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REDUCING CAR USE THROUGH NEW URBAN DESIGN SCHEMES IN WESTERN TEHRAN

A Thesis in

Architecture

by

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ABSTRACT

The world has become progressively more modernized and urbanized during the past century, and the growth of megacities is now a worldwide phenomenon. Despite differences in the nature, level, and magnitude of urbanization in developed and less-developed countries, all countries face similar problems in their urbanized areas. Current development patterns have become a major source of concern in developed countries due to the extent of environmental damages and health problems that they have caused. However, the need for new urban development paradigms and modern environmentally conscious patterns is not limited to developed countries. Addressing the development pattern of developing cities is also critical to meeting the dual challenges of climate change and urbanization.

As the second-largest city in the Middle East and one of the largest cities in the world, Tehran faces substantial challenges of which spatial and traffic congestion, air pollution, and inadequate infrastructure seem most prominent. This thesis is an attempt to identify problems associated with the current development pattern of Tehran. Municipal districts 21 and 22 in the west of Tehran are the focus of this study. In 1993, these districts were added to the city in an attempt to implement environmentally friendly principles and create a development pattern based on a logistic plan. However, the existing master plans for development of these districts primarily promote a private-car-dependent urban environment. The author proposes strategies, alternative plans, and design guidelines for reducing reliance on automobile transportation in these developing areas.

This thesis provides an overview of Tehran’s growth and its problems with an emphasis on development patterns. Based on an analytical study of the developing sector of Tehran (municipal districts 21 and 22, which are the focus of this thesis) and their weaknesses and
potentials, the study draws upon new urban development paradigms with an emphasis on sustainable transportation, including Peter Calthorpe’s Transit Oriented Development guidelines and Robert Cervero’s definition of a transit metropolis. The thesis encompasses proposals, design guidelines, and prototypes to be used for districts 21 and 22 consistent with all the studies and analyses in these rapidly developing districts of Tehran.

Key words: Tehran, transit-oriented development, pedestrian-friendly environment
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I would like to dedicate this thesis to my late father, an extraordinary human being, who has always been my mentor and my hero. I owe him all that I am.
Chapter One

Prologue
1.1 Introduction

The world is undergoing a large wave of population growth and urbanization. Urban growth is inevitable; however, the rate and magnitude of that growth vary in different regions. Researchers have different and sometimes contrasting opinions about the growth of our cities. While some scholars such as Friedman, Richardson, Soja and Tobin view cities as a requirement for modernization, agglomeration, productivity, and economic enhancement, other scholars such as McGee and Qadeer suggest that cities in less developed countries do not form adequate conditions for productive economic activities, agglomeration, and social welfare. However, in spite of these contradictory opinions, most scholars agree that rapid urbanization in less-developed countries over the past four decades has brought about many negative consequences.

Iran, with an economy dominated by oil and gas exports, has a population of over 70 million, 71% of whom live in urban areas. Dependency on changing oil revenues and vulnerability of the economy to external factors has created differential growth rates in industries and urbanization, resulting in rural-urban migration and a number of social and economic problems.

Tehran, the capital city of Iran and the second-largest city in the Middle East, is the major growth center and the economic and political powerhouse of the country. With a population of around 8.5 million in a metropolitan region of 12 million inhabitants, Tehran’s population is more than the sum of the next three major cities of Iran, namely Mashhad, Isfahan, and Tabriz. This imbalance between Tehran and other large cities of Iran, which has made Tehran more developed than other regions of the country, is a result of intense political, administrative, and economic centralization.
As Tehran’s population continues to grow, the city spreads across the countryside into the mountains to the north and to the threshold of the desert in the south, replacing streams, natural areas, agricultural fields, and farmlands with urban fabric.

Like many other cities in the country, thousands of years ago Tehran started to develop as a village in accordance with the natural environment, but with advances in modern technology and development it has transformed into a sprawling modern megalopolis. What was once a symbiotic development pattern has now evolved into a parasitic one, breeding a general disregard for environmental constraints and potentials.

1.2 Problem Statement

Currently, Tehran is plagued with increasing socioeconomic and environmental problems due to its rapid population and spatial growth. These problems include spatial and traffic congestion, air pollution, and inadequate urban services and infrastructure. Insufficient public transport and traffic congestion are problematic issues, which appear to be insolvable. Generally in Iran, and particularly in Tehran, addressing sustainable development has not been a priority in urban planning. There is no doubt that further development has to be based on a new paradigm.

According to Iranian health experts, each year thousands of deaths are caused by heart attacks and respiratory diseases related to air pollution. As a result, the central government and the city council have directed extra attention to this issue. In 2010, the magnitude of the problem caused the government to announce a number of public smog holidays to curb the
level of pollution. According to the Associated Press news agency, each of these holidays cost about $130 million\textsuperscript{11} a day, mostly due to business closures.

It is believed that a deficient spatial structure will increase transportation time and air pollution and will cause unnecessary expansion of urbanized area. This will result in decreased quality of life for the population and a decreased number of natural sites. According to The Economist, pollution is the most notable environmental problem that affects a majority of Tehran’s population.\textsuperscript{12} The World Bank, which in 2003 lent Tehran $20 million to clean up the air, said the pollution in Iran's major cities exceeded World Health Organization standards by 40% to 340%, depending on location.\textsuperscript{13}

Different factors, which can be divided into five separate categories, have contributed to the rising air pollution in Tehran.

A. Mobile pollution sources: Transportation

Enormous numbers of cars, buses, mini-buses, vans, trucks, and motorcycles support an overpopulated city and operate in an extremely congested road system. According to Payvand Iran News, the latest research conducted by Tehran Municipality and Iran’s Department of Environment (DOE), carbon monoxide is known to be the main air pollutant in Tehran. Over 80% of Tehran’s air pollution is caused by auto exhaust fumes.\textsuperscript{14} Vehicles are the main source of carbon monoxide and nitrogen oxide emissions and of tiny particles in the air.\textsuperscript{15} Motorcycles also have a large share in polluting Tehran’s air.\textsuperscript{16} The following factors play important roles in this regard:

a. City Planning

A car-oriented development pattern encourages people to drive their private cars or take taxis for their daily commutes. Despite enforcing a Traffic Restricted Zone (TRZ) around the
Central Business District and a secondary larger ring surrounding the main zone and some other highly polluted areas,\(^{17}\) the traffic problem remains unresolved around most of the city.

Furthermore, insufficient parking space increases traffic on the streets. Long lines of cars are a familiar sight in Tehran, crowding the streets, jamming intersections, and circling endlessly in search of parking spaces. Daily need for parking space in Tehran is more than 170 times the available spaces.\(^{18}\)

Inadequate, inefficient, and under-developed infrastructure along with limited public transportation services\(^ {19}\) contribute to the problem by increasing the attraction of private cars and motorcycles for the sake of higher convenience and efficiency.

b. Auto Industry

Iran’s booming automobile industry, which is the second largest industry of the country after oil and gas,\(^ {20}\) is increasing the number of vehicles on the streets every day. Iran has lately been placed in the top twenty car producers in the world. Twenty-five automakers along with two mega corporations, Iran Khodro and Saipa, produce a wide range of vehicles from motorbikes to heavy-duty trucks and much more.\(^ {21}\) As a result, transportation policies have usually been influenced by automobile industries due to their significant economic impact.

Moreover, despite the fact that Iran’s auto manufacturers have been required to meet emissions standards for the past 10 years,\(^ {22}\) the application of obsolete technologies in new Iranian vehicles prevents them from meeting these environmental emissions standards.\(^{23}\)

Another contributing factor is the dilapidated stock of vehicles that do not meet the standards of fuel conversion systems and emissions regulations. A decade ago a number of programs were introduced by the government to take older, polluting cars off the roads and replace them with new cars.\(^ {24}\) In addition, yearly emission inspections became mandatory.\(^ {25}\)
However, in reality these programs have faced numerous challenges due to the lack of funding and bureaucratic hurdles.26

c. Fuel

The state government has always subsidized the price of gasoline, and the relatively low prices leave no incentives for alternatives to driving. Even after the government imposed a monthly ration of 16 gallons per personal car and increased the prices from 40 cents a gallon to $1.44 a gallon in 2010, driving still remained a highly attractive yet relatively cheap pastime.27

On the other hand, low quality of fuel leads to highly toxic exhaust gases. Until 1996, the low-quality fuels (leaded gasoline and high sulfur diesel fuel) contributed heavily to the problem of air pollution.28 However, recently the government has been working on initiatives to reduce pollution through increasing the production and distribution of cleaner natural gas, so more cars can use it instead of gasoline.29

d. Culture

In Tehran, cars have become the most essential mode of transportation and a part of the city’s culture.30 There is an obsession with cars and driving amongst the people, especially the young population. To them, driving represents independence and freedom, as the car allows them to bring a little bit of privacy out on to the streets,31 where the suppressive theocratic state (Islamic Republic of Iran) prevents them from freely expressing themselves. However, in spite of these social and cultural factors in favor of driving—which should not be overlooked—it is the modern layout and automobile-centered development pattern of the city that initiated these habits. The current urban design scheme with an extensive network of highways and streets prioritizes car travel and causes heavy traffic in Tehran.
B. Lack of Green and Open Spaces

Well-designed public open and green spaces that are conveniently located have always been widely used and popular in Tehran. Destruction of green spaces in and around Tehran in favor of new construction has been a significant part of the city's environmental challenges. Green spaces can act as the “lungs” of the city. They provide relief from the continuous urban fabric and can contribute to the preservation of biodiversity. They also provide space for outdoor recreation, which can boost the pedestrian-friendly quality of city’s neighborhoods and encourage walking and cycling.

C. Topography and Climatology

Tehran is bound by mountains in the north and east, which block the flow of humid winds off of the Caspian Sea and reduce the amount of rainfall considerably. The mountains around Tehran also make the city vulnerable to wintertime atmospheric inversions, when cooler air close to surface traps pollution in the city. Also, Tehran's major wind flow is from the southwest to the northeast, spreading pollutants from the industrial sites in the west all over the city and trapping them against the high mountains.

D. Improper Zoning

While the direction of major wind flow in Tehran is from the southwest to the northeast, most of the industrial and manufacturing sites in and around Tehran are located on the western and southern periphery of the city (in districts 9,19,20,21). Iran's busiest airport and the main International airport are also located in the west and southwest of Tehran. Moreover, a refinery is located in the south of the city. The toxic emissions from these centers
are spread by the wind over the city and trapped in the north and east against the mountain chains.\textsuperscript{36}

\textbf{E. Lack of Public Awareness and Insensitivity towards Environmental Issues}

In spite of many studies that have demonstrated the adverse effects of air pollution on the natural environment and human health, neither people nor politicians have taken strong actions against the polluting industries and irresponsible daily activities.\textsuperscript{37} In the case of developing areas of the city, many opportunities for environmentally-conscious design have been overlooked in favor of strategies that promoted automobile use, even though planners considered the opportunities to be the last chance for creating a logistical growth plan for the city.

In districts 21 and 22, which were added to Tehran in 1991,\textsuperscript{38} in addition to all the above-mentioned problems, the automobile-centered and non-pedestrian-friendly design of the area has led to social segregation. In this area, the Tehran-Karaj highway, along with the aboveground metro line, act as a physical barrier between districts 21 and 22. (Figure 1-1) The highway divides districts into separate, radically different urban environments. The layout of the border between these two districts promotes car use as the only option for commuting between them.

\begin{figure}[h]
\centering
\includegraphics[width=0.5\textwidth]{figure1.png}
\caption{Tehran-Karaj Highway and the metro line separating districts 21 and 22}
\end{figure}
Each district has been planned by different planning firms and is being developed independently by their municipalities, disregarding the adjacent district’s plans, which consequently widens the gap between them. District 22, for example, is planned to have vast areas of open green spaces (such as Chitgar National Park) and serve as a recreational center for the entire city. District 21, on the other hand, was developed with a high density of industrial and manufacturing sites. It is one of the most polluted areas of the city, and its residents do not have an easy access to the amenities of the adjacent district.

1.3 Objectives of Investigation

The main objective of this thesis is to investigate the current development plans, analyze their strengths and weaknesses, and propose viable strategies for improving the development patterns of districts 21 and 22 of Tehran by reducing reliance on automobile transportation through creation of attractive streetscapes and parks. Peter Calthorpe’s Transit-Oriented Development principles, as well as Robert Cervero’s Transit Metropolis concept, are considered as possible methods of accomplishing the stated goals. Iranian cultural and historical development patterns are also studied. The design proposal is based on the existing transit line and existing green spaces. Ultimately, the goal of the thesis is to determine the potential for increasing green public spaces in the urban fabric and suggest means of implementation. As a result, this approach will facilitate walking and cycling to reduce the city’s reliance on automobiles and promote pedestrian use of green spaces.
1.4 Research Design

Different methods and processes are used to address the problem mentioned above. First, the study encompasses an archival research where the historical background, as well as the literature on Tehran, is assembled in order to better understand the settings and conditions of the city of Tehran.

A well-based knowledge of the city, its problems, and its potential was needed to achieve the objective of this thesis. Thus, the first step was an analytical study of Tehran. Although a general knowledge of Tehran was necessary, the scope of this research is limited to the developing area of the city within the boundaries of districts 21 and 22. The history of these two municipal districts —before and after they were included in the city boundary—and the impact of this addition on the city were inspected and analyzed. The study aimed to find the inadequate strategies in planning these areas and the potential to make their growth compatible with eco-friendly development principles.

Most of the above-mentioned research was archival. The quantitative studies such as demographics, structure of the population, immigration, growth rate of population, density, activities, economy, and employment statistics were available from the Iranian Center for Statistics. Other quantitative studies such as urban management, building and population density in the two districts, transportation, traffic flow, and infrastructure were obtained from the municipalities of these two districts and their master plans.

Additionally, analytical study of photographs and historical maps provided useful insight into the existing condition of the site. Moreover, the precedents of pedestrian-friendly arrangements of old cities and neighborhoods of Tehran were investigated. This was carried out through archival study, comparative study, and case study. After presenting this overview on
Tehran, Robert Cervero’s model of Transit Metropolises and Peter Calthorpe’s Transit-Oriented Development guidelines were studied.\textsuperscript{43, 44}

In the second section of this thesis, based on the outcome of the studies and analyses of the first section, proposals and guidelines are provided particularly for the area of study, along with some design prototypes. This section includes digital models, maps, drawings, and diagrams.

\textbf{1.5 Limitations}

Although most of the capital city is already fully developed, and any fundamental changes in its development pattern will require measures far beyond the scope of this thesis, the western sector of the city, which is still under development, has the potential to follow a more environmentally conscious pattern of development with fewer problems. To have a more practical and realistic approach, this study is limited to two municipal districts of Tehran as areas of current development.

Furthermore, it would be prudent to be aware of the obstacles and challenges of gathering geographically specific statistical and empirical data on the subject of this thesis. First and foremost is the lack of well-organized and independent statistical institutions and organizations that conduct scholarly surveys and gather statistical databases. Political, social, and financial incentives have sometimes led to manipulation of the numbers and information that are presented to the public.

This has caused a shortage of accurate, up-to-date, and factual resources that are available to individuals or institutions that conduct academic research. Moreover, the majority
of publications are only obtainable in hard copy. Consequently, based on the author’s location and difficulties of traveling to Iran, access to such documents and conducting field studies were done through online sources published by the respective organizations based in Iran, and published literature, both in Persian and English. Finally, the new policy of the Iranian government, which prohibits Iranian students who are studying abroad from conducting research on subjects exclusively related to Iran, has posed more challenges in that regard.
Chapter Two

The City’s Overview
2.1 Introduction

Tehran’s development as the capital of Iran has been most prominently affected by economic and sociopolitical circumstances. This chapter will discuss the significance of these factors in the history of Tehran’s development. This study is relevant because it identifies the challenges Tehran is facing in its current state and because it clarifies the origins of these challenges. Recognizing the process that has created Tehran’s challenges will show to what extent these challenges are resolvable. Clearly, addressing all of the factors contributing to Tehran’s challenges is far beyond the scope of this study. This chapter will study factors such as politics, social reform, and modernization, and as a departure point will focus on transportation as one of the most prominent challenges in Tehran and as the city’s main source of pollution.

