ACHIEVING A PEDESTRIAN ORIENTED TRANSPORTATION SYSTEM IN ANKARA

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ABSTRACT

ACHIEVING A PEDESTRIAN ORIENTED
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Yaşdağ, Serkan

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After World War II, automobile use expanded rapidly in the developed countries. As a result, travel pattern changed entirely and automobile has become the dominant form of transport in cities. As a result, the city has been shaped and sized in response to automobile needs. Such increase caused traffic problems in the Central Business Districts and surrounding areas. The problems of traffic congestion and pedestrian circulation have become an important issue in the whole city. As traffic problems have grown in developed cities, they had to be engaged in managing travel demand of people in order to provide mobility and access with reference to the advancing principles of sustainability. In this scope, this study shows the need of travel demand management to create a sustainable transport system. As a case, this study will evaluate the transport problems of Ankara and the place of the city in the urban transport policy process. At this point, transport problems and the transformation of road network and their impacts on the city will be examined in four periods. As a conclusion, urban transportation strategies needed for creating a sustainable transport system are overviewed for the city of Ankara.

Keywords: Sustainable transportation system, travel demand management, pedestrian oriented, integration of all modes

ÖZ

ANKARA'DA YAYAYA YÖNELİK
ULAŞIM SİSTEMİ ÖNERMESİ

Yaşdağ, Serkan
Yüksek Lisans, Şehir ve Bölge Planlama, Kentsel Tasarım
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II. Dünya Savaşından sonra, gelişmiş ülkelerde otomobil kullanımın hızla artması sonucu kentlerdeki ulaşım dokusu tümüyle değişmiş ve otomobil ana ulaşım aracı haline gelmiştir. Artık kentler otomobillerin gereksinimine göre şekillenmekte ve gelişmektedir. Otomobil kullanımındaki bu artış, Merkezi İş Alanları ve çevrelerinde trafik problemlerinin çıkmasına neden olmuşlardır. Trafik tıkanıklığı ve yaya dolaşımı böylelikle kentlerde önemli bir konu halini almıştır. Trafik sorunlarının artmasıyla birlikte gelişmiş ülke kentleri sürdürülebilirlik kavramı çerçevesinde ulaşım talebini yöneterek ihtiyaçlarını karşılamışlardır. Bu kapsamda bu çalışma sürdürülebilir ulaşım sistemi için talep yönetiminin gerekliliği üzerinde durmaktadır. Ayrıca bu çalışmada, örnek olarak alınan Ankara kentinin ulaşım sorunları ve kentin kentsel ulaşım politikaları sürecindeki yeri değerlendirilecektir. Bu noktada ulaşım problemleri, yol sistemindeki gelişim ve bunların kente etkileri dört dönem için incelenecektir. Sonuçta, Ankara kenti için sürdürülebilir ulaşım sistemi için gerekli ulaşım politikaları tanımlanmaktadır.

Anahtar Kelimeler: Sürdürülebilir ulaşım sistemi, ulaşım talep yönetimi, yayaya yönelik, tüm modların entegrasyonu.

To My Parents...

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CHAPTER 1

INTRODUCTION

The aim of this study is to analyze the transportation strategies for achieving a balanced sustainable transport system. It will examine experiences obtained from several sets of policies that have been implemented until now in order to overcome automobile dependence, and as a case Kızılay Zone in Ankara will be studied. The main concern of the approach originates from the concept of integration of all transport modes and reorganization of transport network in accordance with contemporary transport planning principles.

A sustainable transport system can provide mobility and accessibility to all urban residents in a safe and environment friendly mode of transport. Non-motorized modes are most critical elements in any traffic system. A well functioning road infrastructure must fulfill the requirements of all road users. Pedestrians, cyclists should not be eliminated from urban transport system. Meeting the special needs of non-motorized modes in the city becomes crucial for the efficient performance of all traffic. This is a complex and difficult task requiring a detailed evaluation.

This study is discussing the relationship between traffic problems and automobile dependence in the city. One of the issues, which will be discussed, is whether public transport and non-motorized modes such as walking and cycling are alternatives to automobile uses or complements the use of automobile in the urban transport system.

Every developed city faces with the problem of traffic congestion. In the second half of the 20^{th} century, the problems of traffic congestion and pedestrian circulation have become an important issue not only in city center but also in residential areas. After this period, the balance between all transport modes changed and motor vehicles have gained importance over other modes in the transport system.

After the Second World War, in the developed countries, the transportation patterns changed entirely and automobile has become the dominant form of transport in cities. Inner city trips that had been made by rail transport system started to be made by private cars. Newman (2001) points out that motorized transport has progressively rebuilt the cities. Indeed, the city has been shaped and sized in response to automobile needs. The post 1940's economy gave rise to the automobile uses as a mass form of movement. According to Newman (2001, pg: 96), this popularity of car in creating new freedom over space and time became a momentum for urban change.

The increase in automobile supply and the lack of road network caused traffic congestion in city centers, which enabled urban transportation planning to gain importance. In the beginning of the problem, to overcome traffic congestion, transport planning mostly emphasized on construction of new road network and widening of existing ones. However, according to Acar and Eker (1994), this approach resulted in "not only increase in the use of private cars but also decrease in the demand for public transport types" (Çubuk and Türkmen, 2003, 127). Likewise, urban transport planning in those years was only to encourage private car uses through physical improvements.

However, this tendency in the transport planning changed with the report by Buchanan published in 1962. Buchanan claimed that the main reason behind traffic congestion was the encouragement of private cars and engineering approaches to the traffic problems (Kancabaş, 1998).

From the level of street design, automobile dependence has urged pedestrians to leave public open spaces to automobiles. Roadway spaces were allocated for the needs of motor vehicle. In addition, it has many negative impacts on the city with respect to ecological, social and economical aspects.

As stated by Gehl and Gemzoe (2001), although the city has had always a role as meeting place, marketplace and traffic space, automobile dependence changed the balance between the uses of city center. In the traditional city, there is a balance between them. Walking was the dominant form of transport. The scale of city and

opportunities for movement allowed pedestrians to act more freely. However, as a result of the increase of car traffic, a single use, car traffic usually has gained importance over other uses of city space. After automobile invasion reaches to upper level, public space and public life have been damaged. According to Gehl and Gemzoe (2001), the approach against to automobile dependence has occurred as a reflection to automobile dependence in order to create a new balance between three uses of the city as meeting place, marketplace and traffic space.

Automobile dependence in urban transport system causes a need to change the mode share for travel, including less motorized private mode trips and more trips with public transport and non-motorized modes like walking and cycling. This study also tries to find an answer to the question of how we can a change in mode choice for the trips and how provide the needs of integration of all modes.

To overcome the problem, in all the best practice cities, a series of complementary transportation and city planning efforts at the national, regional and local level have been implemented; including improving regional transit system, promoting public transit through transit priority measures, reducing car traffic in centers through reorganization of traffic and parking management and creating car free areas by pedestrainization.

In sustainable transportation, the aim is to achieve a balance between the community's strategic social, economic and environmental needs. It depends heavily on promotion of public transport and non-motorized modes. Provision of safe infrastructure for non-motorized modes may need segregation of road space from motorized traffic or reduction in speed of vehicles. Both measures could result in decreasing car uses.

The main hypothesis of this study is that pedestrianization by closing some streets to motor vehicle is not adequate approach for a pedestrian oriented transportation system. It requires a comprehensive approach including travel demand management, operations management, pricing policies, vehicle technology improvements, and integrated land use and transportation planning. In this context, it is argued that there

is a need of travel demand management to create a sustainable transport system including constraining the increase in automobile use and creating car free city centers; that a “new traffic culture” be promoted.

All cities have overcome similar problems of automobile dependence by creating a public transport network and by considering non-motorized modes in the planning of new developments through providing road space to pedestrians in order to achieve a balance in the urban transport system. According to Kirkham (2001), these cities have succeeded in reducing the dominance of the automobile within their cities through implementing more socially, economically and environmentally friendly means of transportation.

Investigating the traffic problem and its impacts on the city is very much worked issue in the world since 1950’s. The problem to create a livable city is evaluated in the frame of transport system and pedestrianization of inner core is perceived only as a part of this system. But in Turkey, it tries to be solved only by localized measures such as by closing some streets to vehicle use or widening existing roads. Therefore, satisfactory results are not achieved. Instead, problems of pedestrian circulation should be evaluated in the frame of general transport system and achieved not only in center but also in the whole city. Therefore, the aim of this study is to contribute to understanding the problem of urban transport system in Ankara.

The reason for choosing Kızılay Zone as the case study is to examine the possibility of transformation from a car-oriented city center to a pedestrian-oriented one and answer the question how the physical structure of Kızılay achieves this transformation.

In fact, in this respect, Kızılay is good example for this study because of its physical, social and economic development after the second half of this century. The dependence of transportation on the motor vehicle in Ankara has resulted in restricting pedestrian movement in narrowing sidewalks. Moreover, the recent urban transport projects which are present as solutions by the Greater Municipality, cannot provide any satisfactory solutions and increase the car traffic in Kızılay.

Kızılay, which was proposed as the administrative center in Jansen's plan at the end of 1920's (Tankut, 1993, 67), began to transform to a new nucleus in Ankara's commercial structure in 1950's. As a result of this transformation, Kızılay developed as the second commercial center which began to compete with its new and modern functions. This situation resulted in social and economic activities to shift from Ulus to Kızılay.

