LESS PARKING, MORE CITY

CASE STUDY IN MEXICO CITY

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1. DEFINITIONS, ABBREVIATIONS, AND ACRONYMS

AMW	Annual Minimum Wage
BRT	Bus Rapid Transit
BLR	Building-to-Land Ratio
DF	Federal District
ECOBICI	Mexico City's Shared Bicycle System
EGDF	Estatuto de Gobierno del Distrito Federal (Mexico City's Government Statute)
EOD	Encuesta Origen Destino 2007 (2007 Travel Survey)
FAR	Floor Area Ratio
GDF	Gobierno del Distrito Federal (Mexico City's Government)
GMR	General Management Rules
INEGI	Instituto Nacional de Estadística y Geografía (National Institute of Statistics and Geography)
ITDP	Institute for Transportation and Development Policy
RTM	Reglamento de Tránsito Metropolitano (Metropolitan Traffic Regulation)
RTP	Red de Transporte de Pasajeros (Passenger Transport Network)
SDZ	Strategic Development Zones
SEDUVI	Secretaría de Desarrollo Urbano y Vivienda (Ministry of Urban Development and Housing)
SEMOVI	Secretaría de Movilidad (Ministry of Mobility)
STC Metro	Sistema de Transporte Colectivo Metro (Collective Transport System Metro)
STE	Sistema de Transportes Eléctricos (Electric Transport System)
TOD	Transit-Oriented Development
VKT	Vehicle Kilometers Traveled
ZMVM	Zona Metropolitana del Valle de México (Mexico City Metropolitan Area)

2. INDEX OF TABLES, DIAGRAMS, GRAPHS, AND ILLUSTRATIONS

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3. INTRODUCTION

In this report, the Institute for Transportation and Development Policy proposes six general modifications to Mexico City's parking policy. These are derived from analyzing the current policy resources and their effects on urban development and mobility in the city.

The relevance of parking management is described through its influence on the city's performance and the objectives of denser, more mixed, compact, and less car-oriented urban development. Considering that all car trips start and end in a parking spot, parking management becomes a key tool to control and reduce congestion.

Throughout the document the economic, urban, and traffic impacts hidden in parking minimum requirements for new buildings are described, together with an empirical analysis of the big real estate developments in Mexico City. The amount and location of parking spaces associated with these buildings can be observed, along with their relation to mass transit coverage. A simulation was carried out in the north area of the Doctores neighborhood, to estimate the impact on traffic derived from adding a range of quantities of parking spaces.

Furthermore, ITDP's proposals are complemented by a review of various strategies applied in other cities, to show the range of possibilities for a new parking policy in Mexico City and the rest of the country.

4. WHAT IS **THE RELEVANCE** OF PARKING **MANAGEMENT** POLICES?

Parking policy reform is a travel demand management (TDM) tool that can influence a whole spectrum of transportation and urban development issues: congestion, promotion of public transit, compact development, affordable housing, air quality improvement, walkability, economic vitality of business corridors, and public space reclamation. *All car trips start and end in a parking spot.*

Many cities that have focused on finding a way to accommodate private vehicles face a conflict between the desire to meet the demands for more parking and the capacity to increase parking supply without negative consequences. Cars spend most of their lives parked, thereby taking away space for other land uses such as residential, retail, or services that would contribute to the city's economic performance and tax rolls.

The ultimate goal should be the transport network's efficiency, avoiding road congestion, and optimizing public transport use. Parking management is part of a universe of measures and techniques that may encourage a shift from cars to more sustainable modes like public transit or bicycles. From Bogotá to Paris, public transport improvements have been most successful when coupled with TDM elements, like higher on-street parking fees, a decrease in available parking spaces, congestion charging, low-emission zones, and access management.

In 2012, Mexico City began to address on-street parking issues by implementing ecoParq, the city's parking enforcement and pricing system. ecoParq has helped demonstrate that on-street parking saturation is a demand management issue, not a supply shortage, showing that parking policies could indeed impact driving behavior.

Starting from the 1920s, United States cities began including parking requirements in land use and zoning regulations, as a way to solve what was happening on the streets: cars disorderly parked at free spots, infringing pedestrian areas and blocking moving lanes. In order to tackle the problem, cities thought to put parked cars out of sight by placing the burden on real estate developers to build structured parking.

However, poor on-street parking management has perpetuated disorder and other issues, exacerbated by the parking requirements in building codes.

Off-street parking leads to bottlenecks on roads along the way to a destination and especially on city streets during peak times even if it is out of sight at the origin. In fact, studies carried out by Hermann Knoflacher at Vienna University of Technology, show that parking in buildings makes it harder to capture public transport ridership. People are more likely to drive when a car is more accessible than a Metro or Metrobus (BRT) station a few blocks away. Hence, if a city's objective is to increase transit ridership, parking close to mass transit should be minimized.

In a global metropolis competing for investment, jobs, and residents, in an environment with scarce developable land and budget restrictions, parking policy has become a crucial part of the equation. Together with mixed, dense, and compact transit-oriented development, the world's decision makers have started to think about parking policy reform as a critical piece of the puzzle to create better streets and better cities. International best practices offer lessons that demonstrate the efficiency of this reform as a means to achieve transit-oriented development, and a better quality of life.

5. WHAT IS THE CURRENT PARKING POLICY IN MEXICO CITY?

Various instruments of all legal hierarchies regulate the amount, location, and functioning of vehicle parking in DF, from *Mexico City's Government Statute* (EGDF) to codes, regulations, and specific norms. We present a basic summary of these instruments with vehicle parking regulation and management.

LAWS

Mexico City's Government Statute: Defines the public administration's responsibility to legislate in development planning and parking.

Mobility Law: Names the Ministry of Mobility (SEMOVI) as responsible for generating the rules of operation of public parking garages, proposing the fee structure, and establishing guidelines to allow on-street and off-street parking; gives SEMOVI responsibility to establish in the Mobility Program the parking management policy, according to the needed studies, to reduce parking requirements for buildings as part of the strategic plan *More Mobility with Less Cars.* Additionally, establishes the goal of modernizing parking policy in accordance with best international practices and with the objective of reducing car usage.

Commercial Establishments Law: States as a priority for the Mexico City government to foster preferential parking by retailers for their clients in order to discourage car use; they are obliged to have the specific number of parking spaces defined in the building code and zoning programs. The exceptions are: when the surface is smaller than 100 m^2; when it is a preserved building; when it is located on a pedestrian street; or when it has as of rights. Commercial establishments that do not comply with the minimum spaces are obliged to have a valet parking service and/or a contract with a third party in order to offer parking. Also, some minimal operational criteria are established for public parking garages, which are considered low-impact uses by this law.

Environmental Law: Sates that parking garages larger than 10,000 m^2 are subject to an environmental impact assessment; land area dedicated to parking in mixed-use complexes is exempted from paying the rights for construction permits established in the tax code.

CODES

Tax Code: Exempts the surface destined to parking in commercial establishments from paying for rights of notices and permits, and exempts parking from utilization fees to prevent, mitigate, or compensate road, environment, or water impacts; defines the on-street parking fee through a parking meter scheme at $2.00 Pesos every 15 minutes.

REGULATIONS

Regulation of the Urban Development Law: States that an urban impact assessment is required for nonresidential and mixed-use projects larger than 5,000 m^2, residential projects larger than 10,000 m^2, gas stations, crematoriums, or when the General Management Norm #10 applies (in these cases, the built area devoted to parking is not quantified).

Public Parking Garage Regulation: Determines the requirements, opening, functioning, fees, and public parking garage service promotion. They are classified according to their facilities and service type; it establishes the promotion organ named Public Parking Garage Promotion Advisory Commission; aims to encourage public transport use by building and promoting public parking garages at stations; indicates the need for companies and education centers to provide parking service and offer preferential prices to their users to discourage car usage.

Metropolitan Traffic Regulation: Determines the public spaces where vehicle parking is prohibited; indicates the penalties for people who park their vehicles at prohibited areas, as well as the possibility of immobilizing the vehicle in case of illegal parking.

Regulation for the Control of On-Street Parking: Establishes the rules regarding the functioning of the parking meter system.

Building Code: Stipulates that projected buildings must have a minimum number of vehicle parking spaces, in accordance with the Technical Complementary Norms for Architectural Projects, in the parking section. The norms also establish the minimum dimensions for parking spaces and circulation areas, among other proscriptions.

TABLE 1: RULE 26. PROMOTE AND FACILITATE THE CONSTRUCTION OF SOCIAL HOUSING

Percentage of the Amount of Parking Spaces Required	Land area up to 500 m²	Land area between 501 and 1,000 m²	Land area between 1,001 and 3,000 m²	Land area between 3,001 and 5,000 m²	Land area above 5,000 m²
A. Selling price of the dwelling up to 20 times the AMW*	10%	20%	30%	40%	50%
B. Selling price of the dwelling above 20 and up to 25 times the AMW	40%	50%	60%	70%	80%
C. Selling price of the dwelling above 25 and up to 30 times the AMW	60%	70%	80%	90%	100%

*Note: AMW – Annual Minimum Wage.

GENERAL MANAGEMENT RULES (GMR)

GMR 1: States that underground built area (generally used as parking) is not quantified in the calculation regarding the allowed maximum floor area ratio (FAR).

GMR 4: States that up to 30 percent of the open area in a project may be paved when it is used as walkways or parking.

GMR 7: States that, when parking is built half a level below the sidewalk level, the number of levels and allowed height will be quantified from half a level above the sidewalk.

GMR 10: Only applicable in areas and roads determined by the Urban Development Programs (Zoning), and establishes the buildings' maximum heights; nevertheless, it requires projects to provide an additional 20 percent of parking spaces than those required by the Building Code and its Technical Complementary Norms.

GMR 17: Allows the functioning of public parking garages in any zoning, except for green areas, open spaces, and conservation area.

GMR 26: States that, in social housing projects, the parking requirement is reduced to a fraction depending on the price of the units and the size of the property (*See Table 1*).

Particular Management Rule to Promote Public and Private Parking: Forms part of the District and Partial Urban Development Programs of the city, allowing openings of parking garages in any zoning; additionally, it exempts parking garages in HO (Residential with offices), HM (Mixed), and E (Urban equipment) zonings to present an Urban Impact Assessment.

PROGRAMS

General Development Program 2013–18: Establishes the objective of reducing parking requirements in areas with high connectivity and access to mass transit within the goal "promote the shift to more efficient transport modes other than private motor vehicles"; besides, it defines the goal of promoting and evaluating the parking meter system.

District and Partial Urban Development Programs: There are sixteen District Programs and forty-five Partial Programs. They establish zoning and constructive potential on the city's urban land. The particular norms, incentives, and guidelines are defined, based on a diagnosis and the formulation of a target image. Regarding parking, these programs generally have the goal of increasing parking supply through the promotion of public parking garages and increasing (even more) the requirement in the building code.

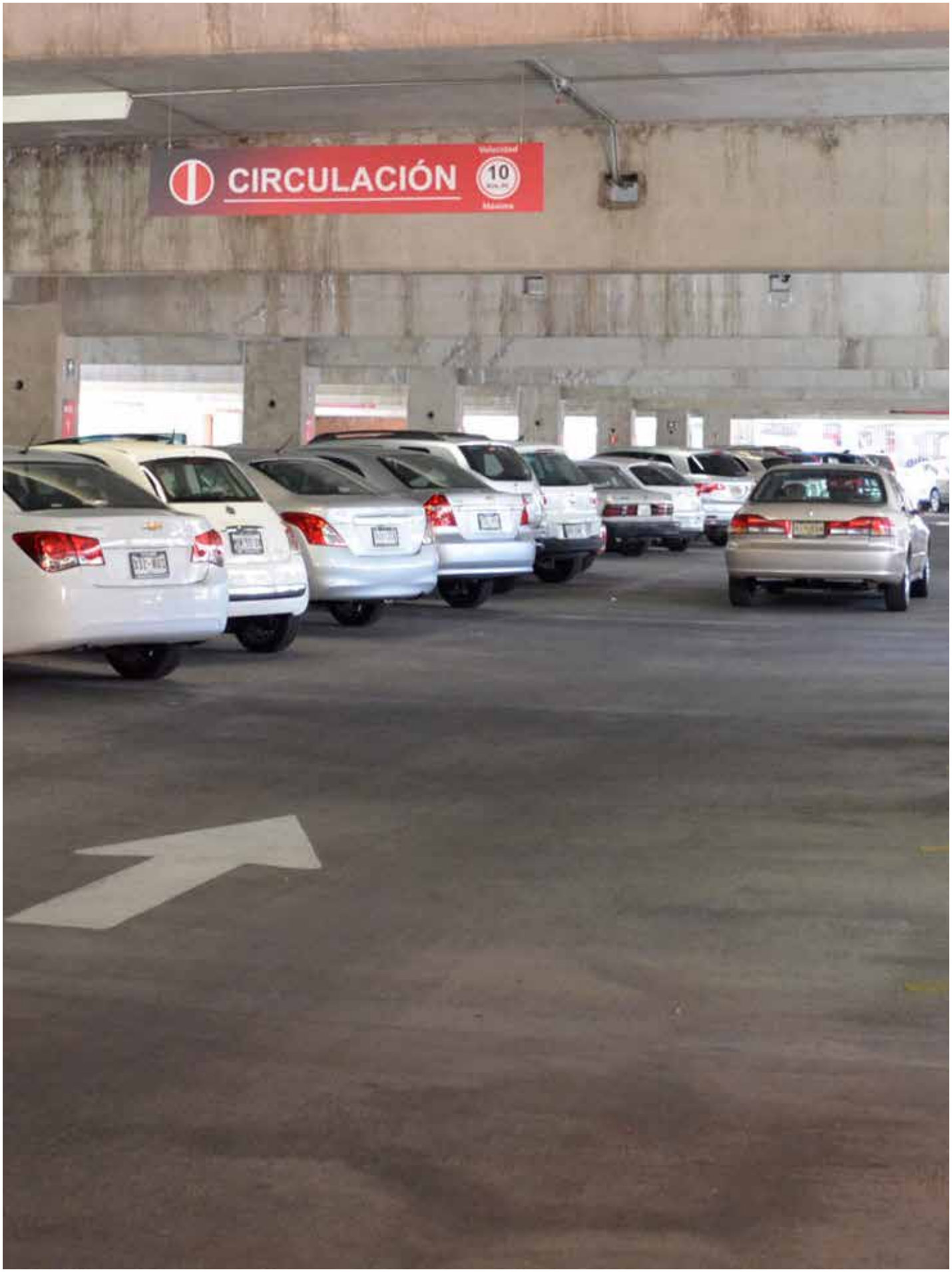
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TABLE 2: DISTRICT URBAN DEVELOPMENT PROGRAMS

District program	Parking strategy	Parking vision	Does the particular management norm to promote public and private parking apply?	Does it promote the construction of parking near mass transit?
Álvaro Obregón	More parking is better	Insufficient	Yes	Yes
Azcapotzalco	More parking is better	Insufficient	Yes	Yes
Benito Juárez	More parking is better	Insufficient	Yes	Yes
Coyoacán	More parking is better	Insufficient	Yes	Yes
Cuajimalpa de Morelos	More parking is better	Insufficient	No	NA
Cuauhtémoc	More parking is better	Insufficient	Yes	Yes
Gustavo A. Madero	More parking is better	Insufficient	Yes	Yes
Iztacalco	More parking is better	Insufficient	Yes	NA
Iztapalapa	More parking is better	Insufficient	Yes	Yes
Magdalena Contreras	More parking is better	Insufficient	No	NA
Miguel Hidalgo	More parking is better	Insufficient	Yes	Yes
Milpa Alta	More parking is better	Insufficient	Yes	NA
Tláhuac	More parking is better	Insufficient	Yes	NA
Tlalpan	More parking is better	Insufficient	Yes	Yes
Venustiano Carranza	More parking is better	Insufficient	No	NA
Xochimilco	More parking is better	Insufficient	No	NA

Increase to the building code requirement due to corridors or zones	Density bonus if more parking than required is provided (as a sustainability criterion)	Considers parking as mitigation of urban and traffic impacts	Declares saturated on-street parking in the diagnosis	Considers implementing meters and/or increasing enforcement of the traffic regulation	Parking built above ground quantifies as part of the allowed FAR
10%, 20%	Yes	Yes	Yes	No	Partially
20%	NA	Yes	Yes	RTM	NA
20%	NA	Yes	Yes	No	NA
20%	Yes	Yes	Yes	RTM	No
20%	NA	Yes	Yes	No	NA
20%	NA	Yes	Yes	RTM	NA
20%	Yes	Yes	Yes	No	No
20%	NA	Yes	Yes	RTM	NA
20%	Yes	Yes	Yes	RTM	No
20%, 50%	NA	Yes	Yes	No	NA
20%	NA	Yes	Yes	Yes	NA
20%	Yes	Yes	Yes	No	NA
20%	NA	Yes	Yes	No	NA
20%	Yes	Yes	Yes	No	No
20%	NA	Yes	Yes	RTM	NA
20%	NA	Yes	Yes	RTM	NA

THE BUILDING CODE

Currently, in the Building Code's Technical Complementary Norms for Architectural Projects, the minimum amount of parking spaces for each project is a function of land use and built area.

In response to the growing motorization and on-street parking saturation, American cities started implementing this strategy in the first half of the last century. Measurements were taken at free parking spots during peak days of the year, for various land uses. The highest demand was set as a minimum requirement in a manual, implying an overestimation; the example would be to determine the demand for parking in a mall at Christmas Day as the requirement for all commercial uses during the rest of the year. The result has been that cities that adopted this model have an oversupply of parking. This model has been exported to various cities around the world.

Mexico City first approached this model when the 1942 Building Code stated that "when systematic parking (on-street) obstructs traffic permanently and generates congestion..." the government could apply one of the following measures:

a) Oblige new entertainment centers, or those that would extend their built area, to provide parking spaces
b) Promote the construction of public parking garages.

Furthermore, the requirement for commercial and office buildings was at least 15 percent of the profitable surface and 10 percent in residential, under the following conditions no matter the land use:

1. Buildings higher than five stories would be obliged to provide parking (sometimes above four-floor buildings too).
2. Government could designate areas where even the already built area must comply with the obligation, due to intense traffic in the area.
3. Parking could be provided at no more than 200 m from the building.

The code published in the Federal Official Journal on February 9, 1966, does not mention a parking requirement. In 1973, the Vehicle Parking Law was published, both for private and public parking garages.

It was considered to be in the public interest to have "the establishment of vehicle-parking garages in houses, buildings and special constructions designed for meeting centers, condos and residential units." Consequently, it was mandatory to provide sufficient parking according to the rules published (*See Table 3*). It was the first time that construction was conditioned upon car-parking provision for all land uses and, in many ways, related to the built area.

This law considered a substitute tax for those cases in which the required parking surface was not covered or had a different use. The amount of the tax was calculated as it follows:

$$I = \frac{T - C}{2}$$ where,

T = the cadastral value x 8 m^2
C = value of building parking = 23 m^2 x 26 times the General Minimum Wage

In 1980 the law was repealed but the minimum requirements and substitute tax remained valid until the publication of the 1987 Building Code, where new minimums were established. It was the first time that the parking demand, for all uses other than residential, was only related to the built or land surface, leaving behind the relation with the number of rooms or guests in the building (*See Table 4*).

TABLE 3: VEHICLE PARKING LAW (1973–80)

Land Use	Built Area, Number of Rooms, Number of People, etc.	Minimum Parking Spaces
Residential (Single-family)	Less than 200 m^2	1 per unit
	From 201 to 300 m^2	2 per unit
	From 301 m^2 on	3 per unit
Residential (multi-family)	Less than 60 m^2	1 every 3 apartments
	From 60 to 80 m^2	1 every 2 apartments
	From 80 to 120 m^2	1 per apartment
	From 120 to 150 m^2	1.5 per apartment
	From 150 m^2 on	2 per apartment
Housing Complexes (except social or low-income)		1 per apartment
Offices	Total area	1 per 50 m^2
Commerce	Less than 100 m^2	0
	From 101 to 500 m^2	1 per 50 m^2
	From 501 to 1,000 m^2	1 per 40 m^2
	From 1,001 m^2 on	1 per 30 m^2
Hotels	First 20 rooms	1 every 4 rooms
	Extra rooms	1 every 8 rooms
Banking Institutions	Total area	1 per 20 m^2
Schools	Kindergarten, elementary and junior high school	1 per classroom
	High school	1 per 8 m^2 of classroom
	Universities	1 per 6 m^2 of classroom
Restaurants	Category 1 (no alcohol)	1 per 4 guests
	Category 2 (with alcohol)	Category 2 (with alcohol)
Gyms	Total area	1 per 50 m^2

TABLE 4: BUILDING CODE (1987)

Land Use	Built/Land Area	Minimum Parking Spaces
Single-Family Housing	Less than 120 m^2	1 per house
	From 121 to 250 m^2	2 per house
	From 251 m^2 on	3 per house
Multi-Family Housing (without elevator)	Less than 60 m^2	1 per house
	From 61 to 120 m^2	1.25 per house
	From 121 to 250 m^2	2 per house
	From 251 m^2 on	3 per house
Multi-Family Housing (with elevator)	Less than 60 m^2	1 per house
	From 61 to 120 m^2	1.5 per house
	From 121 to 250 m^2	2.5 per house
	From 251 m^2 on	3.5 per house
Housing Complexes (except social or low-income)	Less than 60 m^2	0.5 per house
	From 61 to 120 m^2	1 per house
	From 121 to 250 m^2	2 per house
	From 251 m^2 on	3 per house
Offices	Total area	1 every 30 m^2
Commerce	Basic commodity stores, specialties, supermarkets, retail, shopping centers	1 every 40 m^2
Hotels	Construction surface	1 every 50 m^2
Banking Institutions	Construction surface	1 every 15 m^2
Schools	Basic education	1 every 60 m^2
	Medium and medium-high education	1 every 40 m^2
	Higher education	1 every 25 m^2
Restaurants	No alcoholic beverages	1 every 15 m^2
	With alcoholic beverages	1 every 7.5 m^2
Gyms	Construction surface	1 every 40 m^2

ILLUSTRATION 1: BLUEPRINT FOR THE QUANTIFICATION OF DEMANDS FOR PARKING PER AREA ACCORDING TO THE 1987 BUILDING CODE

Area	Parking Requirement Discounts
1	0%
2	10%
3	20%
4	30%

The peculiarity of this version, contrasting with previous and current ones, was the creation of the "Blueprint for the Quantification of Demands per Area." Four areas were defined, where the requirement would be to comply with a percentage of the information established on the table.

TABLE 5: BUILDING CODE'S TECHNICAL COMPLEMENTARY RULES FOR ARCHITECTURAL PROJECTS (2004)

Land Use	Built/Land Area	Minimum Parking Spaces
Single-Family Housing	Less than 120 m^2	1 per house
	From 121 to 250 m^2	2 per house
	From 251 m^2 on	3 per house
Multi-Family Housing (without elevator)	Less than 65 m^2	1 per house
	From 66 to 120 m^2	1.25 per house
	From 121 to 250 m^2	2 per house
	From 251 m^2 on	3 per house
Multi-Family Housing (with elevator)	Less than 65 m^2	1 per house
	From 66 to 120 m^2	1.5 per house
	From 121 to 250 m^2	2.5 per house
	From 251 m^2 on	3.5 per house
Management	Offices and doctors' offices larger than 80 m^2	1 every 30 m^2 built
	Official representations, embassies and consulates	1 every 100 m^2 built
Commerce	Basic commodity stores, specialties, supermarkets, retail, shopping centers	1 every 40 m^2 built
Hotels	Built area	1 every 50 m^2 built
Banking Institutions	Larger than 80 m^2	1 every 30 m^2 built
Schools	Elementary, junior high and high school	1 every 60 m^2 built
	Universities	1 every 40 m^2 built
	Postgraduate studies	1 every 25 m^2 built
Food and Beverages	Coffee shops, coffee shops with internet, and taverns larger than 80 m^2	1 every 30 m^2 built
	Nightclubs and discotheques	1 every 15 m^2 built
	Cantinas, bars, beer shops, and video-bars	1 every 7.5 m^2 built
	Restaurants larger than 200 m^2	1 every 10 m^2 built
Gyms	Built area	1 every 40 m^2

The blueprint shows that, in the 1987 Building Code, there is a relationship between density, access to mass transit and parking demand and, therefore, car use *(See Illustration 1)*.

On April 8, 1991, the city published the "Agreement by which, with the goal of promoting social housing, the General Coordination of Urban Reorganization and Environmental Protection will partially or totally exempt parking spaces considered in the city's Building Code, taking into account the type of building." The agreement also allowed the exemption of parking in restored preserved buildings classified by the National Institute of Anthropology and History (INAH) or the National Institute of Fine Arts (INBA). For both cases, it was necessary to present an exemption-opinion request before the coordination.

In 1993, a new version of the Building Code was published. The table containing the parking requirements is located in the ninth transitory article and they would remain valid while the corresponding Technical Complementary Norms were not issued (which happened in 2004). The level of requirement per land use and construction surface was maintained with respect to the 1987 table, as well as the discounts per areas.

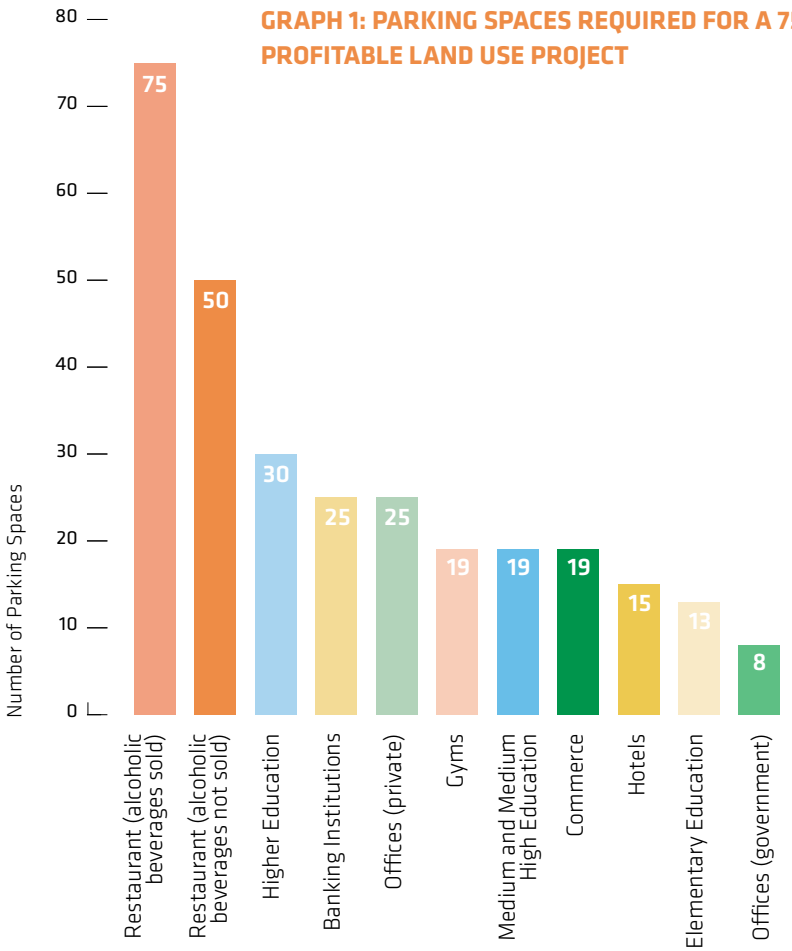
On January 29, 2004, the current Building Code was published. Article 79 states that "buildings should have the minimum vehicle parking spaces' functionality, amount and dimensions, including those exclusive for people with disabilities, according to the Technical Complementary Norms."

The Technical Complementary Norms for Architectural Projects contain information regarding the construction of parking in subchapter 1.2: dimensions, walkways, gradients, exceptions, and a table with the minimum number of spaces required per land use and surface *(See Table 5)*.

Under these norms, the possibility of exemption was maintained for the preserved buildings classified due to their architectural or artistic value, but the blueprint for the quantification of demands per area was removed. The current regulation does not accept the existence of a relationship between location and car use.

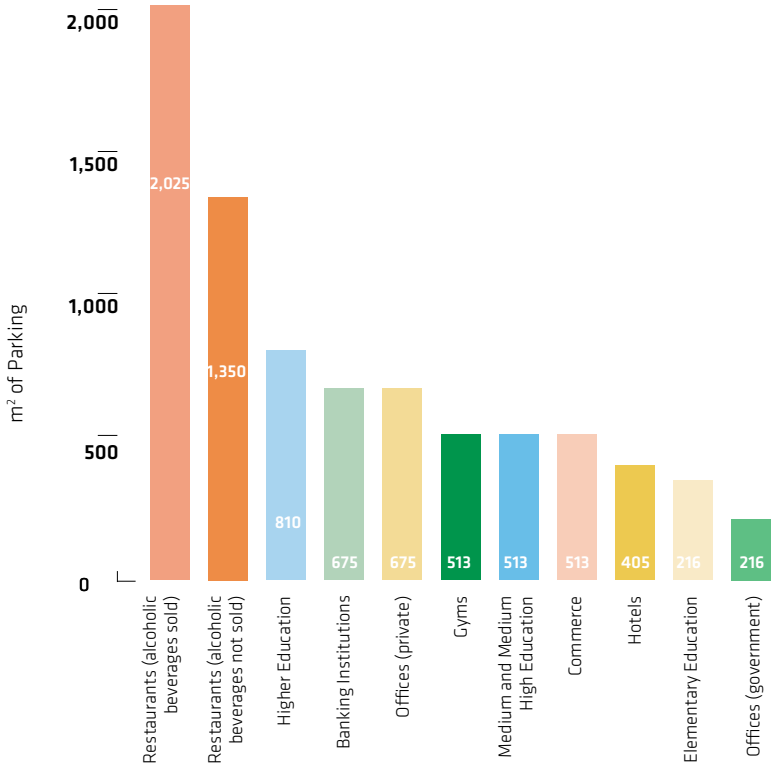
Under a building model, with nonresidential uses and a built area of 750 m^2, the amount of parking spaces showed in Graph 1 is required (without considering the exemption or discount cases, nor the increases resulting from the District or Partial Programs).