2.2 The Geography of Tehran

Tehran, “the largest urban concentration between Istanbul and Mumbai,”\(^4\) is in the north-central region of Iran, on the southern slopes of Alborz Mountains. (Figure 2-1) The highlands are located to the north of the city, and their height decreases towards the central desert in the south. Due to a major difference in elevation from north to south (Figure 2-3, Figure 2-2) and denser concentration of green spaces in the north, the weather is significantly different in the northern areas of the city that is in the flat south. On any given day, one can clearly distinguish between the air quality and temperature of northern and southern areas. Snow days are usually limited to the northern districts; on those days, while cars cannot travel in the northern districts, the southern part of Tehran might just have rain.
Because of the significant difference in air quality, the price of housing in the northern part of Tehran is up to ten times more than that of southern districts. As a result, the north is mainly home to the very wealthy and the south houses the less fortunate. This results in significant cultural differences between the north and the south.

Figure 2-1: Tehran Location
Source: [http://www.overland-underwater.com/media/maps/iran_map.gif](http://www.overland-underwater.com/media/maps/iran_map.gif)
2.3 The History of Tehran

2.3.1 From a Mall Village to the Political and Economic Capital

Tehran is now a giant metropolis, and it is hard to believe it was once a small village outside of Ray. Ray, the capital of the Seljuk Dynasty, was located on a main road, along the southern side of Alborz Mountains and a part of the Silk route. Ray was destroyed completely by
Mongolian invasion in 1220. The destruction of the city led to the migration of its inhabitants to the nearby village, Tehran.46

In 1786 Tehran was turned into the seat of government by the Qajars because it was close enough to the Qajar tribal territories and far enough from the previous capitals and supporters of the previous rulers. The city had a symbolic location at the foot of the highest peak in the land, as well as a strategic and central location to rule a vast country.47

2.3.2 Population Growth and Economic Development

According to Fereydoon Firoozi, before 1786 Tehran was an agrarian community, but the establishment of the Qajar Dynasty brought soldiers and courtiers to the town, and this attracted more people and added a consumer aspect to the area.48 This was the beginning of trade and traditional industries such as millinery, shoemaking, hosiery making, and blacksmithing, as well as the manufacture of munitions, which triggered economic and demographic concentration in Tehran.49 With a population 15,000 of at the end of the 18th century, the population grew around tenfold50 by 1869, when the first census of Tehran showed a population of 155,000.51

In the 1930s, another major transformation happened when the restricting walls around the city were demolished to allow for further expansion of Tehran. According to the fourth census of the city in 1932, Tehran’s population was 310,139, consisting of 70,500 families.52 The state needed to re-plan the city, re-define its rapidly changing spatial functions, and modernize its infrastructure to accommodate and control the population growth.
2.3.3 City’s Structural Development

This section will describe the main changes the city went through and explain the prominent factors affecting the shape and the development of the city.

2.3.3.1 Traditional Structure

Comparing the developmental stages of Tehran from 1834 to 1857 (Figure 2-4, Error! Reference source not found.) indicates that the basis of the city’s expansion lies in the three main structural elements of state, religion, and market. The bazaar (the market element) starts from the southern gate and continues to the western gate. It is located to the south of the walled royal complex (the state element). Masjed-jame (the mosque, which is the religion element) is located on the north-south axes and connects two main gates. The bazaar is connected to the residential areas by streets and alleys that functioned both as access ways and trade routes for smaller businesses and linked the public realm of the city to the private areas.53
Figure 2-4 Tehran from 1834 to 1847
Source: Author, based on Ohadi, “Tehran: From the Aspect”
2.3.3.2 Modernization and Reform

The transformation of Tehran into a modern city started in 1869 when the first plan for development of the city was drawn up by a design group in the Darolphonun School (Polytechnic of Iran, established 1851) under the supervision of a French man named Monieur Buhler.54 According to Asef Bayat, Baron Haussmann’s vision of a modern city had influenced the
planning principles of the Middle East and was adopted by Khedive Ismail in Cairo and the Ottoman rulers in Istanbul. Baron Haussmann was responsible for transforming Paris through introducing wide straight boulevards instead of narrow alleys, creating an axis connecting the city’s prominent monuments and, public parks and placing regulations on facades. In Tehran’s plan, the regular geometry of the new boundary of the city and the grid of straight streets and roundabouts were based on these principles. (Figure 2-6, Figure 2-7)

Figure 2-6 Tehran Streets in 1890
Source: Ohadi, “Tehran: From the Aspect”
Streets that were once leisure centers transformed into commercial centers, and their identity and status changed. The Widening and Expanding of Passages Act turned the streets
into a dominant urban element of the city. The bazaar and squares were no longer the core and structural elements of the city. Tehran started to develop along its streets, and these modern elements changed the structure of its urban fabric and cityscape.\textsuperscript{56}

The second large-scale town-planning exercise in Tehran was carried out for accommodating growth as well as introducing modernization. For this purpose, new urban elements such as new streets, hotels, European-style shops, a bank, and a telegraph house were built.\textsuperscript{57} According to Bayat, modernizing the structure of the city was also meant to facilitate riot control.\textsuperscript{58} However, these attempts failed to transform the underlying traditional neighborhood structure of the urban fabric.

\textbf{2.3.3.3 Political Factors}

After the invasion of the Russians from the north and the British from the south during World War I, a north-south trade axis was created, which intersected the now defunct east-west axis (Silk Route), and this gave Tehran an even more strategic status, being at the meeting point of these two main axes.\textsuperscript{59}

When, according to Firoozi, Reza Shah, the founder of the Pahlavi Dynasty, was crowned in Tehran in 1925, the agrarian base of the city had been completely replaced by an industrial-commercial economy, and was centralized around various ministries with a “pyramidal structure” which had their branches in provincial centers, cities, and towns.\textsuperscript{60}

According to Bayat, through the adoption of a zoning system that was mainly based on socio-economic class divisions, the traditional neighborhood system was altered.\textsuperscript{61} However, many of the characteristics of the older urban fabric and social arrangements endured, which
added to the paradoxes of the rearranged urban structure of the city. Beyond its impact on neighborhoods’ structure, trade, and economy, urban modernization was also considered a tool to escalate state power in controlling the politically active population of the capital city. According to Sanjoy Mazumdar, “Reza Khan’s worst opposition came from the bazaar and the Muslim clergy, all concentrated in the congested bazaar area in southern Tehran.” Following Reza Shah’s orders, the city turned into an open matrix to facilitate the access of troops and tanks. (Figure 2-9)

2.3.3.4 The influence of the Secular Government on the City Fabric

Reza Shah is known to be the first king of Iran who intentionally tried to create a non-religious, modern, and secular character for the capital. Being inspired by Ataturk’s plans in Turkey and Baron Haussmann’s design of Paris, he embarked upon a series of projects to “modernize” and “westernize” the city. Under his rule the traditional pedestrian-oriented layout of the city was modified, and the hierarchy of access routes from the bazaar to the main roads—which lead to narrower streets and alleys, then to cul-de-sacs, and finally to a cluster of buildings—was rearranged. He chose not to use the existing royal buildings (Arg) and moved his residence to the north of the city. Such a decision impacted the direction of Tehran’s growth to north. (Figure 2-8, Figure 2-9 Modern Street Network of Tehran)

The spatial growth of the capital city, in other words, became intertwined with the multifarious modernization of both the state and the populace. According to Abrahamian and Madanipour, “administrative centralization,” “integration of regions into a national market,”
“development of a transport network,” “expansion of bureaucracy,” and “restructuring towns and cities” were signs of growing secularism and nationalism in this period.  

In the process of westernization, building types also changed from inward-looking, low-rise, courtyard-oriented buildings to modern outward-looking, high-rise structures. This phase of Tehran’s development and urban planning was not based on any existing Persian models and local expertise; the new layout was radically different from the traditional urban and social fabric of the city.

Figure 2-8 Tehran’s Main North-South Axes
Source: Author adopted from Tehran Comprehensive Plan Maps by Boomsazgaan
2.3.3.5 Break of the Traditional Structure

In the post-1960 years, Tehran expanded in all directions,\textsuperscript{65} and urban spaces were no longer organized according to ethno-religious divisions as they were in traditional neighborhoods and quarters.\textsuperscript{66} According to Madanipour, now the city was divided “along the lines of income and wealth,” with the better off moving to the northern areas (with a better climate and more amenities) and the poor living around the bazaar and in the older neighborhoods of the south.\textsuperscript{67} Following the move of the royal buildings to the north, cultural and economic segregation appeared in the city, the duality between the north and the south was accentuated, and the three national institutions—bazaar, mosque, and palace—lost their status. The confrontation of traditional and modern urban designs had further complicated the
unequal growth of Tehran in space, wealth, population, and cultural assortment in comparison to other urban centers of the country.

The Second World War was followed by an increase in oil revenues and a drive toward industrialization in the country in general and in the capital, which consumed the major portion of the oil revenues, in particular.68 According to Amirahmadi and Kiafar, more than 46 percent of all large industrial establishments and most of the major nonoil industrial operations of the country, including auto-assembly plants and home appliance factories, were gathered inside or on the periphery of the city.69 Tehran’s role as the administrative and economic center of the country was strengthened due to the reliance of the country on-oil revenue, which was controlled by the government from the capital.

The fast growth of Tehran’s population due to in-migration caused the uncontrolled expansion of the city in all directions. The growing city absorbed and destroyed a significant portion of the existing suburban green spaces, gardens, and surrounding villages. According to Madanipour, the city managers felt the need to control the growth of the city, but the municipality didn’t have the required legal and financial means to deal with this issue. Consequently, a legal agenda was created in 1965 to form the Urban Planning High Council and set up comprehensive land-use and urban development plans.70

**2.3.3.6 The Comprehensive Plan**

In 1966, the American firm Gruen Associates, founded by Victor Gruen, the alleged inventor of the shopping mall, was commissioned by the Iranian government to create a comprehensive plan for Tehran in association with the Iranian architect, Abdolaziz
According to Madanipour, in their studies the consultants documented “high
density, especially in the city center; expansion of commercial activities along the main roads;
pollution; inefficient infrastructure; widespread unemployment in the poorer areas, and the
continuous migration of low-income groups to Tehran, due to the country’s economic
structure,” as the city’s main problems.72 New knots, it had become evident, had been added to
the already complicated urban fabric of the capital.

According to Costello, physical planning and new street networks were the core of most
proposals.73 Multiple alternatives for the development of Tehran were considered, including
“the possibility of establishing a new nucleus to the west near Karaj or the possibility of a radial
expansion along the main routes leading into the city, with sub centers strung out on highway-
and railway-oriented ribbons.”74 The final proposal redirected Tehran’s development from a
north-south axis to an east-west axis through a new highway and subway network. It included a
number of satellite towns, which were meant to mitigate pressure on the city and provide local
centers for the urban clusters of Tehran.75 The comprehensive plan was approved in 1968.76

In this plan, ten large, fairly self-contained urban districts (including the old city of Ray in
the south and the new wealthy suburb of Tajrish in the North) formed the city.77 (Figure 2-10)
They each had a commercial and an industrial center with high-rise buildings and were
separated from each other by green belts. Each district was divided into a number of areas
(nahyeh) and neighborhoods (mahalleh) with local high schools, primary schools, and other
facilities. A transportation network, which included motorways, a rapid transit route, and a bus
route, connected these districts. High-density residential areas were located on the rapid transit
nodes to turn them into activity nodes. 78 In this plan, the green valleys, which started from the
Alborz Mountains in the north and extended to the areas with higher densities in the south, were meant to direct water, air, and greenery through the city.\textsuperscript{79}

Gruen who was influenced by the “American tradition of planned community,”\textsuperscript{80} drew up a plan for Tehran that had many of the qualities and features of an ideal American metropolis of the time, including “separation of functions, highways, suburbs, shopping centers, and housing areas with different densities.”\textsuperscript{81} (Figure 2-11) A striking example of similarities between Tehran and an American metropolis is Los Angeles, where Gruen’s firm was located. According to Zareh, vast clusters of houses, invisible public space, highways that define the city layout, indoor shopping malls, and sprawl are some of the elements these two cities have in common. However, the prominent similarity they share is the importance of individual mobility in the city and the automobile-based infrastructure.\textsuperscript{82}
Figure 2-10 Urban Districts in Victor Gruen's Comprehensive Plan for Tehran
Source: Costello, "Planning Problems"
In order to control Tehran’s development, a five-year service line was drawn in the master plan. The line was supposed to move outward every five years for twenty-five years to reach the outer limit of the city as anticipated in the comprehensive plan. For development outside the line during these years, special permission was required. 83 However, according to Garnett, this restriction caused a significant increase in land value due to scarcity. As a result, private developers started to build, in some cases illegally, on land outside the 5-year boundaries. 84 Thus, the restriction failed as a functional policy for controlling Tehran’s expansion.

Out of all the proposals of the comprehensive plan, according to Madanipour, only a few were implemented, including “a network of freeways to connect the disjointed parts of the
sprawling metropolis; zoning as the basis for managing the social and physical character of different areas; and the introduction of Floor Area Ratios for controlling development densities." According to Amirahmadi and Kiafar, in 1976, the municipal government felt the need to revise the districts’ boundaries and divisions. Tehran’s outer boundary was redefined to cover an area of fifty thousand hectares in addition to a five hundred-hectare non-municipal area called “Hareem”. At this time the city was divided into twenty municipal districts. (Figure 2-12)

![Map of Twenty Municipal Districts of Tehran](image)

**Figure 2-12 Twenty Municipal Districts of Tehran**  

Population density grew along with physical expansion of the city. By 1979, approximately 60 percent of Tehran’s population lived in districts that had a density of two hundred to five hundred persons per hectare. These dense districts were mostly located in the
southern, eastern, and southwestern parts of the city. In 1980, density in the southern districts (151 persons per hectare) was more than 3.5 times greater than density in the northern districts (43 persons per hectare).88

2.3.3.7 The Revolution, the War, and the Band-Aid Policies

In 1979, the Pahlavi regime was overthrown by a revolution that was triggered by economic inequalities, social segregation, and the country’s dependence on oil revenues. Madanipour believes that the main goal of the revolution, which established the Islamic Republic in 1979, was “restoring Iran’s economic, political, and cultural independence” through “reducing the dependence on oil revenue,” supporting agriculture, “reducing social polarization,” decentralizing the administrative system, and nationalizing banks and large companies. Expectedly, however, by nationalizing banking, insurance, large industries, and major parts of foreign trade, the revolutionary government, in fact, strengthened the central role of Tehran.89

After the Islamic Revolution of 1979, and the inherent consequences of such radical movement, authorities adopted short-term policies with the goal of fast results to alleviate Tehran’s numerous problems at the time. According to Ahmad, a major rural-urban migration happened after the leaders of the revolution promised free land and housing to the poor.90

Following Imam Khomeini’s decree that “everyone had the right to own a house,”91 and in line with the revolutionary notion that land belongs to God, the directions of Gruen’s plan were disregarded for almost two years, and multiple organizations with different and sometimes contrasting agendas took over the deserted properties and embarked upon new development
plans. The lack of a strong management system caused a great deal of chaos in the growth of Tehran in this period.\textsuperscript{91} However, this chaos didn’t last long, and the government started selling land at prevailing market prices as the long Iran-Iraq war of 1980 to 1988 plagued the economy.\textsuperscript{93} More than ever before, the post-revolutionary modernization of Tehran had taken an eclectic shape in reaction to increasing pressures on the city as the center of all revolutionary politics and of the war-time economy.