High capacity roads in the city centers influence the land use around, and make it less people friendly. If a large proportion of pedestrians in the city center is not in a safer environment, the Municipality of Greater Ankara has to deal with their needs. Today, the existing road system cannot cater to the needs of pedestrians. Meeting special needs of the non-motorized modes in transportation system in Ankara is crucial for this study.

The method used in this research is developed through case studies. The data used in the study is mainly qualitative data obtained by the interpretation of plans and land use maps compiling the written documents related to the subject.

In this general frame work, the second part of this study focuses on the analysis of the conceptual change that happened in the city center. It is aimed at making a definition of problems and their reasons. While doing this, it also mentions the role of the city center in the social life of people, and the social, economic impacts of the automobile on the city.

In the third chapter, it basically outlines the processes and strategies to achieve an urban transport system based on less car trips by driver and higher share of public transport and non-motorized modes through a range of physical and managerial changes. In an attempt to solve automobile dependence problem and find sustainable transport solutions for Kızılay, it is necessary to look at how other cities have solved these problems since the end of the Second World War. By studying the histories and current systems of best practice public transport cities, it is hoped that solutions to the problem of automobile dependence may be suggested.

The purpose of the international literature review is to investigate the various policies and approaches that have been used internationally to stimulate public transport and non-motorized modes. Thus, it will provide important background knowledge of good practice in this aim. This knowledge will help to identify any threats and opportunities to the stimulation of these uses in Ankara and to devise a number of recommendations. The best practice cities of interest in this study are Zürich, Switzerland; Freiburg, Germany; Strasbourg, France; and Copenhagen, Denmark.

The literature review on international cases is followed by the Ankara case study chapter. Firstly, the historical evaluation of Kızılay Zone is analyzed in three subsequent periods. The first period is planning of Ankara according to the Lörcher Plan, between 1924 and 1932. The second period is Jansen Plan period, between 1932 and 1957. And the third period is Yücel-Uybadin Plan and AMANPB Period, from 1957 until today. Secondly, in order to understand the pedestrian character of Kızılay Zone, planning efforts related to transportation and pedestrians are evaluated. Thirdly, transportation problems of Ankara are analyzed with reference to geomorphologic, social and economic aspects of the city and the impacts of planning periods.

And finally, with reference to the contextual, conceptual and spatial analyses made, an attempt will be developed for the redevelopment of urban transportation system of Ankara. Accordingly, this study will determine the urban transportation strategies for Ankara needed for achieving a pedestrian oriented transportation system.

CHAPTER 2

AUTO DEPENDENCE AND ITS IMPACTS ON THE CITY

2.1 Definition of Automobile Dependence

The term of automobile dependence was popularized with the book of "Cities and Automobile Dependence" by Peter Newman and Jeff Kenworthy in 1989 (Raad, 1998, 12). This term can be described as an evolutionary stage wherein the physical form of cities is shaped entirely by transport technologies, economic forces and cultural factors. It consists of high levels of automobile use, automobile-oriented land use patterns, and limited travel alternatives to commuters. Due to limited transportation choice and the increasing use of private car, cities are dependent on automobile to meet urban travel needs.

As stated by Raad (1998, 15) traditionally automobile is often seen as a perfect solution to challenge to mobility as it offers drivers "control, comfort, freedom and convenience in going anywhere at anytime". In promoting mobility, the efficient and quick movement of traffic has become a singular objective of cities. As a means of promoting mobility, public policy has focused on increasing personal car ownership.

One of the key defining features of automobile dependent city is a right relationship between automobile dependence and level of car use. All measures dependent on giving priority to private car instead of promoting public transport increase automobile dependence's level of city. They also result in some impacts such as road building, urban sprawl and the decline of transit. All impacts of automobile dependence are associated with the ownership and use of private automobiles.

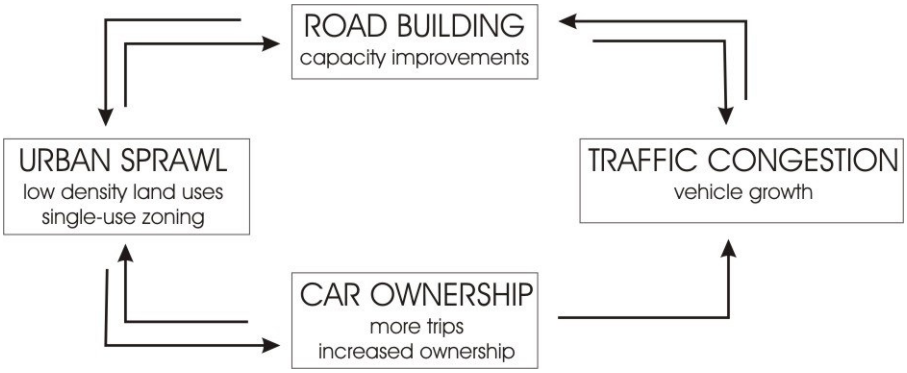


Figure 2.1 Positive feedback relationships in automobile dependence (Raad, 1998, 19)

It is seen in Figure 2.1 above, high level of car ownership has positive effect on the increase in traffic congestion. As a reaction, the city tries to supply a new infrastructure such as building more and more road surfaces, in order to meet demand increase. According to Raad (1998, 23), there is also "a positive feedback whereby an action leads to a reaction which in turn intensifies the condition responsible for the initial action".

It is also important to note that "the lack of cooperation and coordination between municipalities in dealing with the challenges of transportation and land use has been identified as a major aggravation to urban sprawl and automobile dependence"(Raad, 1998, 18).

2.2 Impacts of Automobile Dependence

Although cars provide many benefits both to individuals and to the community through great mobility and accessibility, it should be noticed that automobile alone is not sufficient and effective solution in response to decreasing demand of transportation. As stated by ACT (2004, 81), the community should not rely on exclusively on cars because "some people in the community are not able to use or afford to own a car".

In this way, after World War II, most cities have largely been constructed around the automobile, creating a culture heavily reliant on private automobile access. However, automobile dependence results in some interrelated impacts on the city, as seen in the Figure 2.2. Impacts are (Raad, 1998, 20);

- environmental (such as urban sprawl, smog and air pollution);
- economic (from providing urban infrastructure across a more dispersed geographical area); and
- social (including isolation, economic stratification of areas and reduced access to public services).

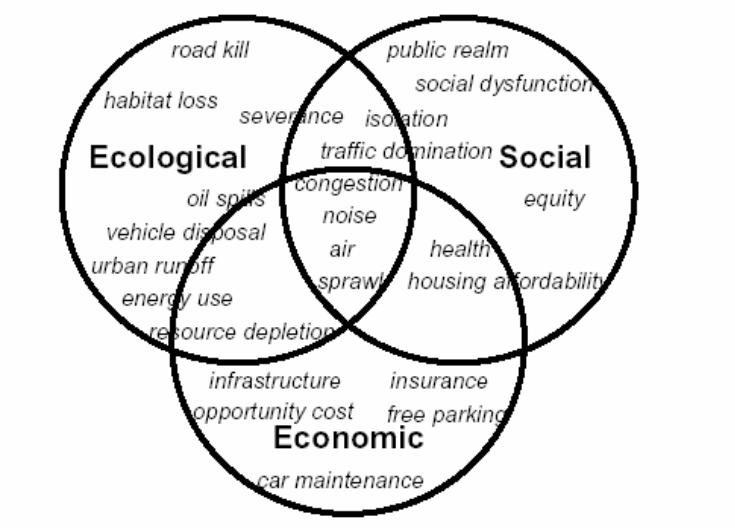


Figure 2.2 Ecological, social and economic dimensions of auto dependence (Interrelated causes of automobile dependence) (Raad, 1998, 29)

One of the most important impacts is environmental because it is one of keys for sustainable development. In environmental aspect, the growth in the number and use of the motor vehicle has many environmental impacts in many ways such as traffic congestion and air pollution. Santos (2000, 1) describes traffic congestion as "a situation in which the volume of traffic exceeds the free flow capacity of the link or junction, and in such cases each additional vehicle causes delays to other vehicles and thus more costly journeys".

Besides, transportation is 97% dependent on petroleum as its source of energy (Gordon, 1991). In this scope, oil and gas are fossil fuels and cannot be regenerated so they are not sustainable sources of energy. These fuels are considered as the main sources of some several impacts on environment such as air pollution, emissions and noise.

Raad (1998, 16) states that automobile dependence has also many land use impacts. According to observations on the experiences, in automobile dependent city, activity centers (businesses and other public facilities) are located along arterials and highway intersections rather than in clusters and traditional commercial centers. Automobile dependence also increases the amount of land that is allocated for roads and parking facilities. Much of the "potential exchange spaces" is actually occupied by movement space such as roads, parking lots and freeways. This reduces both the quantity and quality of transportation choices. At the street level, increased automobile traffic makes walking and cycling more difficult and unpleasant.

Many studies have shown that there is an inverse relationship between car use and car ownership and urban density. Automobile enables city to spread 40 to 50 km in every direction (Figure 2.3), thus fill in all the urban area between the transit corridors. The increase in private car use enables urban density to decrease and land use to become segregated as seen below. At this point, building more roads makes the low density development possible and also makes automobiles "a necessity where transit services are unable to support themselves" (Raad, 1998, 18).