GRAPH 1: PARKING SPACES REQUIRED FOR A 750 M² PROFITABLE LAND USE PROJECT

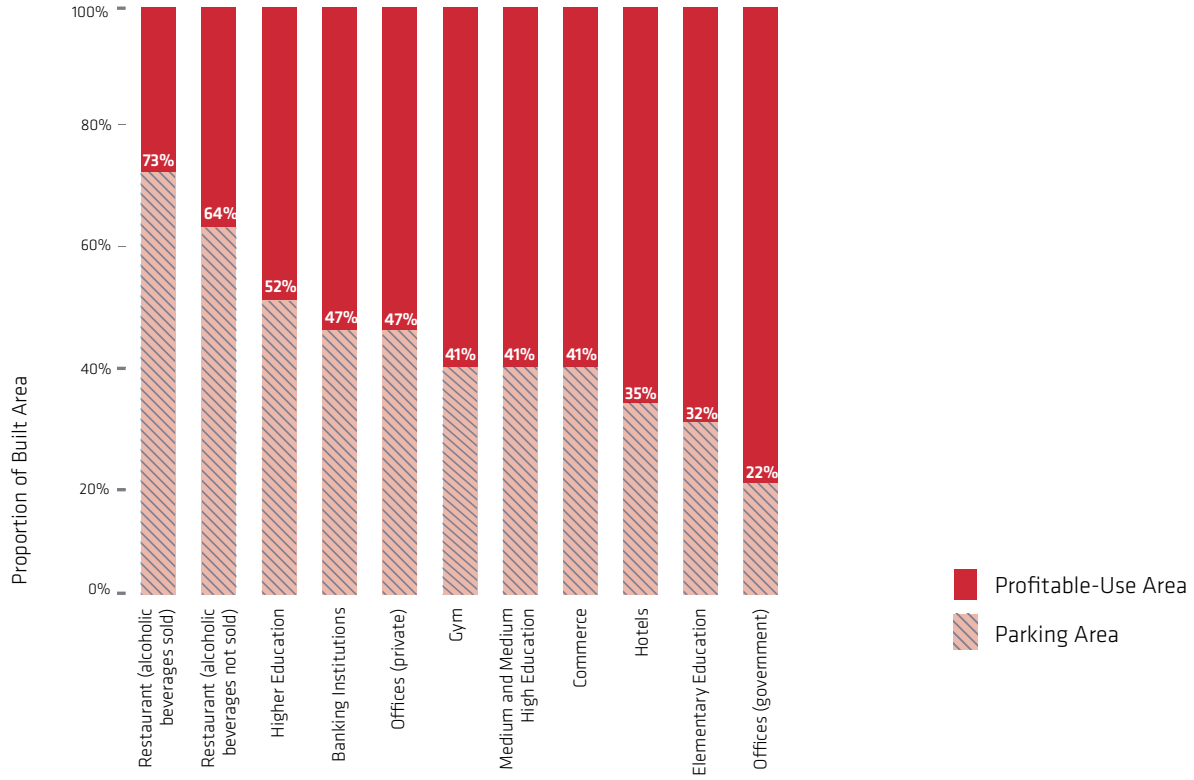


Supposing 27 m² as the average size of parking space, the building model would require the following amounts of m² and proportions of the built area devoted to parking.

GRAPH 2: M² OF PARKING REQUIRED FOR A 750 M² PROFITABLE LAND USE PROJECT ACCORDING TO THE CURRENT REGULATION



GRAPH 3: PERCENTAGE OF BUILT SURFACE AREA REQUIRED FOR PARKING IN A 750 M² OF PROFITABLE LAND USE PROJECT ACCORDING TO THE CURRENT REGULATION



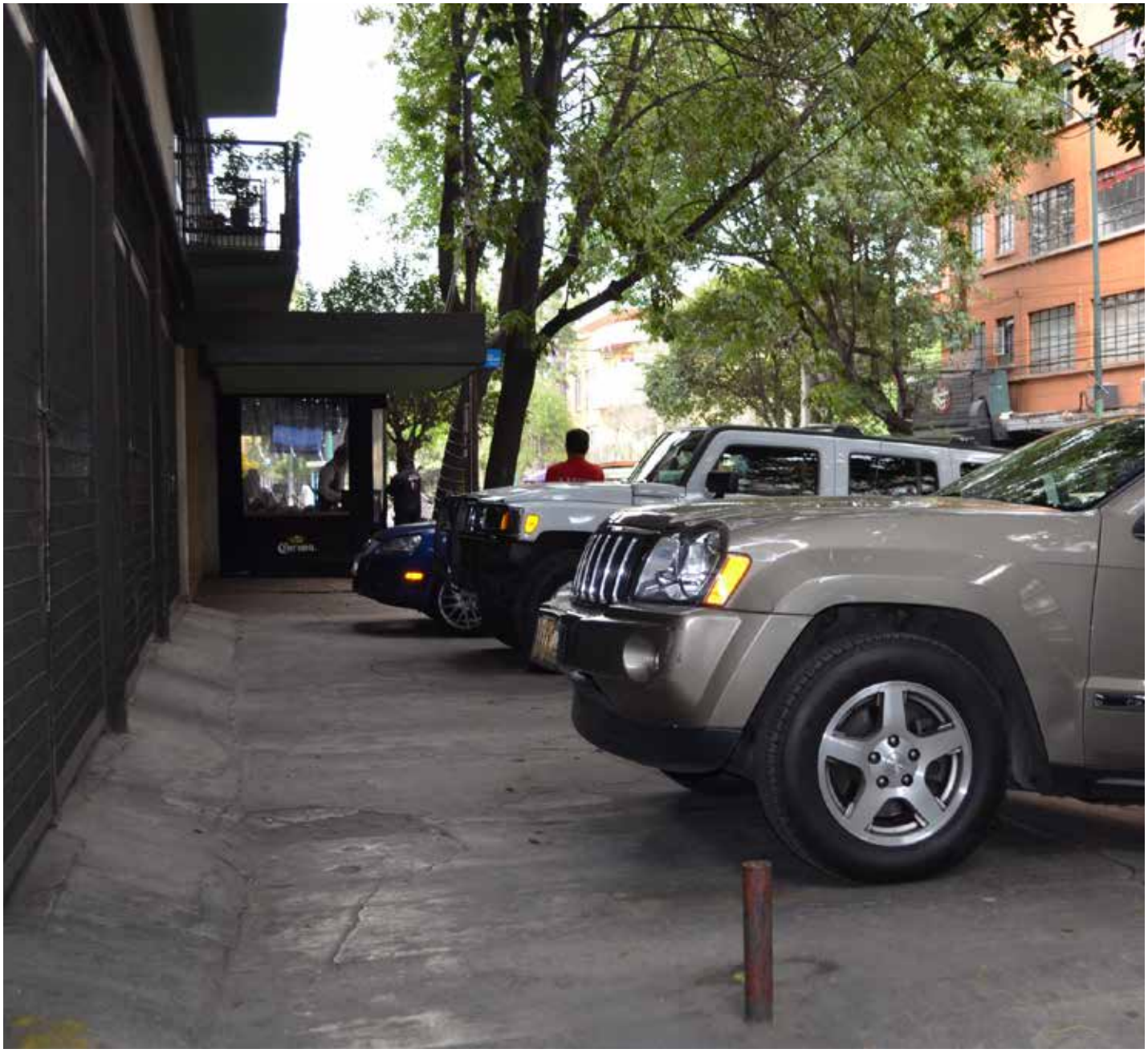
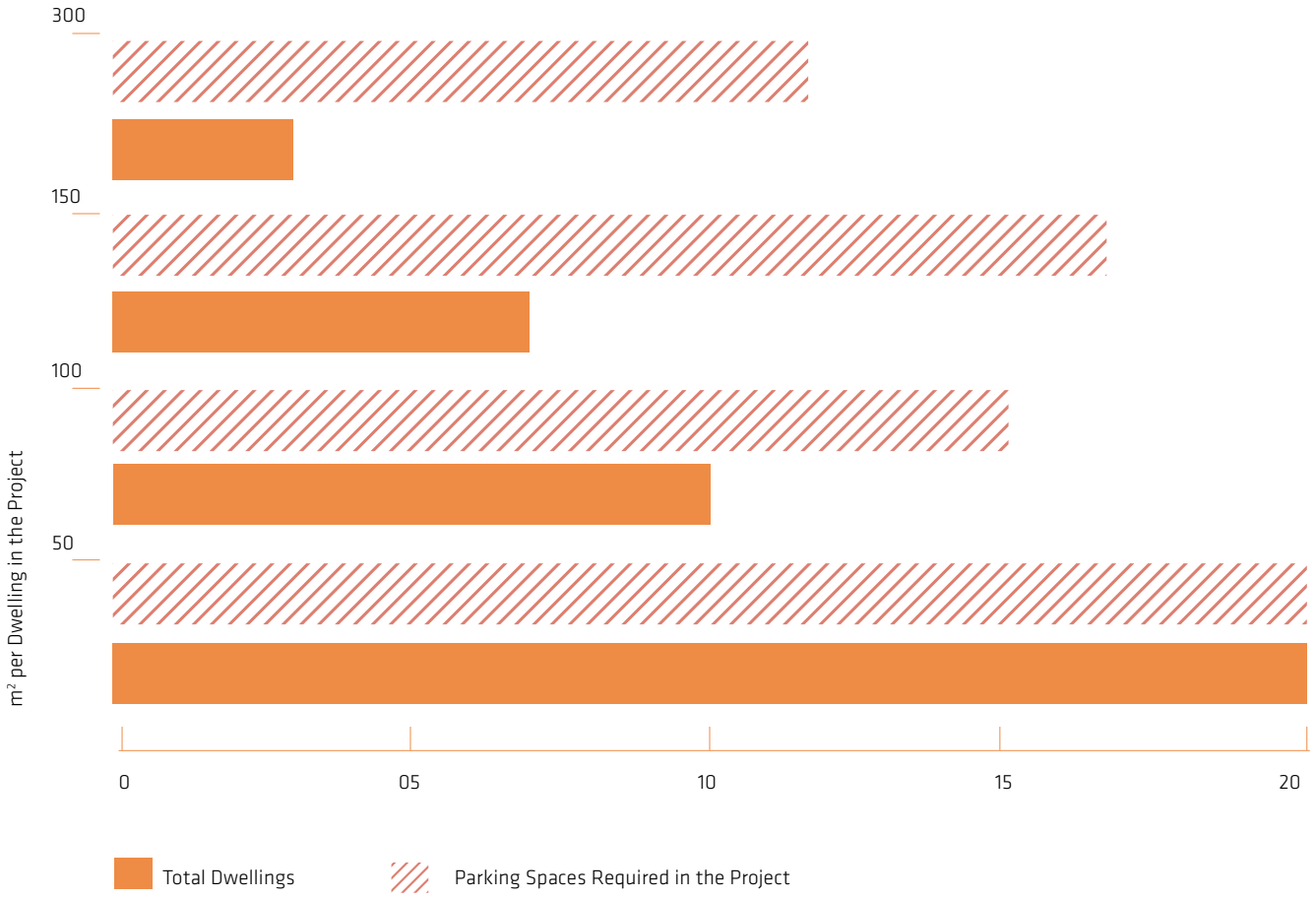


TABLE 6: EXAMPLE OF A MULTI-FAMILY HOUSING PROJECT

For multi-family housing projects with elevator in units of 50, 100, 150, 200, and 300 m^2, with a total of 1,000 m^2, the following indicators would result:

m^2 per Dwelling	Total Dwellings	Parking Spaces Required per Dwelling	Parking Spaces Required for the Project	m^2 Devoted to Parking per Dwelling	Total m^2 Devoted to Parking	% of Built Area Devoted to Parking per Dwelling and Total
50	20	1	20	27	540	54%
100	10	1.5	15	40.5	405	41%
150	7	2.5	17	67.5	450	45%
300	3	3.5	12	94.5	315	32%

GRAPH 4: NUMBER OF DWELLINGS VS. NUMBER OF REQUIRED PARKING SPACES



GRAPH 5: PROPORTION OF BUILT AREA DEVOTED TO PARKING AND HOUSING

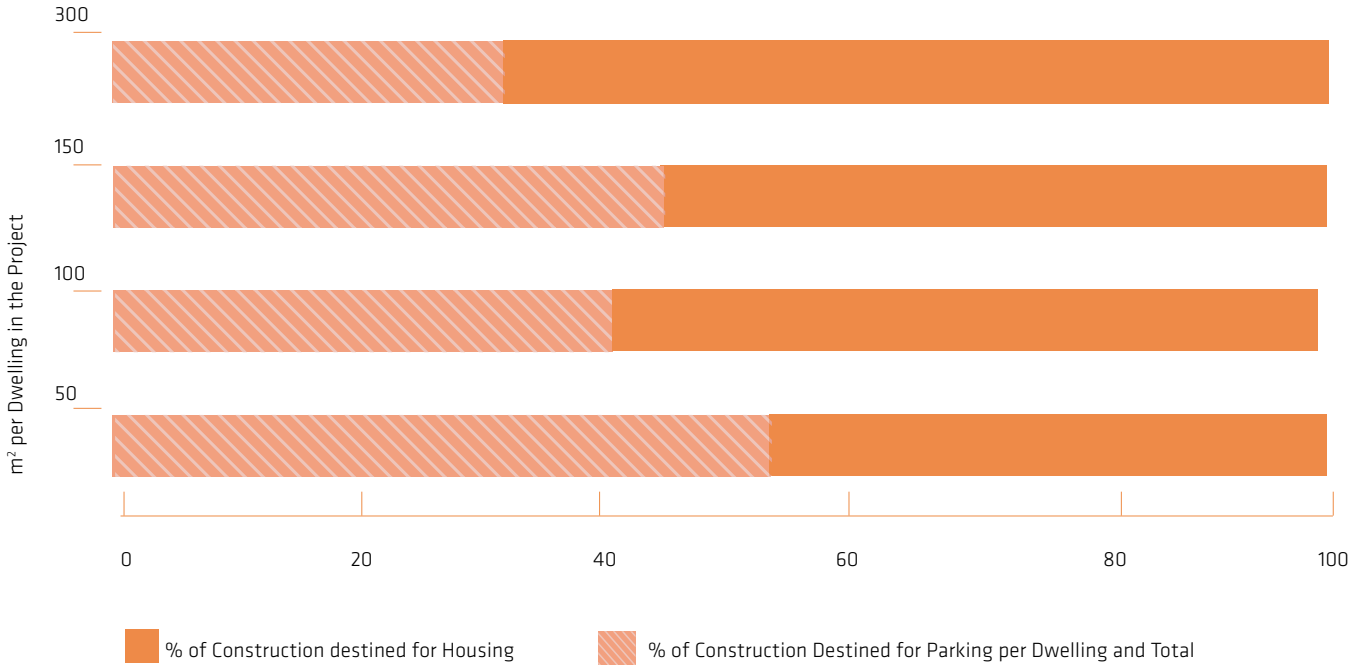
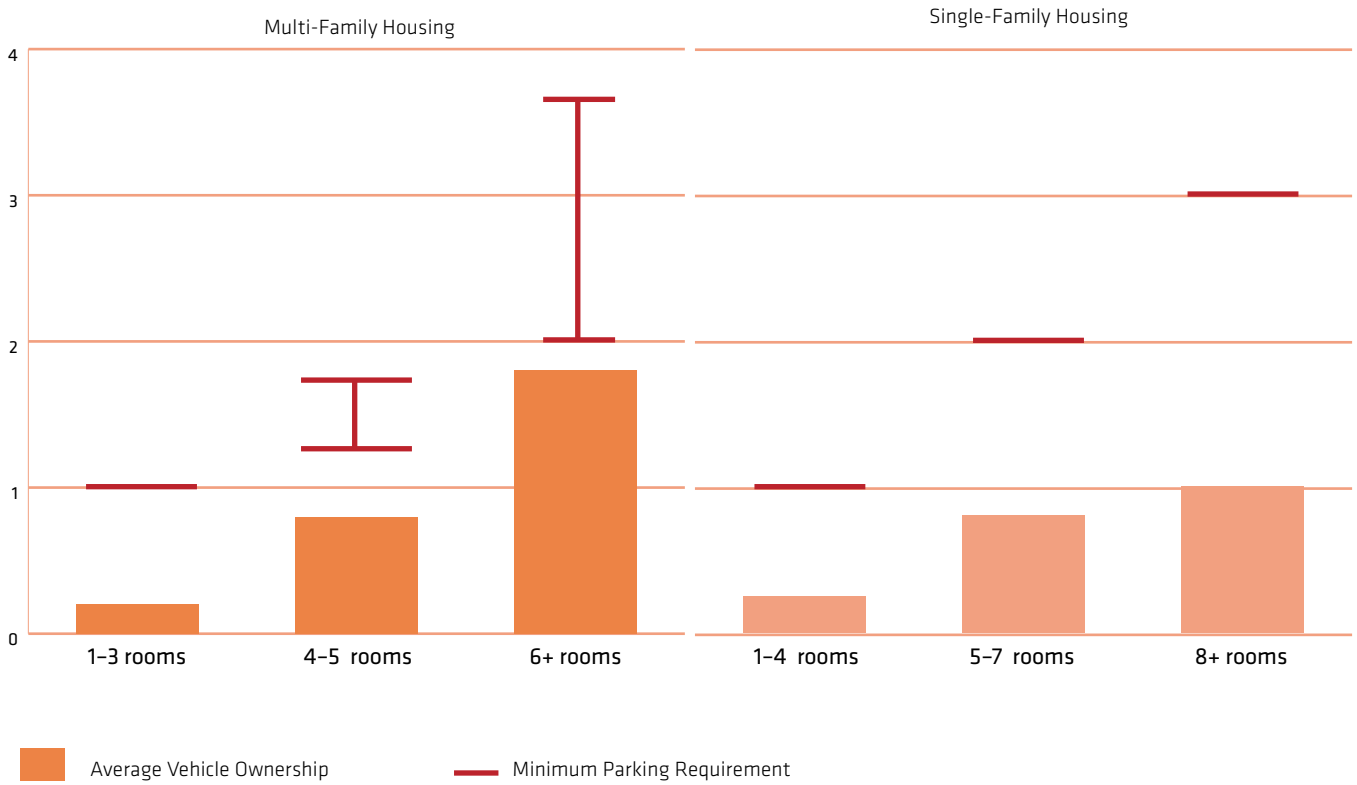


TABLE 7: CARS PER HOUSEHOLD

Number of Rooms	Average Number of Cars per Household
1	0.20
2	0.21
3	0.21
4	0.55
5	0.85
6+	1.09

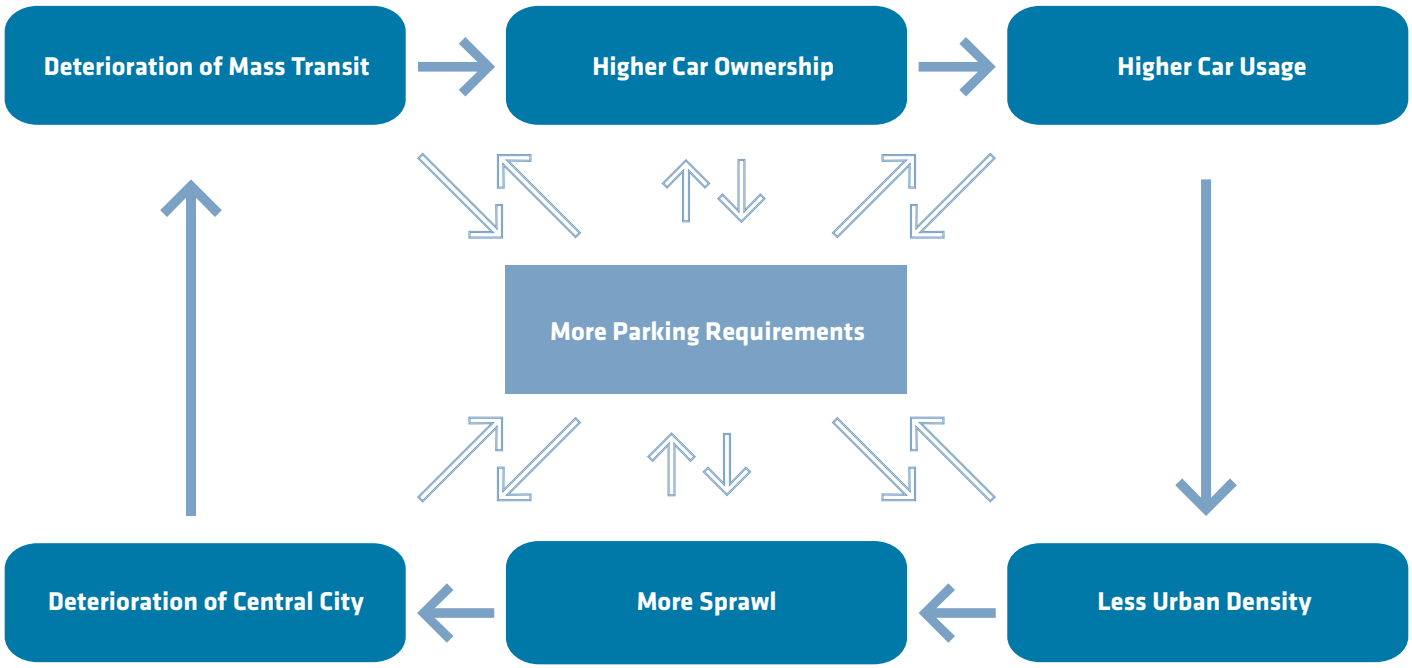
According to INEGI's 2010 Population Census data and the National Survey on Household Income and Expenditures, the residential parking demand presents a strong relationship with Mexico City's household income. Even though official data measures the dwelling size according to the number of rooms and not the m^2, it is clear that the demand is lower than the mandatory parking requirement *(See Table 7 and Graph 6)*.

GRAPH 6: CARS PER HOUSEHOLD COMPARED TO THE MINIMUM PARKING REQUIREMENT



6. WHAT IS **THE GOAL** BEHIND THIS REGULATION?

DIAGRAM 1: VICIOUS CYCLE BASED ON INSUFFICIENT PARKING



Source: Shoup, 2005.

What Is the Regulation's Goal?

In Mexico City's Parking Regulation, there are some premises that the Institute for Transport and Development Policy considers false, and they respond to the city's target image differently than the one expressed by the 2012–18 administration:

a) Parking is a public service.

- The government would be obliged to guarantee as much parking as possible, at the lowest price. This is neither desirable nor feasible due to economic, environmental, and spatial reasons.

b) Parking should grow as driving grows.

- The efficient management of location, amount, and price of parking is one of the most important and effective tools to reduce car usage.

c) An urban area benefits from a higher supply of parking spaces.

- The oversupply of parking implies an over-demand of use, even more when it is planned to be free or low-cost. This means that parking produces more car trips and, therefore, congestion.

d) There is no relationship between parking demand and mass transit coverage.

- The accessibility to public transport systems in an area of the city directly influences driving patterns.

e) There is no relationship between the amount of off-street parking and on-street parking management.

- Generally, it is thought that road saturation will be solved through building public and private parking garages.

f) There is no relationship between the amount of required spaces per land use and their peak demand periods.

- The regulation does not observe that complementary land uses, such as residential and offices, can use the same parking spaces. Shared-parking strategies reduce space devoted to sheltering private cars.

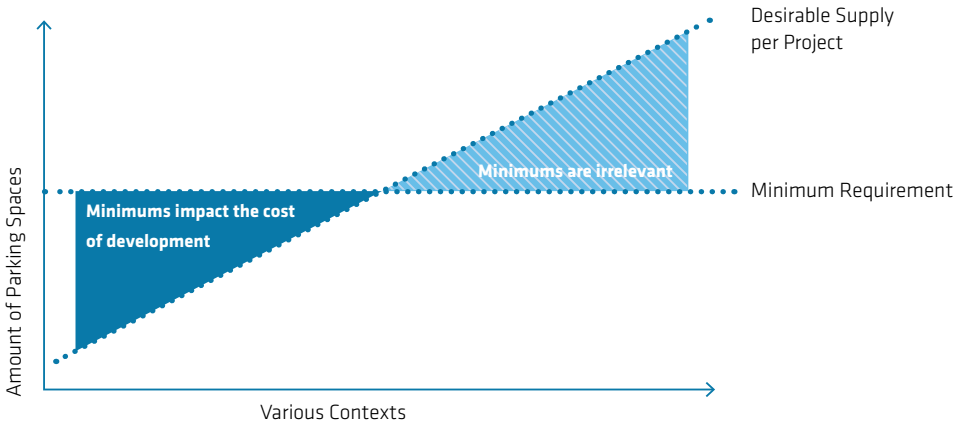
g) Parking spaces mitigate urban, economic, environmental and traffic impacts in real estate developments.

- Guaranteed parking at the origin and destination of a trip is an incentive for driving. Hence, plentiful and accessible parking equals congestion.

Currently, the city is immersed in a vicious cycle based on parking insufficiency (*See Diagram 1*).

7. WHAT ARE **THE IMPACTS** OF A MINIMUM **PARKING** REQUIREMENT **PER BUILDING**?

GRAPH 7: RELEVANCE OF REQUIRING PARKING IN NEW BUILDINGS



Economic Impacts

Development Costs

Through interviews carried out for the project, the average cost of a parking space was calculated in $4,000 to $9,000 Mexican Pesos with an average value of $6,550 Pesos per m^2. The cost only refers to the construction investment (material and labor); it does not consider other variables such as land value, maintenance, operation, or the cost of providing a larger built area of profitable use (housing, office, service, or commerce), which could have more benefit for the city.

The empirical analysis of various architectural projects shows that the average size of a parking space is 27 m^2. Therefore, each spot has an average construction cost of $175,500 Mexican Pesos, which results in 30–40 percent of the total construction cost in big real estate developments.

The imposition of this cost has bigger consequences on those projects in which the parking demand could be lower than the requirement, due to public transport coverage or socioeconomic patterns. When it is desired to provide more parking than the minimum, the regulation becomes irrelevant because, either way, there is a market predisposition to provide more spaces (*See Graph 7*). In this second case, the road capacity of an area should be considered, as well as the maximum tolerable levels of congestion to implement a limit of added parking (maximums). This means that the incentive of "at least X parking spaces should be built" must change into "no more than X parking spaces should be built" because the city cannot handle such numbers of cars on its roads.

Car-Usage Hidden Subsidy and Higher Costs for Everyone Else

The increase of the costs of development is generally transferred from developers to tenants, no matter if it is housing, commerce, offices, or services, through a higher sale/rent value. Tenants, too, transfer the increase to the general population (no matter if they have a car to park or not). Considering that, in Mexico City, close to 70 percent of trips are not by car, the majority is paying the minority's need of parking. This is what Donald Shoup called an invaluable cross-subsidy to car usage in his book The High Cost of Free Parking.

Urban Impacts

Sprawl

Minimum parking requirements form two strong incentives to the growth of the urban area of Mexico City. First, the increase in the cost of construction makes it more accessible to develop areas less consolidated, which are usually those far from the center and from mass transit infrastructure, with lower land values.

Second, when the value of the land is less than the cost of building structured parking spaces (above or below ground), it could be a better economic decision to acquire a larger amount of land and provide surface parking. This means that there is an incentive to use a large part of land as parking.

The growth of the urbanized area toward zones with no mass transit coverage increases the car's competitiveness over sustainable urban mobility. In the midterm, this could mean more traffic and a bigger need for building parking, nurturing the problem that the regulation sought to remedy.

Land Sub-Utilization

The construction of parking competes for space and budget with other uses (housing, offices, commerce, and services) in real estate projects. This competition sometimes impedes land owners from taking advantage of the total built area allowed by zoning and other regulations. This happens mainly because, as the parking minimum

is linked to the built area, it implies that every added m^2 of any land use supposes adding m^2 of parking.

In this competition, parking has an advantage because adding housing, office, commerce, or service surface imposes adding parking, while adding parking surface does not impose any other uses.

The requirement implies adapting the design of buildings to the dimensioning of parking. This means that the land must be large enough to fit parking garage access, ramps, and turning radii. Urban development and design is limited by car accessibility, thus adding a difficulty for the reutilization of land in consolidated areas or corridors where property surface are not large enough to allow this adaptation.

Traffic Impacts

More Cars, More Congestion

The previously mentioned impacts, together with guaranteeing parking spaces in housing and destinations, stimulate motorization and the use of these cars. The city increases its dependency on private vehicles. Road capacity in neighborhoods cannot (and should not) grow at the same pace as its parking supply, which would mean sacrificing private and public space (sidewalks and parks), which form part of the city's competitiveness. The result has been an increase in congestion levels (*See Doctores Neighborhood Case Study*).

False Mitigation

The parking requirement comes from the idea of making real estate development responsible for the vehicle congestion it will cause. This implies that 30–40 percent of a project investment must be used to provide parking. Nevertheless, according to what has previously been explained in this document, such regulation tends to increase car usage in the midterm.

Analyzing only one office building on Reforma Avenue with the requirement of providing at least two thousand parking spaces, a conservative estimate of 324 Million Pesos would be needed. This money could be more useful for the city if it were used to improve the zone's accessibility: pedestrian and cyclist infrastructure or better public transport *(See Table 8)*.

TABLE 8: FALSE MITIGATION:
WHAT CAN BE BUILT WITH A PROJECT'S 324 MILLION PESOS FOR PARKING?