After the war, according to Vanstiphout and Madanipour, due to the anti-Shah and anti-American sentiments of the Islamic Republic, Gruen’s plan—as a legacy of the monarchy of the Shah—was criticized. Therefore, an attempt was made to develop a new plan, but this new plan was unsuccessful for several reasons. The main reason was that the government provided no financial resources to implement its aims. Additionally, it didn’t include any urban design ideas that could be considered revolutionary. Ultimately, the municipality decided to continue with Gruen’s plan.\textsuperscript{94}

### 2.3.3.8 Greener Tehran

In 1989, Gholamhussein Karbaschi was appointed as mayor of Tehran.\textsuperscript{95} He was a technocrat who wanted to tone down the revolutionary and exclusionary character of the capital, transform it to “a post-Islamist metropolis,” and create a plural urban space while considering “pious sensibilities.”\textsuperscript{96} When Karbaschi was in office, the municipality—which had to finance itself—generated an estimated $6 billion of revenue between 1990 and 1998 by semi-privatizing a large portion of municipal services and extracting fees and taxes from developers.\textsuperscript{97} Gruen’s plan, which had assigned precise densities to different zones, allowed the city to sell
density rights to those who wanted to exceed the authorized density of their plots and sell permits to those who wanted to violate zoning regulations. The city also decided to disregard the planned five-year intervals for expansion of the city boundaries and immediately expand the city to the proposed 1991, ending boundary.

Although these strategies financed most of Tehran’s urban renewal projects and the construction of new infrastructure in some parts of the city, they ruined the coherence of the 1968 comprehensive plan and caused a significant change in the cityscape of northern Tehran and an area in the south. The “lungs of Tehran”—the gardens in the north of the city—which brought cool weather down from the mountains and dispersed smog and pollution, disappeared, and large townhouses and villas with big yards were replaced by dense high-rise structures. (Figure 2-13) In the poorer south, “Navab,” a major controversial redevelopment project, cut an expressway through the dense and old fabric, building mid- to high-rise structures on each side. (Figure 2-14) This created an intense contrast between the old and the new fabric and caused serious social and urban environmental problems.
However, it is noteworthy that under Karbaschi’s term as mayor, Tehran turned into a greener city. According to Bayat, boulevards were planted with flowers and 600 new green parks and thousands of acres of forest were planted on the city’s edge, which provided safe and pleasant spaces for diverse classes, genders, and cultural groups. The municipality also built around 138 cultural complexes and 27 sports centers, and turned 13,000 vacant lots into parks or playgrounds to add safe recreational spaces to the city. Karbaschi’s administration tripled the number of expressways and arterial roads and increased public-transportation vehicles by 50 percent to shorten the north–south spatial distance and create a better connection between them. Furthermore, the depressing gray mood of the city was refreshed by the mandatory painting of shops and offices.

One of the major modernizing projects of the municipality during this period was building new department stores (e.g. Shahrvand) and shopping malls with a modern distribution system throughout the city. These commercial centers with their modern structures were very
well received by the youth since the structures offered a new environment in which they could meet and socialize\textsuperscript{109} without fearing the moral police.

For families and the elderly, on the other hand, these places started to play the role of the traditional neighborhood centers and the bazaar. The cultural centers built or restored in this period turned into popular urban spaces for the elite and upper classes, who expressed their distinction through their sense of fashion, their choice of cars, and other modes of consumption.\textsuperscript{110}

2.3.3.9 “Tehran 80” the New Comprehensive Plan

The 25-year life of Gruen and Farmanfarmaian’s plan came to an end in 1991. An Iranian consulting firm (A-Tec) was commissioned to review the old plan and find solutions for the new challenges of the expanded, modernized metropolis.\textsuperscript{111} According to Madanipour, it was in 1993 when this new plan was finally prepared and approved by the Urban Planning High Council. It focused on growth management and a linear spatial strategy with the scales of urban region, sub region, district, area, and neighborhood. This plan also included proposals for “conservation, decentralization, polycentric development” and, more importantly, “development of five satellite new towns, and increasing residential densities in the city.” The municipality, however, did not implement this plan and instead produced its own plan, for the period 1996–2001. This plan was known as Tehran Municipality’s First Plan, or Tehran 80.\textsuperscript{112}

Tehran 80 aimed to achieve these following objectives: a clean city; ease of movement in the city; creation of parks and green spaces; development of new cultural and sports facilities; reform of the municipal organization; and planning for the improvement of urban space,
including preparation of comprehensive and master plans for land use and conservation. Its proposals were partially implemented by the municipality along with a couple of the 1968 plan’s proposals. According to Madanipour, these implementations resulted in an increase in the amount of green open spaces in the south: construction of new parts of the proposed motorway network of the 1968 plan, opening of large parts of the city to new development; and facilitation of movement across the city.114

Based on Gruen’s plan, Tehran’s west was the only possible and logical direction for development of the city. The growth of the urban fabric was restricted by the mountains to the north and east and by the desert to the south. Furthermore, development towards the south would threaten the agricultural fields and create serious problems in terms of water supplies and water sewage services for the new settlements.115 Thus, districts 21 and 22 were added to Tehran in this plan to accommodate further growth in an efficient manner. (Figure 2-15, Figure 2-16) This plan divided the city into 22 districts within five sub-regions, each with its own service center.116
Figure 2-15 22 Municipal Districts of Tehran
At this time, according to Bayat, governance of Tehran was severely affected by the contention within the state-between extremists on one side and post-Islamist modernizers and free-market advocates on the other side- and by the aggravating struggles to define the spirit of the city and control its resources. The political and economic power of a major section of the regime was challenged by Karbaschi’s projects, which were gradually changing the disputed Islamic identity of the city. His plans included construction and promotion of new shopping malls and department stores that influenced the bazaar as one of the main support bases of the extremists. Consequently, some attempts were made by the national Council of Public Culture and Ministry of Housing to revitalize the revolutionary and Islamic identity of Tehran,
but they failed.\textsuperscript{118} The revolutionary Islamists with the help of the conservative judiciary eventually removed Karbaschi from power in 1998.\textsuperscript{119}

The next influential and powerful mayor of Tehran was Mahmoud Ahmadinejad, appointed in 2003 by the City Council, which according to Bayat was controlled by the conservatives at the time. Ahmadinejad made many attempts to undo his predecessor’s course of actions, give Tehran a pious and revolutionary character, change the socio-cultural landscape of Tehran once again, and his allies to have access to Tehran’s resources.\textsuperscript{120}

In his last year as mayor, Ahmadinejad ran for the presidency. Tehran’s poor districts were repaved as a part of his political efforts to attract the lower classes’ support and vote.\textsuperscript{121} On a larger scale, interim measures with short-term results were taken to reduce traffic jams and alleviate one of the major problems of Tehranis’ daily life.\textsuperscript{122} He even managed to convince the city council to disburse $35 million on his disputed monorail project in 2003 despite all the negative criticism it had received from the transportation experts and urban planners. The monorail project was never completed, though, and its half-built structure was demolished in 2010 by the next mayor of Tehran.\textsuperscript{123}

2.3.3.10 \textit{The Current Urban and Social Structure of Tehran}

Tehran is now a high-density city with about 146 people per hectare in the built-up areas, with a mildly polycentric structure and without a dominant Central Business District. Accessibility and proximity to the center does not seem to play a significant role in the formation of land prices. In Tehran, land in the center is cheaper than in the periphery,\textsuperscript{124} and the price difference in various locations can be explained by environmental quality.
Looking at the aerial view of Tehran we can still trace the lines and areas of the Gruen plan, surrounded by the endless mass of buildings (Figure 2-17). The city has astonishingly managed to absorb the original grid in the unplanned chaotic development to generate one of the “biggest urban growth spurts of the twentieth century.”125

Tensions and contradictions between deep-rooted traditions and a rebellious modernity have been an ongoing affair in the life of the city. A survey indicates that “only 12 per cent of young Iranians ever go to mosques, and 25 percent of Tehranis have never been to one.”126 The
new generation have demonstrated their long-standing desire for civil liberties any time they have had an opportunity. It is evident that piousness and extreme religious beliefs are enforced into the society and maintained through coercive powers of the government, and that the majority of Tehranis—and particularly the middle- and upper-classes—are following the rules and many of the social norms only because they are obliged to.

This progressiveness of Tehranis is evident in several aspects of their social behaviors: the visibility of women in public and their contribution to the community; high rates of literacy and education (both in women and men); choice of attire; decline of traditional neighborhoods; trends towards apartment living and modern architectural structures; the ever-increasing number of cafes and shopping malls; underground literature; the music and film industries; and the growing urban individuality. Urbanism is not just increasing the pace of life in Tehran; it is also increasing the pace at which life changes.

The religious military regime has adopted policies to restructure and reform Tehran in accordance with their revolutionary and extremist Islamic beliefs and theology and to inculcate its residents with their values. These policies seem to have failed since strategies such as strict dress codes, ubiquitous presence of the “moral police” and pro-regime vigilantes, building mosques and shrines in public spaces all over the city, endorsing and constructing iconic buildings with Islamic architecture styles, removing the statues of artists, writers, and historical figures in an attempt to disfigure the secular fabric of the city127, and even reburying the remains of Iran-Iraq war martyrs on university campuses have done nothing but create a paradoxical spatial pattern.

Unlike in most of the metropolises in the world, political security is more important than social, economic, and criminal security in Tehran. Authorities, who find the post-Islamist, plural,
renewing, and modern city of Tehran in contrast with their Islamist ideology and governance methods, are constantly looking for ways to redefine the spirit of Tehran and keep it under control. However, their ever-increasing attempts to turn Tehran into a religious city and defeat what they call “cultural invasion” have been unsuccessful.

Those whose lifestyles and tastes do not conform to the imposed rules and restrictions use their homes, cars, and other private spaces for recreation, communication, and their social life. Moreover, the impact of the western world keeps growing in the everyday life of the city through facilitated interactions. New media, the Internet, goods, styles, and the considerable number of Iranians living abroad have played a bold role in fusing cultures. Now, Tehranis are demanding democracy and freedom of speech more than ever. A good evidence for that notion is their recent uprising, known as the Green movement, which was sparked off by the controversial presidential election in 2009.

2.4 Urban Governance

Sectorial management is the foundation of the administrative systems in Iran. Urban development and delivery of services is directed and done by local branches of different ministries. With a hierarchical structure and a vertical management system (Figure 2-18), it is difficult for a local civil institution such as a municipality to deal with and solve urban issues at the city level. The municipality’s effectiveness and authority are challenged by the overlap of interests and affairs between the central government and local agencies and the ambiguity of who holds what responsibilities. These complications are even more intense when it comes to city councils.
Although the 1906 Constitutional Revolution asked for city councils to be formed, these institutions were not created until almost twenty years after the Islamic revolution. Currently, Tehran is run by the municipality in association with the Islamic City Council, which has 15 elected members. The mayor is the executive manager and is elected and supervised by the City Council. The central municipality directs and monitors the 22 municipalities of the 22 districts of Tehran, which are each run by their own mayor. The districts each consist of various departments, deputies, and advisors. All of these organizations, managers, and directors are subject to control of the central government, multiple ministries, and, above all the president and the supreme leader. As a result, they often lack the authority, confidence, and power to execute their missions and deliver required services independently. The administrative system of Iran has remained essentially centralized after the revolution despite the advent of new agencies and organizations, and local democracy is still being deliberately ignored and suppressed.
Although several institutions regulate the city of Tehran at different levels, due to an ailing democracy and lackluster public participation the system is dependent on the decision-making capabilities of those who are in power, and policies are under the influence of major political figures. Under such a complex system, with too many institutions, organizations, and departments that are involved in the governance of the city, it is hard to tell how and where a movement towards a sustainable city can be initiated. On the other hand, the upside is that monopoly of power could accelerate reaching a common ground and making decisions for the future of the city.

Figure 2-18 The City Government Diagram
Rather than visionary ideas and plans, it is usually the connections and political status of individuals in power (mainly the mayor) that determine their success in gaining state and public support and in securing funds for implementing their ideas for the future of the city. This makes the process of decision making faster and easier and is most favorable when those in charge are capable of making wise decisions that would benefit the majority of the city and its residents in the long term and are not meant to merely alleviate the ongoing problems of the city in a speedy manner.

Unfortunately, though, some of the city projects undertaken by the municipality are running behind schedule due to financing problems. Unlike the government, municipalities’ budgets are not available in advance. The government, enriched by oil revenue, sets its budget goals based on the forecasted available revenue and so usually does not run into funding problems in the case of tax revenue shortages. The city, on the other hand, has to meet the budget by collecting taxes.

2.5 Current Policies

Currently, different planning consultants are commissioned by the municipality to draw up master plans for each of the 22 districts of Tehran. In theory, they can determine the development patterns of each district but their plans should still be congruent with the comprehensive plan of Tehran, which is based on the network of highways and streets and has an automobile-oriented structure. Therefore, even though the municipalities of districts 21 and 22 claim that they have adopted a range of environmentally-friendly measures in their plans,
the development pattern of the area still promotes auto-mobility and is not pedestrian-friendly at all.

2.5.1 Transportation as a Focus

Tehran’s current mayor, Ghalibaf, has carried out a number of projects begun when Karbaschi was mayor, including the restoration of cultural complexes, the construction of highways and tunnels, and the expansion of Tehran’s metro system.\textsuperscript{133} Owing to these efforts, in 2011 the Institute for Transportation and Development Policy (ITDP) named Tehran as one of the winners of that year’s Sustainable Transport Award (STA), with Guangzhou taking first place. The STA is awarded each year to cities recognized for reducing air pollution, increasing mobility, and improving the safety and accessibility of walking and cycling.\textsuperscript{134}

Among the achievements recognized, in 2010 Tehran’s subway system added 77 new kilometers to the existing 159 kilometers of metro lines. Additionally, the city invested in a 100-kilometer bus rapid transit network (BRT), serving 1.8 million passengers daily, and implemented a bike-share system with multiple stations in one district of Tehran.\textsuperscript{135}

In what could have been an opportunity to showcase his success in implementing sustainable transportation and display Iranian national achievements before an international audience, Ghalibaf was invited to the 2011 Sustainable Transport Award in Washington, DC. Unfortunately, the Iranian government denied his exit permit and he could not leave the country.\textsuperscript{136} Not coincidentally, in 2010 Ghalibaf had been in conflict with President Ahmadinejad about the metro’s development budget.\textsuperscript{137}
The development of Tehran’s metro system has been hampered by political power struggles over its management and financing, with the funding planned to come from both the municipality and the national government.\textsuperscript{138} Parliamentary legislation authorized a $1 billion payment to the Metro Company in 2010; however, the money was not disbursed by the Ahmadinejad administration as scheduled.\textsuperscript{139}

Additionally, the use of congestion pricing to reduce rising rates of car ownership has been one of Tehran’s most successful initiatives for sustainable transport. Unfortunately, at this point it is unclear if the policy has reduced traffic and whether funds will be used to support sustainable forms of transportation.\textsuperscript{140} The lack of funding highlights that the support of the government through legislation, taxing, and infrastructure investment is essential to successful developments in sustainable transport.

### 2.5.2 Transportation Modes and Services

Tehran is a massive metropolis, and the magnitude and complications of its mobility challenges go beyond the regional scale. Types of transportation services in Tehran can be defined along a continuum according to types of vehicles, passenger-carrying capacities, and operating environments. Various factors such as the origin and destination of the trip, time of day and day of the week, and the social class of the commuter define the mode of transit that residents of this city use.

i. **Private automobiles**
Tehran has experienced serious problems such as air pollution and congestion due to the rising rate of car ownership. There are more than 3.5 million automobiles and 2.2 motorcycles in the streets of Tehran.\footnote{141} This is four times the number of cars that existed four years ago (1300-1500 cars are added to the streets of Tehran every day).\footnote{142} The capacity of roads has only doubled over this time and there are only 972,000 parking spots in the city while there is a need for an additional 523,000 spots.\footnote{143} Thus, the streets of Tehran become more congested every day and, consequently, driving becomes more challenging.

Nevertheless, despite the heavy traffic jams, drivers find creative ways to navigate through traffic on the streets of Tehran. Drivers inevitably learn to drive aggressively and defensively at the same time. These drivers use every inch of space to get through the traffic. In the absence of lane dividers, cars pass each other by going into the traffic lane moving in the opposite direction, if there is room, and when an oncoming car approaches they slow down to avoid a collision. They follow the unwritten rules of driving in the capital.