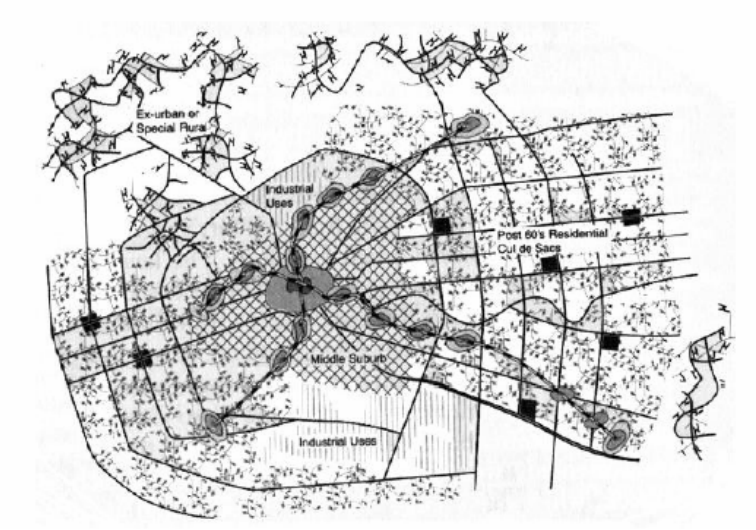


Figure 2.3 Automobile dependent city. (Newman, 2001, 95)

Jane Jacobs (1961) describes the process as erosion of cities:

> *Erosion of cities by automobiles entails so familiar a series of events that these hardly need describing. The erosion proceeds as a kind of nibbling, small nibbles at first, but eventually hefty bites. Because of vehicular congestion, a street is widened here, another is straightened there, a wide avenue is converted to one way flow, staggered-signal systems are installed for faster movement, a bridge is double-decked as its capacity is reached, an expressway is cut through yonder and finally whole webs of expressways. More and more land goes into parking, to accommodate the ever increasing numbers of vehicles while they idle. No one step in this process is, in itself, crucial. But cumulatively the effect is enormous. And each step, while not crucial in itself, is crucial in the sense that it not only adds its own bit to the total change, but actually accelerates the process (Raad, 1998, 24).*

In brief, the automobile dependent city encourages peoples to make all trips by car. Thus, this type of city can be defined as a city with an unsolvable traffic problem at its core unless more attention is given to reduce the need to travel by car. As a result, this city could not be considered as sustainable.

2.3 Changing Character of the City

Given the physical impacts of automobile dependence on city, city center has changed dramatically in favor of automobile use. As stated by Gehl and Gemzoe (2001), in spite of the differences on the pattern of usage, city center has always a role as meeting place, marketplace and traffic space.

In the past, there was a good balance between the three uses of the city. Gehl and Gemzoe (2001) describe the traditional city that, "the scale of these cities, the dimensions of the streets, the distribution of uses along streets and squares are in harmony with human senses and opportunities for movement". This feature of traditional city allowed pedestrian to act more freely. Pedestrian was a dominant factor so transportation system was depended mostly on foot. As seen in Figure 2.4, this gives the city center a compact form with a diameter of walking distance.

Examples of intact medieval cities can be given as an example for the traditional type of cities. In this scope, Venice is considered as one of the best-known examples of the pedestrian city in the world. Even today, the entire city has no cars operating on its streets. As stated by Torlak (1983, 159), it is a good example for the study of pedestrian spaces because "its streets have been shaped and sized in response to human needs and behavior". In respect of its pedestrian system, pedestrian ways are completely separated from vehicular transport (Figure 2.5). Venice as an example for pedestrian city is also important because it shows that "two completely different and separate transportation networks-waterways and pedestrian ways can operate well together" (Torlak, 1983, 159).

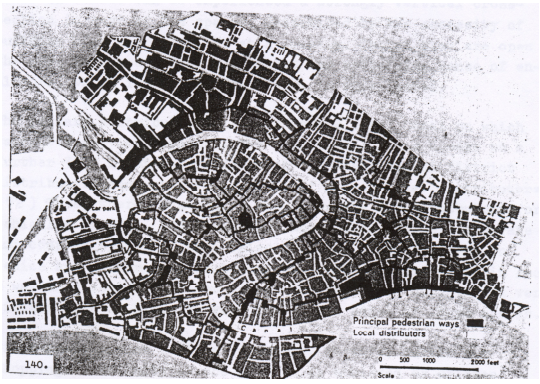


Figure 2.4 Form of traditional walking city (left). (Newman, 2001, 93)
Figure 2.5 Venice as an example for pedestrian city (right).(Torlak, 1983, 158)

However, rapid industrialization changed entirely the condition of the city with the subject of three main uses. The rapid developments on the transportation technology in the 19th century gave people a wider range and allowed the city to expand significantly in area. After the introduction of car at the beginning of the 20th century, transportation patterns in city changed dramatically. Gehl and Gemzoe (2001) depict that, as a result of this change, "uses that had been in balance for centuries were now in open conflict".

The developments in the 20th century have also affected the role of city as marketplace. Economic pattern of city firstly developed at center, and then jumped out of city center thanks to the transportation opportunities. Likewise, with the words of Gehl and Gemzoe (2001), "trade from open booths was gradually moved to small shops along streets and squares, then to supermarkets, and finally to big shopping malls, usually far from the heart of the city".

Furthermore, the developments in the 20th century changed also the conditions for the role of city as meeting place and information exchange (Gehl and Gemzoe, 2001). This reduced the opportunities for human social interaction.

Gehl and Gemzoe (2001) state that contrary to the traditional city, with the increase in car use, the balance between the three uses of the city has changed in favor of car traffic. Car traffic has become the crucial mode in transport system. Meeting the

requirements of car traffic by reallocating public spaces for car uses has gradually become a fact in city center. Likewise, spaces in streets and squares have been invaded for car traffic and parking (Figure 2.6). This condition of city center enables pedestrian with difficulty to walk on street and to spend time in public spaces. It is clear to say that invasion by car decreases the quality of public space and thus forces people to escape from city center.

Figure 2.6 Invasion of car traffic in streets. Westport, Ireland (right) and İstanbul, Turkey (left) (Jan Gehl & Lars Gemzoe New City Spaces Winning Back Public Space, http://www.rudi.net/bookshelf/books/new_city_spaces/pages/chapter1/c.shtml, April, 2006)

The level of automobile use has reached such a dangerous point that public space and public life are threatened. Due to automobile dependence, the pedestrian movement has been restricted and most of social and recreational activities have disappeared. Sidewalks have disappeared in city centers as well as residential areas and public spaces have gradually been allocated for car needs, such as parking. According to Gehl and Gemzoe (2001), consequently, city center gains "a feature of a parking space for requirement of heavy car traffic", as seen in Figure 2.7.

It is important to point out that heavy dependency on the automobile results in the emergence of a new term called "car culture". As a part of this new term, the regional shopping centers outside the city have appeared which have negatively affected the commercial structure of the city. As a result, the city center loses its commercial value to outskirts of the city or around main arterials and highway intersections.

Walking as a main mode has declined for the city. Instead, the transport policy of the city has remained primarily car-oriented. Automobiles form the backbone of the urban transport system. In this transport pattern, commuters choose private cars rather than public transport in their daily trips. There are many cities of this type in many places predominately in North America.

Figure 2.7 The city centre as car park, Spokane, Wa. USA
(Jan Gehl & Lars Gemzoe New City Spaces Winning Back Public Space, http://www.rudi.net/bookshelf/books/new_city_spaces/pages/chapter1/c.shtml, April, 2006)

As a reflection of automobile dependence, a new approach has emerged in the city, which depends on the establishment of a new balance between the uses of the city as meeting place, marketplace and traffic space. Gehl and Gemzoe (2001) describe this new concept as “a new and intense period”. This was born in Barcelona in which more cities and city spaces were created and renewed in order to obtain good public space for new types of public life. Actually, the date of interest in public spaces and public life goes back to the past 30 to 40 years. Since then, it has grown to give pedestrians more opportunities in the condition of city center.

According to Gehl and Gemzoe (2001), one important source of this inspiration came from shopping centers. Some of the earliest pedestrian areas throughout Europe between the period of 1950’s and 1970’s were based primarily on this commercial concept. Actually, the real purpose of pedestrian streets was to get people to shop because they made it easier for people. Especially in Europe, tradition is also very important source of inspiration. Many European cities continue to carry on a lively tradition of using city spaces for social and recreational activities.

It is worth noticing that Gehl and Gemzoe (2001) think that oil crisis starting in 1973 was also an important turning point for the traffic situation in cities. The insufficiency of fossil fuels has obliged cities to take new measures in order to ensure a better balance between motorists and other forms of transport. Since then, interest in non-motorized modes and public transportation has grown accordingly.

2.4 Cities in the United States and in Europe

As mentioned before, the developments on automobile-based urban transit systems could cities to expand beyond their compact centers, and to enable suburban growth along arterial roads. After the Second World War, city centers were strongly influenced by the increasing use of motor vehicles and by economic expansion. As a result of this increase in private transport and suburbanization, city centers have lost several economic functions to around the city.

Every developed city has faced with the problem of the increasing use of motor vehicles. As for the comparison of cities, American cities are considered as a dispersed city due to high dependence on private cars. European cities are more compact than United States cities. Unlike European people, people in American cities choose private cars instead of public transportation to come to city centers. However, this percentage around 85% is much less for European cities and our cities (Torlak, 1983). European cities have better public transport services and have much greater control over land use planning and development than cities in the United States.

In American cities, residential units have left the city and suburbs are formed. Torlak (1983) thinks that the development of shopping centers around cities and along the sides of the expressways instead of the center enables the city center to turn into a “slum”.

In addition, car ownership is higher in the United States than in most European countries. The proportion of private cars in all trips is much less than in American

cities. It is seen in Table 2.1 that Newman and Kenworthy (1989) categorized the cities of their study into five classes from very high levels of auto dependence to very low levels of auto dependence (Raad, 1998, 13). Unlike in North America where the percentage of non-motorized modes is about %8.06 in all trips, in Western Europe this percentage is about %31. This categorization and percentage of non-motorized modes in all trips indicate that automobile dependence in an American city is much more than in an European city.