2.9 km of Complete Streets	7,330 Shared Bicycles (ECOBICI)
3.7 km of BRT (Metrobus)	446,897 m^2 of Accessible Sidewalks
60 km of Bike Lanes	


MPU-37-35

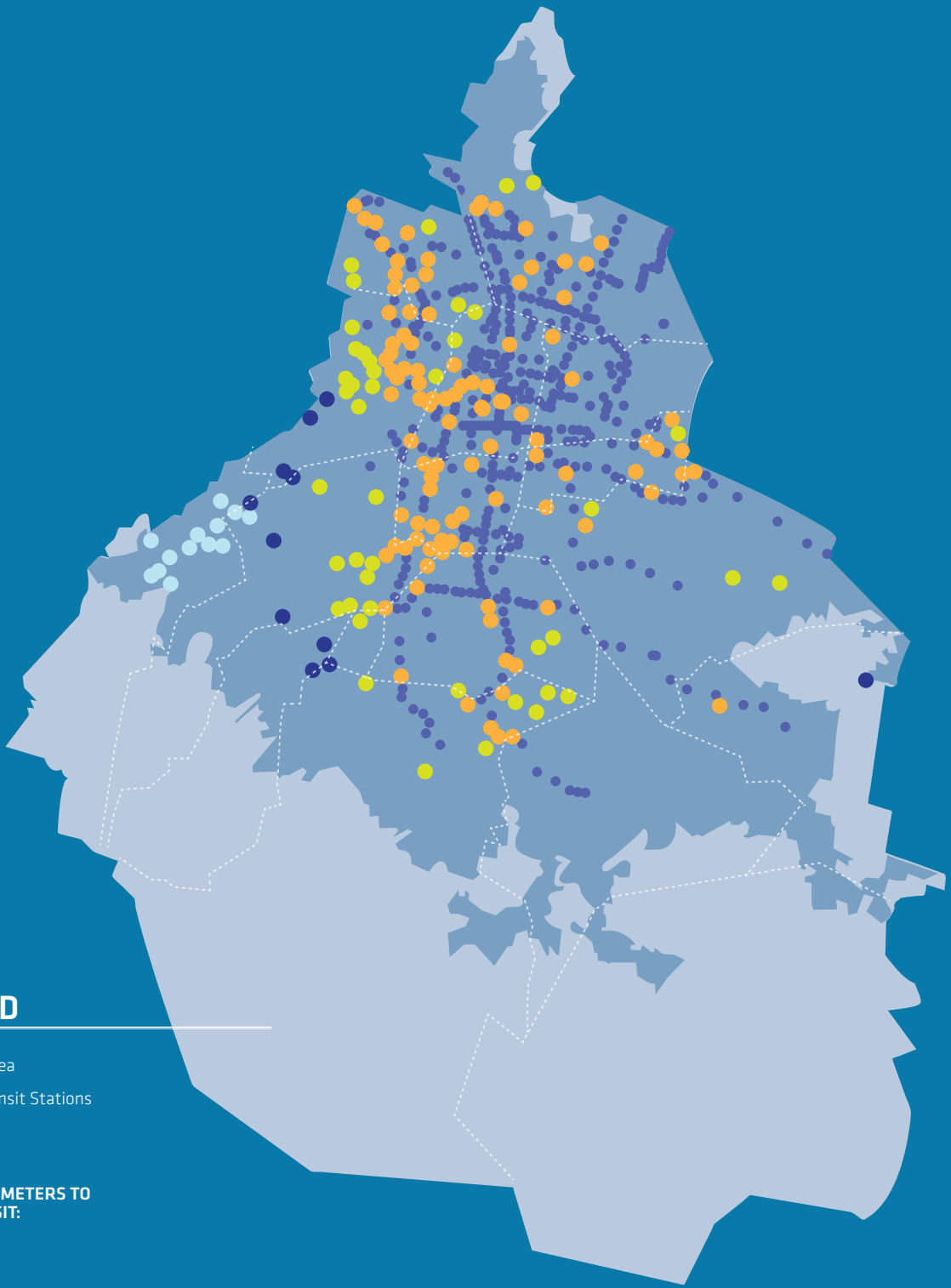
8. WHAT IS **HAPPENING** IN THE CITY´S **BIG REAL** ESTATE **DEVELOPMENTS**?

Big Real Estate Developments in Mexico City

To carry out an analysis of the consequences of parking minimums on Mexico City's urban development, real estate projects that need an urban impact assessment were reviewed; this means residential buildings of more than 10,000 m^2 or more than 5,000 m^2 for nonresidential uses. The analysis was carried out for 251 total projects from 2009 to August 2013, and the following information was gathered:

a) Year of the assessment.
b) Project's address.
c) Project's land uses.
d) Property surface.
e) Project's open and developed areas.
f) Highest level in the project.
g) Lowest underground levels in the project.
h) Built area above and below ground, and total.
i) Number of dwellings in the project.
j) Number of parking spaces in the project, below and above ground.
k) m^2 of residential, offices, commerce, and parking in the project, below and above ground.
l) Number of stories allowed.
m) Built area allowed above ground.
n) Number of parking spaces required.
o) Linear distance to mass transit systems (STC Metro, Metrobus, Electric Transport System [*STE*]), Mexibus, and the Passenger Transport Network (*RTP*).
p) Minimum linear distance to mass transit.

ILLUSTRATION 2: ANALYZED REAL ESTATE DEVELOPMENTS AND THEIR DISTANCE TO MASS TRANSIT



LEGEND

- Urban Area
- Mass Transit Stations
- Districts

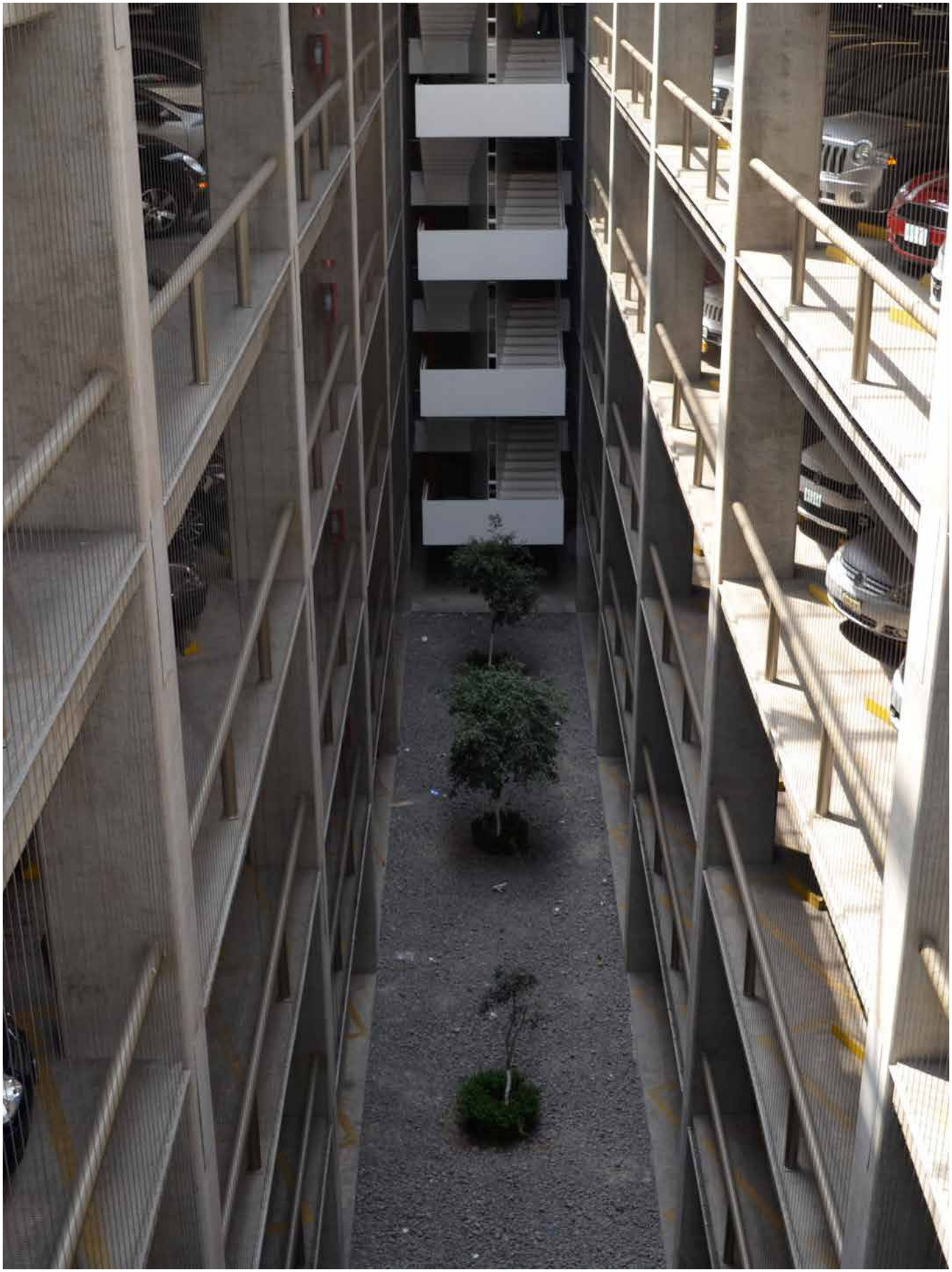
DISTANCE IN METERS TO MASS TRANSIT:

- 15–800
- 801–3,000
- 3,001–6,000
- 6,001–11,422

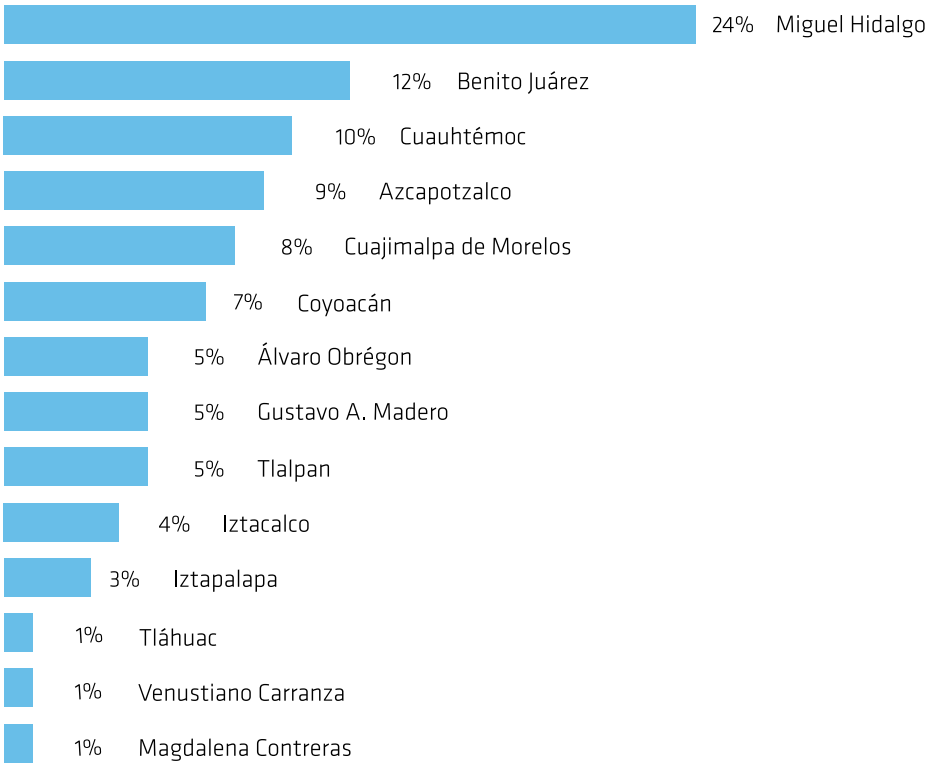
TABLE 9: PROJECT DISTRIBUTION PER DISTRICT

District	Commerce	Housing	Mixed Use (With Housing)	Mixed Use (Without Housing)	Office	Social Housing	TOTAL
Álvaro Obregón	1	10	5	4	5	0	25
Azcapotzalco	6	3	4	0	0	9	22
Benito Juárez	3	7	4	16	1	1	32
Coyoacán	6	6	0	1	3	1	17
Cuajimalpa de Morelos	0	12	4	2	1	1	20
Cuauhtémoc	1	2	9	10	2	2	26
Gustavo A. Madero	2	2	2	0	0	6	12
Iztacalco	1	1	1	0	0	7	10
Iztapalapa	6	0	0	1	0	0	7
Magdalena Contreras	1	0	0	1	0	0	2
Miguel Hidalgo	2	17	15	15	9	2	60
Tláhuac	0	0	0	0	0	2	2
Tlalpan	3	4	5	0	0	0	12
Venustiano Carranza	2	1	0	0	0	1	4
TOTAL	34	65	49	50	21	32	251

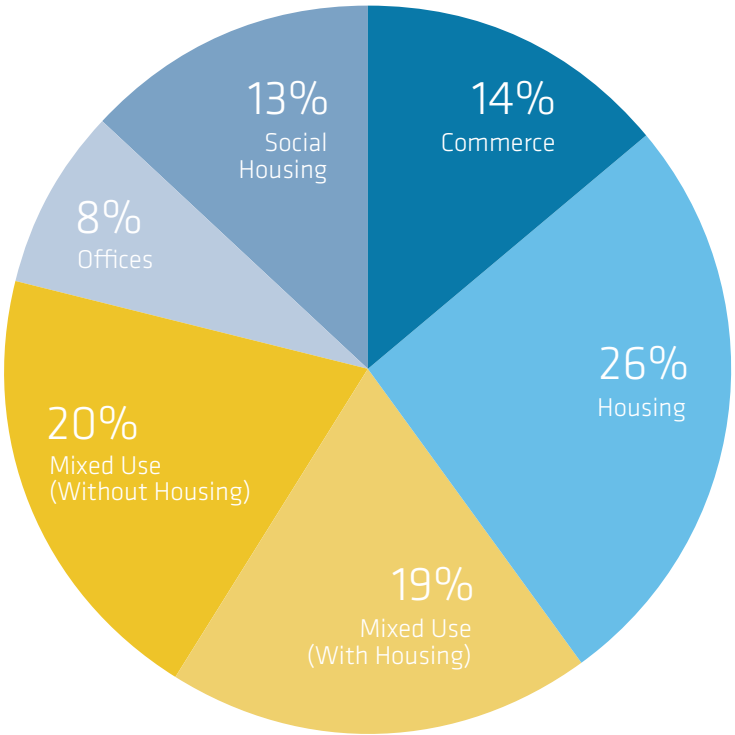
Note: Most of the projects are of housing (65), followed by mixed-use buildings without housing (50) and mixed-use buildings with housing (49).



GRAPH 8: PROJECT DISTRIBUTION PER DISTRICT



GRAPH 9: PROJECT DISTRIBUTION PER LAND USE



24 percent of the cases are located in the Miguel Hidalgo District, 12 percent in Benito Juárez, 10 percent in Cuauhtémoc and Álvaro Obregón, 9 percent in Azcapotzalco, and the remaining 35 percent in the other eleven federal districts (*See Graph 8*).

Taking into account the developments' distance to Metro and Metrobus, it looks like there is no incentive to build near them. This shows that the increase in housing, offices, and commerce, and therefore parking, does not follow the mass transit coverage strategy.

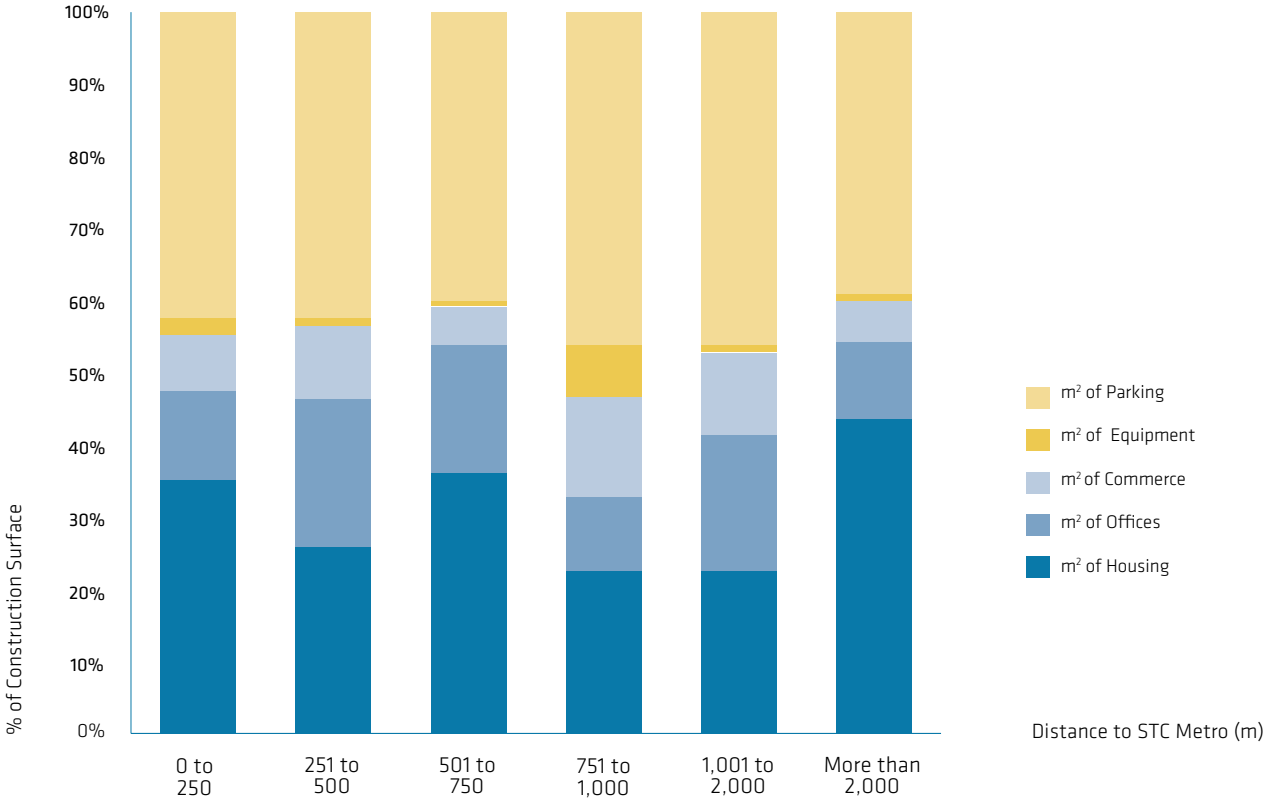
TABLE 10: PROJECT AND BUILT M² DISTRIBUTION WITH RESPECT TO THE DISTANCE TO A METRO STATION

Distance to STC Metro (m)	Projects	Parking Spaces	m² of Housing	m² of Offices	m² of Commerce	m² of Equipment	m² of Parking
0 to 250	19	37,919	931,669	327,769	207,796	62,376	1,125,719.00
251 to 500	40	31,216	526,135	420,670	203,546	18,059	865,210.68
501 to 750	37	24,856	616,743	290,613	96,225	15,306	667,000.28
751 to 1,000	29	25,686	354,197	175,548	219,625	114,108	743,046.55
1,001 to 2,000	64	70,490	1,046,325	856,372	530,589	25,906	2,125,916.65
More than 2,000	62	60,177	1,895,171	469,592	229,585	49,667	1,679,517.38
Total	251	250,344	5,370,240	2,540,566	1,487,366	285,423	7,206,410.53

TABLE 11: PROJECT AND BUILT M² DISTRIBUTION WITH RESPECT TO THE DISTANCE TO A METROBUS (BRT) STATION

Distance to Metrobus (m)	Projects	Parking Spaces	m² of Housing	m² of Offices	m² of Commerce	m² of Equipment	m² of Parking
0 to 250	28	25,788	390,477	278,638	214,562	8,857	715,613.32
251 to 500	9	7,727	35,178	155,910	55,408	2,616	219,368.47
501 to 750	12	14,890	231,014	198,656	103,476	7,007	394,134.94
751 to 1,000	15	10,002	223,765	132,778	14,856	4,600	249,873.71
1,001 to 2,000	49	54,065	1,224,063	459,432	363,966	137,935	1,452,290.25
More than 2,000	138	137,872	3,265,743	1,315,151	735,097	24,407	4,175,129.83
Total	251	250,344	5,370,240	2,540,566	1,487,366	285,423	7,206,410.53

GRAPH 10: LAND USE DISTRIBUTION IN PROJECTS WITH RESPECT TO THE DISTANCE TO A METRO STATION



GRAPH 11: LAND USE DISTRIBUTION IN PROJECTS WITH RESPECT TO THE DISTANCE TO A METROBUS (BRT) STATION

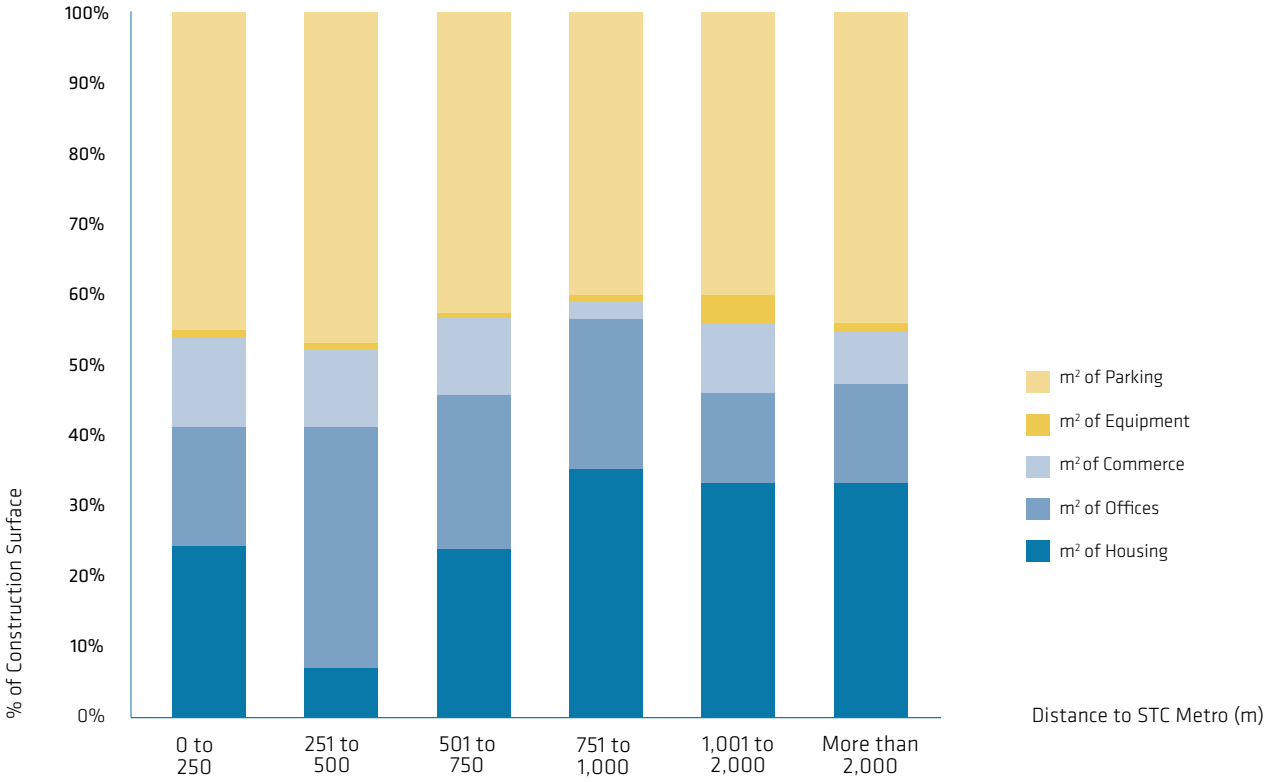


TABLE 12: PROJECTS AND BUILT AREAS PER URBAN AREA

Location per Urban Area	Projects	Parking Spaces	m² of Housing	m² of Offices	m² of Commerce	m² of Equipment	m² of Parking
Within Circuito Interior (Inner Ring Road)	38	47,017	964,391	574,979	299,547	31,938	1,283,839.64
Between Circuito Interior (Inner Ring Road) and Periférico (Outer Ring Road)	150	149,179	2,772,505	1,427,620	1,074,240	214,579	4,381,978.04
Rest of DF	63	54,148	1,633,344	537,967	113,578	38,907	1,540,592.84
Total	251	250,344	5,370,240	2,540,566	1,487,366	285,423	7,206,410.53

In order to understand the location of developments with respect to the urban dynamics given by the road infrastructure in Mexico City, three indicators were identified for the three areas shown in Table 13.

In this case, it was identified that close to 58 percent of the built m² of big developments happen in Area 2, followed by Area 3 with 23 percent and only 19 percent within *Circuito Interior* (Inner Ring Road).
Nevertheless, mass transit coverage is decreasing among Areas 1 to 3.

TABLE 13: CONSTRUCTION SURFACE DISTRIBUTION PER URBAN AREA

Area	Limit	% of Built m² associated to the Analyzed Developments
1	Within Circuito Interior (Inner Ring Road)	18.7%
2	Between Circuito Interior (Inner Ring Road) and Periférico (Outer Ring Road)	58.4%
3	Rest of DF	22.9%

GRAPH 12: LAND USE DISTRIBUTION PER URBAN AREA

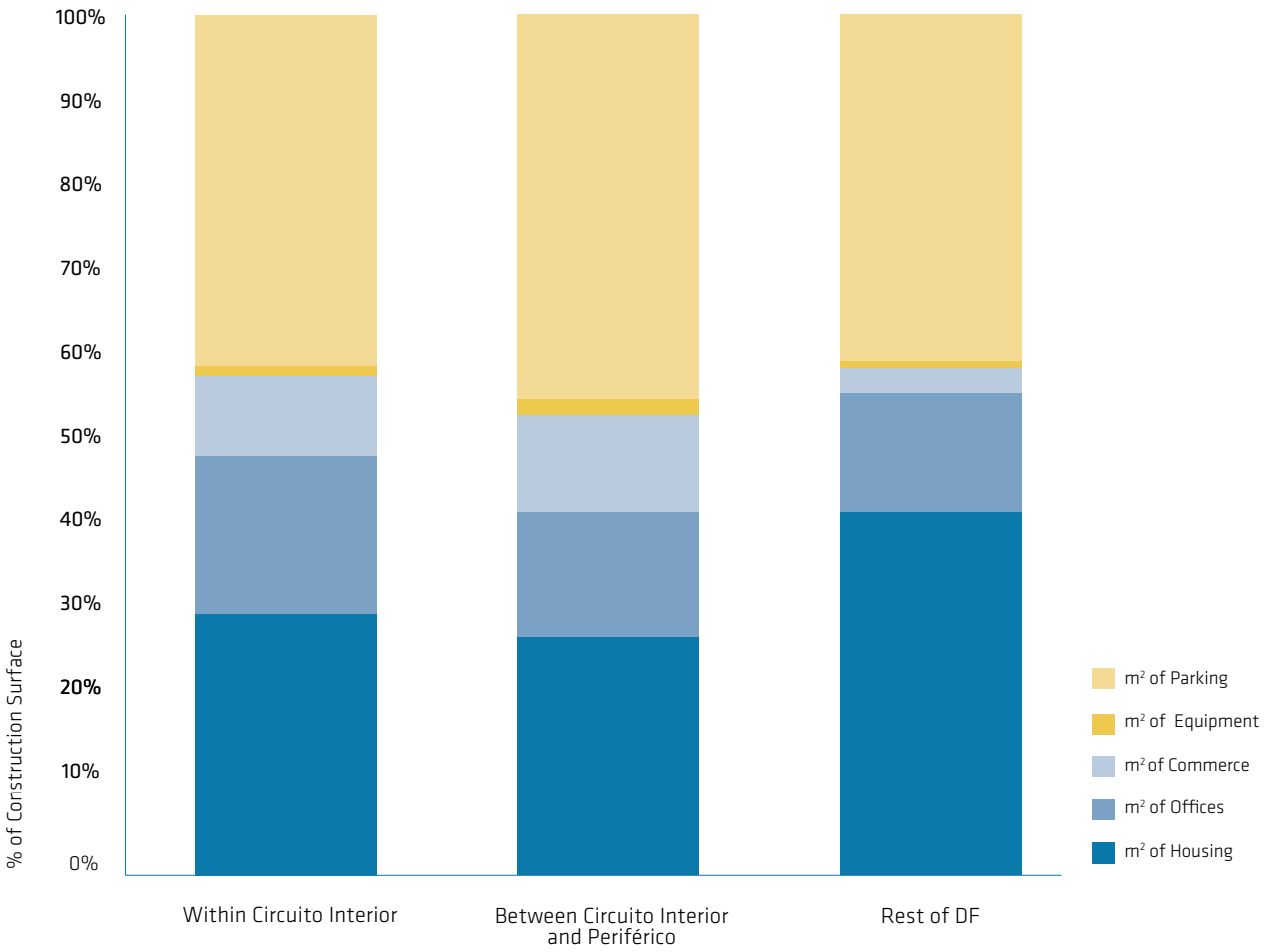


TABLE 14: PROJECTS AND PARKING SPACES PER YEAR

Year	Projects	Parking Spaces
2009	71	80,874
2010	31	18,861
2011	48	51,853
2012	60	51,971
2013	41	46,785
TOTAL	251	250,344

With an average of 50 projects per year, a total of 250,344 parking spaces were added, meaning an average of almost 1,000 parking spaces per project.

The annual average parking space growth ratio is 33 percent, only considering the city's big real estate projects (*See Graph 13*).