In the expressways of Tehran, the automobile creates a completely different experience of urban life. Even though most of the expressways are jammed during rush hours, drivers tend to speed up if the opportunity allows. Speeding sometimes seems to be a rebellious act done mostly by the youth and cab drivers for various reasons like drawing attention, dismissing the pressure of being stuck in standstills for hours, and reaching their destinations as soon as possible. This situation changes the quality and character of the urban environment and makes it unsafe for both the pedestrians and the drivers.

Moreover, cars are popular due to the sense of privacy that they offer. When in the car, people can listen to the music they like, talk the way they want, and avoid being caught by the moral police for what they wear. When they are not allowed to express their opinion in the
public spaces and live as they wish, they withdraw from their restricted public lifestyle and start to express themselves in the private sphere. As mentioned earlier, since the Islamic regime of Iran has created multiple layers of urban life in Tehran, and since self-expression is limited to private spaces, the amount of privacy one can have in public gains a great deal of value.

The car culture is to a great degree similar in Tehran and an American city like Los Angeles. Vesta Zareh believes that residents of both cities love the idea of owning a car as much as they want to own a place to live. Private automobiles are the most important means of transportation and, more importantly are part of the city culture. She believes automobiles are the symbols of 21st century prestige and affluence and define one’s mobility and position in the city. In Tehran there is an obsession with cars and driving particularly among the youth. They practice “cruising” and “car flirting” and exchange phone numbers while driving their cars. For them, the car means individualism and freedom.

ii. **Metro**

The initial plans for Tehran’s metro system were laid in the 1970s. However, the Islamic revolution and the war between Iran and Iraq put a hold on its construction. Later, in 1985, Tehran Urban and Suburban Railway Company was established to own and operate the metro system, and its development started with the help of foreign corporations (e.g. RATP). Currently, four lines (lines 1, 2, 4 and 5) of the metro are operational, and three more lines are to be constructed. (Figure 2-19) Line 5 is an above ground commuter line connecting Tehran to the city of Karaj.
The metro is a much faster means of transportation to get around certain parts of Tehran compared to the other options. It is also more efficient and convenient since it runs on a timetable. According to a post on TheCityFix, “rates of construction of the mixed light and heavy rail system has just recently seem [sic] to have eclipsed freeway construction, as city planning officials have realized that an auto-centric approach has thus far failed commuters.”147 The current mayor, Mohammad-Bagher Ghalibaf, believes that Tehran’s metro has the potential to increase to 4.5 million passengers a day from its current 2 million, provided that new rail lines are constructed and new cars and more stations are added. This, however, depends on whether or not the government approves the required development budget.148
iii. **Bus Rapid Transit (BRT)**

The city has recently invested heavily in five BRT lines extending more than 100 kilometers, which transport 1.8 million passengers per day with an integrated electronic fare system. The network is planned to have seven lines, with three of the lines already operating. Each of the first three lines has its own corridor and reserved platforms.

According to Montazeri and Hashemi, three years after launching the first BRT line, travel time in the BRT-served routes has decreased by 35%, the number of bus passengers has increased by 300%, and air pollution has decreased by 45%. Close to 35% of BRT passengers had never used the regular bus system for their commuter trips before. The first line was operated by the government agency, but arrangements are being made to prepare new routes for private-sector investment. To encourage the use of these facilities, a handful of major streets (such as Vali-asr) have turned into one-way systems, making buses the only way to commute in these routes.

iv. **Bus and Minibus**

Conventional buses and minibuses are indeed the cheapest means of public transportation in Tehran. Both are operated by public and private companies. Public buses and minibuses are much cheaper than the private ones due to the subsidization offered by the government. Private busses run on a schedule and tend to be less crowded than public busses. The problem with public buses is that in most cases they do not operate on a time schedule. They can also get crammed with passengers at peak hours due to the high demand for cheap transportation. In respect to Islamic and cultural rules, there is a sex-segregation policy on
public buses, with women riding in the back and men riding in the front. This rule, however, is not enforced in minibuses, whether public or private.

v. Taxies

Taxies are a major component of Tehran’s public transportation system. According to the Tehran Taxi Management and Supervision Organization, currently around 21.2% of trips in the capital are made via taxies. There are different types of taxies, ranging from government- (Tehran Taxi) and privately operated companies to the service provided by individuals (unofficial taxies) in the form of shared taxies (yellow and green taxies). Also, call taxies, private taxies, women’s taxies, and vans operate throughout the capital.

Shared (collective) taxies could be considered as a form of carpool. Up to four passengers share a taxi (previously the number was five passengers, allowing two passengers in the front, with the driver). Drivers, who work on fixed routes, wait for passengers in designated taxi stops in key locations and strategic points and leave the stops to go to their destinations when they are full. Drivers of other shared taxies are open to offers from a largely fixed set of popular nearby locations. They drive around and stop for passengers who are hailing taxies by standing on the street side. Once drivers spot potential passengers, they slow down with the passenger window rolled down and wait for the passengers to shout their destination. Based on the number of passengers and their destinations, drivers decide whether or not to stop.

It is common for commuters to combine walking with multiple cab-rides to reach their destination. They also can negotiate a higher fare with the driver and get a ride directly to their destination. Based on the negotiation and the fare, a driver may or may not pick up other
passengers. Overall, shared taxies are considerably cheaper than privately operated ones and are a cost-effective and efficient mode of transport between Tehran’s major centers.\textsuperscript{157} There are also call taxies available with much higher rates that pick up passengers from their origin and drop them off at their destination.

Additionally, there are a significant number of unregistered taxi drivers in Tehran. These drivers use personal cars that function as taxis, mostly as an alternative source of income for the owners. A relatively new service is the Women’s Taxi. Women who prefer to move around in cabs with women drivers can call the taxi services that are run by women, for women only.\textsuperscript{158} Many of the customers are highly conservative Muslim women who feel uncomfortable traveling alone in a vehicle with an unknown man.

\textbf{vi. Motorcycles}

In dense areas of the city, motorbikes are a rather convenient means of transportation during the rush hours. They are gaining popularity every day\textsuperscript{159} and are among the fastest and most flexible means of transportation offered today. Most of these motorcycles are equipped with simple and affordable two-stroke engines. These engines account for a significant portion of air pollution and damage to the environment.\textsuperscript{160} In the absence of regulations and effective law enforcement policies, motorcycles use every bit of available space to squeeze and maneuver through the cars. Although women are legally allowed to obtain motorcycle licenses, there are no female motorcyclists in the streets and they only ride on the back seat.\textsuperscript{161}

A relatively new phenomenon is that of motorcycle taxis (Figure 2-20) in congested areas of the city. They are widely used by men as a means of transportation in spite of their extremely poor safety measures (passengers are never given a helmet) and comparatively high
fares. They are also a gender specific mode of transit since women are not allowed to ride on motorbike taxies.\textsuperscript{162}

\textbf{vii. Bicycles}

Bicycles were used as an economic means of daily transportation (especially by lower-income classes) before the sharp hike in car ownership in Tehran that caused the streets to clog. Subsidized gas, which has made driving affordable for the majority, along with the natural slope of the city, plays an important role in the declining popularity of biking as a transportation mode. Also, Islamic and cultural restrictions limit women to cycle only in designated areas. These rules restrict women from riding bikes in public spaces, and cycling areas are provided in Parks (such as Chitgar Park) for recreational purposes only.
However, over the past few years, biking has gained more popularity, thanks to Ghalibaf’s vision for a greener city.\textsuperscript{163} He has been promoting cycling to help ease traffic congestion, improve air quality, and accommodate health- and fitness-oriented Tehranis.\textsuperscript{164} As part of an experimental program, the municipality has developed a bike-share system—similar to the ones launched in European cities—in one of Tehran’s districts and has established a number of bicycle venues, known as “bicycle houses” at metro stops in this district.\textsuperscript{165} Due to the major elevation difference in the north and south of the city, the program organizers have hired an engineering firm to design bicycles that can handle the slopes, perhaps even ones with rechargeable electric engines that can assist with elevation gain.\textsuperscript{166}

Currently, there is a growing network of bicycle lanes in twelve districts of Tehran, district 22 being the major one\textsuperscript{167}; however, there is a lack of traffic rules and supervision over these lanes. Nonetheless, the municipality’s goal is to make streets of the entire city conducive to cycling.\textsuperscript{168}

According to Pucher, Komanoff, and Schimek, “the possibility of accidental injury and death is a major obstacle to bicycling. Making cycling as safe as or safer than driving will require major behavioral changes by both drivers and bike riders.”\textsuperscript{169} Such changes are necessary in Tehran. According to the same source, “establishing motorists’ accountability for their actions toward cyclists” could also promote cycling.\textsuperscript{170} Educating motorists about cyclists’ rights and enforcing traffic laws that allow cycling on most streets could also be helpful.\textsuperscript{171}

Critics might argue that separating bicycle lanes and paths is not enough to increase the safety of cycling, but evidently, according to Tolley, rail trails and mixed-use greenway paths have boosted recreational bicycling, and “strategically located cut through paths” promote utilitarian cycling by reducing the time of commutes.\textsuperscript{172}
viii. Walking

The modernizing plans that have been implemented in Tehran throughout its recent 200-year history have altered and spoiled the pedestrian-friendly structure of the city and its walk-able urban fabric. Even though congestion in some areas of the city makes driving and cab-riding an extremely slow and painful experience, people still prefer to ride in taxies or drive; one such reason might be the poor quality of sidewalks and the fact that walking is not facilitated. Safety concerns could be another reason. Footbridges and underpasses are scarce on the streets of Tehran, and stop signs are not used at crosswalks.

Pedestrians are strongly protected by the law, making the driver always at fault in case of accidents. Law makes drivers liable for all the damage to the pedestrian and to the family of the victim. However, cars, motorcycles, and pedestrians all have equal status in the streets meaning that pedestrians have as much of right of way as the cars do. Consequently, even with a footbridge available nearby, pedestrians may choose to cross the streets hoping that the drivers will slow down or swerve for them to pass. (Figure 2-21)

Figure 2-21 Pedestrians Crossing a Street in Tehran
2.6 Conclusion

The history of Tehran’s development can be divided to two main eras, before and after the proposal of the comprehensive plan. Before this proposal the city’s formation was very “liquid” and took its form from global and local political and social events. After the proposal of the comprehensive plan, development became more regulated. However, there have been many instances of ignoring these regulations, which suggest a lack of municipalities’ ability and/or desire to enforce regulations.

The most prominent alteration of the city based on the comprehensive plan was the city’s development around the network of highways, promoting car-oriented transportation. This created a “knot” that only became more and more complex as the population grew and the centralization of Tehran persisted. It is safe to say that if there is one problem in Tehran that can be solved, transportation is that problem. Tehran, like many megalopolises, is a city dictated by traffic circulation; refining its transportation system can have a significant effect on the overall quality of life of its inhabitants.

An overview of the social, political, and cultural situation in Tehran shows that creating change at the policy level is an arduous task and is affected by a multitude of factors far beyond the reach of designers. Creating a properly designed case study at a smaller scale and in a less developed area, and consequently proving its efficiency, will help to gain the attention of officials and encourage them to apply these policies and regulation to larger scales.
Chapter Three

Municipal Districts 21 and 22
3.1 History of the Area

In the post-1960 years, the city expanded considerably in all directions, particularly towards the west and east. According to Vanstiphout, Gruen and Farmanfarmaian’s plan for Tehran turned it into something between a central city and a linear one by expanding and pulling it in a westerly direction along the foothills of the Alborz Mountains. In this plan, the boundaries for the growth of the city were to be expanded every five years.

However, after the Islamic revolution, five-year intervals in expanding the city were abandoned in order to provide more land for development. The city expanded straight to the 1991 end-boundary, and development started in Western Tehran. In the comprehensive plan, district 21 is designated for manufacturing and freight industries while district 22 is planned as the recreational center of the province. (Figure 3-1)

![Figure 3-1 Major Land Uses Based on the Comprehensive Plan](image)

*Source: Author, based on comprehensive plan maps by Boomsaazgaan*
3.2 District 21

Municipal district 21 did not exist before 2004, and this sector of the city was a part of municipality district 9. Currently, district 21 is one of the vastest districts of Tehran with an area of 5,156 hectares (7.8% of Tehran’s area), which is divided into three sections (Nahiyeh).\(^{177}\) (Figure 3-2) It is also one of the least-populated areas of the city, accommodating 2.1% of Tehran’s population in 2005.\(^{178}\)

![Figure 3-2 Three Sections (Nahiyeh) of District 21](http://www.hamshahrionline.ir/news-81473.aspx)

Thanks to the Mehrabad Airport, Tehran-Karaj Highway, Karaj Highway (Jaddeyeh Makhsoos-e-Karaj), Fath Highway, and the railway to the south of Fath Highway, advantageous freight access has been one of the defining historical features of the district’s industrial land supply.\(^{179}\) (Figure 3-3, Figure 3-4) Its uniquely advantageous location for industrial land appears
to be well situated for continued growth in distribution activity, benefitting from the primary freight corridors of the province and the existing transportation infrastructure in the area. It is now one the most important parts of the economic base of the city—and the country—and brings income into the region.180

![Map of districts](image)

**Figure 3-3 Development of industries in District 21 from 1838 to 1979**

*Source: Author, based on industrial management studies maps by Zaadboom Consultants Inc.*
Over the past few decades, district 21 mostly accommodated workshops, industrial and manufacturing buildings, warehouses, and transportation terminals, and it did not have vast areas of residential land use; however, after the revolution there was an increase in military and residential land uses of the area.  

(Figure 3-5) However, these uses are not evenly balanced in the three sectors of the district. In sector one, 55.5% of the land use is residential, while in sector two only 8.4% of the area is residential, and 33.6% of land use is residential in sector three.  

Freight industries, storage and distribution centers, and heavy products manufacturing—such as the auto industry—have become major basic industries in this district and the region.  

Unfortunately, 79.5% of the manufacturing buildings and workshops of the district are located next to residential areas with no proper buffers.  

Due to a lack of protective measures and safety standards, the waste and pollutants generated by these buildings trouble the employees as well as the residents of the district, in addition to creating disturbing characteristics such as dirt, noise, glare, heat, odor, etc.
The biggest concentration of residential buildings (61%) is located in sector one. (Figure 3-6) Large portions (46.3%) of industrial uses are located in sector 2, and sector 3 has large areas (62.1%) of vacant and undeveloped land.\(^{186}\) The district’s residential communities are far apart, separated by military (19.76% of the district’s area) and industrial lands (35.45% of the district’s area).\(^{187}\) (Figure 3-5, Figure 3-6) The current separation of uses in the district requires more auto trips for shopping and services and precludes the expediency provided by a sensible mix of uses. A compatible mix of commercial, residential, and industrial uses can improve the current situation.

Figure 3-5 The Existing Zoning and Land Uses in District 21
Source: Author, based on the maps in the master plan of the district, Zaadboom Consultants Inc.
Figure 3-6 Residential Complexes (in Lighter Color), which are Separated by Non-Residential Land Use
Source: Author, based on the maps in the master plan of the district, Zadboom Consultants Inc

Other than the pollution generated by the district’s industries, the separation of uses, and the absence of buffer zones between different uses—with different transportation access, site characteristics, and requirements—the additional major problems of district 21 are a car-centered urban design, with a streetscape which is not conducive to walking, and the lack of a good public transportation system. There is also a lack of recreational and public green spaces in the area. (Figure 3-7, Figure 3-8, Figure 3-9, Figure 3-10 An Example of District 22 Residential Blocks in a Car-Oriented Urban Layout)
Figure 3-7 The Proposed Land Uses and Layout of District 21
Source: Author, based on the maps in the master plan of the district, Sharestan Co.