As will be mentioned later, the pedestrian regions are important for sustainable transport strategy. As the aspects of accommodating the pedestrians, there are some differences between American and European cities. American cities use the concept of pedestrianization as a part of the economic revitalization of city centers. In comparison with American cities, most European cities have historic medieval centers. Therefore, the car-free movement in Europe started in the medieval centers. In Europe, pedestrian areas are created for the conservation of historical tissue, for improving residential conditions, and for beautification of the environment (Pressman, 1987, 40). It is likely to say that the main aim of pedestrianization effort in Europe is actually to attract more tourists to visit their city "by achieving meaningful social spaces and by preserving the traditional way of life in city centers" (Pressman, 1987, 40).

Table 2.1 Classification of cities by degree of automobile dependence made by Newman and Kenworthy 1989 (Raad, 1998, 13)

Class I	Class II	Class III	Class IV	Class V
Very High Auto Dependence	**High Auto Dependence**	**Moderate Auto Dependence**	**Low Auto Dependence**	**Very Low Auto Dependence**
Phoenix	Washington	Toronto	Amsterdam	Munich
Houston	Melbourne	New York	Frankfurt	Singapore
Denver	Boston	Copenhagen	West Berlin	Paris
Detroit	Chicago	Hamburg	Vienna	Hong Kong
Perth	San Francisco	Zurich	London	Tokyo
Adelaide	Sydney	Brussels	Stockholm	
Los Angeles				
Brisbane				

CHAPTER 3

THE CONCEPT OF TRANSPORT PLANNING

3.1 Evaluation of Urban Transport Approach

It will be clear from the previous chapter that urban transport problems are currently a significant issue in most countries due to planning approaches depending on automobile dependence. Transport is recognized as a critical contributor to city development. However, it also comes with significant undesirable side effects in terms of environmental, economic and social. As it mentioned before, although cars provide many benefits to the city, the major part of this problem is caused by the car so it needs to be addressed.

In this context, urban transport system is “an important tool” (Ritter, 1964) to overcome these problems and then to create a sustainable and livable environment. It involves a wide variety of infrastructures supporting economies and communities. Therefore, as stated by Rodrigue (2004), “the allocation, design and construction of such resources must be subject to careful planning”. The pressure to maximize the benefits derived from transport systems and to reduce its negative effects such as congestion, pollution causes a need of urban transport planning. Urban transport planning has gained importance with the rapid growth in number of motor vehicles. Increase in automobile’s supply and insufficient road networks resulted in a traffic problem in city center. This problem caused a need of planning efforts to be made.

All cities determined various transport policies in order to decrease the proportion of car use in all trips and to achieve a sustainable transport and consequently to create a more livable places. The periods of 1950’s and 1960’s are the period of traditional planning approach which were in the effect of rapid technological developments and based on the tendency that technology was sufficient to overcome traffic problems.

In the beginning of transport efforts, traffic problem was received only as congestion. Therefore, planning system in those periods was designed to provide high levels of vehicular accessibility. It was mostly to improve accessibility by building new roads and increasing capacities of existing roads rather than providing a better management of the transport system.

Although this type of planning contributes positively to accessibility for cars and commercial vehicles, it makes "public transport, cycling and walking less attractive, and increases environmental pollution" (May, 1997, 57). It is clear that new roads are likely to have an adverse impact on sustainability. This type of planning, on the one hand, attracts new traffic, on the other hand, encourages new developments on the periphery of the urban area.

It is stated in the report of Australian Capital Territory (ACT) (2004, 8) that the approach of building more roads in response to increasing demand is not long term solutions. Evidence shows that more roads provide more traffic and more reliance on cars. This also includes "costs of road construction, maintenance and land take, parking infrastructure and management, and environmental impacts, including air pollution". In this scope, this planning approach is likely to have "an adverse impact on sustainability and reduce city's attractiveness and amenity, especially within inner areas where traffic levels are highest".

According to Rodrigue (2004), traditional transport planning is usually focused on specific problems at a local level. Because of its tendency to deal with localized problems, the solutions adopted in transport planning tend to be much more exact and specific than policy directives. Rodrigue (2004) claims that in this scope, traffic engineers have dominance on this type of transport planning, which gives to this type of planning "a distinctly mechanistic character".

However, this tendency in the transport planning changed with the report by Buchanan published in 1962. Buchanan claimed that the main reason behind traffic congestion was the encouragement of private cars and engineering solutions to traffic problem (Kancabaş, 1998). Gehl and Gemzoe (2001) mention that oil crisis starting

in 1973 was also an important turning point for the planning approach in cities which forced them to "take new measures in order to ensure a better balance between motorists and other forms of transport".

With the increase of traffic problems over the last 50 years, it was accepted that estimating traffic increase and then providing capacity increase to meet the expected growth is not right and adequate approach for transport planning. To obtain a better management of the transport system, a new type of transport planning based on using multi-disciplinary teams has emerged in order to widen the scope of the planning process.

Rodrigue (2004) defines contemporary approach as a new approach not only to improve accessibility but also to improve safety and health, and to reduce emissions from vehicles for livable environment. Contrary to traditional type, contemporary transport planning provides high levels of accessibility "with lower costs and less negative impacts" (ACT, 2004). The differences between these two types of planning approaches can be summarized as below.

Table 3.1 Differences between Traditional and Contemporary Transport Planning made by Elker in 1999 (Çubuk and Türkmen, 2003, 130)

TRADITIONAL TRANSPORT PLANNING	CONTEMPORARY TRANSPORT PLANNING
Planning of transport supply	Management of demand
Priority for motor vehicles	Priority for pedestrians
Capacity increasing	Efficiently use of existing infrastructure
Devoted to problems of car users	Devoted to problems of all users / integration of all modes
Capital intensive investments	Small investments
Inflexible decisions	Flexible decisions
Physical solution	Management/legal/economic solutions

It is certain that resolving of increasing concern about road accidents, global warming, and environmental pollution requires changes in public attitudes and planning approaches. In this context, in 1980's there was a turning point for transport planning approach. A new term called "sustainability" emerged. A focus on environmental sustainability is key motivator in the development of this approach. Sustainable development has gained importance after 1970's, but was heard widely after "Our Common Future" published in 1987 (Yalçıner Ercoşkun, 2005, 532). Since then, the significance of sustainable development has increased rapidly.

It is perhaps useful at this point to define the term of sustainability. Sustainability can be defined as "meeting today's needs without adversely affecting the ability of future generation to meet their needs" (Williams, Burton and Jenks, 2000, 3). Yalçıner (2005, 530) explains this meaning as a contemporary evaluation which sees the use of environment not only "for the current users but also the use of environmental resources by the future generations". It is a concept which has many dimensions like ecological, economic and social.

Williams, Burton and Jenks (2000, 3) state that the aim of sustainability is to produce a "user-friendly city in terms of not only its form, but also its function, as a place for living" (Elkin, 1991). This means that city should be developed with respect to economical, social and environmental issues. There is a relationship between the shape, size, density and uses of a city and its sustainability. In other words, the form of a city can affect its sustainability. As mentioned by ACT (2004, 9), in this context, planning is one of the main tools to obtain a sustainable development because sustainability is related to efficient planning. Sustainable transport planning is crucial for reversing the problems caused by automobile dependence and for building cities which are equitable, accessible and economically viable.

In the process of sustainability in a city, transportation is considered as a key issue. Forbes and Brittingham (2001, 1) define sustainable transportation as " the ability to meet the needs of current society to move freely, gain access, communicate, trade, and establish relationships without compromising the ability of future generations to meet their own needs". It is interested in "meeting the access and mobility needs of

the commuting while balancing environmental, economic and social goals" (ACT, 2004, 11). Its aim is to achieve a balance between the community's strategic social, economic and environmental transport needs. While doing this, it has a greater emphasis on non-motorized modes (walking and cycling) and public transport. To meet the increasing demand by sustainable modes, it is interested in reshaping transport system to encourage walking, cycling and public transport. ACT (2004, 9) arranges its aims as "decreasing the automobile dependency, increasing pedestrian movement and the use of bicycle, decreasing the air pollution and energy consumption, more accessible by public transport mode". It is clear that increasing proportion of travel using modes like walking, cycling and public transport will help in creating more sustainable system in the long-term and maintaining the city's attractiveness.

While traditional planning is for planning of transportation supply, contemporary planning includes the concept of travel demand management. In traditional approaches, supply will be increased to meet increasing demand, but contemporary approach establishes a balance between them through limiting demand by means of travel demand management techniques.

As stated by Black, Mason, and Stanley (1999, 2) the travel demand management element is one of important feature assisting city to move towards more sustainable urban transport system. Travel demand management is to modify travel decisions of commuters by providing more sustainable transport modes. Its aim is to reduce traffic demand, traffic congestion, and environmental pollution through the increased use of alternatives modes of transport. It refers to a range of techniques or mechanisms that can contribute to sustainable cities development. In this context, it differs from road based solutions, which can be best described "as one of extrapolating or predicting the growth in road traffic and expanding road capacity to meet that demand".

Managing the demand for transport needs several sets of the policies and actions to further promote a reduced reliance on the private motor vehicle and in particular to improve the livability of cities. These policies can be categorized as follows:

- The promotion of alternative modes to the private motor vehicle i.e. public transport, walking and cycling.