GRAPH 13: CUMULATIVE PARKING SPACES

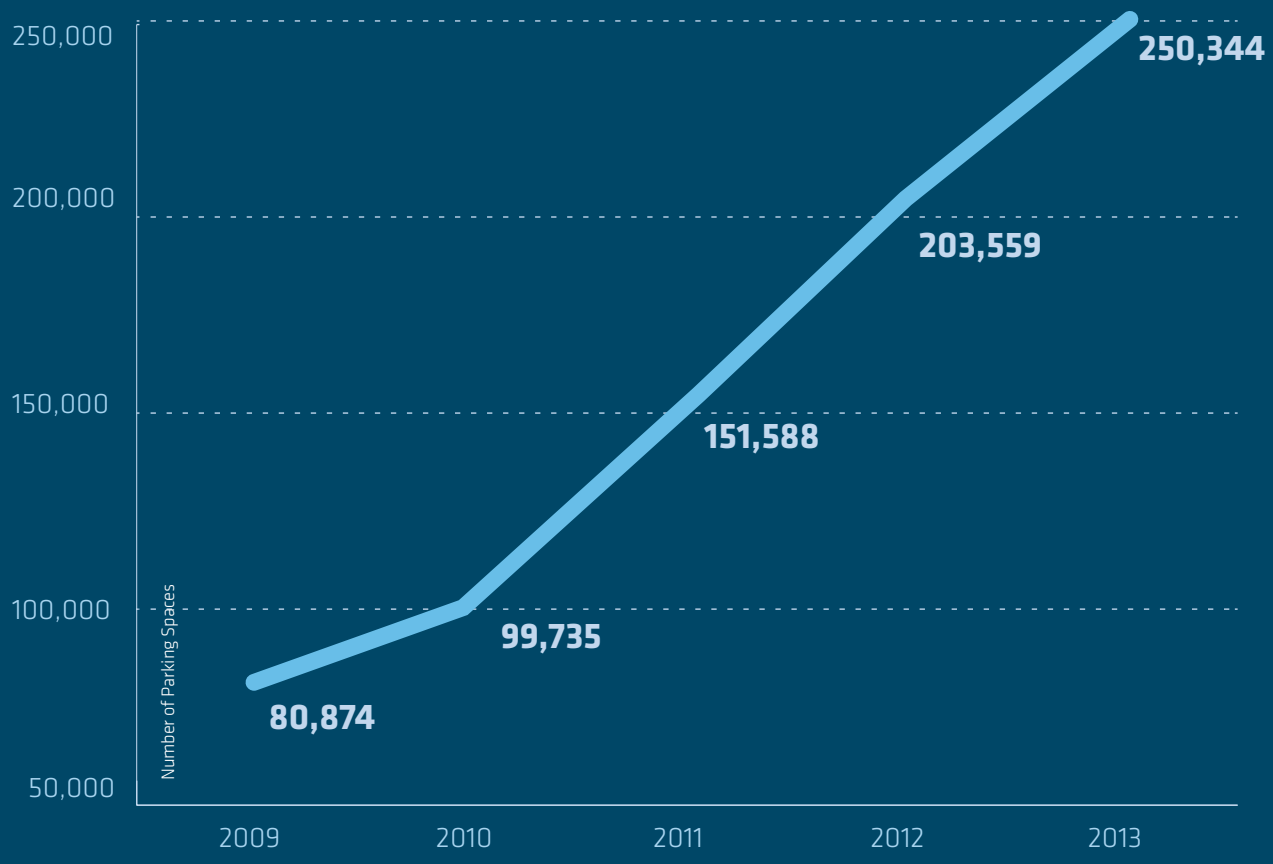
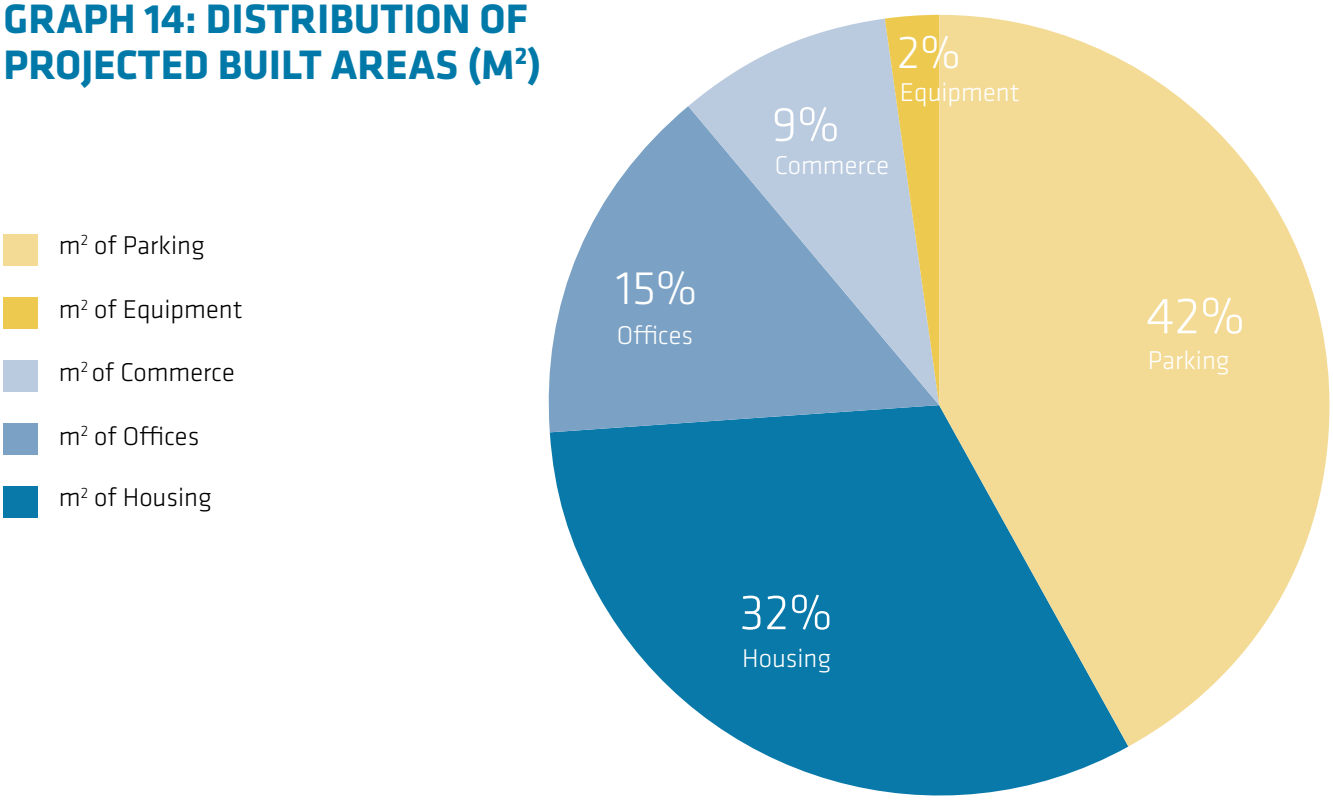


TABLE 15: DISTRIBUTION OF BUILT M² PER PROJECT'S MAIN LAND USE

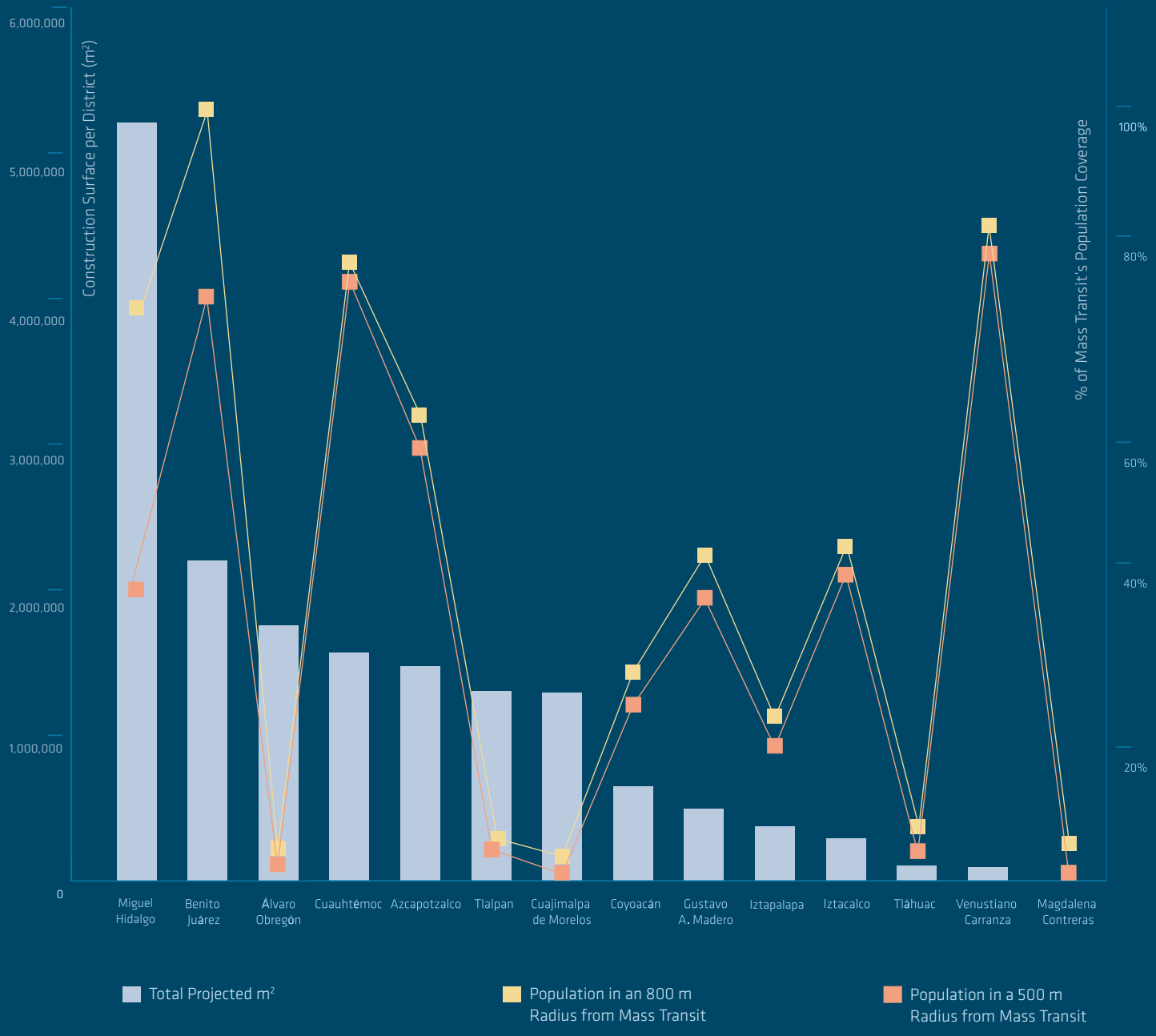
Main Use of the Project	Housing (m²)	Offices (m²)	Commerce (m²)	Equipment (m²)	Parking (m²)	Total (m²)
Commercial	0.00	2,676.54	789,682.20	149,419.71	971,086.05	1,912,864.50
Housing	2,207,811.75	0.00	3,188.11	45,904.99	1,092,810.28	3,349,715.13
Mixed-Use with Housing	2,354,322.21	734,792.29	347,999.52	46,209.88	2,663,963.45	6,147,287.35
Mixed-Use	0.00	1,342,188.01	332,494.18	17,007.12	1,764,775.84	3,456,465.14
Offices	0.00	460,908.89	12,452.54	4,503.61	408,998.35	886,863.39
Social Housing	808,105.62	0.00	1,549.19	22,378.14	304,776.56	1,136,809.51
Total	5,370,239.59	2,540,565.73	1,487,365.73	285,423.45	7,206,410.53	16,890,005.02

Of the total 16,890,005.02 built m², more than 7 million (42.66%) were destined for parking.

GRAPH 14: DISTRIBUTION OF PROJECTED BUILT AREAS (M²)



GRAPH 15: TOTAL BUILT M² PER DISTRICT VS. MASS TRANSIT COVERAGE



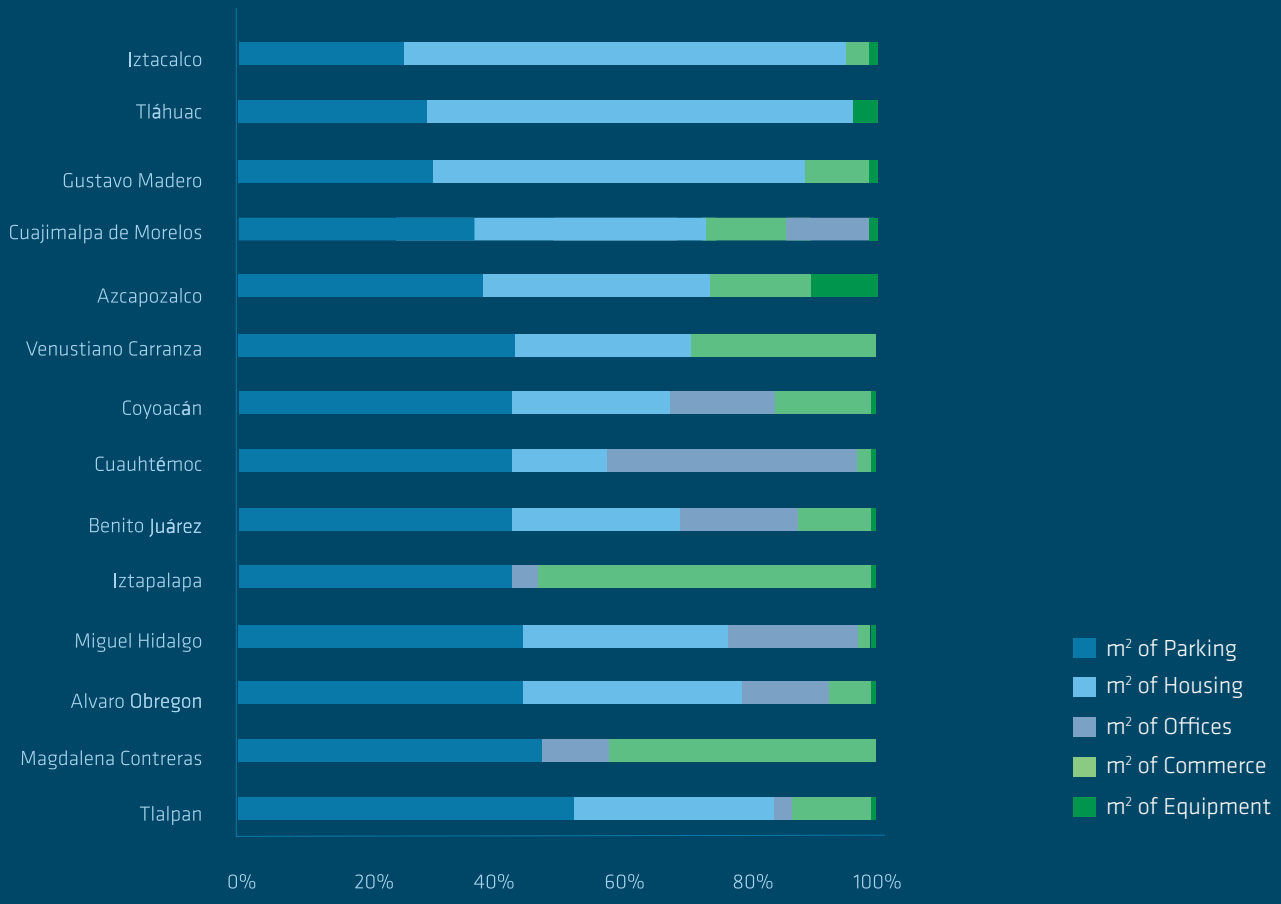
85 percent of the parking spaces were projected underground with an average size of 29.21 m². The spaces built above ground level presented an average dimension of 25.65 m²; therefore, under current common construction practices, an average of 27.43 m² is used per parking space.

To make the calculation, the total built area devoted to parking is considered (including areas of access, circulation, and service) and divided by the number of spots in the project.

Given this calculation, 37 percent of the total built area is underground parking; and a total of 957.5 underground levels were projected. Graph 18 shows an example of an average building in each of the analyzed districts.

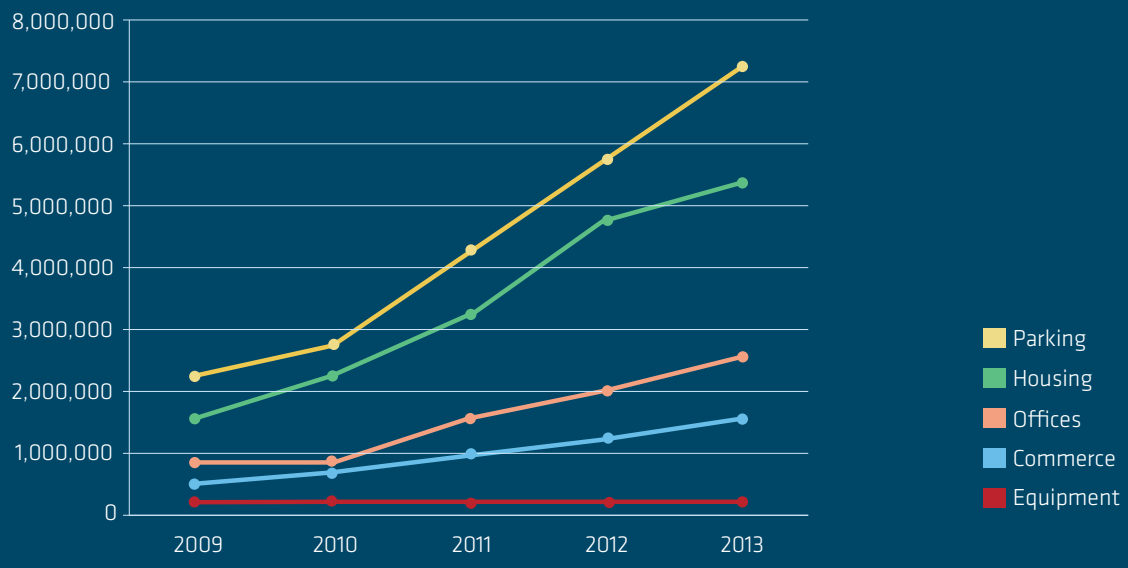
The ratio of m² of parking compared with the other land uses for each of the districts is shown below:

GRAPH 16: PROPORTION OF PARKING BUILT AREA COMPARED TO OTHER LAND USES PER DISTRICT

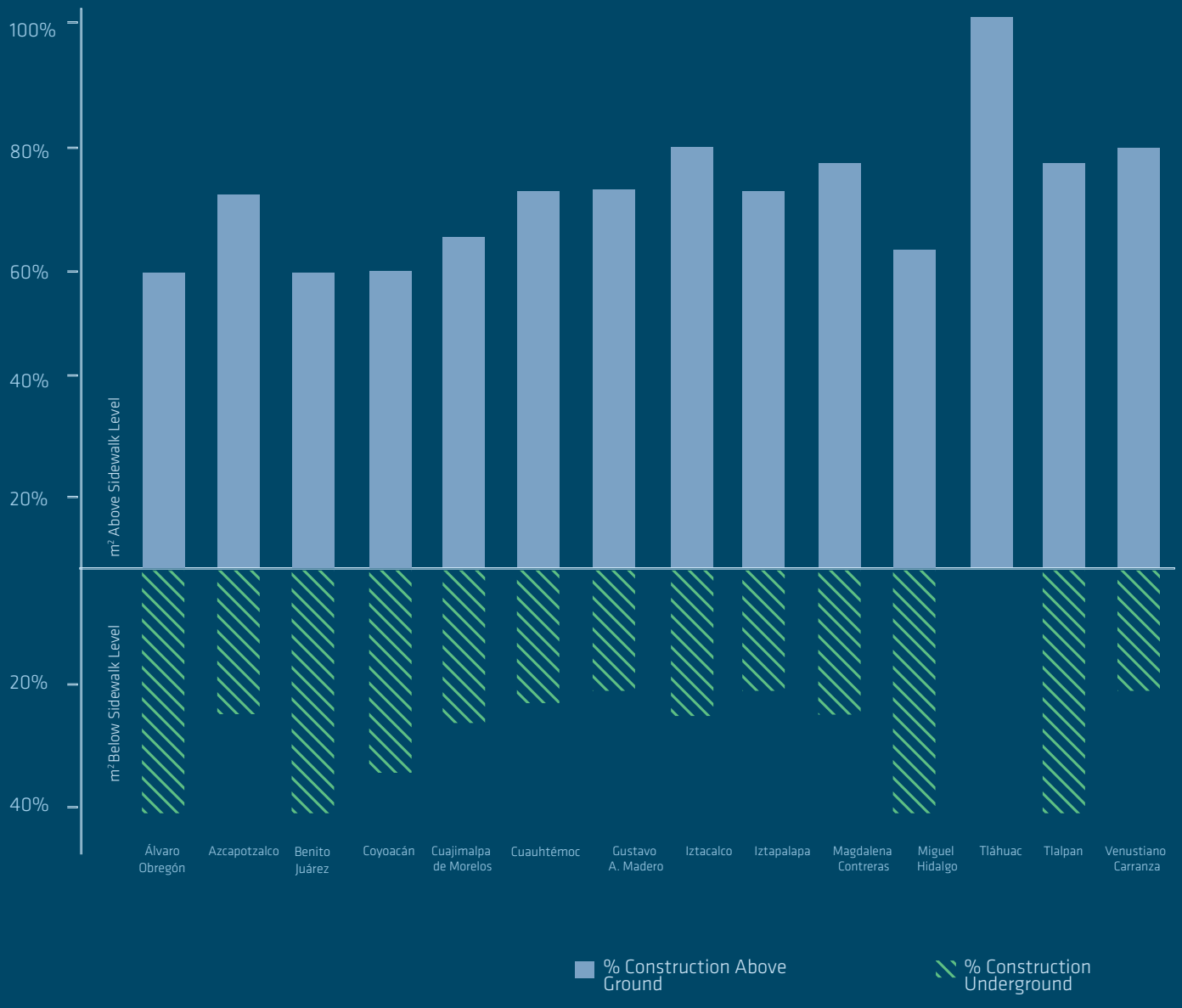


In Mexico City, the built area destined to accommodate private vehicles outpaces other uses with the highest growth rate.

GRAPH 17: CUMULATIVE BUILT AREAS PER LAND USE (M²)



GRAPH 18: PORTION OF UNDERGROUND BUILT AREA IN AN AVERAGE BUILDING PER DISTRICT



Within the 251 analyzed cases, a total of 3,450,165.33 m^2 of land was accumulated which, compared to the total built area has replicated 4.9 times the land area (Building-to-Land Ratio, BLR) in these projects. Out of the total, 2.81 of the BLR corresponds to uses other than parking, which represents 2.09 of the total 4.9 BLR *(See Table 16)*.

GRAPH 19: BLR PER DISTRICT

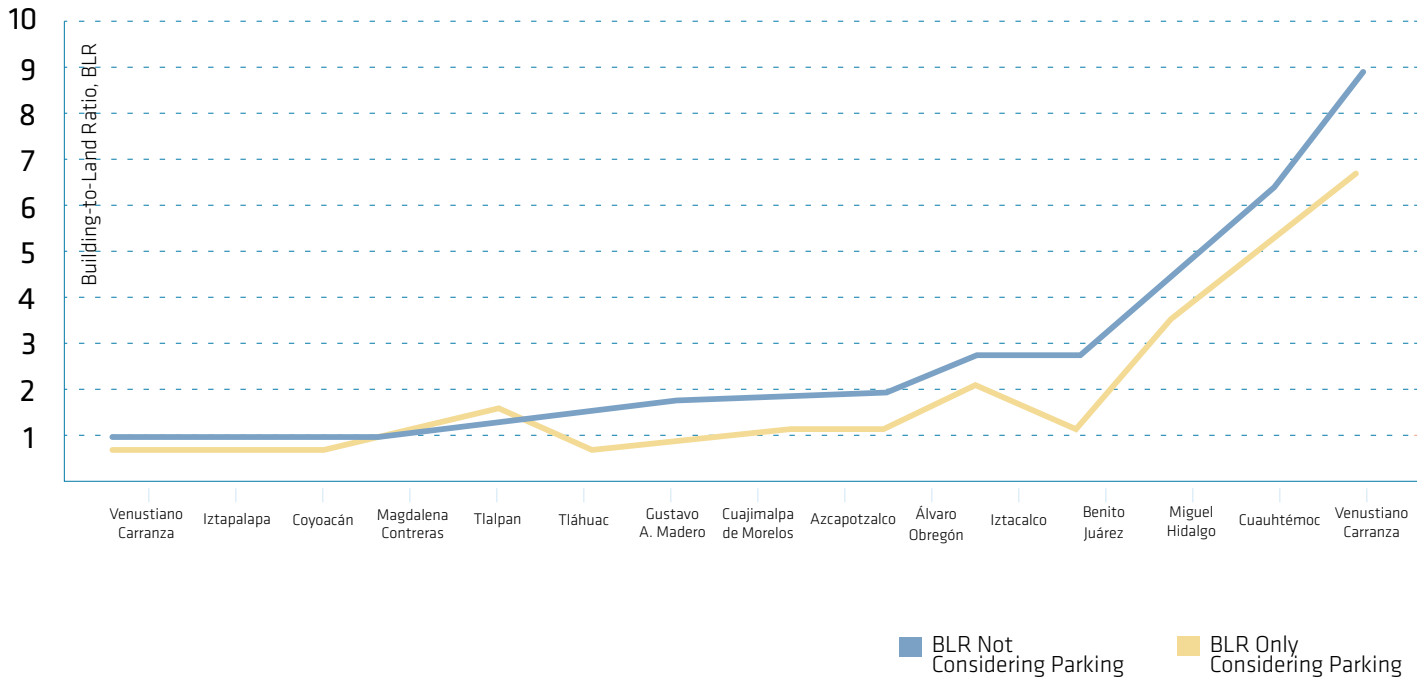


TABLE 16: BLR PER DISTRICT AND USE

District	Housing	Offices	Commerce	Equipment	Total Without Parking	Parking	TOTAL
Álvaro Obregón	1.70	0.54	0.46	0.05	2.74	2.21	4.95
Azcapozalco	1.17	0.01	0.51	0.36	2.04	1.25	3.29
Benito Juárez	2.13	1.56	0.98	0.07	4.74	3.61	8.35
Coyoacán	0.44	0.29	0.28	0.01	1.03	0.76	1.78
Cuajimalpa de Morelos	1.53	0.36	0.03	0.06	1.98	1.14	3.11
Cuauhtémoc	2.25	6.14	0.45	0.06	8.90	6.72	15.62
Gustavo. A Madero	1.64	0.00	0.29	0.04	1.97	0.85	2.82
Iztacalco	2.66	0.00	0.13	0.05	2.83	1.00	3.83
Iztapalapa	0.00	0.05	0.87	0.01	0.93	0.72	1.64
Magdalena Contreras	0.00	0.21	0.83	0.00	1.05	0.95	2.00
Miguel Hidalgo	3.68	2.26	0.45	0.06	6.44	5.16	11.60
Tláhuac	1.53	0.00	0.01	0.08	1.62	0.68	2.30
Tlalpan	0.95	0.07	0.37	0.03	1.43	1.56	2.99
Venustiano Carranza	0.45	0.00	0.45	0.01	0.91	0.67	1.58
Total	1.56	0.74	0.43	0.08	2.81	2.09	4.90

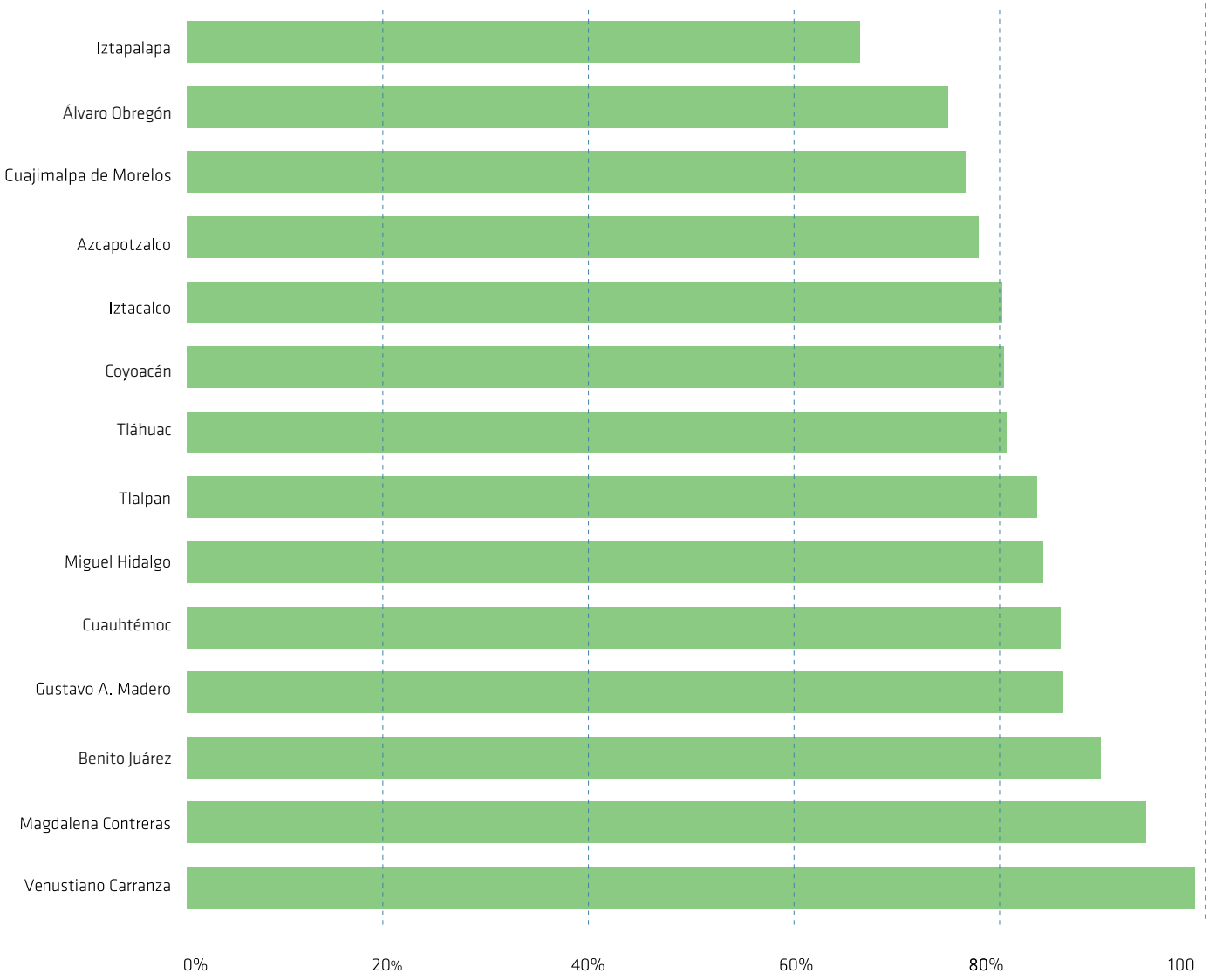

MERCADO

TABLE 17: AVERAGE UTILIZED AS-OF-RIGHT URBAN POTENTIAL PER PROJECT'S MAIN USE

Land Use	% of Utilized Constructive Potential
Commerce	68.8%
Offices	77.0%
Mixed-Use with Housing	82.3%
Housing	84.3%
Social Housing	84.5%
Mixed-Use Without Housing	88.0%
Total	81.9%

In the analyzed developments, 81.9 percent of the allowed m^2 were utilized (*See Table 14*). One of the reasons why almost 20 percent of the potential is wasted is that the parking requirement obliges investors to allocate important economic resources to provide parking instead of adding the total profitable m^2 that the zoning allows.