Figure 3-8 The Proposed Transportation Network
Source: Author, based on the master plan maps of the district, Sharestan Co.
Figure 3-9 The Auto-Oriented Urban Design of District 22
Source: Author

Figure 3-10 An Example of District 22 Residential Blocks in a Car-Oriented Urban Layout
Source: Author
3.3 District 22

Before the 1970s, there was almost no urban infrastructure or any significant urban fabric in this section of the city. In the comprehensive plan of Tehran designed by Gruen and Farmanfarmaian, this area was included in the city boundaries. It expanded over almost half of Latmar and Vardavard (two of the ten large urban and fairly self-contained districts), which from 1970 to 1981 were separated from each other by green belts. About 20% of district 22’s lands were subdivided and privatized. The rest of them were divided into big parcels (1,000 square meters and over) for public use.\textsuperscript{188}

After the Islamic Revolution, properties in this section of the city that mostly belonged to the Farmanfarmaian and Firouzgar families were declared public, and a large a part of these lands was assigned to the Urban Land Organization. Also, another major property owner of the Kan area, Ayatollah Molla-Ali, endowed about 500 hectares of land.\textsuperscript{189}

Since the lands were available, during the Iran and Iraq war (1980-1988), military forces occupied 25% of the district for military uses.\textsuperscript{190} Some development cooperatives also began housing developments in the designated residential lots, and later on, due to the problem of overpopulation and the ever-increasing demand for housing, city officials decided to start developing this section of the city based on logistic plans.\textsuperscript{191} In 1996, the master plan for the development of the district, designed by Bavand Consultants Inc., was approved for the first time with the promise of turning this district into a well-planned, environmentally conscious urban development with a systematic pattern. These plans were reviewed and revised later by Bavand Consultants Inc. and Arman Shahr Company to resolve some of their implementation issues, and when the master plan was officially approved by the parliament in 2000, the municipality of district 22 started working on it.\textsuperscript{192}
Now, with an area of more than 6,000 hectares, district 22 is the vastest district of Tehran. The Alborz mountain range in the north, Kan floodway in the east, Tehran-Karaj Highway in the south, and the city boundaries of Karaj in the west surround this district. With the biggest sport complex of the country (Azadi sport complex), Chitgar National Park, and vast areas of open green space, district 22 is planned to be the recreational center of the city and also of the province.

Currently, military forces occupy considerable areas of land for uses such as helicopter manufacturing, garrisons, military training camps, and equipment storage facilities. In the northeastern section of the district, several residential communities have been developed by different public sector cooperatives, mostly for low-income groups and government employees. Universities and research centers also own a portion of the properties and have started developing them for campuses and research centers as well as for housing for their employees. Nonetheless, the existing extensive undeveloped and vacant lands of the area offer a great many opportunities for further development. (Figure 3-11)
District 22 is connected to the rest of the Tehran through the Tehran-Karaj metro line, two north-south highways, and three major east-west highways. Also, the foothills of the Alborz Mountains and the topography of the district, coupled with Chitgar National Park and the river/floodways of the area, create a unique environmental quality for this district. Thus, the district has many desirable characteristics for recreational uses. On the other hand, given the amount of undeveloped land in this section of Tehran, it can be an ideal destination for those who want to leave the most populated areas of central Tehran and settle in the quieter and less-polluted periphery. The challenge is to maintain a good balance between developed lands and open spaces.
The major wind flow in the Tehran area is from west to east, and the local wind blows from the northern mountains to the south. Because these winds are critical for dispersing the air pollution away from the city, the urban fabric of western Tehran should be planned and designed in a manner that does not block the wind flows. Therefore, the placement of development, building height codes, floor-area ratios, and the layout of buildings are of great importance and should be given a great deal of attention by planners.

Unfortunately, although the planners claim that sustainability has been a priority in the design of the district, and some efforts have been made to ensure sustainability (e.g. designing a 140 km bicycle lane network), the development plans are still automobile-oriented, with an extensive network of highways and arterial roads connecting different parts of the district to each other and to other areas of the city. (Figure 3-12, Figure 3-13)

![Figure 3-12 An Example of District 22 Residential Blocks in a Car-Oriented Urban Layout](source: District 22 of Tehran Municipality, accessed March 18, 2009, www.district22.org.)
Services are laid out along the major arterials. The metro stops have been disregarded to a great extent in these plans, and zonings and land uses are arranged based on the hierarchy of access roads. Separation of uses is another feature of these plans. The creation of an artificial lake is planned next to Chitgar National Park to enrich the environmental quality of the district. Although according to the initial plans, Resalat Highway was supposed to be laid out around the lake, after a series of economic and environmental studies, its path changed; now it is planned
to pass through the lake, over an island in the middle of the lake.\textsuperscript{199} (Figure 3-14, Figure 3-15)

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{image}
\caption{The Existing Land Uses and Major Access Ways and Traffic Corridors in District 22}
\end{figure}

Source: Author, based on the master plan maps of the district, Sharestan Co.

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{image}
\caption{The Proposed Land Uses and Layout of District 22}
\end{figure}

Source: “Master Plan of District 22,” Sharestan Co.
Chapter Four

New Urban Development Paradigms
4.1 Problems of Auto-Oriented Development

The growing number of publications on rising traffic volume and congestion in most cities and towns reflects citizens’ escalating concerns about the problems of an automobile-dependent world. Yet, vehicle ownership and miles driven per capita are increasing all over the world, and no one has been able to introduce an easy way to reverse this trend. However, experts in sustainable transportation and urban design have proposed a number of combined strategies.

The invention of cars, along with cheap petroleum, has changed the way cities are laid out, and pedestrians’ needs have been sacrificed in the modern world to facilitate movement of vehicles. More freeways and ever-larger parking lots, arterial systems, street networks with few intersections, many wide lanes, and soft sweeping turns have taken the place of safe, comfortable, and visually appealing streets with direct links to close destinations such as shops, schools, services, or recreation areas. Currently, the automobile dominates the streets, which used to be shared by shoppers, bikers, trolleys, pedestrians, and cars. The automobile also dictates the form of our cities, the scale of our streets, and the orientation and placement of buildings.200

In his Cities for People, which was published in 2010, Jan Gehl discusses the change in paradigm that happened in the 1960s and views the city through the human perspective.201 He states that the booming auto industry enabled people to bring their personal cars to the streets, and notes that urban planners and traffic engineers made sure there was enough capacity for the increasing number of cars that roamed the streets and that helped people to commute. According to him, the modernist approach to urban planning, which was adopted in this auto-boom era, has failed society by shifting the focus to the form of the built environment and
automobile and away from people. In his opinion, city planners have been laying out cities based on how they look from the sky, and architects have been designing large structures with attractive forms that are out of scale and lack details. They have forgotten the fact that people need livable, sustainable, safe, and—more importantly—humanly scaled cities. 202

American cities are among the most dramatic examples of car-oriented development in the world. According to Peter Calthorpe, a strong cultural preference for isolation among Americans, whether through living on large lots or driving private automobiles, in addition to plentiful land and a powerful automobile industry, led to homogenous, out-of-scale, and sprawling suburbs in the United States after World War II. 203 These dwelling patterns gained popularity because they promised “privacy, mobility, security, and ownership.” 204 However, for half a century they have not delivered what they have promised. Some fifty years later, society has begun to realize that these attractions were followed by a series of environmental, social, and economic costs and consequences.

Among the public and environmental costs of auto-dependent development are high individual and household transportation expenses, auto maintenance and storage, and construction and improvement of roads, which are added to the cost of new housing through development fees. Yet, what is more important to consider are the long-term negative externalities of traffic congestion, air pollution, squandered energy, time lost to commute distances, and lost open space and agricultural lands.

On the other hand, it is hard to measure the benefits of auto-mobility accurately, and there is very little known about the profits of the car culture in a quantitative sense. Analysts who think the social benefits of motor-vehicle use exceed the social costs propose higher economic productivity, the freedom and flexibility of auto travel, and door-to-door service
features of the car as advantages of automobile.\textsuperscript{205} Even if we were to accept that this is true for those who own a car, for those who cannot afford or choose not to have one, the costs of auto-dependent development outweigh the benefits. Also, there is no guarantee that these benefits will stand the test of time.\textsuperscript{206}

We need to address the negative consequences of an auto-reliant world before it is too late. While some environmental problems such as air pollution, noise pollution, and energy consumption are commonly recognized as negative outcomes of the car-culture, other environmental concerns are not as commonly known as consequences of car-oriented development. Some of these include: environmental damages, such as the decline of farmland, wetland, and open space (due to low-density development); water contamination; the decay of natural landscape; and climate change.\textsuperscript{207} Therefore, a more compact urban form, from the standpoint of public finance and economy, is more cost-effective, environmentally friendly, and, thus, desirable.

Traffic congestion is one of the most challenging problems of car-oriented cities. By considering the road space as a shared, underpriced public resource, traffic congestion can be analyzed as “a classic case of the tragedy of the commons.” While traffic jams affect all of the vehicles that are over-consuming the road space, no one pays the actual marginal social costs of the waste of time and energy, the emission of extra pollutants in the air, increasing accidents, and the decline in the productivity of commuters due to the stress caused by sitting in traffic jams.\textsuperscript{208}

According to Cervero, these externalities should be accounted for when setting optimal congestion levels. Traffic congestion can be a sign that driving is underpriced or is time-competitive with other modes of transit, and to combat the problem of congestion these issues
should be addressed. Although the common response to traffic congestion has been to build new roads and widen existing ones, studies show that new road capacity is not effective in the long term as it attracts new growth and more vehicles and prompts motorist travel.\textsuperscript{209} Constructing more roads tends to address the symptoms of a cause, rather than the cause itself. However, a network of sidewalks, pathways, bikeways, and transit routes can promote alternative modes of travel and reduce automobile use.

### 4.2 New Urbanism Theories

New Urbanist ideas emerged almost three decades ago in the United States as a reaction to the conventional suburban development pattern, known as sprawl, to advocate environmentally responsible developments. The focus of urban design shifted again towards people and human needs, and planners and architects started to address the lack of livable, sustainable, healthy, attractive, humanly scaled, and safe communities.\textsuperscript{210} Walkability, diversity, and regional planning were some of the core principles of New Urbanism. Similar concepts were introduced with different names such as Urban Villages, Compact Communities, Pedestrian Pockets, Traditional Neighborhood Development (TND), and Transit-Oriented Development (TOD) to map out the future growth of American cities. These concepts shared a common perspective and set of goals and were different only in details and emphasis.\textsuperscript{211}

The formation of the Congress for New Urbanism (CNU) in 1993 by a group of architects and planners, including Andres Duany, Elizabeth Plater-Zyberk, Peter Calthorpe, Daniel Solomon, Stefanos Polyzoides, and Elizabeth Moule, was a catalyst for the movement.\textsuperscript{212} CNU is currently the leading supporter and promoter of New Urbanist ideas and has managed to attract over
3,000 members. Regular conferences around the US are among the other activities that this group uses to further promote New Urbanist design principles.\textsuperscript{213}

According to The Charter of The New Urbanism:

The Congress for the New Urbanism views disinvestment in central cities, the spread of placeless sprawl, increasing separation by race and income, environmental deterioration, loss of agricultural lands and wilderness, and the erosion of society’s built heritage as one interrelated community-building challenge.\textsuperscript{214}

The New Urbanists stand for:

...the restoration of existing urban centers and towns within coherent metropolitan regions, the reconfiguration of sprawling suburbs into communities of real neighborhoods and diverse districts, the conservation of natural environments, and the preservation of our built legacy.\textsuperscript{215}

The CNU states that “physical solutions by themselves will not solve social and economic problems, but neither can economic vitality, community stability, and environmental health be sustained without a coherent and supportive physical framework.”\textsuperscript{216} In the charter, 27 principles are provided to “guide public policy, development practice, urban planning, and design.”\textsuperscript{217}

Peter Calthorpe was among the first group of urban designers who declared the necessity of rising to the challenge of introducing “the needs of the pedestrian and transit into the auto-dominated regions of our metropolitan areas.”\textsuperscript{218} His goal was to introduce practical ways to save land, energy and resources, reduce traffic, provide affordable housing, give children and the elderly more access, and shorten the commutes of working people.\textsuperscript{219}

Calthorpe, who was a co-founder of the CNU and its first board president, is best known for introducing the concept of Transit-Oriented Development in \textit{The Next American Metropolis: Ecology, Community, and the American Dream}, published in 1993.\textsuperscript{220} In this book, in opposition to suburban settlement patterns of the time, he offers physical design concepts and guidelines
for the preservation of the environmental quality of neighborhoods and districts, improvement of social life, and enhancement of a sense of community.

Being an architect, urban designer, and land-use planner with a practical approach, he tried to go beyond the policy statements that are, as he put it, “typically lost in implementation.” He claimed that he has created a “tool that can be used for the larger structuring of a region as well as the design of a neighborhood.”

Calthorpe’s design strategy for an urban form of development around transit is based on: preserving the delicate habitat, riparian zones, and high-quality open spaces; organizing growth to be dense and transit supportive on a regional level; creating pedestrian-friendly street networks with a high degree of connectivity; orienting buildings and neighborhood activity to the sidewalk and public places; providing a variety of housing types; encouraging infill and redevelopment along transit corridors within existing neighborhoods; and locating mixed-use facilities within walking distance of transit stops.

These principles aim to create communities that are walkable, human-scaled, diverse, and integrated in use, and which are, as he states, “in stark contrast to a world dominated by specialization, segregation, lack of scale, and centralization.” The communities are meant to counteract the problems caused by suburban growth, environmental stress, a lack of affordable housing, intractable traffic congestion, decay of open space, and decline of lifestyle quality which “burden[s] working families and isolate[s] the elderly.”

In Calthorpe’s opinion, since human scale and human needs do not change with the advent of each new technology, certain design principles of traditional old towns are timeless and can be adapted to contemporary situations. While auto-oriented development models demand big, isolated, iconic buildings, which can be read at the speed of the car, pedestrians
want “an architecture oriented to the sidewalk, that creates continuity along with diversity, and that has human scale and detail.”

Even if we were to accept that Calthorpe’s idea of the timelessness of human needs (e.g., social needs) is valid, it is important to realize that the modern world requires a new lifestyle with new demands. Time is gaining more value every day, and mobility has never been of such importance in our daily life. Not only are new technologies invented to make our lives more convenient, but also they are designed to save time.

Nevertheless, the auto, which was meant to increase our mobility, “somewhere along the continuum from convenience to congestion,” dominates our lives. It also defines our experience of the built environment and has many implications on our settlement patterns, such as segregation of culture, land use, and change of scale. The quality and placement of development, which used to be determined by natural systems and human scale, is now being guided by cars.