  It includes the improvement of alternative transport options in order to provide to the community with greater choice in their trips. Walking and cycling are provided as healthy and effective alternative modes of transport in order to reduce the reliance on private motor vehicles in the region, particularly for short trips.
- Physical regulations to private motor vehicles such as ring roads, traffic calming and pedestrianization.
- Integration of transport system and land use planning
- Regulatory restrictions on car use.

3.2 Promotion of Alternative Modes

3.2.1 Improved Public Transportation

It is considered that the main reason behind the traffic problem in the city is the dominance of private car over the other types of transport modes. Cities have developed some measures regarding to the discouragement of private car use in order to reverse this explosion. According to Nash and Sylvia (2001), “an improved public transportation is essential in order to decrease the traffic congestion created by automobiles”. Although each city has a unique approach, high quality public transit system can provide an effective alternative to automobile use in order to meet the needs of all citizens.

According to sustainable transport planning, one of the most important goals of the traffic policy is to increase the proportion of the trips made to and from the centre using public transport rather than private car as high as possible. Its attractiveness can be increased by not only physical measures but also some taxation measures against private usage. Cities thus have implemented various set of measures for reducing the negative effects of vehicular on the city and to increase the attractiveness of public transport. All measures support each other and have an

impact on several modes of transport. To be effective, transit service must be competitive with automobiles in terms of speed, convenience, comfort.

It is clear that well-used public transport will reduce the need for supplementary roads and parking. Construction of a metro rail system and increase in number of buses would also increase the number of access trips by walking and cycling. At this point, it is important for the concept of sustainability.

For a long time, the cities have put very much effort into developing public transport. In this scope, Zürich, Switzerland; Strasbourg, France; and Freiburg and Karlsruhe, Germany are considered as the best practice public transport cities for creating an efficient public transport network. These cities have tried to change the dominance of the automobile in the city and have succeeded in reversing this case within their cities.

The observations on the experiences show that the main measure implemented is the transit priority measures in order to make public transportation more preferable over the automobile.

3.2.2.1 Transit Priority Measures

In the study of "Implementation of Zürich's Transit Priority Program" (Nash and Sylvia, 2001, 21), the transit priority improvements are defined as a "range of techniques, i.e. physical improvements, operating changes and regulatory changes, designed to speed up public transit vehicles and improve the transit system's efficiency".

Transit priority improvements are developed to reduce transit vehicle delays, which can be categorized into the following types:

a. Roadway Improvements / Traffic Regulations

As stated by Nash and Sylvia (2001, 22), this type of improvements are designed to meet conditions in public areas and minimize unnecessary negative impacts. They consists of traffic regulations, minor physical improvements, and changes to traffic stops. Parking restrictions and controls are implemented to minimize transit vehicles delays. The location of transit stops is so effective on transit speed that transit travel times can be improved by reducing of number of transit stops then really necessary and by relocating stops to places with better conditions, such as to the near or far side of an intersection.

b. Traffic Signal Priority

Traffic signal priority is the most effective measure in increasing transit travel time because delays at traffic signals causes nearly 50 percent of the transit vehicles delays (Nash and Sylvia, 2001). Traffic signals are designed to provide a green light to transit vehicles whenever there is a conflict between transit vehicle and other vehicles in order to obtain priority transit system over private cars. There are two methods for providing transit priority at traffic signals: passive, active.

As defined by Nash and Sylvia (2001, 23), passive priority, which is the simplest form of providing transit priority, depend on setting cycle times to reflect the average speed of transit vehicles in the mixed traffic. Although this approach is not very effective, it can create significant benefits in streets such as San Francisco's Market Street where is used by multiple transit vehicles.

Unlike passive priority, active priority system is more effective method which has been used since 1970 in USA and Europe. This approach is used in many cities. This system interrupts individual traffic and gives green signal to transit vehicle when they approach intersection. It is managed electronically by computer control system or physically by the operator.

c. Separate Right of Way

In most rapid transit systems, the exclusive right of way is a key approach to make the system fast. The most common way of creating a separate right of way is to take an existing lane of traffic and allocate it for transit use only. These lanes can be used only by public transit vehicles. This can be achieved by stretching roadway for use of transit vehicles only, and by traffic signal that enables transit vehicles to be the first to enter a stretch of uncongested roadway. Traffic lane can be physically separated by building a new separate right of way, for example a busway. However, painted line is also used in separation of traffic.

Transit malls are other method for creating separate right of way whereby many different transit lanes can operate with little or very limited private traffic. They provide acceleration in public transit system by reducing interference with private traffic. In the cities of United States there are many examples of transit malls. (Nash and Sylvia, 2001).

3.2.2 Integration of different modes

Integration of modes is an important aspect in achieving a sustainable and efficient transportation network. It is clear that unless the needs of non motorized modes of transport are met, it will be almost impossible to design any sustainable transport system for urban area. Pedestrians and cyclists are the most critical elements in mixed traffic so their needs should be provided by existing roadway system.

Nash and Sylvia (2001) are of the opinion that the integration of different forms of transport system and giving them priority over automobiles are the crucial policy to stop most of the urban transport problem regarding private car uses. Evidence shows that the integration of modes is essential requirement to overcome the conflict between automobile traffic within the city center and the quality of its urban surroundings.

In this scope, the cities have tried to achieve a balance in their transport system to reverse the trend of private car uses. Therefore, they have actively supported alternative modes such as cycling and walking to obtain a sustainable transport system. It is certain that this approach enables a greater participation in the system (Figure 3.1), where all modes support to each other and do not compete among themselves. The most important, but also most difficult task of transport planning is to facilitate a system serving alternatives as a complement means to the needs of people. This can be reached only by combining all transport modes. Achieving a combination in system, rather than depending on only one form of transport, makes the system more attractive for people.

It is clear that increasing the use of walking as a mode of transport for people has many benefits to the urban transport system. Walking must be an essential part of any integrated transport policy because nearly all trips involve a walk and walking is still the main mean of transport. In integrated system, it is aimed to give more road space and priority to non-motorized modes in order to improve conditions. This includes reallocating road space to these types of modes, providing direct and convenient walking routes, providing safety and considering walking and cycling in the planning of new development.

Transport system should get potential car driver not only onto public transport but also to non-motorized modes, in particular walking. This can be achieved by providing safety to pedestrians through reduction in the speed and volume of motorized traffic. This is important to affect a person's decision to use bicycle or to walk. The experiences show that the rearrangement of public spaces for pedestrians has resulted in a significant increase in the number of trips made on foot.

Likewise, by means of integration, the cities have achieved a significant reduction in automobile traffic through a prioritization of the use of the public transit system within the city and the replacement of short car trips with walking and cycling.

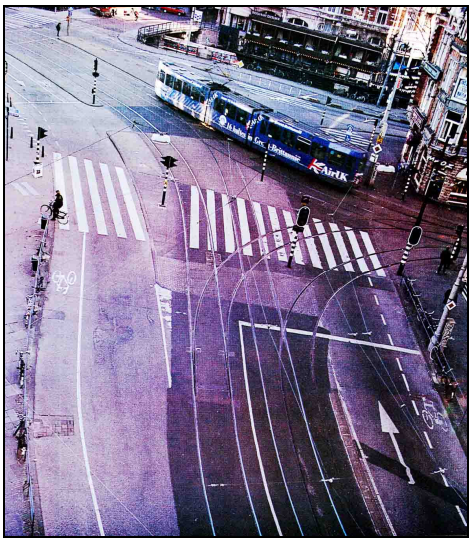


Figure 3.1.Integration of different modes in Amsterdam (left) (Günay's Personal Archive)
Figure 3.2.Integrated Pedestrian/Cycle Path and Light Rail Station (right) (Kirkheim, 2001, 8)

Figure 3.3.Bicycle infrastructure giving priority to cyclists. Houten (left), Strasbourg (centre) and Freiburg (right) (Zucks, 2001, 11)

3.3 Physical Regulations

One of most important measure against car use is physical regulations. Physical regulations are designed to reduce vehicle use. Cities throughout the region have implemented various physical regulations including reorganization for traffic by ring roads for shifting traffic out of city center, traffic calming measures, and pedestrianization.

3.3.1 Reorganization of traffic flow

Regional measures in a complementary transport policy are inevitable for the success of sustainable transport vehicles (Nash and Sylvia, 2001, 23). The experiences show that as a part of the physical regulations, cities propose a system of highways radiating from the center of the city, linked by one ring road (Figure 3.4). In this scope, ring road system forms the backbone of all regional policies by guarding city center from car traffic in order to decrease car traffic passing through center. The implementation of ring road is important in the process of reducing car use in the city center and thus pedestrianization of the city center.

In this way, transport system offers alternatives to the single occupied vehicle while going wherever they want without passing through city center. They also propose high capacity parking places around ring roads to transfer easily the driver to other means of rapid transit such as train or bus. These transmission points enable automobile to integrate conveniently with other transport modes.

Figure 3.4 Ring Road around the city centre of Liverpool. (Ritter, 1964, 181)

3.3.2 Traffic Calming

As for traffic calming, it is a traffic management approach that evolved in Europe. Its aim is to reduce the dominance and speed of motor vehicles and improve conditions for non-motorized street users. It consists of set of physical measures to cut vehicle speeds. All these measures either reduce vehicular speed or eliminate through traffic to safeguard pedestrians.

As defined by report of Federal Highway Administration (1994), historically, traffic calming originated in German with the pedestrianization of downtown shopping areas. In this approach, non-motorized forms of transport especially pedestrians are given priority over automobiles. Over thirty years, a variety of traffic calming techniques has been applied in many European countries with different names. Each of traffic calming measures has the aim to "slow vehicle speeds without actually restricting or interfering with the flow of traffic".

