the planning of Mexican cities.

## GENERAL DEVELOPMENT PROGRAM FOR MEXICO CITY 2013-2018

The local government program contemplates the matters on urban development and mobility within the focus called "habitability, services, public space and infrastructure". This focus includes two areas of opportunity related to Transit-Oriented Development. The first one refers to the territorial occupation pattern and the second one to automotive transport. Each of these areas of opportunity establishes the following objectives, goals and lines of action:



### AREA OF OPPORTUNITY 1. TERRITORIAL OCCUPATION PATTERN

**Objective 1:** Orient urban development towards a compact, dynamic, polycentric and equitable city that strengthens productive activities and promotes investment in order to achieve a pattern of efficient occupation which will lead to the redistribution of the population towards areas that combine different land uses, improve public infrastructure, bring employment and housing closer to public transport and fosters territorial equity.

**Objetivo 2:** Regenerate and redensify zones located in central areas with recycling potential, as well as in areas that can attract additional population, have a more intense and diverse land use, and offer conditions of sustainability and profitability.

→ **Goal 1:** Moving forward with the creation of conditions in order for households to be close to their daily school, job or recreational activities and therefore making the economic, social and environmental resources more efficient.

→ **Line of action 1:** Conducting studies that will enable locating strategic places or projects of territorial proximity, considering infrastructure, territorial resources, the quality of services and the access to them.

→ **Line of action 2:** Designing programs that outline strategies, criteria and coordination mechanisms in order to achieve a city that is close in terms of land use, transport, public space, services and infrastructure.

→ **Goal 2:** Implementing integral urban regeneration programs in strategic nodes and corridors for the city, that promote public, private and social projects that foster a variety of land uses, productive activities, recovery of public spaces, green areas and equipments, as well as strengthen infrastructure networks, with the goal of generating social production of the habitat, increasing the quality of life of the population and decreasing real estate pressure on conservation areas.

→ **Line of action 2:** Promoting strategies that support the development of nodes and corridors that include solutions based on non-motorized transport, recognizing pedestrians as a key factor in urban mobility.

### AREA OF OPPORTUNITY 4. AUTOMOTIVE TRANSPORT

**Objective 1:** Establish public policies to reduce car use in order to guarantee a better quality of life and reduce the negative externalities that are associated to its use.

→ **Goal 1:** Avoiding or reducing the need to travel by individual vehicles.

→ **Line of action 1:** Promoting redensification through land uses and sustainable transit-oriented development in the planning process.

→ **Goal 2:** Promoting the change towards more efficient modes of transportation than private motor vehicles.

→ **Line of action 2:** Reducing parking requirements in areas with high connectivity and access to mass public transport.



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