Gehl believes that architecture has a significant influence on people’s lifestyle and that buildings and cities shape citizens. He argues that the approach to urban planning has to change to a bottom-up perspective, where the main focus is on people and their needs. He compares out-of-scale car-oriented neighborhoods with human-oriented urban fabrics and demonstrates how diverse pedestrian- and bicycle-friendly neighborhoods with tree-lined streets, roadside cafés, and street-oriented retail stores can attract the public, while large-scale car-friendly form-oriented urban fabric puts people off. Thus, the presence of people brings safety, liveliness, and allure to human-oriented neighborhoods and attracts more people to the area, which leads to a desirable and healthy urban environment.
4.3 Development and Transportation

Five years after the publication of *The Next American Metropolis* and the introduction of Transit-Oriented Development, the noted transportation expert Robert Cervero addressed the problem of auto-dependent development on a larger scale in his book, *The Transit Metropolis: A Global Inquiry* (1998). In *The Transit Metropolis*, he argued that the New Urbanism Movement had been focusing on the neighborhood and community levels and was only proposing micro-scale pedestrian-friendly designs.\(^{231}\) In Cervero’s view, although there is an essential need for physical guidelines and good-quality designs for places that are physically conducive to transit riding, they cannot solve the problems of an auto-oriented world.\(^{232}\) As he states, “Islands of TODs in a sea of freeway-oriented suburbs will do little to change fundamental travel behavior or the sum quality of regional living.”\(^{233}\)

Cervero asks why automobile use continues to grow and public transit use is declining, and what characteristics and strategies can reverse this trend. He points to the increase in personal incomes and car ownership, affordable parking, and the expansion of cities and metropolises as factors that have led to a decline in transit use worldwide.\(^{234}\) From the standpoint of a planner, he analyzes the issue at the regional scale versus the local scale and tries to emphasize the importance of coordinating transit-supportive development at a metropolitan scale.\(^{235}\)

The transformation of urban form and transit over time, their mutual impact on each other, and the motivations for coordinating transit and urban development are the subjects of study in this book. It examines the public policies that, in combination with the model of a transit metropolis, can lead to a more sustainable city. Based on the collective evidence from case studies, Cervero discusses the lessons learned and their implications for transit systems and
the cities of tomorrow. He has come to the conclusion that many common beliefs about transit and the city are false and can be reversed.\textsuperscript{236}

From his studies, we can learn that transit is not necessarily only a means of transport for the underclass and marginalized population, and that improving the quality of transit will attract middle-class households and will polish transit’s image. Good transit and prosperous environments can support and boost each other.\textsuperscript{237} Transit can attract riders and, therefore, generate profit if high-quality service is provided. To provide high-quality service, transit supply should match the cityscape.\textsuperscript{238}

We also learn that “Public transit” does not literally mean publicly owned and operated transit. Private-sector enterprise can also be involved in the business of designing and providing efficient transit services, while governments still own and control non-rolling-stock assets such as railway tracks, land, guideways, and buildings; the supply, quantity and price of services, and competitive tendering are used to reduce costs.\textsuperscript{239}

Another important lesson is that compact development and high densities can be appealing to people by enriching consumer choices and providing good-quality transit, coupled with community amenities such as on-site recreational facilities and attractive landscaping. The objective of high-density development is to induce transit ridership and serve the society as a whole through the environmental benefits of efficient patterns of growth.\textsuperscript{240}

We should realize that the transportation-land-use nexus is of great importance, even in modern societies, in which one can travel from anywhere to anywhere. According to Cervero, policies that underprice and mismanage transportation and land resources are to blame for suboptimal outcomes of transportation-land use. By implementing efficient pricing in the urban transportation sector, transit investments could impact land-use patterns significantly.\textsuperscript{241}
From the standpoint of a planner, Cervero also lists lessons derived from successful transit metropolises. His studies show that successful metropolises always benefit from inspired leaders with passion, determination, and commitment who are able to articulate their vision and win over others to follow a desired course of action. In addition, he believes that well-articulated visions of the future and a clear plan for the development of the metropolis are necessary to gain public and political support.242

Cervero also emphasizes the importance of institutions and governance. To coordinate the decisions affecting transportation and built environments, efficient organization of regional governance systems is required. These arrangements should facilitate a clear and rational division of institutional responsibilities between the public and private sectors. In the transit arena, mainline services like metro lines are mainly sponsored by the public domain, and paratransit feeders are owned and operated by the private sector.243

To remove many of the biases that encourage and sometimes reward auto motoring, successful transit metropolises promote using alternative modes of transportation by putting restraints on auto ownership and driving. This can be achieved through punitive pricing and taxing as well as through regulations and physical design strategies.244

The true economic and social costs of auto motoring can be compensated to some extent by steep surcharges on gasoline and automobile purchases, large vehicle import duties, expensive central city parking, and road pricing (through an area licensing system that charges automobiles entering downtown zones during peak hours).245 Garaging requirements, alternating a ban on car usage (based on vehicles' license plate numbers), traffic calming, and parking management (limited parking in city center) are some of the other strategies and
regulations that can encourage transit riding, walking, and cycling. These measures are referred to as “auto disincentives” by planners; however, Cervero calls them “auto equalizers.”

Making transit time-competitive with the private automobile by giving preference to “high-occupancy vehicles in the use of scarce road space” is another strategy many transit metropolises have adopted. In these cities, a big portion of downtown streets has been designated for the use of buses, trams, and non-motorized transportation. Competition offers time, cost, and reward efficiency.

In successful transit metropolises, government sets the standards regarding timetables, routing, and fares, and the service is delivered at the lowest cost due to competition. In these places, the public sector owns the fixed capital infrastructure, while the rolling stock belongs to the private sector. By separating asset ownership and service delivery, the public sector can manage the quality of services, and market forces competitively determine their price. As long as the public good is promoted, profiteering is not discouraged in these cities.

Vibrant central business districts are also an important feature of transit metropolises. Nevertheless, subcenters, or hierarchies of second- and third-tier centers, are also essential for mounting and sustaining integrated regional transit networks. A strong-centered metropolis can suffer from mobility problems; therefore, in many transit metropolises, decentralization has occurred to avoid unidirectional, radial flows into a dominant center and the inefficiencies of back-hauling empty buses and trains.

Cervero argues that concentrating mixed-use development along transit-served corridors has mobility benefits that are as effective as more aggressive land-use interventions such as jobs-housing balance and self-contained growth. So, according to him, it is more
important to create balances of housing, shops, jobs, and community services between communities rather than within communities.254

The most important lesson, however, is that of reclaiming cities for people, not cars. Transit metropolises are trying to change the scale of the city to what is compatible with walking and cycling and change the speed at which people experience their built environment.255 In such cities, functional spaces for pedestrians and cyclists are considered basic provisions and not amenities. Transit is at the core of the community, and transit stations are turned into mobility hubs and gathering spaces.256 Civic squares do double duty, while urban furniture and green spaces add comfort and a visual aesthetic to the city.257

Finally, it is important to recognize that land-use visions (ends) should determine the transportation (means), not the other way around. People and places are more important than transportation. As Cervero puts it, “transportation is a means to connect people and places,” and we want to minimize transportation time to be able to spend more time at desired destinations.258

Having studied relationships between transportation and land use the world over, he introduces four classes of transit metropolises, including “adaptive cities,” “adaptive transits,” “strong-core cities,” and “hybrids,” and sorts twelve case studies into these categories.259 These transit metropolises benefit from regional mobility and also pursue objectives such as sustainability, accessibility, livability, social diversity, entrepreneurship, and offering better living, working, and traveling options. Their built form and mobility environment make transit a preferable alternative to the private automobile for traveling.260

“Adaptive transit” regions, according to Cervero, are regions that have adapted their transit systems to fit their low-density land use by employing on-demand shuttles, vans, and/or
flexible bus systems. “Strong-core cities” are those that have integrated transit and urban fabric in the city center by providing a variety of transit services, centered around mixed-traffic light rail systems.²⁶¹

He defines “Adaptive Cities” as transit-oriented metropolises that have adapted their land use to fit around major transit systems such as subways or light rail lines to achieve larger societal objectives, such as preserving open space and producing affordable housing in rail-served communities. The fourth category includes “Hybrids-adaptive cities and adaptive transit,” which are cities that have created a balance between building along mainline transit corridors and making use of transit to provide convenient access to their suburbs and exurbs.²⁶²

“Adaptive Cities” (such as Stockholm, Copenhagen, Tokyo, and Singapore) benefit from dense, mixed-use neighborhoods and new towns located around rail nodes. They are metropolises with strong, dominant Central Business Districts and remote communities and subcenters connected to their Central Business Districts via rail.²⁶³ (Figure 4-1 Transit and Urban Form Relationship in Adaptive Cities) Douglas Porter notes that developers benefit from increased property values when they establish developments around existing transit systems, due to the accessibility and viability of the locations as destinations. Additionally, because a portion of car trips is shifted to transit, developers benefit from reduced parking requirements, including the viability of shared parking.²⁶⁴
According to him, communities that are developed around transit nodes also benefit from the place-making qualities of compact, mixed-use development and experience a smaller increase in the volume of road traffic than would otherwise happen due to the shift of some trips to transit. Transit agencies, on the other hand, gain visibility for transit as a good alternative transit mode and also benefit from increased ridership generated by development near transit.

Although, currently, suburban areas are mostly designed for people who drive their private automobiles, they need to transform and grow around existing transit in order to avoid the problems of auto-oriented development and to provide a wider choice of travel options for their residents. To create successful transit districts around the existing transit in suburban areas (the “adaptive city” model), planners, developers, transit agencies, and public officials need to build a compelling case for the special kinds of development that can benefit from locations...
near transit. According to Porter, the regional, local, fiscal, and economic benefits of this development pattern should be introduced, and innovative policies and incentives should be offered to promote these kinds of developments. Public policy and regulatory adjustments, including zoning and permitting changes, are usually necessary as well.²⁶⁷

Suburban areas with more flexible transit systems such as rubber-tire services can also adopt the “adaptive city” model. Bus transit is capable of shaping urban form since it is the accessibility premium that attracts real estate development and thus shapes urban form, not the type of transit. Therefore, high-density development can happen around bus stops and along busways. In fact, bus transit can potentially be a stronger shaper of urban fabric for its flexibility and adaptability to sprawling patterns of development.²⁶⁸

4.3.1 Planning Principles for Development around Transit

The most widely known principles of New Urbanism, Traditional Neighborhood Development (TND) and Transit-oriented Development (TOD), are similar in terms of promoting mixed-use, transit- and pedestrian-oriented development, a variety of housing types, and high densities. However, in TND (also known as a village-style development), town and neighborhood centers, public spaces, human-scale design, an interconnected network of narrow streets with traffic-calming measures, and elements that create a stronger sense of community are prioritized, while in TODs immediate access to transit is very important.²⁶⁹

It is true that any large-scale urban project, whether it is land use, new development, or redevelopment, should be planned. The goal of these plans should be to attract the market and increase ridership for transit through these projects. Obviously, the quality of transit services
makes locations that are accessible to transit more attractive to households. However, appropriate zoning, a vision for the transit station area, provision of infrastructure, and the granting of incentives for development are also needed in successful transit districts. Moreover, the quality of pedestrian connections between transit stations and destinations are of great importance. Above all, a good design is required to gain public support and enhance the urban fabric.

Planning around transit, however, should be done both at the regional level and at the site level. Proper arrangement of land uses, transit functions, and the activities adjacent to transit are essential to generate transit ridership and support transit riders. On the other hand, the design and mix of uses within walkable and cycling distances of station areas must promote walking and cycling.

Experts believe that an appropriate mix of activity and a good physical design complement each other. A high density of employment and housing creates demand for transit access in rush hours, while the arrival of people creates a need for other public and service uses and the concentration of retail, which will keep the station area active and lively in the hours between and following the daily commute. In the following schematic diagram, Calthorpe presents a visual representation of land use relationships that provides a framework that needs to be modified based on the planning circumstances of each region and locality. (Figure 4-2) The ways in which suburban development patterns relate (or do not relate) to transit, however, vary in the same ways that suburban developments do.270
Figure 4-2 The Concept of Transit Oriented Development by Peter Calthorpe
Source: Calthorpe, The Next American Metropolis, 56.

The suburban developments that are established on a rail line and have clusters of residential area close to stations, with streets and walks providing access to stations, can attract residents who want to live further away from the Central Business District and commute to jobs downtown. However, a good and time-efficient connection between the dots that serve most people’s daily destinations—work, shopping, and school—should be provided in these developments.

The study of successful examples of TODs shows that the focus of planning in the vicinity of stations should be on how the station area functions for pedestrians in order to enhance transit access and ridership. In order to encourage riders to use the services that are provided at the station area, it is also critical to create an interesting urban environment with a sense of place and identity. However, the needs of those riders who come from longer distances,
generally by car or bus, should not be overlooked. To create a balance in the station area, enough parking and transfer facilities should be provided for that group of transit riders.  

A dense district with a mix of uses, which is supported by transit, is not an unprecedented form of urban development. Calthorpe, who is credited with refining the Transit Oriented Development (TOD), advocates a “diverse and inclusionary environment filled with alternative ways of getting around” rather than “a world of private enclaves dominated by the car.” He believes that these qualities have been demonstrated in many older American neighborhoods, towns, and cities and can be updated to match current conditions.  

The best of America’s oldest traditional town planning can be restored in a way that is appropriate to the new condition, the condition which has been defined by the ideology of Modernism and is based on “segregation and specialization, centralization, and an undying dedication to technology.” Although the mixed-use quality of the Main Street in American traditional towns cannot be literally mimicked, new configurations of its design principles are possible—those which incorporate the functional needs of our modern institutions and businesses.  

Calthorpe argues that in traditional towns, age, income, and family size groups, residential and commercial areas, and civic centers may have been physically separated, but they had close, direct, and walkable connections. Privacy was provided through layers of space rather than physical barriers, and security was attained by public observation rather than with walls and gates. The streets had frequent intersections that slowed traffic while allowing it in the neighborhoods. Narrow, tree-lined, walkable streets with sidewalks led to close destinations such as the neighborhood park, daycare, or a school. These towns had “diversity of use and users.”
However, it is important to realize that the planning elements that can be used to create a transit-oriented and pedestrian-friendly urban environment should be put together based on the specifics of the location.\textsuperscript{280} The built environment clearly determines the scale, pace, patterns, and bounds of our culture, which are demonstrated through the aesthetics of place. As a result, an absolute template for designing the built environment cannot be provided, and the specifics of the place, climate, culture, economics, and politics will always impact the directions of our designs.\textsuperscript{281}

Yet, traditional urbanism could inspire us to come up with a transit-oriented urban design that has a sense of place. However, within essentially similar patterns of streets, blocks, and connections, cultural, economic, and environmental preferences should determine types and locations of land uses and densities.

The implementation of pro-cycling and walking policies in Copenhagen is a successful example of new urban design schemes. Reducing car use has improved the quality of life for the citizens, and the reduction in roads has brought the traffic to a new balance.\textsuperscript{282} Wide roadways have been replaced by bicycle lanes, a world-class transit system has resulted in less congestion, and roadside cafés have attracted happier and healthier citizens. People choose to live in Copenhagen instead of moving to the suburbs, and because getting around the city with bicycles and transit is very convenient, there have been only a few complaints about the restrictions on cars.\textsuperscript{283}
Chapter Five

Proposals and Design Guidelines
Before modernism in Iran, the placement and quality of new developments were mainly defined by the natural environment and availability of resources. Now, however, the economy mandates and directs the growth of cities and developments. Urbanization generates a remarkable amount of economic growth and causes innovations that allow the growth to continue in a positive feedback loop. Unfortunately, it seems that we cannot have economic growth without a parallel growth in its negative consequences as a result. The expansion of cities fuels the expansion of economies, and the tension between development and scarcity of resources continues to exist.

In an attempt to improve the modern urban environment, those characteristics of traditional towns which are in favor of the environment and can improve the quality of life for city dwellers could be restored. But we also have to make sure that our cities are economically productive. The goal is to provide new configurations of the design principles of traditional towns while also considering the necessities of modern life. Residents of a modern city need comfortable, safe, and, at the same time, people-friendly urban environments with visually appealing streets and sidewalks that provide convenient access to frequent destinations such as shops, schools, services, and recreation. A humanly scaled built environment that is designed and detailed at the street level can encourage walking and biking and reduce car use.

Knowing that traffic congestion in cities can be a result of underpriced private car ownership, or time-competitiveness of driving with other modes of transit, we could conclude that increasing limitations and cost on auto ownership and driving could help reduce traffic. Thus, policies such as increased tax rates and duties on auto production, import, and trading, as well as steep gas taxation, could be imposed to help alleviate congestion issues in Tehran. Also, traffic-management techniques such as expensive city parking and road pricing (through area
licensing, peak-hour charging, etc.), alternating the ban on car usage (depending on license plate numbers), and physical design strategies could be used to discourage driving and reduce car use in Tehran.

The amount of pollutants emitted by automobiles could be reduced through technological advances and vehicle emission control policies. A decline in the length and number of motorized trips could also be effective. To decrease the number and length of commuter trips, proper zoning and a balanced mix of uses are required. Additionally, an efficient, competitively priced, and high-quality transit system should be provided. More importantly, the city structure and its urban fabric should be conducive to transit riding and the use of other modes of transportation such as bicycling and walking. A consistent network of safe and attractive sidewalks, pathways, bikeways, and transit routes could promote alternative modes of transit, and thus reduce traffic congestion and air pollution.