According to Tooley and Rodney (1990), *Verkehrsberuhigung,* traffic calming in Germany, is the improvements for pedestrians, cycles, buses and trams, an increase in traffic safety, and an improvement in the environment where you live.

As a part of this system, the urban street system is classified according to a new kind of hierarchy; arterials and major routes, collector / distributor streets, and residential streets. In addition, road space was reallocated for non-motorized forms of transport.

Although this method was initially applied in residential areas, then it is extended to be implemented to whole cities. In 1970's, traffic calming approaches shifted from city center to residential streets. A new concept of traffic management was developed in the Netherlands, where the concept of *woonerven* (living yards) was implemented in residential areas. As seen in Figure 3.5, the concept of woonerf depends on no segregation between motorized and non-motorized traffic and on giving priority to pedestrian in the whole street.

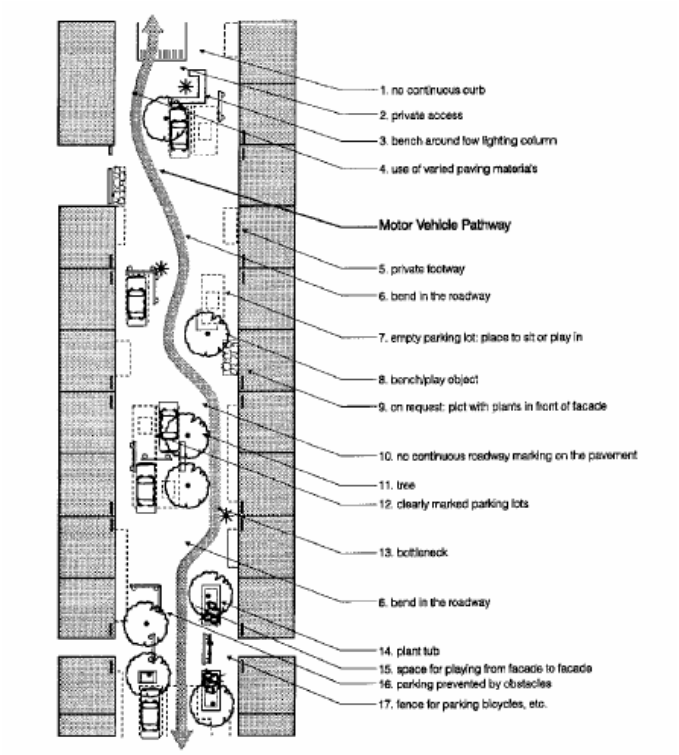


Figure 3.5 A model of Woonerven type of traffic calming. (FHWA, 1994, 11)

Tooley and Rodney (1990) evaluate other types of traffic calming techniques used in Europe. For example, traffic calming efforts in Denmark was mostly focused on developing "Safe Routes to School" projects on areas close to schools and on school routes. In addition, as a part of traffic calming, the city of Gothenburg in Sweden used "traffic cells" in order to restrain traffic by dividing the city into traffic cells. In this method, the city center was divided into five cells. Contrary to private cars, public transport, pedestrians, and cyclists could move freely between these cells. To move from one cell to another, the driver must return to an inner ring road and circle around to the entrance to the next cell. These traffic cells were so effective on city's transport system that city center achieved a greet percentage reduction in car traffic.

Beside traffic calming measures, it is worth noticing that segregation of pedestrian from the motorized traffic is an important well-known solution to prevent from the friction between them. As defined by Ritter (1964, 160), various options to segregate pedestrians from road traffic have been implemented, such as horizontal segregation,

vertical segregation and segregation by time. Pedestrians and vehicles can be segregated where they may in conflict; horizontal segregation is achieved by the vehicles moving around the pedestrian area, vertical segregation is achieved by the vehicle moving over or under the pedestrian area (Figure 3.6), and segregation by time is achieved by vehicle moving to the pedestrian area at certain times only.

Figure 3.6 Segregation pedestrians and car traffic from subway system in Sergels Torg in Stockholm. (Botta, 1987, 153)

3.3.3 Pedestrianization

Francis (1987) evaluates pedestrianization as the strongest and most influential of the street redesign movements that have changed the public environment of many cities. The most popular measure to attract public urban areas for pedestrians is the creation of pedestrian zones. In this movement, streets are allocated for the use by pedestrians. In these areas, pedestrians rather than motor vehicles have the dominant role.

As for the historical evaluation of pedestrianization, its date goes back to 1960's, when downtown shopping streets were converted into pedestrian areas in Germany. Initially, it started "as a part of a general redesign of city centers to make way for the automobile, including central city ring roads, multi storey parking garages, and rear access streets for delivery vehicles (FHWA, 1994, 19). According to Francis (1987), the efforts to create neighborhoods streets for shopping have often been influenced

by “the historic preservation movements”, where buildings are restored to their original or idealized 19th or 20th century character.

It is stated in the Case Study No: 19 (FHWA, 1994, 19) that however, due to economic success and historic economic movements, the pedestrianization of downtown areas became a symbol of enlightened town planning. In western Germany, today, the number of pedestrian areas is over 1000. Then, this movement spreads to all Europe and now is a feature of most European cities.

According to its historical development, while in 1950’s and 1960’s, its aim was to reduce negative impacts of cars on shoppers, in the mid 1970’s; auto-restricted zones became popular, where priority was given to public transit and pedestrian rather than cars that were allowed at certain times, such as evenings and weekends (FHWA, 1994, 19).

As stated in the study of Levent (1999, 18), there are two ways to create pedestrian zones. The first one is the pedestrianization in existing urban environment which means redesign of environment or traffic reorganization in accordance with the criteria of traffic calming and priority for non-motorized transport. The second one is creating new urban streets, such as woonerven, pedestrian indoor streets and democratic streets.

There are a lot of successful examples of pedestrianization. Some of the most well-known examples are Stroget, Kalverstraat, Borgo Stretto and San Marco. Stroget, the main street of Copenhagen, was pedestrianized in 1950’s. In the part of examples, it will be mentioned about the pedestrianization of Stroget as an important part of Copenhagen transport plan.

3.4 Integration of Land Use Planning and Transport

According to Hine (2001, 2) providing integration between land use planning and transport is another key issue to create an efficient and sustainable transport system. This integration at the national, regional and local level can contribute "significantly towards achieving the goals of reducing car use and promoting a shift toward public and non motorized forms of transport".

O'Flaherty (1997, 139) states land use planning as an essential contributor in reducing travel distances and encouraging greater use of sustainable transport modes like walking, cycling and public transport. It is clear that without sustainable planning the city will experience scattered and uncoordinated development patterns. It should be considered in planning process that land use activities and transportation networks are mutually supportive and closely linked. As determined by O'Flaherty (1997, 139), land use activities are settled "without the need to travel by car or when travel by car is essential, by minimizing its usage and shortening the distance traveled".

The integration of economic and residential activities with public transport modes is important in reducing the need to travel, and encouraging the use of more sustainable public transport modes. This integration can provide greater transport links with walking and cycling routes and public transport services. This enables a decrease in private car use by encouraging sustainable transport modes.

3.5 Regulatory Restrictions on car use

Around the world, many cities have implemented some form of traffic management system against car use. These types of measures are regulatory forms which are considered as an alternative way of reducing the demand on car use. Road congestion would be relieved by establishing a better balance between road capacity and demand. This could be achieved by restraining demand through regulatory restrictions such as road pricing, parking regulations and car sharing.

As defined in the study of The House of Commons (2005, 44), road pricing is one of most important push-measure for reducing car traffic. It is developed to improve the efficiency of road use particularly in congested areas. Road pricing system is used as a tool to overcome congestion at certain roads in the most congested areas rather than in the whole city. However, this system needs "public acceptance" (The House of Commons, 2055, 44) to be successfully applied because access for private cars into some streets is allowed only by taking charges from drivers. At this point, it is useful to mention about the London's experience. In 2003, the city of London started to implement a congestion charging scheme for central London. Since then, within the charging zone, the scheme has reduced traffic by 15 percent, congestion by 30 percent (Livingsten, 2004, 490).

Parking regulation is also an important part of policy in limiting the use of cars in city center. According to May (1997, 64), it is more effective way of controlling car use by "reducing the supply of spaces, restricting duration on opening hours, and regulating use through permits or charging". It should be noted that the success of parking controls depends on how they are applied. In the scope, cities have carried on a strict program of reducing number of parking spaces in city center. Parking in the city center is legally or physically kept low to limit car flows to the city center.

As mentioned by Bergmaier, Mason, Mckenzie, Campbell and Hobson (2004, 6), car sharing is another implemented regulatory measure assisting city to reduce private car use. In this context, instead of buying a car, people share vehicles with usage costs. This enables, on the one hand, "individuals to gain the benefits of private cars without the costs and responsibilities of ownership", on the other hand, "the community to reduce the number of trips and distances traveled by private cars".

CHAPTER 4

CONTEMPORARY EXAMPLES

There are many cities throughout the world which have implemented many different strategies. Their aim is to reduce car traffic in the city center or to promote architectural quality that offers the best conditions for pedestrians. Thus, they could increase the livability of city that was negatively affected by the increase in car traffic.

On the observation of experiences shows that although the problems in all cities are similar, each city has a unique approach on perception of problem and application of urban transport policies. In some cities, urban policy narrowly focuses on the inner city, while other cities take a broader view of the inner city as well as many urban neighborhoods outside the city centre.

In that sense, the aim of this part of the study is to analyze examples implemented contemporary transport policy from regional scale to street design. Furthermore, it describes transport policies and how they were able to implement their programs. It is expected that the city of Ankara could benefit from these experiences and use the strategies and implementation tools to improve its transport system and its livability.