GRAPH 20: AVERAGE PERCENTAGE OF UTILIZED AS-OF-RIGHT CONSTRUCTIVE POTENTIAL PER DISTRICT



To analyze the urban impact assessments, the difference between the projected parking spaces and those required by the regulation was thoroughly studied for each case. This means observing how many parking spaces are projected above the minimum and the possible causes due to which the decision is made. On average, projects include 10.46 percent above the parking minimum required.

According to developers interviewed by ITDP, the main reasons why they build more spaces than those required are:

a) To have a comparative advantage in the market among similar developments.
b) The development's location.
c) The lack of mass transit.

Nevertheless, all of them considered that:

1) The parking supply should have an inverse relation with mass transit infrastructure. This means that, if a development is close to mass transit, less parking should be built.
2) Without a regulatory requirement, there would be less parking. On average, they could build the percentages stated in Table 18, as a ratio of the current minimum requirement, according to the land use and location with respect to mass transit coverage.
3) Depending on the case, by building less parking they would get to one of the two following options:

a) Allocate less capital investment in the development.
b) Add more profitable m² (housing, offices, commerce).

4) The minimum parking requirement is a limitation to generate projects and design, which add to a dense, mixed, compact, and Transit-Oriented Development.
Before analyzing the behavior of the difference between the quantity of parking projected and the mandated minimum, two factors that encourage the construction on average 10.46 percent above the requirement are important to highlight:

a) The regulation only allows building more spaces than those required. There is no maximum limit, which implies that investing in those who do not want to use a car and explore that market is not possible.
b) The minimum requirement itself is likely to be surpassed due to projects' dimensioning. Supposing that a construction, due to various conditions of the property, allows building levels of parking with a maximum of fifty spaces. The profitable m² and land uses impose the construction of at least three hundred twenty spaces. After six levels of parking, twenty spaces would still be lacking, which would suggest adding one more level. Under these suppositions, there is an economic incentive for the last level to reach maximum capacity (fifty spaces) and overpass the requirement by thirty.

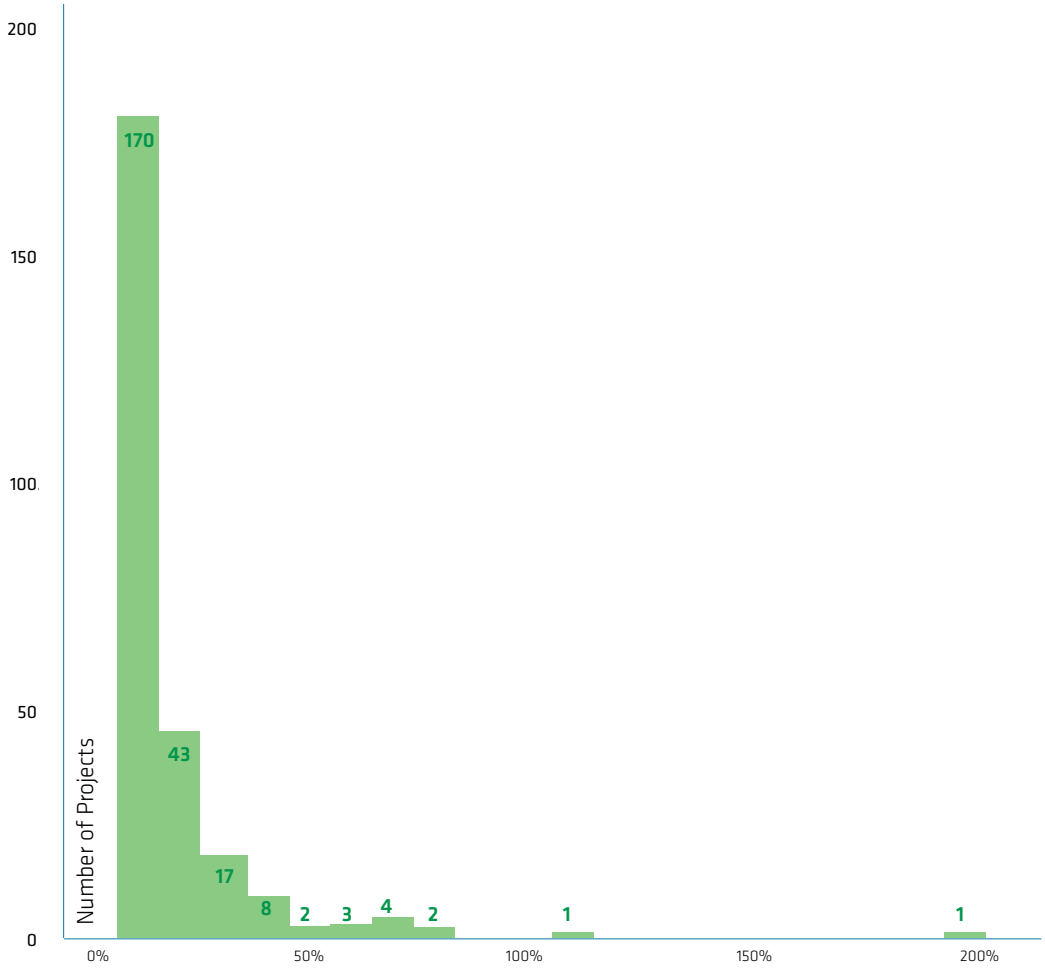
An analysis of the amount of parking projected versus the minimum required is presented below:

- *170 out of 251 cases provide less than 10 percent parking spaces above the minimum required.*
- *59 out of 251 cases projected exactly the minimum parking required.*
- *Average: 10.46 percent above the minimum requirement.*
- *Standard deviation: 19.29 percent.*

TABLE 18: FRACTION OF MINIMUM PARKING REQUIREMENT THAT WOULD BE BUILT IF THERE EXISTED NO REGULATION (ACCORDING TO INTERVIEWS WITH DEVELOPERS)

Land Use	General Estimation (%)	Estimation if the Development is Closer than 800 m to Mass Transit (%)	Estimation if the Development is Further than 800 m from Mass Transit (%)
Social Housing	75	38	55
Middle-Income Housing	87	50	68
Higher-Income Housing	102	63	80
Corporate Offices	60	28	45
Shopping Mall	85	50	68
Mixed-Use with Housing	72	38	55
Mixed-Use without Housing	72	33	50

GRAPH 21: PROJECT DISTRIBUTION ACCORDING TO NUMBER OF PARKING SPACES BUILT ABOVE THE MINIMUM REQUIRED



GRAPH 22: PROJECT DISTRIBUTION ACCORDING TO NUMBER OF PARKING SPACES BUILT ABOVE THE MINIMUM REQUIRED, PER LAND USE

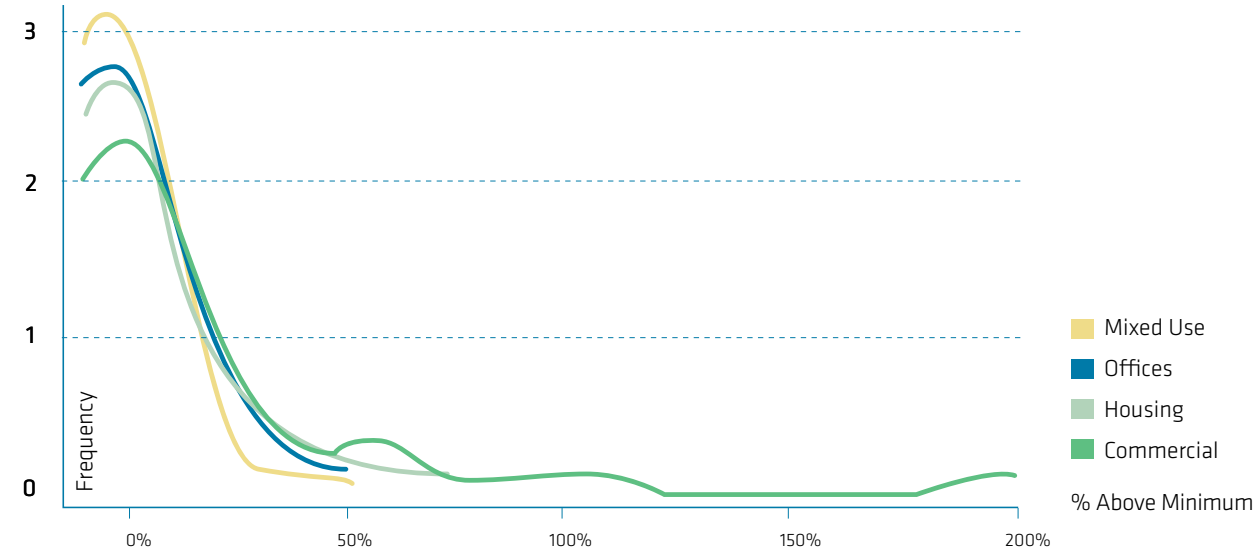


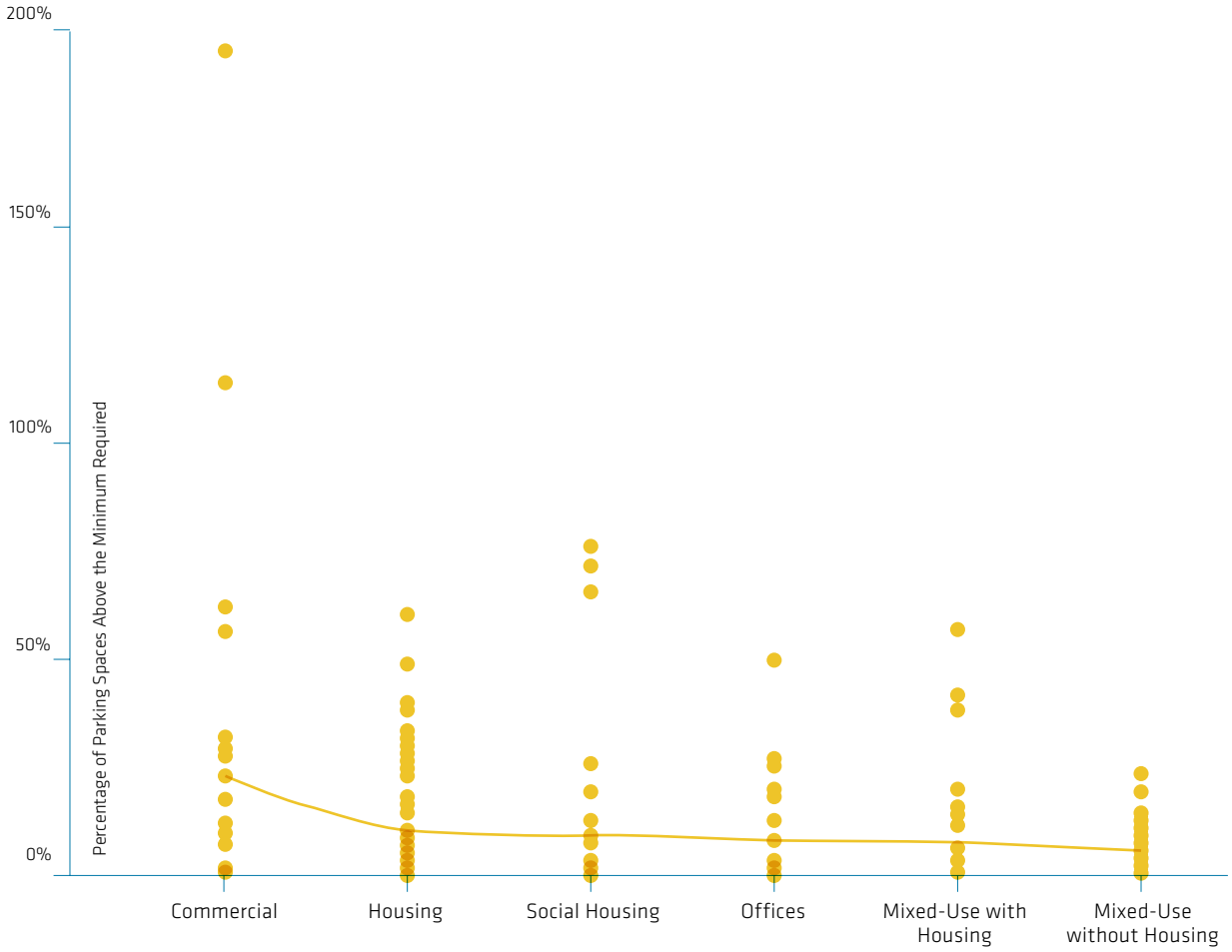
TABLE 19: AVERAGE PERCENTAGE OF PARKING SPACES ABOVE THE MINIMUM PER PROJECT'S LAND USE

Land Use	% of Parking Spaces Above the Minimum
Commerce	22.49%
Housing	11.09%
Social Housing	9.71%
Offices	8.29%
Mixed-Use with Housing	7.62%
Mixed-Use without Housing	5.64%
Total	10.46%

Data shows that for commercial land use, there is a greater disposition to surpass the amount of required parking, while mixed-use projects (with and without housing) are those with lower disposition *(See Table 19)*.

One of the possible reasons for this phenomenon is that, in commercial uses, parking in a public garage can be subject to a fee. As such, parking is an important source of income for investors, turning into a powerful incentive to add more spaces voluntarily.

GRAPH 23: AVERAGE PERCENTAGE OF PARKING SPACES BUILT ABOVE THE MINIMUM REQUIRED PER PROJECT'S LAND USE

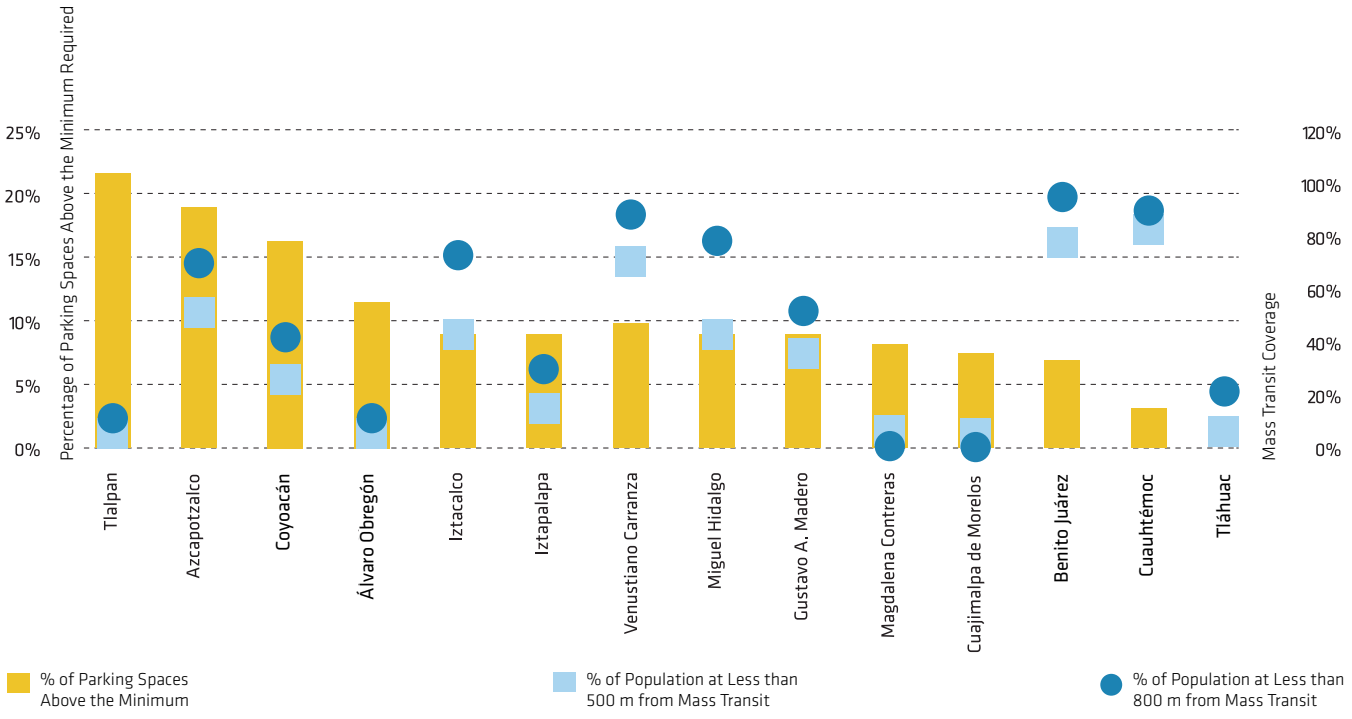


In the Tlalpan district, an average 22.2% more than the required parking spaces were projected, while in Cuauhtemoc district the average is 3.7%. By crossing this information with Mass Transit coverage per district, it seems like it is not an influencing variable, reason why it may be concluded that the decision is made under other criteria.

TABLE 20: PERCENTAGE OF PARKING SPACES ABOVE THE MINIMUM PER DISTRICT AND MASS TRANSIT COVERAGE

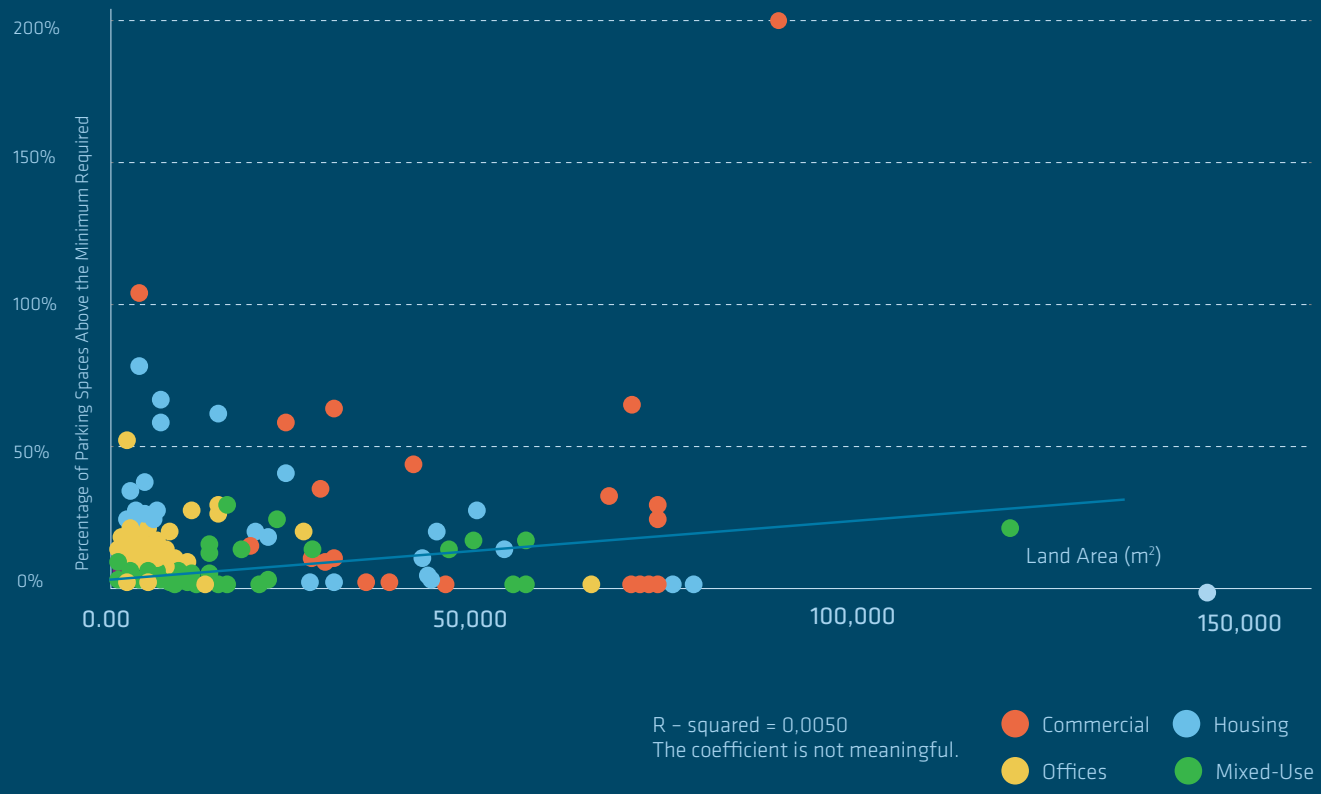
District	% of Parking Spaces Above the Minimum	% of Population at Less than 500 m from Mass Transit	% of Population at Less than 800 m from Mass Transit
Tlalpan	22.2%	6.6%	12.6%
Azcapotzalco	19.6%	54.3%	72.5%
Coyoacán	16.7%	26.9%	42.8%
Álvaro Obregón	11.6%	4.5%	10.6%
Venustiano Carranza	10.5%	70.5%	90.6%
Iztapalapa	9.4%	16.6%	31.5%
Iztacalco	9.4%	46.1%	74.9%
Miguel Hidalgo	9.1%	43.9%	79.4%
Gustavo A. Madero	8.9%	39.3%	51.7%
Magdalena Contreras	8.4%	0.0%	0.0%
Cuajimalpa de Morelos	7.6%	0.0%	0.0%
Benito Juárez	7.4%	79.9%	98.5%
Cuauhtémoc	3.7%	86.3%	92.2%
Tláhuac	0.0%	9.5%	23.3%

GRAPH 24: AVERAGE PERCENTAGE OF PARKING SPACES BUILT ABOVE THE MINIMUM REQUIRED PER DISTRICT AND MASS TRANSIT COVERAGE



GRAPH 25: LAND AREA VS. PERCENTAGE OF PARKING SPACES BUILT ABOVE THE MINIMUM REQUIRED

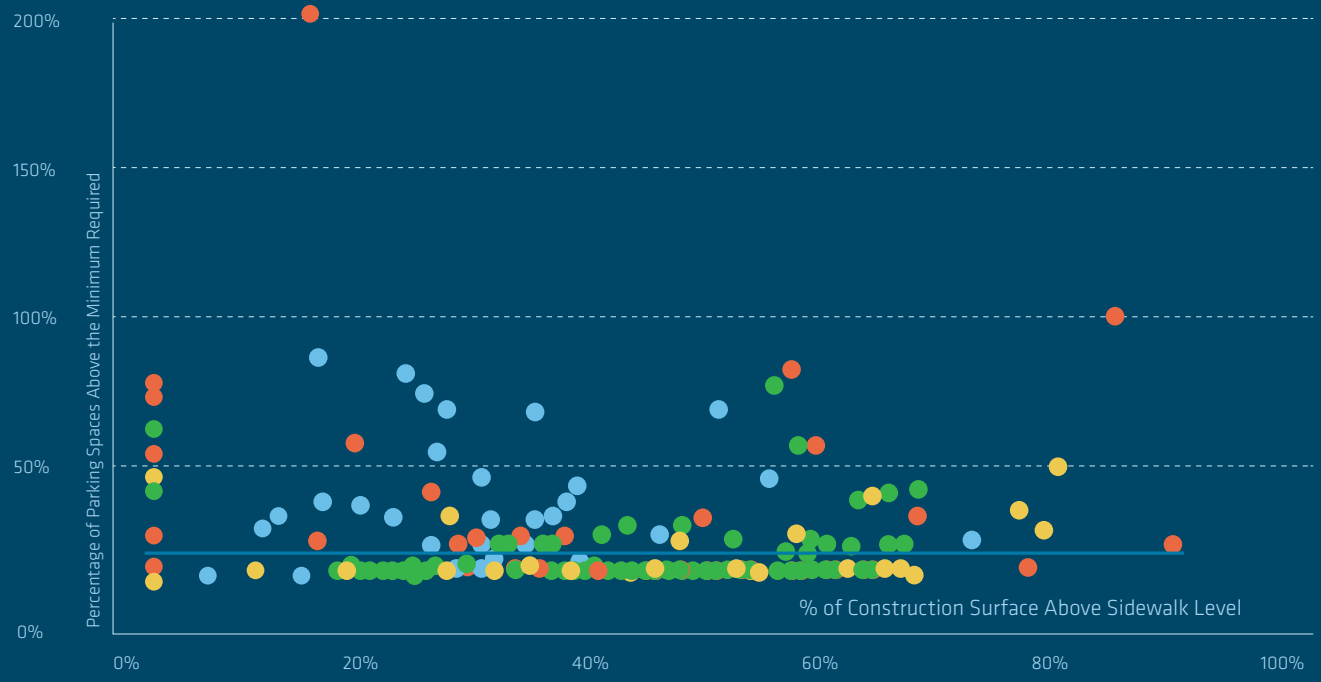
It is important to find out if surpassing the amount of required parking has any relation to the size of the development, as follows:



R – squared = 0,0050
The coefficient is not meaningful.

Commercial
Housing
Offices
Mixed-Use

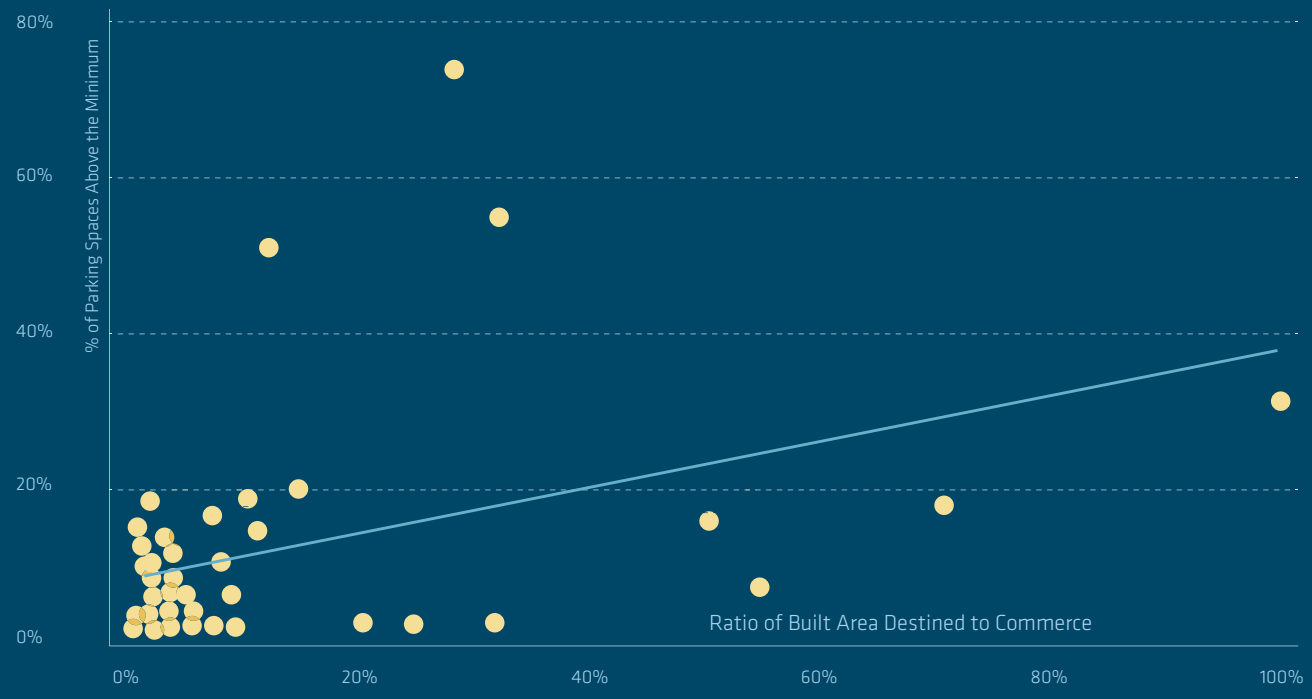
GRAPH 26: PERCENTAGE OF BUILT AREA ABOVE GROUND AND PERCENTAGE OF PARKING SPACES BUILT ABOVE THE MINIMUM REQUIRED



R – squared = 0,0050
The coefficient is not meaningful.