A good quality transit system can be provided through a clear and rational division of institutional responsibilities between the public and private sectors, coupled with competitive tendering. In free-market economies, mainline services like metro lines are usually sponsored by the public domain and paratransit feeders, and rubber-tire services such as buses and minibuses are owned and operated by the private sector. Unfortunately, the lack of clear division between the responsibilities of the national government and those of the city of Tehran has taken its toll on the quality of transit services in general and on the metro system in particular. Allocation of new funding, for instance, has been a challenge due to ambiguities over the ownership of the system. Such issues have slowed the expansion of the network and deteriorated the quality of service.
A dense district with a mix of uses, and which is pedestrian- and bicycle-friendly is not an unprecedented pattern of urban development in Iran. Old Iranian cities were organized around traditional neighborhoods according to religious, professional, and ethnic divisions, with narrow, walkable streets and vertical and horizontal mixed-use character. Frequent destinations such as schools and shopping centers were easily accessible for pedestrians, and bicycles were an important mode of transportation. Single-use neighborhoods—which segregate housing from jobs and services, promote reliance on automobiles, discourage pedestrian activity, and create a sense of isolation—were non-existent in the old Iranian cities.

In the case of Tehran, the direction for the expansion of the city has already been determined and laid out towards the west. Although this developing sector of the city is sustaining the same general problems as the city as a whole, certain factors are specific to this part of the city. One of the best features of districts 21 and 22 is that they are not fully developed yet, and there is still tremendous potential for more efficient, well-thought-out developments in this region. The development pattern is yet to be determined in a vast area of these districts, and major changes in the current zoning codes, including new zoning sectors, design review requirements, use categories, and approval processes for new plans could be proposed to enhance the quality of development and quality of life for the residents.

“Hybrids-adaptive cities” and “adaptive transit” could be good models for transforming Tehran into a transit metropolis. Tehran needs to create a balance between concentrating development along mainline transit corridors and adapting transit to efficiently serve the existing development clusters and spread-out suburbs. The western districts of Tehran (21, 22), however, can follow the “adaptive city” model since they are still under development
and the existing above-ground commuter rail in the area has the potential to define the development pattern of the urban fabric.

Since Tehran is a dense city without a dominant Central Business District (polycentric), and with a mixed-use structure—except for some neighborhoods such as the bazaar area, Ferdowsi, Motahari, and Shahrak Gharb—employing more flexible modes of transit with multiple and disperse origins and destinations can provide a better door-to-door service for commuter trips. On-demand shuttles and vans, flexible bus systems, minibuses, and collective taxies are examples of such modes of transit.

However, the western section of Tehran could instead be arranged around sub-centers shaped around the outlying rail stations. This rail-oriented development pattern will guarantee two-way balanced flows in the region since sub-centers, or hierarchies of second and third-tier centers, are critical for mounting and sustaining integrated regional transit networks.

Generating the required density to create vibrant centers will not be an issue in Tehran since there is no cultural preference for isolation among Tehranis and they are already used to dense urban environments and living in apartments. However, the concept of separation from others might be of importance for some of the inhabitants of Tehran, due to the multi-layer quality of the urban life and the lack of freedom created by the state. Regardless of the social and cultural implications of dense urban environments in Tehran, it is important to realize that the clusters of development should be designed considering the natural air-flow from the northern mountains toward the south and from the west to the east. These winds are critical for sweeping air pollution away from the city.

Although good physical planning and an appropriate mix of activities play important roles in the success and efficiency of the adaptive model, one of the biggest challenges of
building rail-oriented communities is their issue of design. Successful adaptive cities have created livable environments around their transit nodes, which are appealing to pedestrians and cyclists and offer sufficient public amenities. Public squares, outdoor marketplaces, benches, newspaper kiosks, bus shelters, sidewalk cafes, flower stands, and shopping arcades are a number of elements that could serve this purpose. In Tehran, special measures need to be taken, considering the cultural and social codes and the climate and topography of the area.

In Tehran, even when driving is not time- or price-competitive with other modes of transit, a considerable number of upper-class residents tend to drive because they believe public transportation is a means of transport for the underclass and marginalized classes of the population, while owning a private automobile is prestigious. Better marketing strategies, improving the quality of transit services, and enriching consumer choices could change the image of public transportation and attract more riders.

Additionally, with community amenities such as on-site recreational facilities and attractive landscaping on transit hubs and rail nodes, these places can turn into leisure centers and encourage people to use transit. By minimizing the time spent on commuter trips, people will be able to spend more time at desired destinations such as these hubs. This is of great importance in the western section of the city due to the planned and anticipated recreational character of the area, particularly in district 22.

Currently Line 5 of the metro system (the above-ground section of the heavy rail network) is mainly used by commuters from Karaj—the satellite city twenty kilometers west of Tehran with a population of around 1.5 million—which might create unidirectional flows to central areas of Tehran and cause inefficiencies of empty back-hauling of trains during certain hours of the day. However, when districts 21 and 22 are fully developed and inhabited based on
well-balanced mixed-use plans and have well-designed TOD complexes on the transit nodes with lots of recreational activities, the trains will be efficiently used in both directions.

In order to avoid unidirectional flows, multiple origin-destination combinations, served by transit offerings, should be provided by integrating high-capacity mainline services, intermediate connectors, and community-scale feeders in order to avoid unidirectional flows. Unified ticketing and flat-rate tariffs, which facilitate transferring modes without paying an extra fare for passengers, could also help increase transit ridership.

The arrival of people in the four stations of the region creates a need for other public and service uses, and the concentration of retail will keep the stations active and lively. Higher floor-area ratio should be allowed for commercial, office, and residential uses to encourage development along the transit stations, and vacant and abandoned land along the transport corridors should be heavily taxed ad valorem until they are fully developed based on the zoning regulations of the area.

However, the Tehran-Karaj highway, along with the above-ground metro line (Figure 5-1, Figure 5-2 Tehran-Karaj Highway along the metro line at Vardavard Station) and the topography of the area, pose serious challenges to creating accessible pedestrian- and bicycle-friendly transit nodes for the residents of the two districts. This highway, along with the above-ground railway, acts as a physical barrier between districts 21 and 22. It divides them into separate, radically different urban environments. This, in addition to the automobile-centered and non-pedestrian-friendly design of the area, has caused social segregation and environmental injustice. The division has had implications on settlement patterns such as segregation of culture, land use, and change of scale.
Therefore, it is critical to realize that a balance of jobs, housing, shops, and community services is required both along and across the transit corridor. According to Cervero, it is more important to create balances between communities than within communities. Also, since the layout of the border between the two districts promotes only car use for commuting between them, when it comes to the design of the transit nodes, accessibility from both sides and connections between the two districts via paratransit feeders and non-motorized traffic should be a priority. It is the accessibility premium—and not the type of transit—that attracts real estate development and thus shapes urban form. In the end, an appropriate mix of activity and a good physical design will complement each other.

Figure 5-1 Metro line in the area of study (Western Tehran)
Source: Author, based on Google Map
Unfortunately, so far each district has been planned and developed independently by its own municipality. (Figure 5-3) The master plans of the districts are designed by two different planning firms, which were commissioned by the municipalities of the respective districts, and their designs are bound to the jurisdictional boundaries of the districts. In these plans, the design of the area between the Tehran-Karaj highway and the metro line has not been paid enough attention, nor has the design of the metro station areas. Therefore, these oversights have accentuated the gap between districts.
The urban-design schemes and planning agendas of the two districts are also different and sometimes contrasting. District 22, for example, is planned to have vast areas of open green spaces (such as Chitgar National Park) and recreational sites. District 21, on the other hand, was developed with a high density of industrial and manufacturing sites, and the residents of its few residential complexes do not have an easy access to the amenities of the adjacent district. The industrial and manufacturing structures have created a homogenous, scaleless urban fabric.

(Figure 5-4 The Streetscape of District 21 (Jadeh Makhsus)) They also generate a large amount of
pollution and waste, which has led to environmental and health problems for the adjacent neighborhoods.

Figure 5-4 The Streetscape of District 21 (Jadeh Makhsus)

To create a more homogeneous urban quality in western Tehran, the master plans of districts 21 and 22 should be reviewed, and their planning principles should be coordinated. The border between these districts could be a critical section of the area, and its problems and potentials should not be overlooked. A cooperative attempt by the two planning and design teams is needed to refine the parameters used to identify the requirements of the region, the city, and, more importantly, western Tehran as a whole, and to develop balanced plans with special attention to the border and the existing station areas.
5.1 New zoning designations

There is no doubt that industrial districts are essential to the economy of our cities. They are where a good proportion of city dwellers work and operate businesses, and the areas from which a wide variety of goods and services are delivered. However, a major revamp of these districts is long overdue. District 21, as an industrial district with numerous environmental and spatial problems, could benefit from new zoning designations—such as “Business Industrial,” “Office-Industrial Park,” “Eco-Industrial Park,” and “Industrial Mixed-Use”—cityscape improvements, green and recreational public spaces, and spatial connections to district 22.

According to the existing plans, a number of the industrial and manufacturing buildings of district 21 are to be relocated in the new satellite industrial towns around Tehran. Wherever practical, these uses should be removed as far as possible from protected districts and buffered by intervening lighter industrial districts. However, a good portion of heavy industrial uses would be exceedingly difficult, expensive, or impossible to eliminate. These industries must, therefore, be buffered by sufficient area to minimize any detrimental aspects.

A good strategy for minimizing the environmental impacts of these industries is to offer incentives for eco-industrial parks. According to Lowe, Moran and Holmes, “An eco-industrial park is a community of manufacturing and service businesses seeking enhanced environmental and economic performance through collaboration in managing environmental and resources issues including energy, water, and materials.” They believe that close cooperation between businesses could result in synergy that is beneficial to all of them.287

The industrial mixed-use streets should include a broad range of uses, from light industrial uses to high-density mixed-use residential, freight industries, and commercial development with demands for all modes of transit. The light industrial zones are designated to
industries that typically do not create objectionable characteristics (such as dirt, noise, glare, heat, odor, etc.) that extend beyond their lot boundaries. Outdoor operations and storage are completely screened if adjacent to protected districts (such as residential or public spaces), and are limited throughout the district to a percentage of the total operation. Wherever possible, outdoor operations and storage zones are located between a protected zone and a heavier industrial area to serve as a buffer.

The problem is that varied land uses have different demands for street function and amenities and require flexibility to accommodate the current activities of the area as well as potential future uses. Nonetheless, the streetscape of district 21 (Figure 5-4) is in need of basic improvements such as consistent street trees and landscaped planters, more sizable corner curb extensions, highly visible crosswalks with two curb ramps at each corner, more footbridges with escalators, protected bicycle lanes, and pedestrian-scale lighting features at street corners and at regular intervals. By facilitating walking, cycling, and paratransit riding throughout districts 21 and 22, coupled with unified ticketing and tariffs, which allow transferring modes without paying an extra fare for passengers, there will be higher shares of “walk-and-ride,” “bike-and-ride,” and “bus-and-ride” customers at the rail nodes between the two districts.

5.2 Traffic Calming

To foster a more humane and interactive urban environment in these districts, it is useful to implement traffic-calming schemes. Traffic calming can be done by physically altering the existing streets within the neighborhoods. Different road textures, changing the geometry of the road through S-shaped diverters, neck-downs (curb extensions at intersections that reduce
the roadway width from curb-to-curb) at intersections, and speed bumps are some of the traffic engineering devices that can be applied to the streets of the area.

Restrictive measures against private traffic—coupled with a network of inter-connective paths between buildings, and a hierarchy of avenues, streets, alleys, and laneways—lead to dispersed traffic and create a more pleasant walking and cycling experience. These schemes, in addition to new street furniture and attractive landscaping, will improve the quality of non-motorized trips. They will also create a sense of place for the neighborhoods. In addition, the spaces reclaimed through traffic calming techniques can be utilized for sidewalk cafes, markets, and children’s facilities.

The streets leading to transit stations need to be conducive to different transportation modes such as cars, taxies, vans, buses, pedestrians, and bicycles and be safe for all users. The safety measures of the intersections and crossings, sidewalks, bicycle lanes, and transit stops should be given a great deal of consideration. The needs of pedestrians, bicyclists, and transit users should be prioritized over the convenience of automobile drivers.

5.3 TOD Complexes

It seems that fundamental to the development of a vibrant urban life in Tehran is a focal point that is linked to a major commercial center—not necessarily corresponding to the Central Business District—and that this might be rooted in the Iranian tradition of “the bazaar.” The bazaar is a large and unique concentration of commercial activities in a semi-enclosed pedestrian area that acts as an urban center and has been the venue for many social, cultural, and religious events. Thus, a cluster of a high-density core, with a commercial center and civic
uses, which is connected to other focal points by public transit, could set the stage for a good linkage and spatial and social integration between the various parts of the region.

Considering that the city’s traditional social fabric and urban structure was defined by neighborhoods (mahalleh) or the quarter system, a new configuration of self-sufficient mixed-use neighborhoods, with direct connections to these major focal points and local management institutions such as neighborhood councils, could form the modules of the urban fabric in the area. These neighborhoods could benefit from special permitting, zoning for certain uses, or performance zoning based on their location and proximity to the major sites and amenities of the region such as metro stops, large factories, sport complexes, university campuses, Chitgar National Park, and flood canals (maseels). Also, many uses such as artisan studios, photography labs, and glass blowers’ studios which are typically classified as industrial, could be located in some commercial areas to increase the mixed-use quality of those zoning areas.

The TOD complexes around the four metro stations of the area (Figure 5-5) will be the focal points, the commercial, recreational, and civic centers of the west wing of Tehran that work both in local and regional scales. Each transit-oriented development project is unique. Each has its own identity, sense of place, and physical program corresponding to its urban context, the surrounding environment, and the site potentials. (Figure 5-6) Careful consideration should be given to a station’s location in relation to the project, vehicular and pedestrian flows, topographic conditions, and neighborhood character. The TOD complexes offer a variety of services within walking distance of the transit station, with good pedestrian connections to transit and between buildings that are outwardly oriented toward street rather than inwardly oriented toward parking. These features reduce driving by making walking and transit more realistic, attractive, competitive, and efficient travel options.
It is important to recognize that TOD complexes that are located near transit should provide good links and spatial connections to transit, and incorporate land uses and development patterns that support transit. Station-area planners should identify the scale and type of development that is appropriate for the station area in order to attract more riders for transit. The plans should acknowledge that people who live in a quarter-mile radius of a station are more likely to take transit, and proper facilities and access ways should be provided for the needs of bicyclists and park-and-ride customers. Accessible and inviting designs, which are well-integrated into the surrounding neighborhood, enhance transit ridership.