In spite of the fact that there are many differences between Ankara and the examples evaluated in this study in terms of social, economic and physical development, the reason to select these cities as an example could be defined with their success in the process of both perception and implementation of their transport policies. It should be mentioned that they developed a transport concept regarding to management of travel demand. It covers all relations between all components of the city. They have successfully created a sustainable system in the frame of managing travel demand of commuters rather than that of depending on priority of automobile.

4.1 Zürich

Zürich is considered as one of the most livable cities in the world because of high quality of its transport system. Right combination of policies implemented for over 30 years enables the city to achieve sustainability in its system. Its system included policies such as traffic constraints, integration of all transport modes, and upgrading the system of public transport.

After the World War II, Zürich like many other European cities faced with a significant population and economic growth related to increasing use of private cars. In the early 1970's, Zurich started to associate declining social and environmental conditions of the city with increasing traffic. As stated by Cervero (1998), the city developed solution to such a problem with the provision of quality public transport, with a particular focus on trams.

Zürich's public transport forms the main part of its system. It was developed as a response to the needs of cyclist and pedestrians and as a reflection to the dominance of automobile. According to Thomas and Taylor (2002), this enables the city to create a pleasant environment for activity in the inner city, which encourages interaction between community members and tourists.

In this framework, in the early 1970's, the city established following five main goals for its transport policy after the reaction to the congestion and pollution (Thomas, and Taylor, 2002). These were:

- To promote public transport
- To reduce motor vehicle traffic
- To channel motor vehicle traffic and restrain traffic in residential areas
- To reduce the number of parking places for commuters; and
- To guarantee the environment-friendly mobility of cycling and walking.

It is clear that all these goals above are to decrease the proportion of car use in all trips. The transportation system of Zürich consists of two kinds of programs which have been implemented for over the last 30 years: The first one is about Transit

Priority Program dealing with transit priority implementation and the process of developing Zürich's citywide traffic signal control system. The second one is the Complementary Transportation Programs including complementary improvements to reduce traffic in the city and to improve the regional transit system to support Zürich's transit system. Complementary transportation measures also include traffic calming and parking restrictions.

4.1.1 Zürich's Transit Priority Program

Transit priority program in Zürich started in 1973 with approval of the implementation of transit priority measures rather than construction of a new underground transit system. After 1962, 1973, when two public transit projects for underground metro were rejected in referendums by citizens, the city decided to upgrade the existing surface system (tram, bus system).

Unlike many European cities, Zürich started with big advantage that it had a well developed suburban rail system serving the metropolitan area. (Nash and Sylvia, 2001, 8). It needed to upgrade its system by implementing transit priority improvements.

Nash and Sylvia (2001) evaluate citizen rejection and then approval of a transport policy giving priority to trams and buses over private cars as "the most critical break point in Zürich's choosing to adopt the transit priority program". Since 1973, the public transport system (Figure 4.1) has become the most popular means of transportation within Zürich.

As stated by Cervero (1998), the Transit Priority Program of Zürich was established as a reaction of citizen to the congestion and pollution increasing actually in the inner city and points out that the right combination of measures could decrease the attractiveness of car use.

It included implementing a comprehensive transit priority program designed to speed up transit and increase its efficiency throughout the transit network. Nash and Sylvia (2001) point out that upgrading of the existing surface transit system is important aspect in creating more appropriate transit system for Zürich and its cost is significantly less than a new rail system.

Likewise, Willi Hüsler Zürich transportation advisor describes Zürich's experience, in his words:

> *Zürich is proof that a conventional tram and bus system, omnipresent in the most attractive streets and squares of the city and supported by a high-tech operation and control system, is an extraordinarily effective combination. A combination that is more cost effective than an underground system in a city like Zürich (*Nash and Sylvia, 2001, 14).

Figure 4.1 Trams in Bahnhofstrasse, the city's pedestrianised main shopping street
(Thomas and Taylor, 2002, 2)

As explained by Nash and Sylvia (2001), transit priority program includes signalization priority in order to make public vehicles more preferable for commuters. As a part of this effort, the city firstly focused on acceleration of public vehicles by a transit priority policy in the late 1970's because the existing public transport system in Zürich was considered to be slow. In the frame of this policy, traffic police was given responsibility in order to provide priority to public transit at traffic signals to overcome the delays of buses in existing traffic. Thus, the city tried to increase efficiency of the system without significantly impacting traffic flow.

Ott (2002) states that ,however, this application was not enough for the efficiency of system, so in the late 1980, the city of Zürich began to implement a "Speed- up Transit" program in frame of the Transit Priority Program in order to make the public transport system faster and more reliable. This system included a traffic control system known as SESAM for giving priority to public vehicles at traffic signals (Thomas and Taylor, 2002).

As Thomas and Taylor (2002) state that this system allows the traffic lights to turn green for public transit when they are approaching an intersection. Thus, public vehicles are able to cross through intersections without losing any time by using transmitters in the vehicles. They are also programmed to allow pedestrians and cyclists to cross easily. Right of ways was provided for public vehicles such as trams and buses in crowded city streets. According to Thomas and Taylor (2002) this enables system to have "high transit frequency and reduction in journey times".

It is worth to note that the system can estimate the arrival time of a transit vehicle at an intersection and then provides green time only when required by a transit vehicle without significantly impacting traffic. SESAM is controlled by computer system which is based on "the geometry of the intersection and on real-time traffic data collected from sensors in the roadway" (Thomas and Taylor, 2002).

This system offers citizen faster and more reliable alternative to automobile whereby they can travel easily and quickly throughout the city and region using transit. In this system, journey by public transport is faster and more desirable than a similar journey by automobile. From this point of view, the prioritization of public vehicles makes the system efficient and extremely attractive to passengers. As stated by Nash and Sylvia (2001), the city can also keep the roadway network from becoming overloaded by regulating the amount of traffic entering the city and traveling between city zones.

In the level of street design, light rail tracks are separated from general traffic on the roads so many Zürich streets now only have a single lane allocated for automobiles, and priority lanes (Figure 4.2) to light rail or buses (Nash and Sylvia, 2001).

Actually, in spite of sharing same road, there is no competition between the light rail / buses and automobiles for space on the road (Nash and Sylvia, 2001). It is certain that this increases the efficiency of the system and provides a fast service for commuters. Beside its efficiency, it is worth noticing that the whole transit system costs about the same as half a kilometer of a metro-tunnel (Nash and Sylvia, 2001).

Figure 4.2 Tram priority lanes in Zürich (Günay's Personal Archive)

According to the data of EAUE (1996), as a result of the "Transit Priority Policy" and later the "Speed-up Transit program", there is a significant decline in car usage between 1988 and 1993 from %37 to %27.

4.1.2 Complementary Transportation Programs

An important part of Zürich's Transportation Program is that the city has implemented several complementary transportation programs in order to actively reduce private motor traffic. These programs include traffic calming, reduction of roadway capacity, parking restrictions, and improving regional transportation. Nash and Sylvia (2001) point out that all these efforts were implemented together with the transit priority program. According to them (2001), this approach enabled the city to keep traffic away form residential areas and then to speed up transit.

Beside, Zürich developed significant programs to promote non-motorized modes such as cycling and walking. This enables the city to obtain a balanced and sustainable transport system. In this scope, it developed a bicycle network integrated with other modes throughout the city. It also improved pedestrian conditions by carrying on traffic calming techniques and by creating an extensive pedestrian network in the city center.

Another important aspect of transportation policy in Zürich is surely the efficient integration of all forms of transportation. The integration means that all modes play mutually supporting roles to each other. The approach of integration in Zürich's streets is achieved by the concept of "shared street", in which there is no segregation and equality of all road users (Zucks, 2001). As mentioned before, all modes, such as pedestrians, public transit and private cars, could share equally same street without creating any conflict between them.

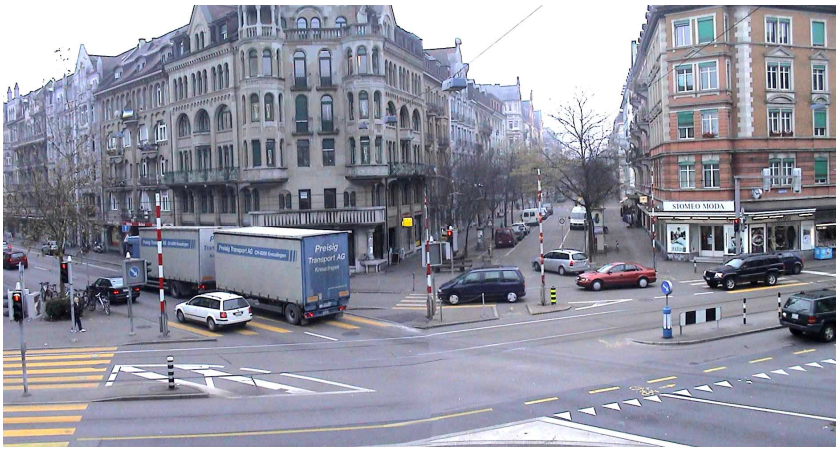


Figure 4.3 Integration of different modes in Zürich. (Günay's Personal Archive)

The main aim of Zürich transport system is to control the vehicle traffic in the city. In this aim, Zürich has used three main approaches including traffic calming, reduction of roadway capacity, and parking controls.