Commercial
Housing
Offices
Mixed use

GRAPH 27: RATIO OF BUILT AREA DESTINED FOR COMMERCE AND PERCENTAGE OF PARKING SPACES ABOVE THE MINIMUM REQUIRED



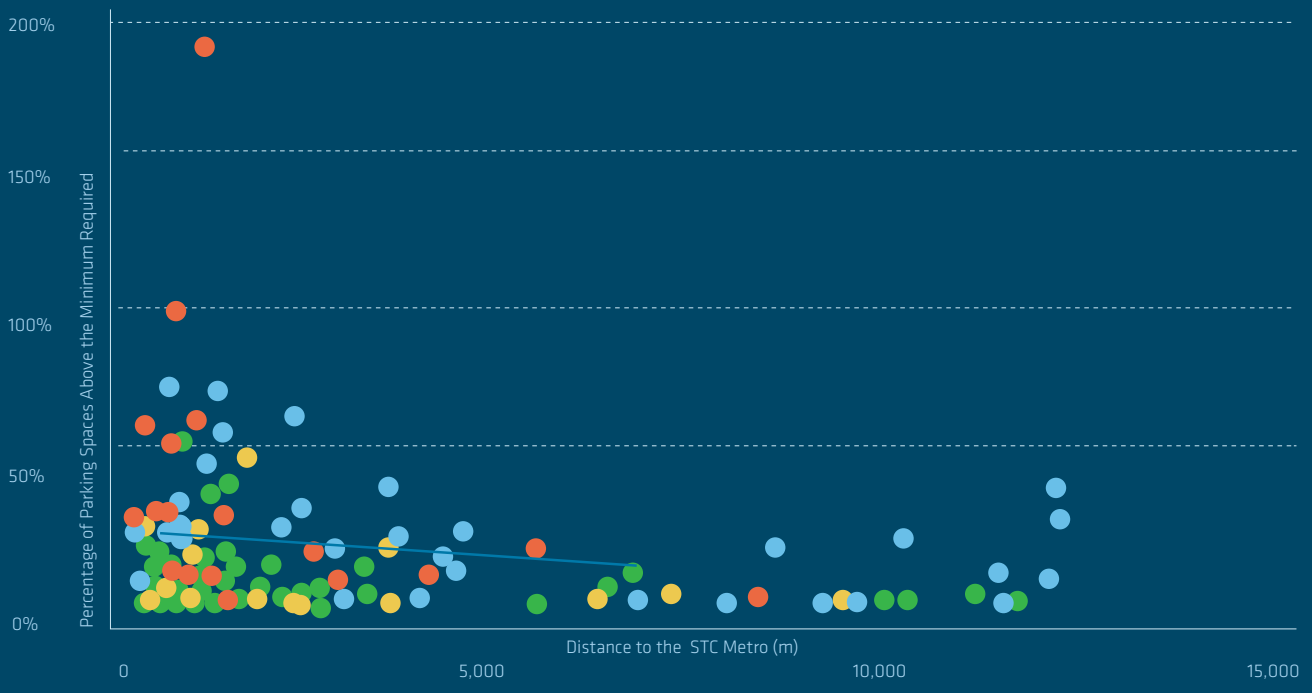
R – squared = 0,1425

Mixed-Use

Coefficient:
0,23 (Meaningful at 1%)

GRAPH 28: PERCENTAGE OF PARKING SPACES BUILT ABOVE THE MINIMUM REQUIRED AND DISTANCE TO A METRO STATION

The possibility of the existence of a relationship that could surpass the amount of parking spaces required by regulation and location with respect to mass transit was also analyzed.

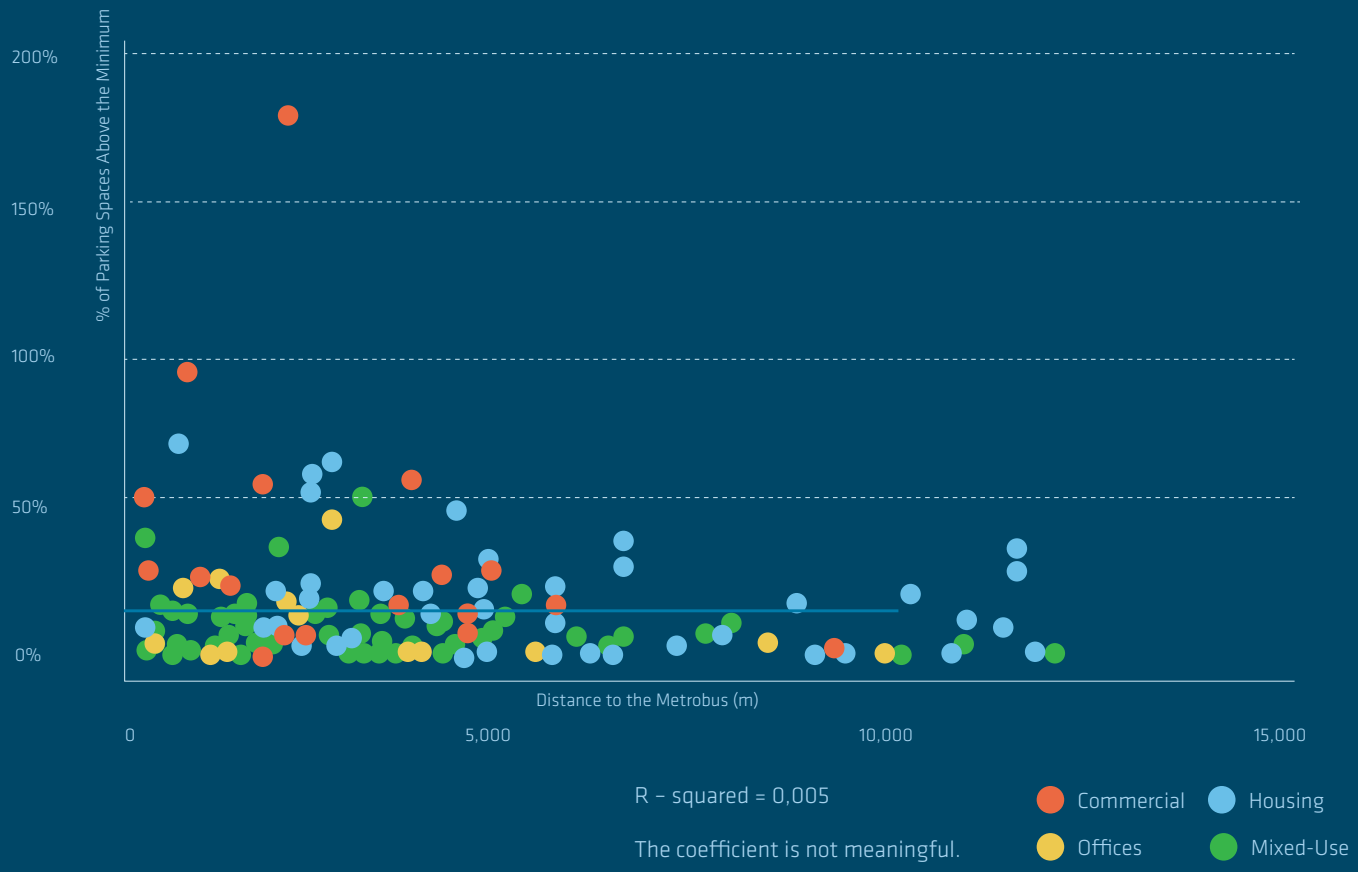


R – squared = 0,0008

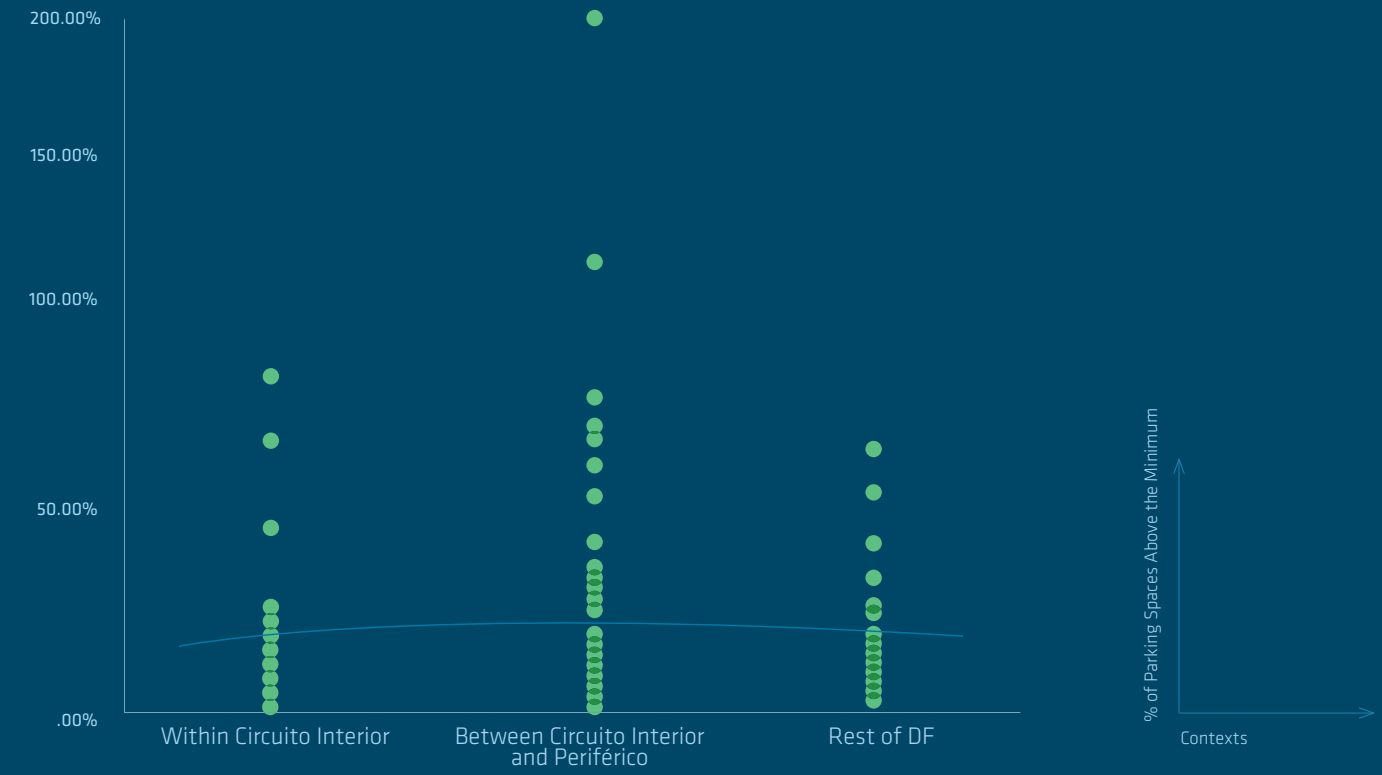
The coefficient is not meaningful.

Commercial
Housing
Offices
Mixed-Use

GRAPH 29: PERCENTAGE OF PARKING SPACES BUILT ABOVE THE MINIMUM REQUIRED AND DISTANCE TO A METROBUS STATION



GRAPH 30: PERCENTAGE OF PARKING SPACES BUILT ABOVE THE MINIMUM REQUIRED AND LOCATION PER URBAN AREA



From the analysis carried out in the 251 projects, the following conclusions can be made regarding parking reform for Mexico City:

1. Generally, the amount of parking built is equivalent to the minimum required, which brings up the question whether many projects would have fewer spaces if there were no legal requirement. This could enhance accessible housing facilities in central areas or those close to mass transit, and mixed and compact urban development.

2. The current regulation does not promote an inverse relation between the added parking spaces and the zone's public transit coverage and quality. Based on this, Transit Oriented Development that complements the densification and car-use reduction goals is impossible, due to an increase of this mobility mode's competitiveness versus public service.

3. The requirement of a minimum amount of parking, associated with the land use and built area, assumes that road capacity is infinite or that impacts regarding time, and economic, social, and environmental costs of increasing it are low.

4. Built area destined for parking grows at a faster pace than any other land use; however, public space continues to be saturated due to the great amount of vehicles looking for a space at a bargain price.

5. The parking requirement associated with the land use is one of the limiting issues to the use of the constructive potential established by zoning.

6. Derived from the biggest real estate projects, ample areas and economic resources are destined for parking, constituting an opportunity cost to the city when other land uses such as housing, offices, or commerce could be built. There is use of resources to ameliorate accessibility in the projects (mass transit, pedestrian, or cyclist infrastructure).

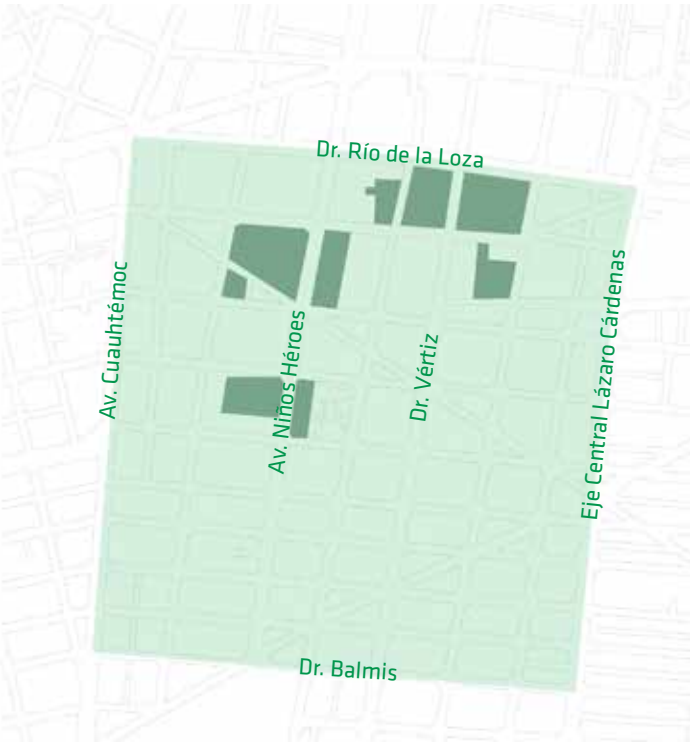
7. Urban development should not be limited to the amount of parking it may provide, but to the capacity of the public transport system to absorb those new trips.

9. CASE STUDY

Transit-Oriented **Development in Doctores Neighborhood**

ILLUSTRATION 3: DOCTORES NEIGHBORHOOD ANALYSIS AREA

ILLUSTRATION 4: SUSCEPTIBLE AREAS TO REDEVELOP IN DOCTORES NEIGHBORHOOD



The report "Transit-Oriented Development in Doctores Neighborhood" defines TOD as a strategy that seeks to integrate mobility and urban development in order to reduce the need for travelling long distances and improve accessibility in cities. To achieve this goal, Transit-Oriented Development aims for neighborhoods around Mass Transit to be compact, dense, and of mixed-uses, to bring work, housing, goods and services closer. This way, the land is used efficiently and the livability of the neighborhood improves.

The location in a central area of Mexico City and the supply of mass transit public services makes it attractive for the implementation of Regulatory and public work improvements, which could make Doctores a showcase TOD zone.

Mexico City's government showed interest in the use of this land, including it within the possible Strategic Development Zones (SDZ). New government and private offices, commerce, and housing are planned.

The main objective of the analysis was, through a traffic micro-simulation model with PTV Group's VISSUM software, to observe the various scenarios of the mobility dynamic that cars would have in the northern area of Doctores (*See Illustration 3*), supposing a fixed number of m^2 added through a redensification project and various levels of compliance with the number of parking spaces mandated by the Building Code's Complementary Technical Rules.

TABLE 21: BUILT AREAS OF PROFITABLE LAND USES SUPPOSED IN THE DOCTORES NEIGHBORHOOD

Area	m² of Government Offices	m² of Private Offices	m² of Housing	m² of Hotels	m² of Commerce	m² of Services
1	135,611	91,708	91,708	20,000	19,250	49,681
2	130,650	87,987	87,987	20,000	20,601	58,057
3	81,442	18,683	18,683	12,000	8,826	22,552
4	700	0	0	12,000	5,305	14,951
Total	348,403	198,378	198,378	64,000	53,982	145,241

The construction of various land uses was supposed in four areas (*See Illustration 4*) with the following quantities of m^2 per use in each area:

Information was gathered through fieldwork, to obtain reliable and precise data:

- Inventory of the location of speed reducers
- Inventory of the location of pothole areas
- Inventory of streets with double-parked vehicles
- Inventory of traffic-light phases
- Inventory of public transport (bus) routes
- Inventory of bus stops
- Field recognition of traffic congestion and behavior

Furthermore, vehicle counts were carried out in four garages near/in the study area, associated with different land uses, to estimate a rate of trips generated by added parking (*See Table 23*):

- Commerce: Pabellón Cuauhtémoc
- Offices: Mexico City's Treasury
- Housing: Morelos Complex
- Garage: Niños Heroes

Ten different simulation scenarios were designed, in which the parameters were the percentage of added parking spaces with respect to the total required (*See Table 22*) and a trip-generation factor, according to the field studies:

1. *Baseline scenario:* current conditions in the study area.
2. *Low-level scenario with 25 percent of the required parking spaces:* a trip-generation factor of 75 percent of the one estimated in the field studies was used.
3. *Medium-level scenario with 25 percent of the required parking spaces:* a trip-generation factor of 100 percent of the one estimated in the field studies was used.
4. *High-level scenario with 25 percent of the required parking spaces:* a trip-generation factor of 125 percent of the one estimated in the field studies was used.
5. *Low-level scenario with 50 percent of the required parking spaces:* a trip-generation factor of 75 percent of the one estimated in the field studies was used.
6. *Medium-level scenario with 50 percent of the required parking spaces:* a trip-generation factor of 100 percent of the one estimated in the field studies was used.
7. *High-level scenario with 50 percent of the required parking spaces:* a trip-generation factor of 125 percent of the one estimated in the field studies was used.
8. *Low-level scenario with 100 percent of the required parking spaces:* a trip-generation factor of 75 percent of the one estimated in the field studies was used.
9. *Medium-level scenario with 100 percent of the required parking spaces:* a trip-generation factor of 100 percent of the one estimated in the field studies was used.
10. *High-level scenario with 100 percent of the required parking spaces:* a trip-generation factor of 125 percent of the one estimated in the field studies was used.

TABLE 22: SCENARIOS OF AMOUNT OF ADDED PARKING SPACES IN DOCTORES NEIGHBORHOOD

Scenarios of Parking Spaces with respect to the Minimum	Government Offices	Private Offices	Housing	Hotels	Commerce	Services	Total
25%	871	1,653	827	320	337	908	4,916
50%	1,742	3,306	1,653	640	675	1,816	9,832
100%	3,484	6,613	3,306	1,280	1,350	3,631	19,664

TABLE 23: RESULTS OF VEHICLE COUNTS IN PUBLIC AND PRIVATE PARKING

Development	Pabellón Cuauhtémoc Shopping Mall		Mexico City's Treasury		Morelos Housing Complex		Niños Heroes Public Garage	
Direction	Entries	Departures	Entries	Departures	Entries	Departures	Entries	Departures
08:00	10	0	7	0	0	8.5	0	0
08:30	21	1	5	0	0	17.5	0	0
09:00	53.5	11	7	1	0	5	24	4
09:30	44	13.5	15	1	0	10.5	20	12
10:00	54	33.5	27	3	0	11	11	8
10:30	62.5	52.5	7	4	0	6.5	17	8
11:00	66.5	51.5	6	9	0	5.5	18	10
11:30	44	36.5	5	7	3	9	11	9
12:00	58	38	5	6	2	4.5	8	11
12:30	69.5	51	3	4	4	5.5	13	14
13:00	65	70	3	3	4	1.5	14	9
13:30	58	33.5	5	2	6	6.5	7	14
Total	606	392	95	40	19	91.5	143	99
Parking Spaces	**758**		**81**		**469**		**350**	
	Capacity	758	**Capacity**	81	**Capacity**	469	**Capacity**	350
	Factor	131.66%	**Factor**	166.67%	**Factor**	23.56%	**Factor**	69.14%
	Entries	60.72%	**Entries**	70.37%	**Entries**	17.19%	**Entries**	59.09%
	Departures	39.28%	**Departures**	29.63%	**Departures**	82.81%	**Departures**	40.91%

TABLE 24: AVERAGE RESULTS OF TRAFFIC INDICATORS IN DOCTORES NEIGHBORHOOD IN LOW-LEVEL TRAVEL SCENARIOS

Each scenario was simulated ten times to obtain the average observed results in Tables 24, 25, and 26.

Indicator	Unit	Current	100% of Parking Spaces (Low)	50% of Parking Spaces (Low)	25% of Parking Spaces (Low)
Average Delay per Vehicle	Seconds	290.19	481.86	346.52	330.70
Average Total Stops per Vehicle	Total Stops	6.11	6.82	6.86	6.61
Average Speed	km/hr	11.94	7.54	9.86	10.40
Average Total Stop Delay per Vehicle	Seconds	167.01	380.94	234.09	211.52
Total Delay Added by All Vehicles in the Area	Hours	1,609.99	2,635.89	2,109.81	1,982.22
Total Added Distance Traveled by All Vehicles in the Area	km	24,871.64	21,884.61	25,323.01	25,544.01
Total Delay Added by All Vehicles Entering the Area	Hours	1,615.41	9,432.10	4,656.72	2,764.89
Vehicles That Could Not Enter the Area in Peak Hour	Vehicles	3,966.90	25,883.50	12,245.40	7,178.70
Total Stops Added by All the Vehicles in the Area	Total Stops	122,072.60	142,540.40	151,560.60	143,519.70
Number of Vehicles in the Area at the End of Peak Hour	Vehicles	2,396.20	3,563.50	2,775.40	2,814.30
Number of Vehicles That Managed to Leave the Area in Peak Hour	Vehicles	17,575.00	16,950.30	19,290.10	18,885.60
Total Stop Delay Added by All the Vehicles	Hours	926.57	2,050.25	1,419.21	1,261.93
Total Trip Time Added by All the Vehicles	Hours	2,085.56	3,046.75	2,585.05	2,464.42
Number of Vehicles in the Area in Peak Hour	Vehicles	19,971.20	20,513.80	22,065.50	21,699.90
Duration of Peak Time	Hours	2.20	3.26	2.55	2.33

TABLE 25: AVERAGE RESULTS OF TRAFFIC INDICATORS IN DOCTORES NEIGHBORHOOD IN MEDIUM-LEVEL TRAVEL SCENARIOS

Indicator	Unit	Current	100% of Parking Spaces (Low)	50% of Parking Spaces (Low)	25% of Parking Spaces (Low)
Average Delay per Vehicle	Seconds	290.19	428.39	386.88	336.50
Average Total Stops per Vehicle	Total Stops	6.11	7.82	6.92	6.72
Average Speed	km/hr	11.94	7.96	9.07	10.15
Average Total Stop Delay per Vehicle	Seconds	167.01	316.42	277.91	219.03
Total Delay Added by All Vehicles in the Area	Hours	1,609.99	2,550.21	2,279.20	2,052.31
Total Added Distance Traveled by All Vehicles in the Area	km	24,871.64	23,559.72	24,302.89	25,637.90
Total Delay Added by All Vehicles Entering the Area	Hours	1,615.41	11,892.26	6,204.71	3,302.71
Vehicles That Could Not Enter the Area in Peak Hour	Vehicles	3,966.90	31,669.00	16,709.70	8,837.30
Total Stops Added by All the Vehicles in the Area	altos totales	122,072.60	170,307.20	151,062.80	147,906.40
Number of Vehicles in the Area at the End of Peak Hour	Vehicles	2,396.20	3,282.60	2,976.20	2,852.00
Number of Vehicles That Managed to Leave the Area in Peak Hour	Vehicles	17,575.00	18,398.30	18,671.70	19,142.10
Total Stop Delay Added by All the Vehicles	Hours	926.57	1,872.55	1,618.44	1,334.18
Total Trip Time Added by All the Vehicles	Hours	2,085.56	2,990.15	2,735.02	2,535.32
Number of Vehicles in the Area in Peak Hour	Vehicles	19,971.20	21,680.90	21,647.90	21,994.10
Duration of Peak Time	Hours	2.20	3.46	2.77	2.40

TABLE 26: AVERAGE RESULTS OF TRAFFIC INDICATORS IN DOCTORES NEIGHBORHOOD IN HIGH-LEVEL TRAVEL SCENARIOS

Indicator	Unit	Current	100% of Parking Spaces (Medium)	50% of Parking Spaces (Medium)	25% of Parking Spaces (Medium)
Average Delay per Vehicle	Seconds	290.19	487.89	376.79	361.01
Average Total Stops per Vehicle	Total Stops	6.11	7.60	7.37	6.71
Average Speed	km/hr	11.94	7.10	9.03	9.63
Average Total Stop Delay per Vehicle	Seconds	167.01	381.34	265.02	247.17
Total Delay Added by All Vehicles in the Area	Hours	1,609.99	2,742.26	2,289.26	2,169.23
Total Added Distance Traveled by All Vehicles in the Area	km	24,871.64	22,104.95	24,609.83	25,115.80
Total Delay Added by All Vehicles Entering the Area	Hours	1,615.41	15,064.75	7,511.42	4,000.54
Vehicles That Could Not Enter the Area in Peak Hour	Vehicles	3,966.90	40,257.20	19,961.70	10,838.50
Total Stops Added by All the Vehicles in the Area	Total Stops	122,072.60	160,916.20	162,516.70	147,791.30
Number of Vehicles in the Area at the End of Peak Hour	Vehicles	2,396.20	3,435.10	2,922.40	2,955.60
Number of Vehicles That Managed to Leave the Area in Peak Hour	Vehicles	17,575.00	17,365.40	19,085.70	18,937.00
Total Stop Delay Added by All the Vehicles	Hours	926.57	2,115.76	1,604.43	1,472.50
Total Trip Time Added by All the Vehicles	Hours	2,085.56	3,155.75	2,749.91	2,641.97
Number of Vehicles in the Area in Peak Hour	Vehicles	19,971.20	20,800.50	22,008.10	21,892.60
Duration of Peak Time	Hours	2.20	3.94	2.91	2.50

GRAPH 31: NUMBER OF VEHICLES THAT ENTERED AND EXITED THE ANALYSIS AREA WITHIN THE SIMULATED PERIOD

The case study results take us to very precise conclusions about the need for parking management and not adding more supply in the area.

During the simulation period, it was observed that the area is close to its maximum capacity. No matter the amount of parking spaces added as part of the project, there are more vehicles than those that the road network can handle to provide a stable service. Such a range of cars goes from 19,971 (current scenario) to 22,065, where the maximum is presented in the scenario with 50 percent of the required parking spaces and a low trip-generation factor (*See Graph 31*).

This means that, as parking is added, more vehicles will try to enter the area's road network. Nevertheless, the capacity is a sight more than two thousand vehicles than the current level. For this reason, the parking spaces added as part of the projection, far from offering an added social value and a solution to congestion, only aggravate the situation.

This can be reflected in terms of lost time generated by the large lines in the area's access and the internal congestion (*See Graphs 32 and 33*).

Furthermore, the increase in congestion implies a substantial reduction in the average speed and an increase in the peak demand period (*See Graph 34*). This period goes from lasting 2.20 hours to almost 4 (*See Graph 35*).

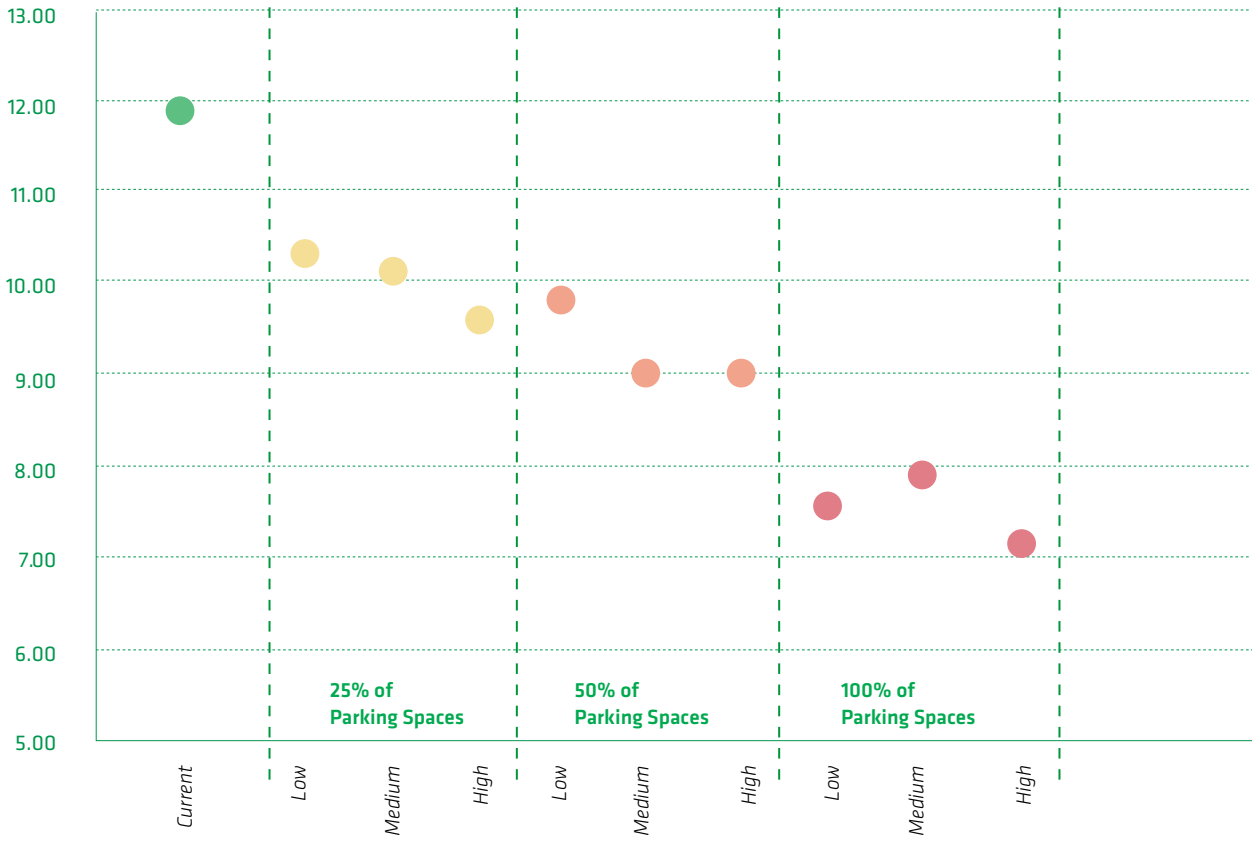
Based on these results, it is important to note that the bigger the added amount of parking spaces as a consequence of a redensification project, a larger amount of vehicles could be expected in the area. This means that the expectation would be a worse performance by the road network, translated into more time lost in traffic, more polluting emissions, and a lower quality of life.

The strategy promoted by Mexico City's government should be accompanied by the limitation of the amount of added parking spaces in projects, and the implementation of incentives to allocate the resources that providing those spaces would imply, to improve and make the neighborhood's public transit system more efficient. In Doctores, there are ten STC Metro stations, five Metrobus (BRT) Line 3 stations, and it is crossed by two Cero Emissions corridors of the Electric Transport System. If, together with that, an expansion of the Shared Bicycle System ECOBICI could be implemented, there is the potential for the public transportation system to absorb the trips generated by the new developments.