Mixed-use design can be complicated by the need to accommodate car-and-bus access lanes, transit tracks, bicycle lanes, and pedestrian walkways while addressing each site’s geographic challenges and setback requirements. The development around transit should be functionally related to the transit node. The challenge is to transform the constraints of the site—for instance, the existing highway along the metro line—into assets. Strategies such as incorporating public plazas, place-making architectural features (e.g. roof structure design elements), lighting features, and visual and functional separation of the residential units from the transit amenity to ensure residents’ privacy could be helpful in this regard.
5.3.1 Design Example

As an example, the schematic designs for a TOD complex around one of the four metro stations of the area are presented in this section. (Figure 5-7 The existing (top) and proposed
(bottom) land uses in district 21 and 22, Figure 5-8) The elements of a successful transit-oriented development, climate, and the urban context have been taken into account in the design and the specifics of the site. This TOD project works with the topography of the site and creates a pedestrian-friendly connection through a huge sunken courtyard, which serves as an urban plaza. The ribbon-like layers of the project crawl under the highway, grow around the transit line, and knit them together. (Figure 5-9, Figure 5-10, Figure 5-11, Figure 5-12)

Figure 5-7 The existing (top) and proposed (bottom) land uses in district 21 and 22
Source: Author, based on Google Earth satellite images
Figure 5-8 The boundary of the project's site, the existing station structure at the Chitgar Metro Stop
Source: Author, based on Google Earth satellite images

Figure 5-9 Schematic design diagram 1 A design to merge the two districts
Source: Author

Figure 5-10 Schematic design diagram 2 folded ribbons with sunken courtyard in-between
Source: Author
Figure 5-11 Schematic design diagram 3, program
Source: Author

Figure 5-12 Project's Site Plan
Source: Author
The goal is to create a welcoming, safe, interesting, and lively environment that is appealing to a wide range of social groups. The recreational activities that work with the adjacent natural park are meant to attract the youth to transit riding and cycling for leisure, and thus reduce the number of unnecessary motorized trips. Additionally, by creating high quality spatial connections between the two districts, the residents of district 21 will be able to benefit from the amenities of district 22 without using private cars. (Figure 5-13, Figure 5-14, Figure 5-15, Figure 5-16, Figure 5-17, Figure 5-18)

Figure 5-13 A view from the northern elevators towards the train tunnel and the main sunken courtyard showing the spatial connection between the two districts under the metro line
Source: Author
Figure 5-14 The Main Sunken Courtyard – An urban plaza with different activities on its perimeter creating a pedestrian-friendly connection between the two districts
Source: Author

Figure 5-15 Leveled Terraces with green spaces creating a welcoming interactive environment for the building users and pedestrians while adding to the plaza’s aesthetic and sustainable features
Source: Author
Figure 5-16 Multi-story buildings wrapping around the sunken courtyard creating an urban edge for activating the space and increasing pedestrian safety
Source: Author

Figure 5-17 The sunken courtyard serving as an urban plaza, connecting two sides of the highway/railway barrier between Districts 21 and 22
Source: Author
5.4 Recreational Green Structure

The floodways (Maseels) of Tehran can define the north-south edges of several sections of the city. They can also accommodate urban wildlife habitats and help with storm water pollution.

5.4.1 Identity, Sense of Place and Legibility

Tehran is suffering from lack of order and coordination and is monotonous over large areas, which makes it confusing and boring. However, some alternate design attempts have been made in Tehran with large “naturalized” parks and an urban water park along one floodway. 288(Figure 5-19)
These projects have been well-received public spaces thus far and encourage further development of a larger interconnected system. The topography and environmental assets such as rivers, floodways, mountains, vegetation, and iconic landscape designs, coupled with main axes, view corridors, and cityscape elements, can be utilized to create a strong sense of place and identity in western Tehran.

In many cities, rivers, lakes, and ports play an important role in defining the edge of urban areas, the physical and visual shape of the city, and also in creating a sense of order in the spatial quality of urban fabric. Although Tehran does not have a significant body of water as cities such as Paris, Sydney, San Francisco, and Hong Kong, the mountain ranges in the north and east of the city (Mount Damavand in particular) and the topography can help create strong, significant, and memorable views with unique spatial and visual qualities.
The north-south floodways and streams of Tehran have had a dramatic effect on the geomorphology of the area and also on the recharge process of Tehran’s aquifers. (Figure 5-20) These rivers, together with some old aqueducts, still yield enormous amounts of water and have had a vital role in providing the population with fresh water for drinking and agricultural purposes in the past.\textsuperscript{289} The floodways also play an important role in directing spring and storm runoffs, originating from upstream mountains, safely through the city.\textsuperscript{290} Therefore, it is essential that they be taken into account in Tehran’s new development pattern. However, their form can range anywhere from engineered canals and channels to a newly redesigned public urban park along one of the northern floodways.

Overall parcel-block patterns of the modern city reveal densely packed small parcels along the majority of floodway corridors through the edges of the older sections. These parcels are organized into regular blocks in almost a grid pattern, only giving way to the transportation corridor with an embedded floodway. The block shapes appear to be formed only by the roadway cutting through them in longer straight segments. In the outskirts, however, this pattern changes to some degree as parcels become more variable in size and corridors more sinuous in pattern.
In the oldest sections of the city, the parcel blocks are regular, and the natural features are shaped mainly to the will of the urban planners. In the western sections of the modern city (districts 21 and 22), however, the pattern breaks down as floodways align almost exactly with the original stream and parcels become much more variable in size, conforming to the floodway corridor. In some larger parcels, the streams still flow naturally. The modern urban fabric along most of the floodways has not utilized the full potential of these natural elements for improving the quality of urban experience and facilitating the north-south airflow in the city. (Figure 5-21 Tehran urban fabric long the floodways (Maseels))

Clearly, public-safety concerns over flooding have dominated the development pattern of the floodway network so far, diverting water away from the core in controlled channels along natural drainage corridors where possible. But engineered canals and channels coupled with a proper and attractive landscape design could create green corridors that would improve a sense of orientation and legibility of the urban space.
In order to use this potential in western Tehran, there is a need for a set of guidelines and codes to regulate the height and volume of the buildings based on their location and to prevent the blockage of views of the mountain. The locations and corridors with unique views should be identified and used for this purpose. (Figure 5-22, Figure 5-23)
Figure 5-22 The structure of significant urban fabric and the area of study
Source: Author, based on Tehran Comprehensive Plan maps by Boomsaazgan

Figure 5-23 Proposed green corridors along the two floodways and major north-south highways in the area and their connections to the four TODs and major green spaces and the proposed artificial lake
Source: Author, based on Google Earth satellite images
Residents of a city have a unique, personal mental image of it, which is composed of multiple images from different angles and perspectives in various scales depending on what seems striking or important to that person. Elements that form a mental image of the city create a sense of scale and help people identify the four main directions. Height differences and building envelopes coupled with the green structure of the area and the iconic architecture of the TOD complexes create view corridors and enhance the legibility, walkability, livability, and imageability of the region.

5.4.2 Bicycling and walking

Although the climate and topography of Tehran affect cycling levels, by increasing the cost and inconvenience of driving, and enhancing the safety, speed, and convenience of bicycling, it can be promoted in this section of the city. Cycling could be a convenient and cheap way to reach transit stations and is also a healthy recreational activity. The green structure can be used for the development of more cycle-appropriate infrastructure, and it also has a great deal of potential for a network of walking paths. A useful combination of trees, vegetation, and shade structures provides for protection from the sharp sunlight of Tehran and attracts more pedestrians and cyclists. By accommodating separate bike lanes and paths, the green structure can serve those who are unable or unwilling to bike for security issues.

5.5 The goals of proposals

The reasons for sprawl in Tehran are different from what causes sprawl in developed countries, particularly in the US. In Tehran, sprawl is mostly due to overpopulation and the ever-
increasing demand for housing, not the desire of the better-off to have more land and privacy.\textsuperscript{291} The appearance of residential high-rise buildings since 1960, and their multiplication since 1980, has not resulted in higher density because as buildings were getting taller, houses consumed more floor space per capita. In the case of Tehran, an increase in floor consumption per person resulted in a decrease in population density.\textsuperscript{292} However, in the western developing section of the city, given the vast areas of vacant land, a well-planned development scheme could create a denser urban fabric that is conducive to transit riding.

Currently, Tehran as a sprawling organism is defined by its infrastructure; however, metropolises should be all about people, not the infrastructure. Cities should facilitate human interactions, the exchange of ideas, free flow of information, and collaborations among the city dwellers. The controlling power of city planners and managers over the inhabitants of a metropolis is very limited. They cannot tell people where to live, what to do, and who to talk to at the end, and that is why cities are so lively and vibrant. The best thing city planners and managers can do is to provide people with an environment conducive to a sustainable lifestyle, while offering education and incentives for environmentally friendly behaviors. The managers should find ways to minimize residents’ hardship while restoring and maximizing their interactions. They should reclaim the city for its people.

Tehran’s older structure could provide a positive model for a pedestrian-oriented city. The vertical and horizontal mixed-use quality of the self-contained traditional neighborhood with different housing types is what western Tehran is lacking now. Environmental elements such as wind direction and sunlight—which used to play an important role in the orientation and placement of buildings—should be considered in the design process. The dense urban fabric in old Tehran—with a good open-space ratio, shaded sidewalks, narrow, tree-lined, walkable
streets, and the connection between nature and the built environment—could also be inspiring
to create a city that embraces nature and belongs to people, not cars.
Chapter Six

Conclusions
One could say that metropolises are one of the most complex man-made phenomena on Earth, and discovering, analyzing, and dealing with all aspects of their challenges is a huge endeavor. Comprehending the multi-layered identity and the social and urban structure of a paradoxical and complicated megalopolis such as Tehran is indeed not an easy process.

Throughout the history of Iran, whenever a city became the seat of the government, it experienced quick and immediate expansion, turning it into a large customer and trade center. In some cases, such as Isfahan and Tehran, this expansion has been followed by the development of infrastructure and industrial activities. The capital city is now the economic, political, industrial, commercial, educational, and cultural center of the country. A major portion of the financial and economic activities of Iran is conducted in Tehran, and the city’s economy directly impacts the national economy.

This relationship between Tehran’s economy and the national economy indicates that a small number of Tehran’s industrial and commercial magnates control the wealth of the nation, resulting in an unbalanced economy, an unhealthy concentration of business interests in the hands of a few, and an uncontrolled monopoly of practices. The government has been trying to mitigate this polarization and decentralize economic activities. However, the attractions and bonuses of living in Tehran still outweigh the efforts made under this policy of decentralization. It seems that even the high cost of housing and living, traffic congestion, and air pollution cannot stop the migration to and population growth in Tehran.

As a result, over thirty-five years after the Islamic revolution, Tehran is a troubled and troubling megalopolis. The city has endured the dialect between a religious dictatorship and a persistent popular defiance. It has been proved that trying to control, direct, and impinge upon the growth and evolution of the city is similar to interfering with the development of a living
organism—most likely a cancerous one. It is an unpredictable and uncontrollable process, and the results are usually beyond anticipation.

Currently, Tehran is facing acute problems due to the extensive use of private automobiles. Pollution-related diseases cause thousands of deaths a year, and the magnitude of the problem sometimes causes the government to announce smog holidays to curb the level of pollution. Both Tehran’s mayor and the City Council are paying particular attention to the congestion and air pollution problems. As a result, the metro system and Bus Rapid Transit (BRT) lines have had an unprecedentedly fast development over the past few years, and auto manufacturers are required to produce cars that run on both gasoline and natural gas.

However, these efforts are not enough to reduce reliance on the automobile. Increasing limitations on and costs of auto ownership and driving could also help reduce traffic and air pollution. Such efforts could include policies such as increased tax rates and duties on auto production, import, and trading, steep gas taxation, and traffic-management regulations such as expensive city parking and road pricing, alternating the ban on car usage, and physical design strategies.

Most importantly, the automobile-oriented urban design of the city must change. A pedestrian-friendly urban environment with high-quality, affordable transportation options can play an important role in car-use reduction. A high-quality transit system can be provided through competitive tendering and public-private partnerships, and a walkable, livable, and safe urban environment can be created based on the principles of New Urbanism.

Western Tehran, which is still under development, has great potential for an urban-design scheme conducive to alternative modes of transportation such as walking and bicycling. However, the existing plans for the development of municipal districts 21 and 22, which were
included in the city boundaries in the 1990s, are still car-centered to a great extent and need to be revised. In this thesis, alternative plans and proposals for car-use reduction have been presented.

These proposals include new zoning designations and traffic-calming schemes, developing TOD complexes around the existing transit nodes, and open space and recreational green structure along the floodways in the area. The proposed guidelines and urban design scheme are meant to improve the environmental conditions and promote the use of the existing transit line as well as walking and cycling in this area.

The new zoning designations require relocation of most of the existing industrial and manufacturing buildings in district 21 and creating new zoning categories of “Business Industrial,” “Office-Industrial Park,” “Eco-Industrial Park,” and “Industrial Mixed-Use.” To provide a proper environment for non-motorized trips, the area of study should have a network of inter-connective paths between buildings and a hierarchy of avenues, streets, alleys, and laneways with a high-quality streetscape and attractive landscaping. Also, to be conducive to different modes of transportation, physical changes to the streets, restrictive measures against private traffic, and safety standards should be applied to all the streets and especially the ones leading to transit stations.

TOD complexes around the four metro stations in the area form a new arrangement of self-sufficient, mixed-use neighborhoods that cluster around a high-density core, with a commercial center and civic uses, which is connected to other focal points by public transit. These neighborhoods benefit from special permitting, zoning for certain uses, or performance zoning based on their location and proximity to the major sites and amenities of the region. As such, they create a spatial and social integration in the area. Building TOD complexes, along with
facilitating walking, cycling, and paratransit riding throughout districts 21 and 22, with unified ticketing and tariffs, promotes “walk-and-ride,” “bike-and-ride,” and “bus-and-ride” commuter trips at the rail nodes between the two districts.

Lastly, in order to address the lack of order and coordination problems, and to create a sense of place and identity in this area of Tehran, the north-south floodways and streams of Tehran are utilized. They could be redesigned as various elements, ranging from engineered canals and channels to public urban water parks or attractive green corridors.

This thesis indicates that Tehran suffers from numerous deficiencies and, above all, suffers from its governance system. By extension, Tehran’s deficiencies diminish the country as a whole. As a result, a large portion of the solutions and proposals for urban improvement may seem infeasible under the current management system of the city. The government, alongside the revolutionary guard (Sepah), is continually proposing encroachments on the rights of the citizens while limiting and undermining the power of the city’s governing authorities. However, experience has shown that gradual change is possible.

As Cervero states in his book, inspired leaders with passion, determination, and commitment, who are able to articulate their vision, can win others over to carry out a desired course of action despite the inevitable limitations and setbacks. The number of successful and popular projects that were planned, designed, and materialized during the terms of Karbaschi and Ghalibaf, the reformist mayors of Tehran, prove this fact.

Also, inhabitants of Tehran are becoming more literate, modern, urbane, and individualistic every day. They have shown a great deal of support for well-articulated visions and well-executed projects. They have learned to transform their challenges into services and infrastructure that can serve their purposes. Women and the young seek to claim their physical
and symbolic presence in the urban realm and welcome all the plans that reflect, reproduce, and embody their demands, needs, and desires. They improvise, they use trial and error, and they adapt to overcome their limitations and lack of resources.

As Majora Carter states: “No community should be saddled with more environmental burdens and less environmental benefits than others.” The fascinating, environmentally conscious historical cities of ancient Persia could teach us about the features of mixed-use, pedestrian-friendly urban environments. They can help us find ways to combat the environmental and social degradation of a modern city and the cumulative effects of increased traffic, pollution, and solid waste. We are all responsible. I believe the problems of an urbanized world can be reversed through new paradigms. Sustainable development can save us from ourselves.
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Notes


9. Zohreh A. Daneshpour, "Moving Towards or Against Sustainability—Tehran as the Case Example" (presentation, City Futures in a Globalizing World: an international conference on globalism and urban change, Madrid, Spain, June 4-6 2009), 7.


23. In 1993, it was reported that the cars in the fleet were inefficient due to older engine designs with fuel consumption 50% higher on average than more up-to-date technologies. Read more at: World Bank, Tehran Transport Emissions Reduction Project, Global Environment Facility, World Bank, (Washington, DC: 1993).


43. Cervero, The Transit Metropolis.

44. Calthorpe, The Next American Metropolis.


47. There are some debates about the year in which Tehran became the capital; Madanipour, Tehran: The Making, 5.


54. Seyed Mohsen Habibi, Of the city and the city: Historical analysis of the concept of city and its physical appearance (Tehran: University of Tehran press [In Farsi], 1999), 133.


56. Habibi, “Of the City and the City,” 134-137; 162-164.


75. Costello, “Planning Problems,” 149.


83. The boundary of the main city of Tehran covered about 220 km² and the outer boundary after 25 years enclosed an area of about 740 km²; Costello, “Planning Problems,” 149.


122. For instance, two-way streets such as Vali-asr turned into one-way streets and their traffic-flow directions were changed repeatedly.


196. e.g. Cheshmeh, Rah-Ahan and Olympic communities; Sharestan Co., “Development Model,” 4.

197. e.g. The genetics Research Center, Police University and Research Institute of Petroleum Industries; Sharestan Co., “City Development,” 10.


205. Cervero, The Transit Metropolis, 52.


207. Cervero, The Transit Metropolis, 47.


223. Calthorpe, *The Next American Metropolis*, 43