GRAPH 32: VEHICLES' AGGREGATE DELAYS WHEN ENTERING THE ANALYSIS AREA (SECONDS)

GRAPH 33: AVERAGE DELAY PER VEHICLE IN THE ANALYSIS AREA (SECONDS)

GRAPH 34: AVERAGE SPEED OF VEHICLES IN THE ANALYSIS AREA (KM/H)



GRAPH 35: DURATION OF PEAK DEMAND PERIOD IN THE ANALYSIS AREA (HOURS)

10. WHAT ARE **OTHER CITIES** OF THE WORLD **DOING REGARDING** PARKING POLICY?

Cities that enacted policies reforming off-street parking requirements are summarized in the table below:

TABLE 27: INTERNATIONAL CASES

Strategy	Examples
Elimination of minimum parking requirement	Denver, USA; Seoul, South Korea
Implementation of maximums	London
Parking caps by areas	NYC; Boston; Portland, Oregon, USA; Zurich, Switzerland
Parking reductions based on distance to mass transit	Ottawa, Ontario, Canada; Paris
Shared parking	Antwerp, Belgium; Hong Kong

ELIMINATION OF MINIMUM PARKING REQUIREMENT

The requirement of a minimum amount of parking spaces in buildings generally forms part of zoning and usually has no relationship with the road network's capacity or Mass Transit service; they are required no matter if streets can handle the induced traffic. Generally, this results in a larger number of spaces than those that the market would naturally provide; developments usually build exactly (or a very close number) to the required parking spaces. This is an indicator that, if regulation would permit it, fewer spaces would be built.

Denver, Colorado, USA

As part of redeveloping the downtown core in a plan called Blueprint Denver, the traditional zoning was eradicated and a form-based code was implemented with no parking requirements. Blueprint Denver's goal is to reduce restrictions to development, which were limiting construction in the city's center. The city of Nashville, Tennessee, has followed these steps, and no minimum or maximum requirements exist.

In both cases, the city centers counted on a considerable amount of surface parking lots close to mass transit stations, which constitutes a great opportunity for land reutilization.

Seoul, South Korea

In the city's central area, the parking requirement is 10 percent with respect to the rest of the city and maximum 50 percent can be built. Seoul is the clearest example within Asian cities with a restrictive focus on parking.

IMPLEMENTATION OF MAXIMUMS

Generally, cities implement parking maximums in the densest areas with greater mass transit coverage. Four cities in the United States have done it in response to the 1970 Clean Air Act, to reduce emissions related to car usage. Recently, other cities have done it to reduce traffic and improve the quality of life.

Several European cities have prohibited the expansion of parking supply in central areas, obliging that any new off-street parking spaces be offset by eliminating an equal number of on-street spaces.

London

The United Kingdom has a national guiding document that invites cities to have maximum parking policies. As a result, some districts in London have abolished the minimum requirements and given access to maximums. The insurance company Swiss Re's building, for example, has 48,000 m^2 of offices and commerce, and only five parking spaces with use restrictions, exclusively for disabled people.

PARKING CAPS (FREEZING) BY AREAS

Establishing a maximum limit to an area's amount of parking supply is a strategic tool for land use and travel demand management, used to influence the quantity of on and off-street parking spaces. The parking supply in an area is frozen at a chosen level according to the road capacity or with a future car-use reduction goal.

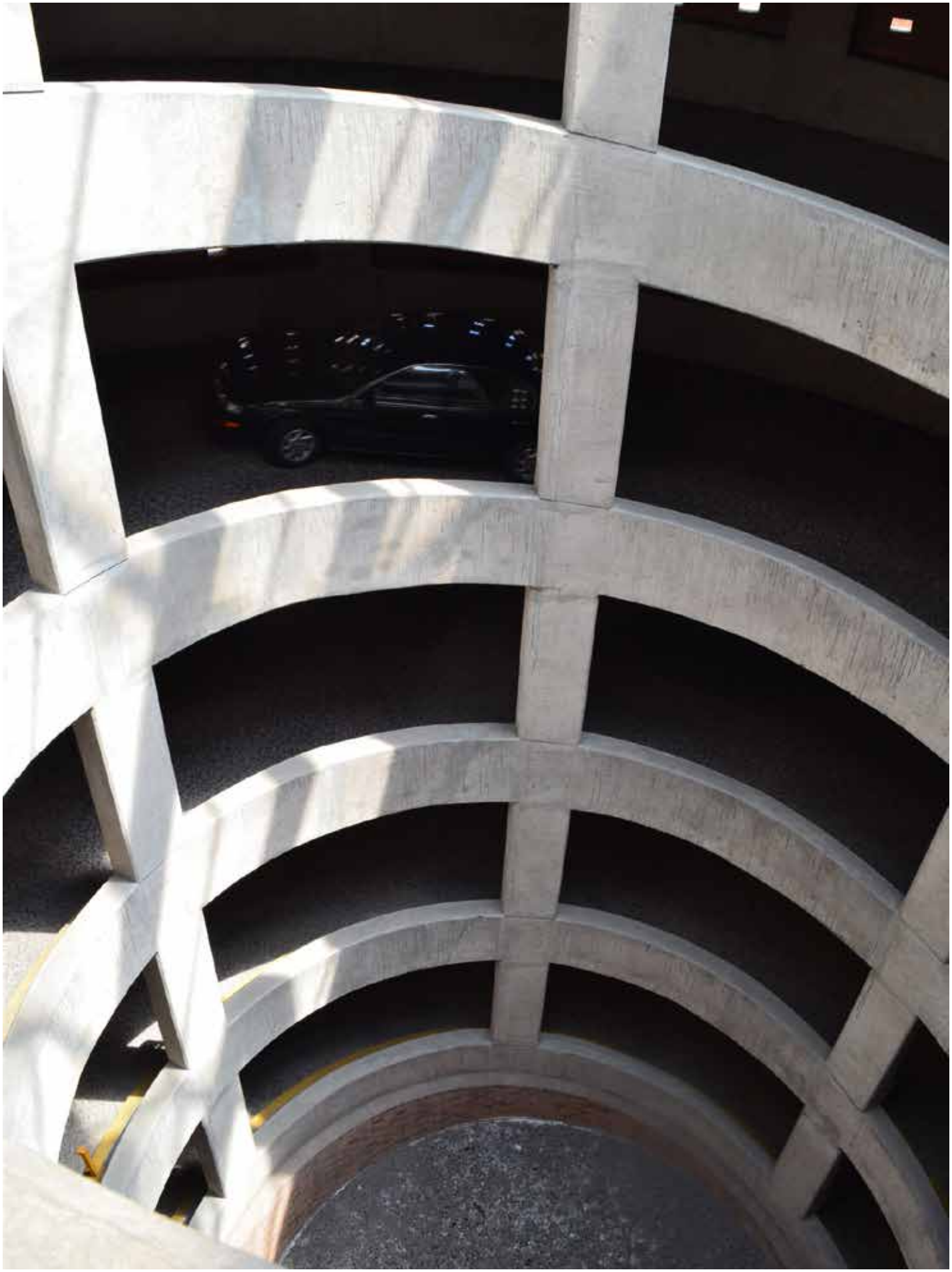
The construction of parking is usually negotiated through the elimination of on-street parking spaces, so that the total supply stays on the same level. A maximum limit per area can be applied together with other strategies such as employer-subsidized transit passes or promoting carsharing/carpooling schemes.

These kinds of strategies recognize that an amount of parking could be needed, and access by private car is controlled due to mobility and environment reasons.

New York City

In 1982, New York City established a parking cap in the heart of Manhattan, at the Central Business District below 96th Street, as a way to control the supply of public off-street parking.

As a result, the total number of parking spaces was reduced from 127,000 to 102,000 from 1978 to 2010. Also, housing buildings can provide a maximum of parking spaces between 20 percent and 35 percent of the new residential units, depending on their location in Manhattan's central area.



Portland, Oregon, USA

Portland, Oregon, implemented a parking cap in 1975 in the city's central area with 36,680 spaces, with some exceptions for housing and hotel spaces. The eliminated parking spaces were added to a "reserve bank," where developers could buy them, previous approval of the city's government. Furthermore, the underutilized spaces can be transferred to other projects on a trading scheme.

In 1997, the city abandoned the parking cap, when it determined that it succeeded in reducing congestion and the amount of days that the air quality standard had been violated. Around that time, Portland set the goal of reducing the amount of parking spaces per capita in the metropolitan area by 10 percent in the following twenty years, together with doubling the area subject to maximums, reaching zones further from the central area. These regulations were approved by the Oregon Department of Environmental Quality.

Boston

Boston froze the amount of parking spaces in 1976, with the goal of reducing congestion and promoting the use of public transportation. The policy is controlled by the Air Pollution Control Commission (APCC) as part of the U.S. Clean Air Act. Building parking spaces is permitted according to the maximum limit imposed by the existing amount and the reserves in a parking bank, controlled by the commission. When parking is reused in a different land use, the developer may build the same number of parking spaces in the new building or build fewer and send the remaining to the bank. The new developments that wish to build more parking spaces than the existing must buy the exceeding from the bank, if there are reserves at the time. This strategy was extended to the East Boston and South Boston districts in 1989 and 1993, respectively.

Zurich

As part of a policy called "Historic Compromise," since 1996 public parking garages can only be developed in specifically designed locations, and the same number of on-street parking spaces must be removed. If the city wishes to remove on-street parking spaces to generate new ones (as it has done), then the amount of parking spaces can be built in public parking garages. Hence, the number of public parking spaces can only be maintained or reduced.

Regarding private parking, the city was divided in concentric areas, where there is a minimum and maximum requirement per building, depending on the area's accessibility to mass transit. In all cases, developers can implement sustainable mobility plans to access a partial or total reduction of any parking requirement.

REDUCTIONS BASED ON DISTANCE TO MASS TRANSIT

Ottawa, Ontario, Canada

Nowadays, Ottawa's zoning bylaw includes progressive parking management policies. There is a small minimum requirement in central areas and maximums were implemented within 600 m of mass transit stations, and reduced maximums in the central area of the city.

Also, it is permitted for parking to be shared between those land uses that experience demand during similar times of the day in order to comply with the reduced minimum. Policy always prioritizes the short-stay visitors so that long-stay ones, generally commuters, have incentives to use transit. In the majority of cases, this goal is reached by using tiered-pricing mechanisms.

Paris

In Paris, a 100 percent discount of the minimum-parking requirement is allowed for buildings in a 500 m radius of a transit stop. Nevertheless, almost the whole city is within this distance from a metro, train, bus, or shared bicycle station. For residential developments, there is a maximum of one parking space every 100 m^2.

11. CONCLUSIONS

Federal and local development programs have defined a review of parking regulation as an important factor, mainly with the intention of reducing or eliminating the parking requirements in new buildings. Nevertheless, the current regulation is based on false premises: it is believed that parking should grow as driving does and that it is an urban and environmental impact mitigation measure.

In Mexico City, abundant and low-cost parking has been considered a measure to reduce the growing congestion. Nevertheless, such a public policy promotes private vehicle mobility, through a car-oriented urban development; it would be hard to increase the regulatory incentives for the growth in parking supply. In the first place, public parking garages of any size are permitted in any zoning with weak quality criteria, which has led to a situation where most are installed on vacant lots. This constitutes a speculation on the potential land values, more than a mobility solution.

In the second place, the requirement of a minimum amount of parking spaces as a function of land use and building size, has guaranteed the automatic and exponential growth of its supply. Nowadays, parking is the land use with the highest growth rate in Mexico City; this results from the obligation of adding built area destined for vehicle parking if adding any other profitable land use, while adding parking itself does not imply an obligation of building other uses such as housing, services, commerce, or offices. For example, it is illegal to build housing without a parking space, no matter if a portion of the market prefers not having a car. This means that, for the current regulation, it is more important to house vehicles rather than housing citizens.

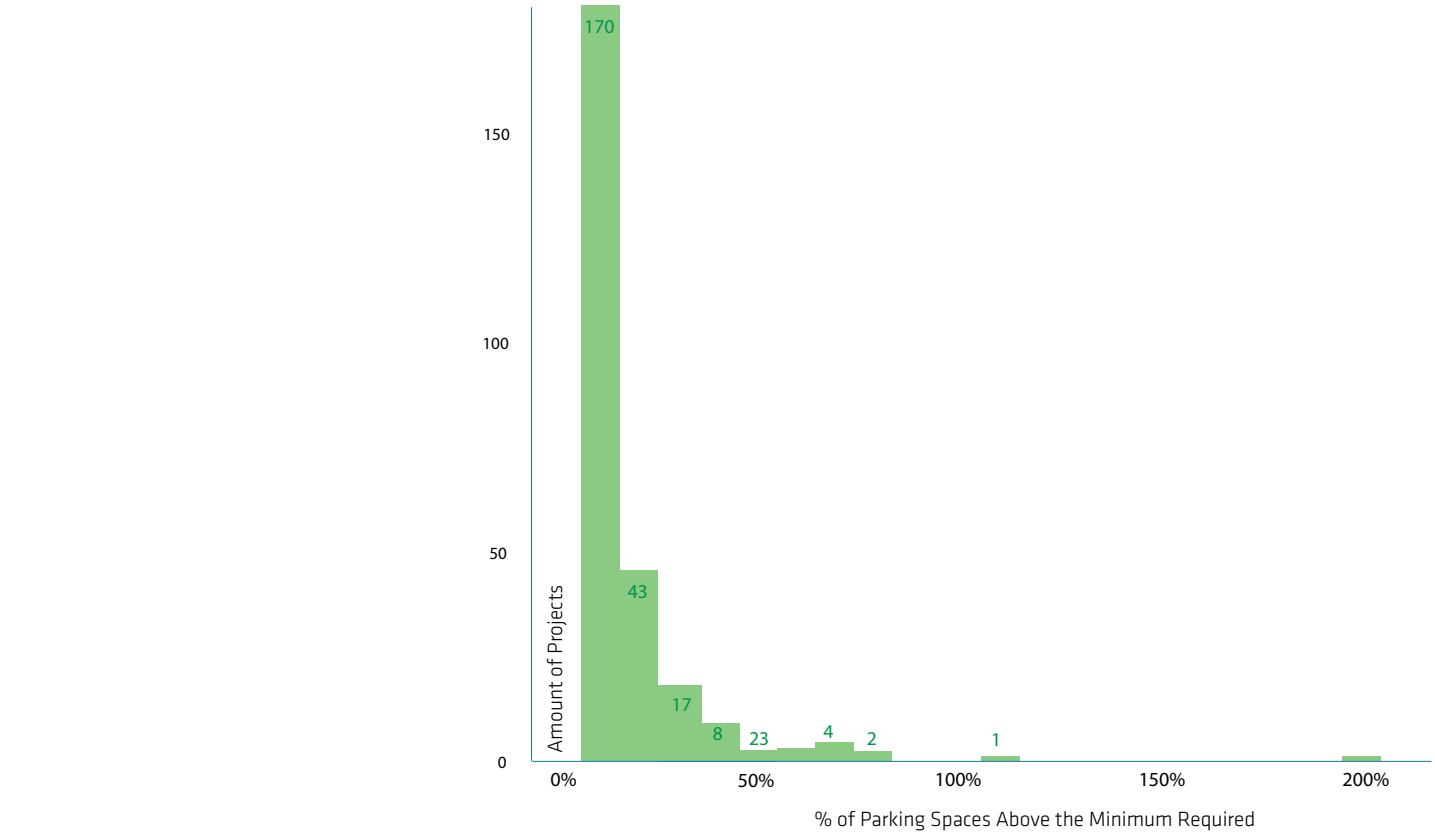
Finally, the majority of on-street parking is free while there is a control over the rates at public garages. Therefore, the city seeks, through its normative instruments, to oversupply parking at the lowest price possible; this situation is incompatible with the vision of a city with less driving. The general attitude of a parking deficit is being nurtured while, what the city really lacks, are instruments that promote an efficient use of the existent parking spaces.

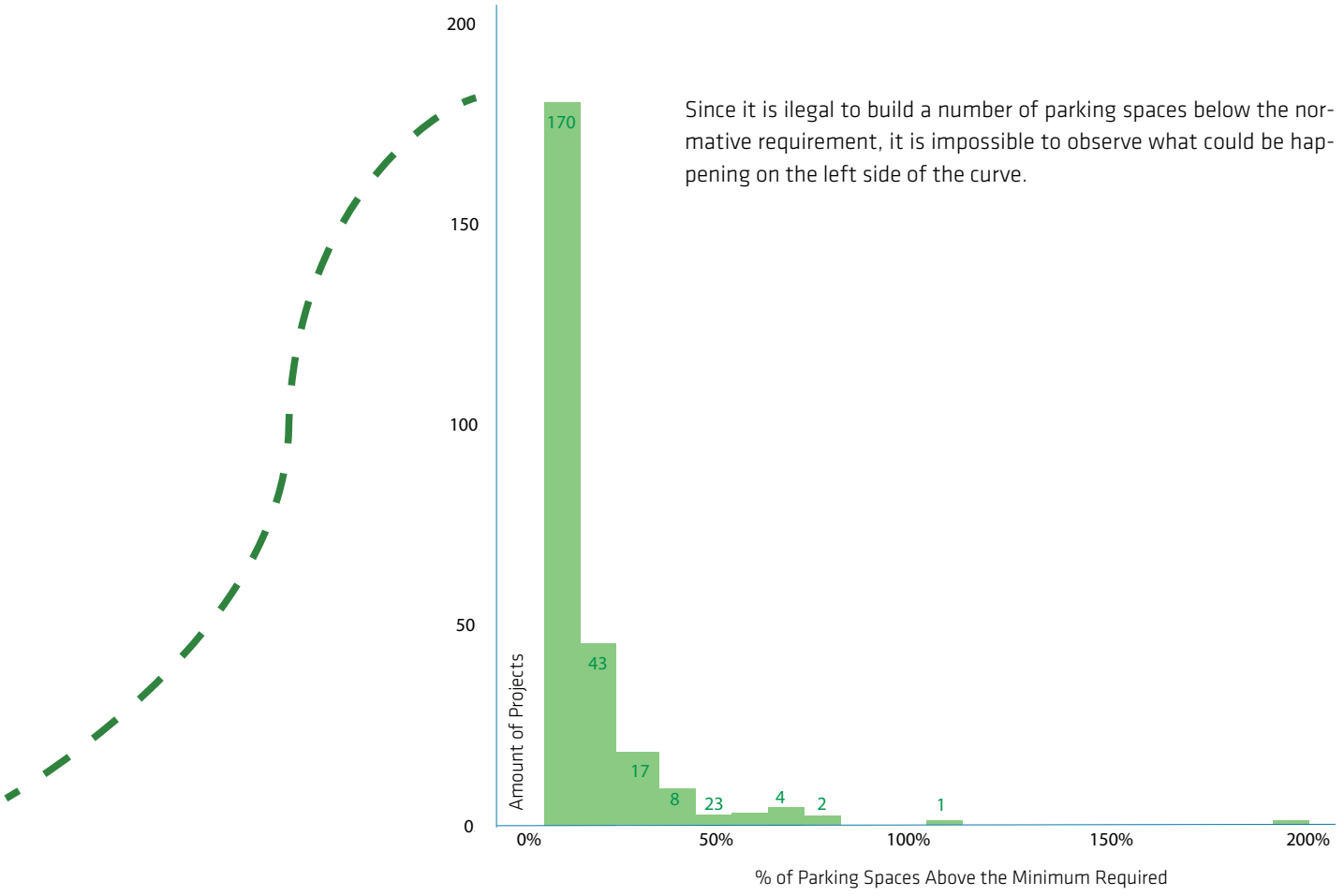
According to the 251 real estate developments analyzed for this study, out of more than 16 million projected m^2, 42 percent is parking, adding more than 250 thousand parking spaces. The built area destined for parking is always the most important one at the city level and the one with the highest growth rate. At this pace, the future of the city is to sacrifice destinations for more parking; lots of parking, less city.

There is no relation between the amount of projected parking and mass transit coverage. Due to the fact that the regulation is homogeneous citywide, more parking is being built where more real estate projects are being built, not precisely where there is less mass transit coverage. The four districts with the largest amount of built m^2 between 2009 and 2013 were Miguel Hidalgo, Benito Juárez, Álvaro Obregón and Cuauhtémoc; they also had the largest amount of parking spaces. For example, in Miguel Hidalgo the size of the developed properties was multiplied more than five times with parking; this means that, if Mexico City had this development rhythm in the following decades, five times the urban area would be needed to fit the amount of parking spaces that the regulation is requiring.

Strictly speaking, developers are limiting themselves to building the number of parking spaces required; this is a strong sign of an existing desire to provide less. This desire has its founding on the fact that the market's demand is lower than the construction cost of parking and the opportunity cost of adding a larger profitable land use. When comparing the amount of projected parking spaces required by regulation, an average of 10.4 percent more parking than required is being built. In practice, this is equivalent to providing the required amount of parking spaces because, due to the dimensioning of projects, it is very complicated to build the exact required amount and the only legal way of approximating to the value is by surpassing it (building more parking spaces).

The following histogram shows that 67.7 percent of the cases projected less than 10 percent parking spaces above the minimum required.





Since it is ilegal to build a number of parking spaces below the normative requirement, it is impossible to observe what could be happening on the left side of the curve.

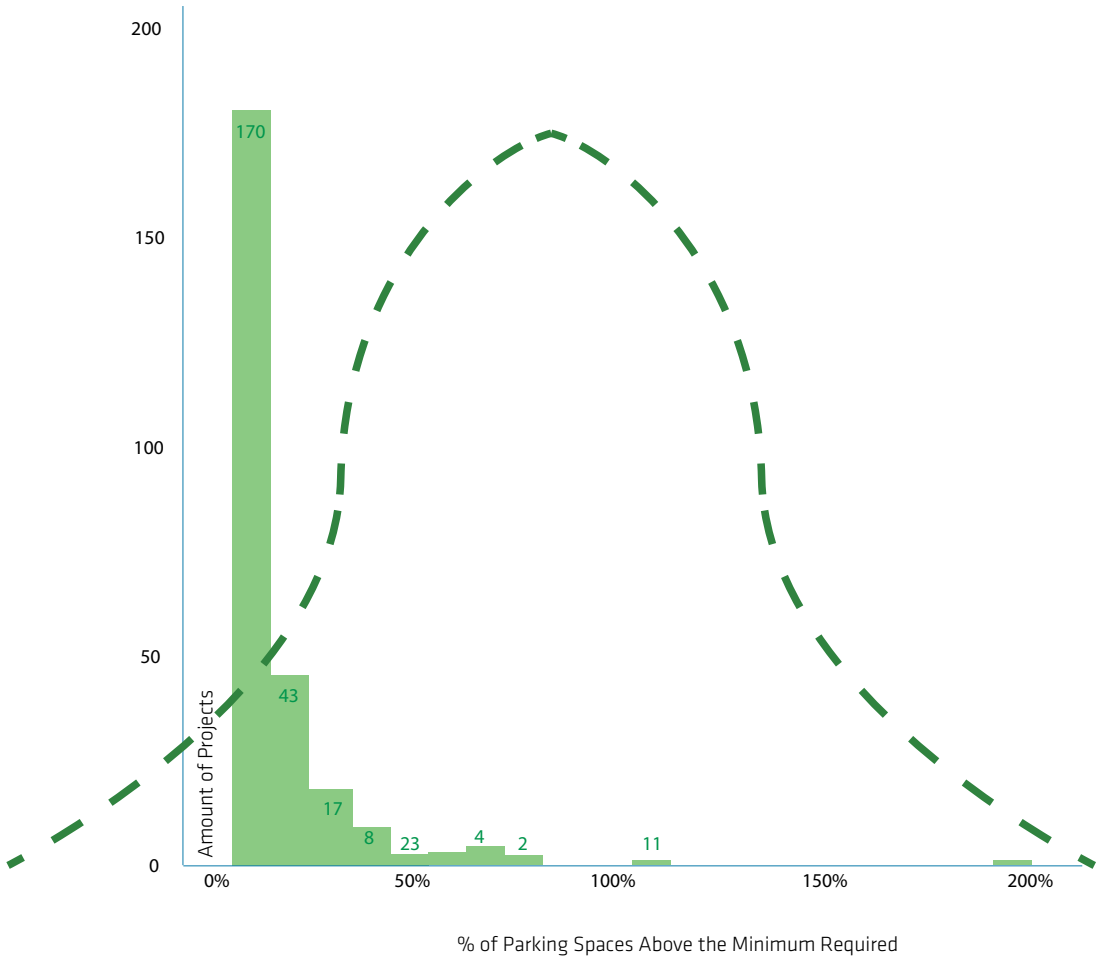
Using the law of large numbers, the previous distribution converges in a random standard normal variable, whose shape resembles a bell, on which the highest point is equivalent to the variable's expected value (market's demand for parking). Therefore, we are found in a position of testing the feasibility of the following hypotheses regarding the relation between the minimum and the market (demand for parking):

1. Is the market equal to the minimum?

In this case, the image we would have of the distribution would be very similar to the previous graph, where the highest point is found on the amount of required parking spaces. In strict terms, we cannot discard it but we know that the regulation has been practically the same during the last thirty years. This would mean that a regulation based on other cities had the fortune of predicting the parking demand level thirty years after. It would be too risky to think of this hypothesis as valid because it would mean a series of implausible coincidences.

2. Is the market higher than the minimum?

In this case, the hypothesis is rejected due to the following argument: the only limiting factor to build more parking than the required is precisely the market. This means that, due to an inexistent maximum limit to the amount of parking per building, this is only limited by the project's budget and expected profitability. Therefore, if the market were higher than the regulation, the highest point of the distribution would be found further to the right from the minimum level, as shown in the following example:

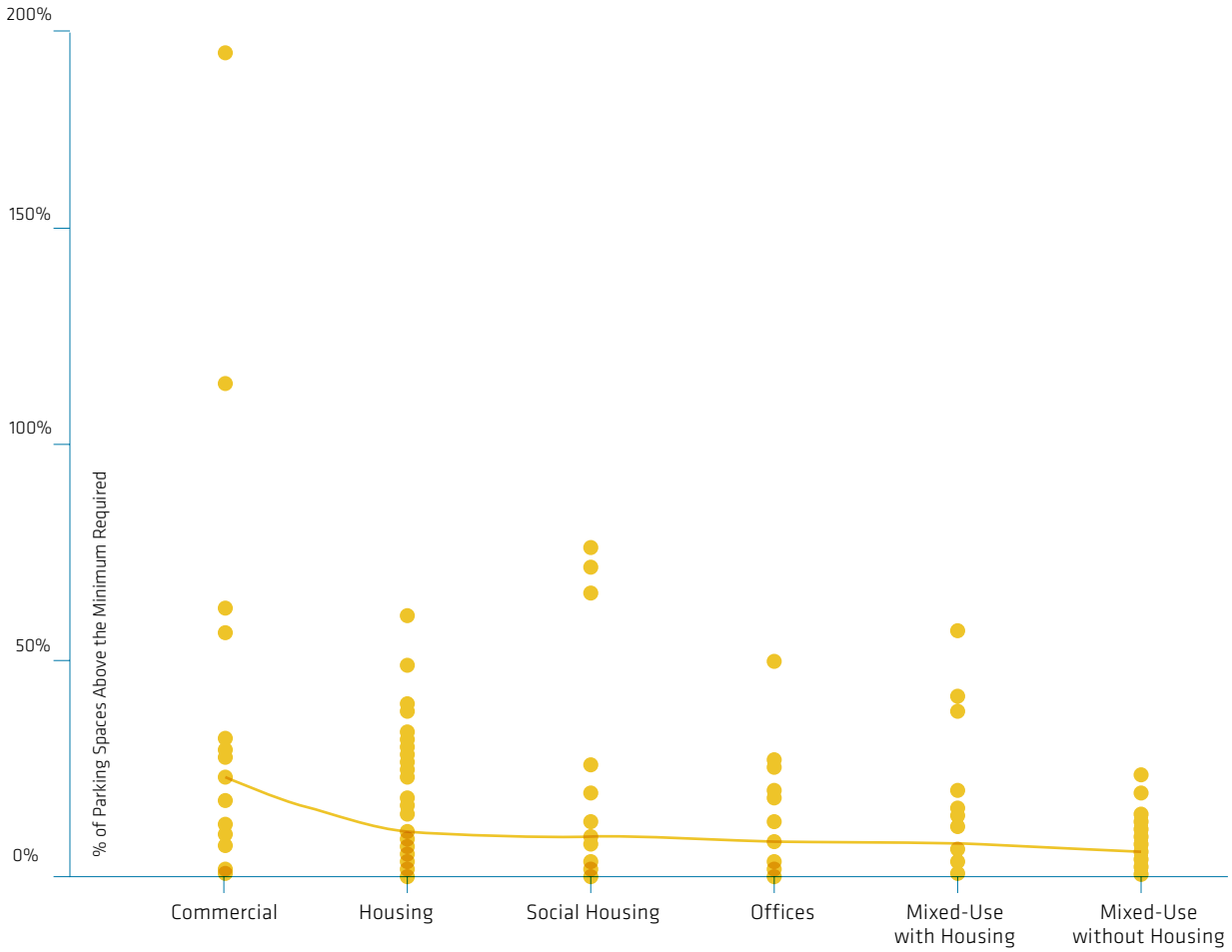


The falseness of both hypotheses leaves us with only one viable option: projects try to build the exact amount of required parking spaces and, more important, they wish they could provide less. This means that the number of parking spaces required surpasses the demand for parking (market).

Through the analysis carried out by the projects' land use, only the case of commerce presents a statistically meaningful difference when comparing the expected value of parking spaces above the minimum required. An average of 22.49 percent more than the required spaces was projected, while the general average was 10.4 percent and, in the mixed-use cases (retail on ground floor), 7.6 percent more parking spaces than the required amount were projected when housing was included in the project and 5.6 percent more when housing was not included.

Land Use	% of Parking Spaces Above the Minimum Required
Commerce	22.49%
Housing	11.09%
Social Housing	9.71%
Offices	8.29%
Mixed-Use with Housing	7.62%
Mixed-Use without Housing	5.64%
Total	10.46%

AVERAGE PERCENTAGE OF PARKING SPACES BUILT ABOVE THE MINIMUM REQUIRED, PER LAND USE



It seems like the exclusively commercial constructions constitute the only case where there is a will to provide a larger amount of parking; the calculations were influenced by a higher variance due to two constructions that projected more than 100 percent parking spaces above the minimum requirement. Those buildings are shopping malls, where a car-oriented design that needs large pieces of land is used. Nevertheless, when commerce is of a smaller scale and forms part of mixed-use buildings, it offers the lowest amount of parking spaces and it could even be said under the previous hypotheses tested that this kind of building is the one that most wishes to provide less parking compared to the current requirement.

According to the interviews with real estate analysts, the two strongest reasons for shopping malls to provide larger amounts of parking are: first, to provide enough parking for the highest-demand days of the year (Christmas, Mother's Day, and Black Friday, among others) and, second, the possibility of transforming it into a public access paid parking garage. This translates into the desire to have abundant parking for no more than thirty days, even though it is a underutilized resource the rest of the year, and the implementation of payment than can make parking one of the "most profitable stores" of the mall.

Furthermore, it is said that there exist informal requirements from large tenants or anchor stores, who condition the leasing contract with the provision of 50 or 100 percent more parking spaces than the ones required by the law. Nevertheless, it has been demonstrated that cities have wider social benefits from low-scale retail; hence, if a city's vision is one of a dense, compact, mixed, and less car-oriented urban development, then the legal framework should respond to those objectives, not to the tenants' requirements.

That is the explanation for shopping malls to use a lower amount of their development rights, compared to the rest. In the case of buildings with commercial land use, only 68.8 percent of the as-of-right zoning potential is utilized while, in the general average, 81.9 percent. One of the reasons for the sub-use of the urban benefits granted by normativity is the association of the parking requirement with the built area. Each profitable use forcedly adds parking; therefore, a competition between parking and other land uses for financial, land, underground, and space resources of the project exists. In average, 18.1 percent of the potential m^2 is wasted because it implies dedicating almost the same amount of surface to underground parking, investing almost the same amount of money.

The situation becomes worse on average when developers wish to provided less parking. Looking at it from this perspective, there is an imposition on the cost of development, which not only undermines the land utilization but also increases the rent value for all the population, no matter if they own a car or not. Therefore, parking is a cross-subsidy to driving, promoting in the midterm a high amount of vehicles on the road network and strengthening the false belief that more parking spaces are needed to mitigate the city's development.

In the Doctores neighborhood we explored, through a traffic simulation, how increasing the parking space supply in various levels generates many negative impacts on the local road network's performance. The waiting times increase, speed decreases, and peak-demand period is prolonged; these effects reflect higher congestion and carbon emissions. During the simulation period, the area's road network does not achieve to provide service to many more vehicles than the current amount. This means that it is useless to continue with the exponential growth of parking spaces in the city when the road network's expansion is neither feasible nor desirable. A parking public policy like Mexico City's supposes an infinite capacity of the road network. Parking is not a mitigation strategy; it is actually a high-impact land use.

Resources allocated to provide parking should be used for real mitigation measures, such as the growth and improvement of the mass transit system, and pedestrian and cyclist infrastructure. For example, real estate analysts expect the construction of 1.2 million m^2 of corporate offices within the next three years; this would mean the mandated construction of 40 thousand or more than 1 million m^2 of parking spaces. In a conservative scenario, this would imply allocating more than 6.4 Thousand Million Pesos for its construction. The expected "social benefit" of this imposed minimum would be to guarantee a parking space to 40 thousand commuters, guaranteeing 40 thousand more vehicles every day trying to access the main office corridors in the city (already congested).

In contrast, with that amount of investment more than 70 km (approximately four lines) of the BRT system Metrobus could be built. With this change in the city's vision, more than 600 thousand people per day could travel in a more sustainable option, instead of 48 thousand (supposing 1.2 passengers/car). Also, more than 50 km of complete streets could be implemented; more than 140 thousand shared bicycles; more than 8 million m^2 of high-quality sidewalks; or more than 1,000 km of bike lanes. All these options and their combinations are a real mitigation to development. It is not about the city not developing; it is about an efficient, reliable, and high-quality public system that can absorb the trips generated by the developments.

12. ITDP PROPOSALS

Resulting from the analysis carried out through this investigation, ITDP proposes the implementation of the following parking reform:

1. Eliminate the parking minimum requirement in new constructions.

This will mean that the amount of parking spaces in buildings will not be associated with the built area and the land use, but the market. This way, the policy will take into account the area's road network capacity and the accessibility to mass transit and other factors that determine the demand for parking, such as the project's location or the socioeconomic sector to which they are targeted.

Also, by dissociating the growth of parking from the housing, commerce, office, or service surfaces, a better use of the land is promoted. First, it is expected for buildings to use the total of the development rights, enhancing a denser, more compact, mixed, less car-dependent urban development.

Regarding housing—it constitutes the implementation of a very strong incentive for the construction of accessible housing with a better location, especially regarding distance to mass transit. It aims to allow living closer to jobs and services without needing a car and providing more affordable options without paying the cost of a parking space.

Requires: Decree of Modification of the Building Code and its Technical Complementary Rules for Architectural Projects.

2. Limit the amount of spaces that can be added in each construction, and the total amount of on- and off-street parking in the city's congested areas.

The best way to influence car usage through a parking public policy is to be stricter regarding the growth of parking spaces in an area and the city. First, the transformation of the current minimum requirement into a maximum is recommended. This way, the regulation will actually state that parking has negative impacts on the city's functionality.

Even so, if all projects include the corresponding maximum, the amount of vehicles that an area can handle could be surpassed. Due to the fact that road capacity is not infinite, then the amount of parking (no matter if it is public or private) should be limited, in order to limit—in the midterm—the amount of vehicles circulating in an area. This is the reason why carrying out a specific analysis per area is also proposed, with special attention in the historic centers of Mexico City, to define the adequate parking cap of different areas. A limited supply of parking is an opportunity for effective travel demand management through price increases in the midterm.

As a complementary step, a citywide parking census per property is proposed. The best way to manage a resource is knowing all its characteristics: where it is located, how many spots are there, to what land use are they associated, do they count with a rate based on time, etc. Such variables should be integrated into the city's updated cartographic cadastral base.

Requires: Decree of Modification to the Building Code and its Technical Complementary Rules for Architectural Projects; agreements for the modification of the urban development programs; creating and updating a parking census for private and public garages, dependent on the Ministry of Urban Development and Housing, and the Ministry of Mobility.

3. Implement the financial incentives that encourage that the amount of parking added is less when access to mass transit is higher.

The regulatory modification proposal includes consideration of parking as a high-impact land use and not as a mitigation measure. Therefore, parking supply in buildings should suppose an economic penalty to partially or totally cover those impacts.

It is recommended for the corresponding payment to grow in an exponential way as more parking spaces are provided in a building. This way, an incentive to provide less parking is clear and the stimulus is higher when the public infrastructure is capable of absorbing a higher amount of trips.

The following accessibility improvements are fundamental to DF's resouce allocation: growth and quality of Mass Transit; modernization and management of surface public transport (buses); high-quality pedestrian and cyclist infrastructure.

Requires: Decree of Modification to the Building Code and its Technical Complementary Rules for Architectural Projects; agreements for the modification of the Tax Code; creation of a public trust whose responsibility must be the management and investment of generated resources.

4. To strictly control location, amount, and quality criteria of public parking garages.

Once again, due to the fact that parking has mobility, environment, and urban impacts, the authority should limit the current incentives that promote the construction of public parking garages, such as allowing them in any zoning. It is recommended to implement a Comprehensive Public Parking Garage Plan for DF, where the following must be defined:

- Areas or criteria for the definition of zones susceptible to having a public parking garage.
- Design, operation, maintenance, technology, and user information criteria for the opening of a public parking garage, and penalties for garages that currently do not comply with them.
- Special taxes per parking space, whose resources must be targeted to the improvement of mass transit.

The goal is to implement incentives so that the existing public garages have the best quality regarding technologies and user information. Also, to avoid the growth of low-quality garages in vacant lots and enable operators to transfer the associated investment increases to drivers through market rates. This means that it should be accompanied by the liberation of parking tariffs, so that demand can be responded to; this way, car users will absorb part of the social costs associated with car usage and the supply of parking.

It is also important to control the growth of the amount of parking spaces in certain areas. In order to achieve this, the construction of high-quality public parking garages should result in the elimination of public-access parking spaces in some other way (such as on-street parking).

Requires: Decree of Modification to the Regulation for the Control of On-Street Parking and the Ministry of Mobility's guidelines; agreements for the modification of development programs; agreements for the modification of the Mercantile Establishments Law.

5. Encourage shared parking incentives for land uses or areas with demand on complementary times.

If a building wishes to provide vehicle parking and will present peak time uses (housing, for example) but there are buildings with parking in the surrounding area with complementary peak time uses (offices, for example), the new building should be able to use the already built parking spaces.

Therefore, private, public, and mixed contracts should be promoted for the shared use of existing spaces. It is important to efficiently use the built infrastructure before supposing the need to grow it.

In the cases in which the authorities determine the need, private parking garages could obtain a license to operate as public garages, as long as they comply with the minimum quality criteria and the same number of spaces is eliminated from the street or other parking garages.

6. Strengthen and grow ecoParq, the on-street parking management program.

To decrease driving, it is fundamental for on-street parking to have a price and zero tolerance with illegal parking (on sidewalks, pedestrian crossings, double parking, etc.).

The strengthening of ecoParq is proposed as a specialized public organism, capable of guaranteeing transparency, efficiency, and effective operation of the parking meter system in the city. The program must be flexible regarding its operation rules and consider each area's socioeconomic and mobility characteristics.

Requires: Decree of creation of ecoParq as a decentralized organism with technical and operative capability, and budget.

13. ANNEX

BACKGROUND

How Does Mexico City Grow and Move?

Distrito Federal (Federal District) is the political and economic capital of Mexico, home of the federal powers. It contributes close to 20 percent of the country's Gross Domestic Product. It is divided into sixteen districts, on a 1,479 km^2 surface.

It consists of close to 8 percent of the Mexican Republic's population, with 8,851,080 inhabitants on an urban area of 63,266 hectares (*See Table 28*). Nevertheless, the urban area's extension has not limited itself to the Federal District's political delimitation. DF, together with fifty-nine municipalities from the State of Mexico and one from the State of Hidalgo, form the Mexico City Metropolitan Area (ZMVM), completing 208,890 Hectares of urban surface where more than 21 million Mexicans live.

After the 1985 earthquake, the Federal District started to experience a depopulation, losing almost 7 percent of its population by 1990 (*See Table 29*), besides the rearrangement of the population that remained within the sixteen districts. The emigration pattern consisted of the central districts losing population to those further away and the municipalities of the State of Mexico mainly.

Taking into consideration the city's performance efficiency, it is very important to implement the right mechanisms to achieve repopulation of the central areas with better public service conditions, in particular close to mass transit systems. In recent years, insufficient efforts to achieve this have been carried out, largely due to the last decade's federal housing policy. From 1980 to 2010, the Federal District recovered its population level; nevertheless, the growth has occurred far away from the Mass Transit System (*See Table 30*).

TABLE 28: SURFACE AND POPULATION PER DISTRICT

District	Surface (km²)	Population 2010
Álvaro Obregón	96.17	727,034
Azcapotzalco	33.66	414,711
Benito Juárez	26.63	385,439
Coyoacán	54.40	620,416
Cuajimalpa de Morelos	74.58	186,391
Cuauhtémoc	32.40	531,831
Gustavo A. Madero	94.07	1,185,772
Iztacalco	23.30	384,326
Iztapalapa	117.00	1,815,786
La Magdalena Contreras	74.58	239,086
Miguel Hidalgo	46.99	372,889
Milpa Alta	228.41	130,582
Tláhuac	85.34	360,265
Tlalpan	340.07	650,567
Venustiano Carranza	33.40	430,978
Xochimilco	118.00	415,007
TOTAL	**1,479**	8,851,080

TABLE 29: CHANGES IN POPULATION PER DISTRICT 1980–90

District	Changes in Population from 1980 to 1990
Cuauhtémoc	-26.87%
Benito Juárez	-25.16%
Miguel Hidalgo	-25.08%
Venustiano Carranza	-25.01%
Iztacalco	-21.40%
Azcapotzalco	-21.09%
Gustavo A. Madero	-16.21%
Álvaro Obregón	0.55%
Coyoacán	7.19%
La Magdalena Contreras	12.67%
Iztapalapa	18.07%
Milpa Alta	18.72%
Xochimilco	24.68%
Cuajimalpa de Morelos	31.22%
Tlalpan	31.41%
Tláhuac	40.69%
TOTAL	**-6.74%**

TABLE 30: CHANGES IN POPULATION VS. MASS TRANSIT COVERAGE PER DISTRICT

District	Changes in Population from 1980 to 2010	Population at 500 m from the Mass Transit System	Population at 800 m from the Mass Transit System
Venustiano Carranza	-37.80%	70.50%	90.60%
Cuauhtémoc	-34.74%	86.26%	92.17%
Iztacalco	-32.62%	46.05%	74.89%
Miguel Hidalgo	-31.34%	43.88%	79.42%
Azcapotzalco	-31.06%	54.28%	72.49%
Benito Juárez	-29.26%	79.91%	98.46%
Gustavo A. Madero	-21.65%	39.32%	51.74%
Coyoacán	3.90%	26.90%	42.85%
Álvaro Obregón	13.74%	4.47%	10.64%
La Magdalena Contreras	38.12%	0.00%	0.00%
Iztapalapa	43.84%	16.62%	31.55%
Tlalpan	76.32%	6.63%	12.55%
Xochimilco	90.82%	8.47%	16.13%
Cuajimalpa de Morelos	104.38%	0.00%	0.00%
Milpa Alta	143.55%	0.00%	0.00%
Tláhuac	145.21%	9.48%	23.26%
TOTAL	**0.23%**	**30.69%**	**44.14%**

GRAPH 36: CHANGE IN POPULATION AND MASS TRANSIT COVERAGE PER DISTRICT

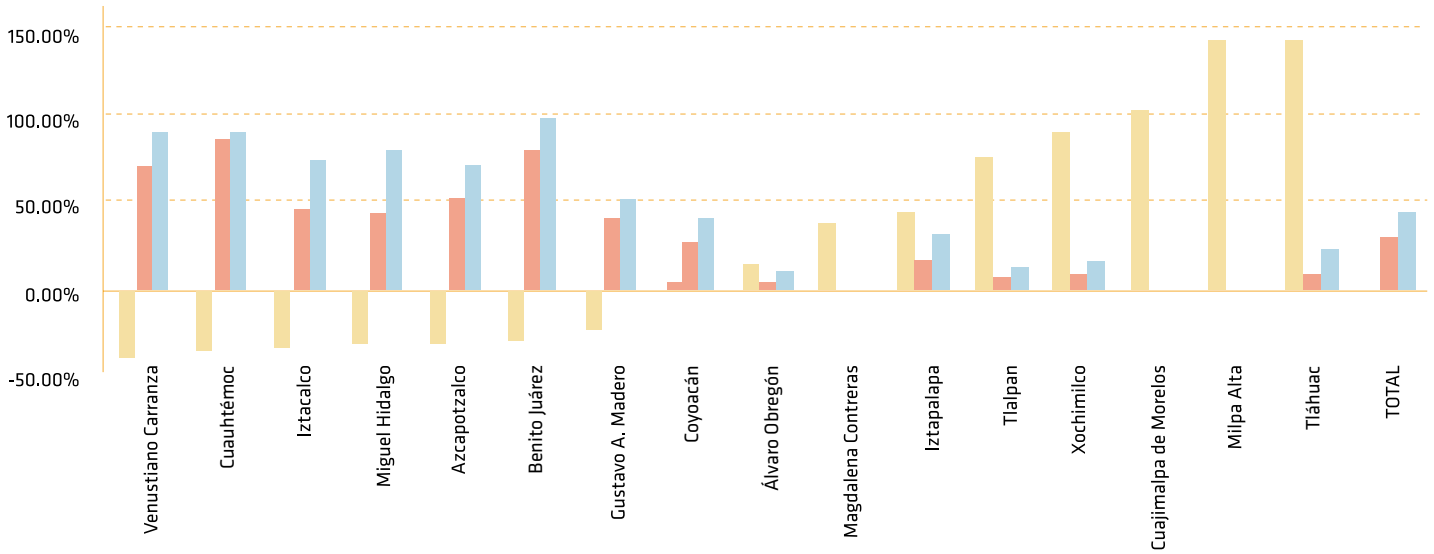


TABLE 31: MODE SHARE IN THE ZMVM (EOD 2007)

Mode Share (EOD 2007)	%
Public Transit	72.1
Car	20.7
Taxi	6.2
Bicycle	1.0
TOTAL	100

TABLE 32: REGISTERED CARS IN MEXICO, THE ZMVM, AND DF

	Private cars registered		
Year	Mexico	ZMVM	DF
1980	3,950,042	1,767,539	1,601,867
1990	6,555,550	2,298,369	1,768,683
1995	7,469,504	2,193,034	1,919,264
2000	10,176,179	2,964,798	2,308,255
2005	14,300,380	3,205,192	2,257,443
2010	21,639,633	5,375,474	3,348,416

The great majority of the economic activities, and therefore the travel demand, are concentrated in the neighborhoods of the central districts, where there is a better coverage of the city's mass transit, provided by:

- 12 STC Metro lines
- 5 Metrobus (Bus Rapid Transit) lines
- 2 Cero Emissions Corridors and 10 Trolebus (Electric Transport System) lines
- 1 Suburban Train line that connects with the State of Mexico
- 10 Passenger Transport System routes
- 268 ECOBICI (the growing shared bicycle system) stations

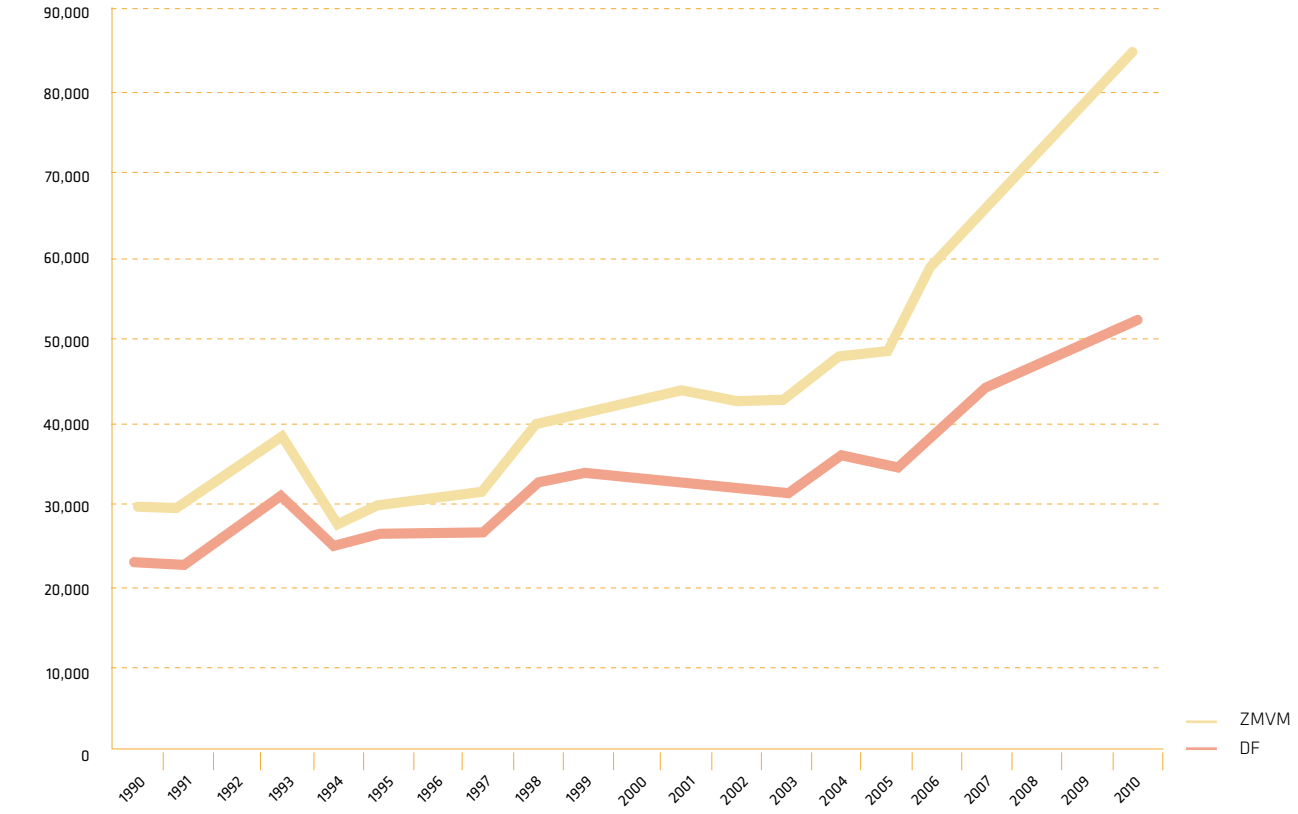
The use of private cars has been continuously growing, going from 16 percent of the modal share in 1989 to 20.8 percent of the twenty-two million trips in 2007, according to the INEGI's *EOD*. Nowadays, it is estimated at 28 percent, without counting pedestrian trips.

The fact that 55 percent of the population is located at more than 800 m from Mass Transit, together with the housing growth at distances far from the main work centers, has been a great incentive for the population's motorization and, as a consequence, the growing congestion that has decreased the inhabitants' quality of life due to time loss, stress, and low air quality.

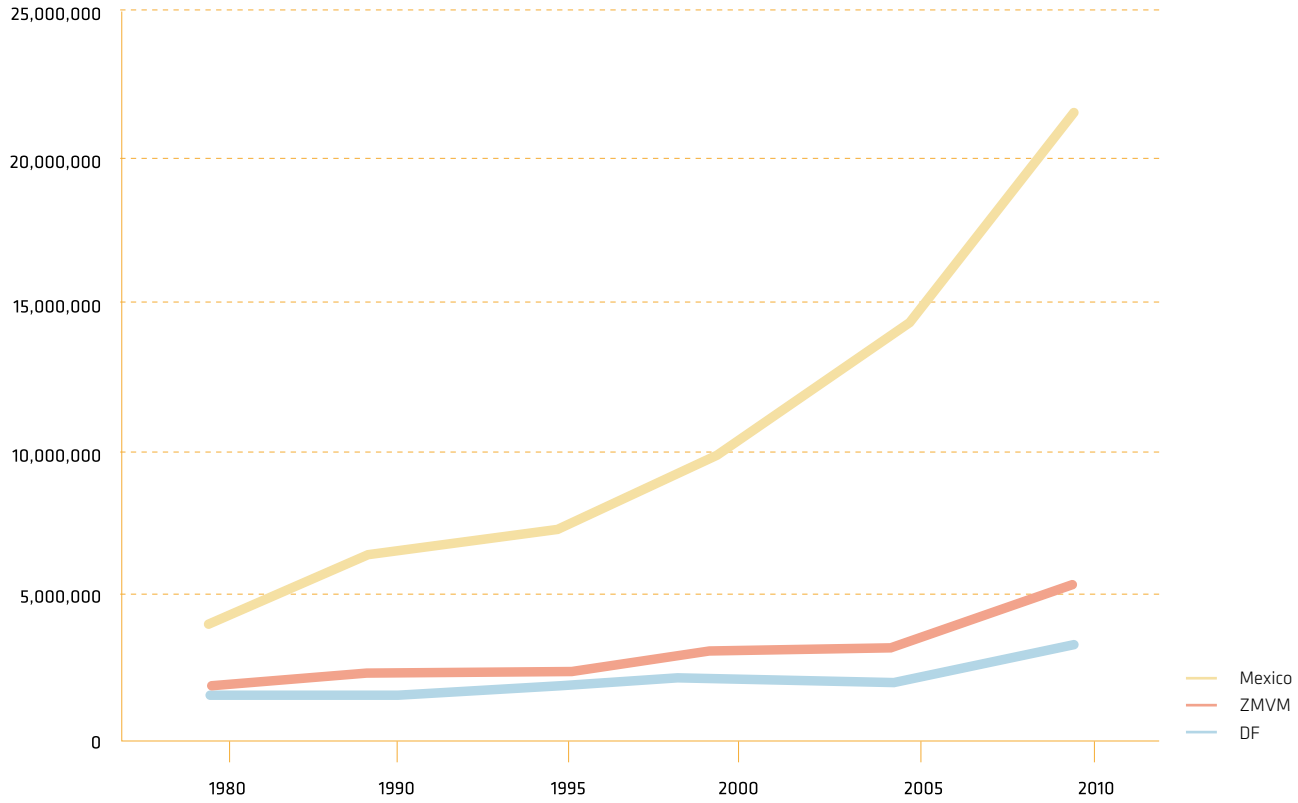
According to INEGI, in 2010 there were 3,348,416 private vehicles registered in the Federal District and 5,375,474 in the ZMVM (*See Graph 38*). This growth has been accompanied by an increase in the number of vehicle kilometers traveled (VKT). VKT is the most internationally accepted indicator to measure vehicle traffic volume in a specific area. The growing tendencies of the VKT estimated for the ZMVM and DF are alarming (*See Graph 37*).

Together with the deficient management and use of urban land, the federal housing policy, and insufficient sustainable urban mobility efforts, the growth in the amount of vehicles and their use also responds to a series of incentives such as the gas subsidies, the growing economic facilities for car acquisitions, and deficient parking management all across the country.

GRAPH 37: ESTIMATION OF VKT IN DF AND ZMVM PER YEAR



GRAPH 38: VEHICLES REGISTERED IN DF, ZMVM, AND MEXICO



14. REFERENCES

Asian Development Bank (ADB). (2010). Parking Policy in Asian Cities. Philippines: Asian Development Bank.

Barter, Paul A. (2010). Off-Street Parking Policy without Parking Requirements: A Need for Market Fostering and Regulation? Transport Reviews. http://dx.doi.org/10.1080/01441640903216958

Blumenaur, E. (2011). Beyond the Backlash: Using Performance-Based Regulations to Produce Results Through Innovation. Journal of Environmental Law and Litigation, Vol. 26-355.

City Club of Portland. (1993). Bulletin Report on Downtown Parking Vol. 74-42. Portland, OR: City Club of Portland.

Departamento del Distrito Federal. (1942). Reglamento de construcciones. Diario Oficial de la Federación.

Departamento del Distrito Federal. (1966). Reglamento de construcciones. Diario Oficial de la Federación.

Departamento del Distrito Federal. (1973). Ley sobre estacionamiento de vehículos. Diario Oficial de la Federación.

Departamento del Distrito Federal. (1987). Reglamento de construcciones. Diario Oficial de la Federación.

Departamento del Distrito Federal. (1991). Acuerdo por el que con objeto de apoyar la construcción de vivienda de interés social. Diario Oficial de la Federación.

Departamento del Distrito Federal. (1993). Reglamento de construcciones. Diario Oficial de la Federación.

Forinash Christopher V., Millard-Ball, A., Dougherty C., and Tumlin J. (2004). Smart Growth Alternatives to Minimum Parking Requirements. United States: EPA.

Gobierno del Distrito Federal. (2004). Reglamento de construcciones. Gaceta Oficial del Distrito Federal.

Gobierno del Distrito Federal. (2004). Normas Técnicas Complementarias para el Proyecto Arquitectónico. Gaceta Oficial del Distrito Federal.

Gobierno del Distrito Federal. (2013). Programa General de Desarrollo 2013-2018. Gaceta Oficial del Distrito Federal.

INEGI. (2010). Censo de población y vivienda 2010. México. INEGI.

INEGI. (2007). Encuesta Origen Destino de la Zona Metropolitana del Valle de México. México:INEGI.

Institute of Transportation Engineers (ITE). (2010) Parking Generation. United States: ITE.

Knoflacher, H. (1980). Öffentliche Verkehrsmittel – Neue Strukturen zur Verbesserung ihrer Chancengleichheit im städtischen Bereich. Internationales Verkehrswesen Vol. 32-3, 176–178. Deutschland: Internationales Verkehrswesen.

Kodransky, M. and Hermann, G. (2011). Europe's Parking U-Turn: From Accomodation to Regulation. Institute for Transportation and Development Policy. New York: ITDP.

Litman, T. (2006). Parking Management Best Practices. Chicago: American Planning Association.

Litman, T. (2011). Parking Management: Strategies, Evaluation and Planning. Victoria: Victoria Transport Policy Institute.

Litman, T. (2004). Parking Requirement Impacts on Housing Affordability. Victoria: Victoria Transport Policy Institute.

Medina, S. (2012). La importancia de reducción del uso del automóvil en México. Instituto de Políticas para el Transporte y el Desarrollo. México: ITDP.

Medina, S. y Veloz, J. (2014). Hacia una estrategia de Desarrollo Orientado al Transporte para el Distrito Federal. Instituto de Políticas para el Transporte y el Desarrollo. México: ITDP.

NYC Department of City Planning. (2011). Manhattan Core Parking Study. New York: NYC Department of City Planning.

Schaller Consulting. (2007). Free Parking, Congested Streets: The Skewed Economic Incentives to Drive in Manhattan. New York: Transportation Altenatives.

Shoup, D. (2005). The High Cost of Free Parking. American Planning Association.

Veloz, J. (2013) Desarrollo Orientado al Transporte en la colonia Doctores. Instituto de Políticas para el Transporte y el Desarrollo. México: ITDP.

Weinberger, R. (2011). Death by a thousand curb-cuts: Evidence on the effect of minimum parking requirements on the choice to drive. Philadelphia: Transport Policy.

Weinberger, R., Kaehny, J. and Rufo, M. (2010). U.S. Parking Policies: An Overview of Management Strategies. New York: ITDP.

Wilbur Smith Associates. (2006). Developing Parking Policies to Support Smart Growth in Local Jurisdictions: Best Practices. United States: Metropolitan Transportation Commission.

Willson, R. (2013). Parking Reform Made Easy. United States: Island Press.

Wilson, Richard W. (1995). Suburban Parking Requirements: A Tacit Policy for Automobile Use and Sprawl. Journal of the American Planning Association. Vol. 61-1, 29–42. United States: American Planning Association.

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