In the 1974 Transportation Plan, the city stated to implement traffic calming in both residential areas and the historic city with the aim of improving residential livability. This was to move traffic out of residential areas throughout the city. Nash and Sylvia

(2001, 95) arrange the traffic calming techniques with sidewalk wider streets, pedestrian zones, speed bumps, one-way streets, and prohibition of night traffic on certain streets. In spite of the fact that each of measures is small and has limited benefits, it is clear that the success of transport system comes from implementing them comprehensively (Nash and Sylvia, 2001).

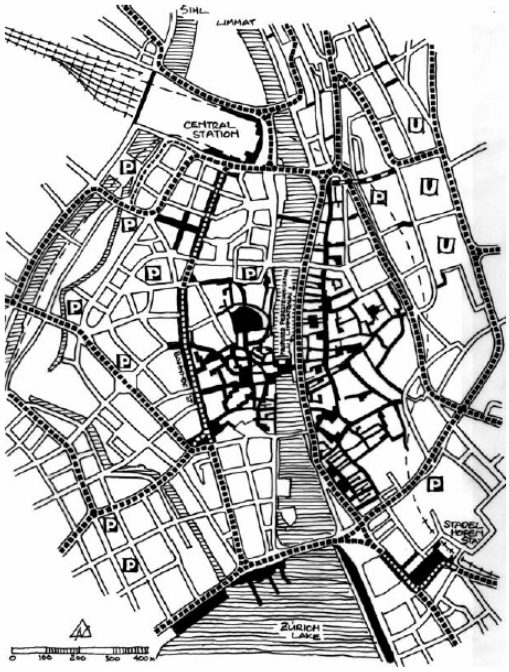


Figure 4.4 Central city of Zürich, showing pedestrianized areas (black), tram lines (dashed), public parking facilities (P), the mobility centre (M) and university campuses (U)
(Thomas and Taylor, 2002, 7)

After moving traffic from residential areas to arterial street, Zürich emphasized on reducing capacity on those arterials. According to this, the number of lanes such as light rail tracks for private motor traffic was reduced to provide exclusive lanes for public transit. At some locations, better facilities were constructed for non-motorized modes such as widen sidewalk, bike lanes. In the frame of actively roadway capacity, Zürich has avoided increasing roadway system capacity. As stated by Nash and Sylvia (2001), with application of reducing the number of lanes and shortening the waiting time at intersections, the city achieved great percentage of reduction in the traffic capacity. In addition, reducing roadway capacity achieves several environmental goals, such as air quality and citywide transport conditions.

Another key aspect of transport policy is the extensive parking controls. In Zürich, this policy is dealing with "parking on private property" (Nash and Sylvia, 2001). Ott (2002) indicates that the application is to regulate the amount of fixed parking spaces in new buildings and the maximum number of extra spaces (Thomas and Taylor, 2002). Zürich began a parking restriction in 1970's and since then the city has carried on this program in order to reduce the number of on street parking spaces.

The main aim of parking control is to restrict the number of parking spaces to the same number in 1990. As explained by Nash and Sylvia (2001), according to parking control, when a new parking space is opened, the same number of parking spaces must be removed from somewhere else in the city center. As a result of parking restrictions, Zürich could achieve a significant reduce in the number of public parking spaces from 61,200 in 1970 to 48,267 in 1999.

It is worth noticing that transportation programs consist of a series of complementary transport policies whose implementation requires several different departments in traditional city organization. The planning and comprehensive implementation process for these programs is complicated so working closely together is a critical need on these programs. In this scope, as stated by Nash and Sylvia (2001), Zürich established two task forces, one at the political level (Executive Council) and one at the departmental level (Working Party), in order to "provide close relations between different departments, and bureaucratic concerns for effective implementation".

The Executive Council was created to focus on overall strategy and implementation of transit priority program. Its role was to force city departments to work together and to approve implementation plans. Working Party was created to plan all improvements and their implementation. It helped the city to implement all improvements and regulations necessary to make the program a success.

4.1.3.1 Improving Regional Transportation Programs

Another crucial issue in Zürich's transport system is regional efforts. Sustainability needs a complementary policy from macro to micro scale. Increasing decentralization and regional transportation needs caused a need for improved transit coordination and regional transit improvements. Nash and Sylvia (2001) point that improving regional transportation was critical to the success of the city's transit priority program. It is clear that the excellent regional system could attract people to use public vehicles. Likewise, the city of Zürich encourages commuters to use public transport as a better alternative instead of using private cars.

In this frame, the city decided to develop 400 km suburban rail network (Figure 4.5) in 1973 in order to improve regional transportation system and to overcome problems with the existing system. This system is called S-Bahn. It was completed in 1990 and now the Zürich region is served by the S-Bahn. After the completion of the S-Bahn, the public transport use increased significantly by 22% in the first years and by 40% over the first ten years " (Nash and Sylvia, 2001).

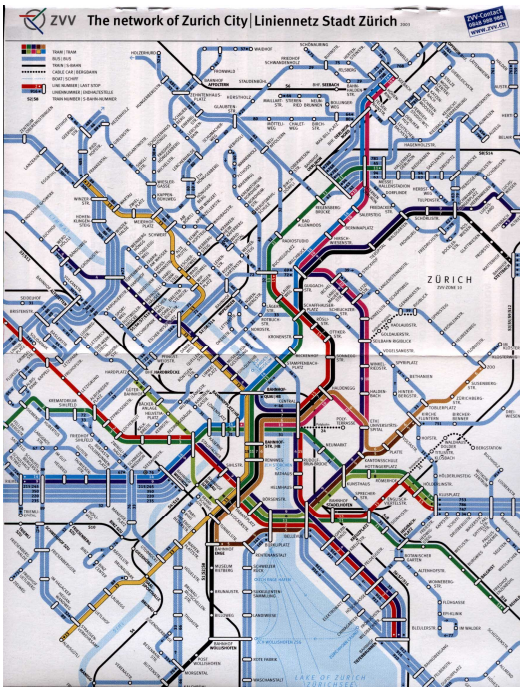


Figure 4.5 The network of rail system in Zürich
(S-Bahn Zürich – Wikipedia, http://de.wikipedia.org/wiki/S-Bahn_Z%C3%BCrich, September, 2005)

4.2 Freiburg

The foundation of the current transport concept of Freiburg goes back to the rebuilding of the city in the 1950's. In those years, the transport policies of the city like many other cities depended on the priority given to the motor vehicle over other modes of transport. After the increase in traffic problem, the city developed new transport policies against the extensive use of private car. As stated by Gehl (2002), the city emphasized on firstly keeping vehicle traffic out of center by directing car traffic to a ring road around city center. In addition, new transport policies were dependent on widening the city centre streets to accommodate car traffic, and thus creating car restricted areas within the inner core only accessible by trams and bicycles. According to Thomas and Taylor (2002), due to the new transport concept, Freiburg has become "a pioneer in Germany in the rebuilding and preservation of its historic city centre to maintain its pedestrian-friendly quality".

Thomas and Taylor (2002) describe the policies implemented in the city center as encouragement of non-motorized modes of transport over the automobile by means of bicycle parking and pedestrian walkways. In this scope, several roads and parking spaces have been removed to allocate for pedestrians and cyclists.

One of the main focuses of the transportation policy in Freiburg is to provide attractive alternatives in order to decrease automobile use. According to Perner (2002), this cannot be done "without creating restrictions", such as car-free areas and pedestrian zones. In 1973, Freiburg converted the entire historic part of the city into a pedestrian zone (Figure 4.6) by shifting car traffic out of city center. Only public transit (trams and buses) was allowed to enter these areas (Perner, 2002). The concept of pedestrianization in Freiburg focused not only on the historic center but also on the entire city.

According to Roberts and Monheim (1990), Freiburg has taken quite remarkable step to create pedestrian areas. In this context, the city of Freiburg has 5 kms of pedestrianized streets, 125 kms of quiet traffic calmed streets, 135 kms of bike paths and an efficient tram and bus system. This can be seen in Figure 4.6 below.

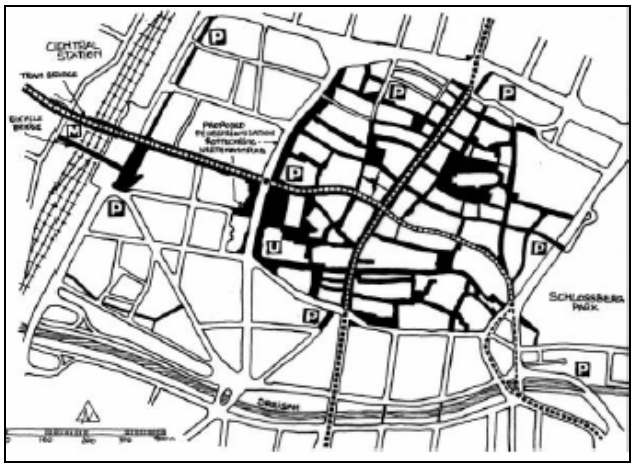


Figure 4.6 Central city of Freiburg, showing pedestrianized areas (black), tram lines (dashed), public parking facilities (P), the mobility centre (M) and university campuses (U) (Thomas and Taylor, 2002, 9)

As complementary to efforts on decreasing private car use, the city focused on improving public transport. It has developed to reduce automobile dependence and has been integrated with urban town planning. As Thomas and Taylor (2002) stated that, the city took a decision to maintain and extent the old tram system in 1969. Since 1983, when the first new tram route opened, the city has built further new tram routes in order to extend the network and to improve current services through prioritization and integration with other modes, in particular buses.

As for parking issue, Freiburg has implemented parking space management to decrease the proportion of trips made by private cars. This measure focused on both the city center and residential region. The restriction and control of parking spaces result in fewer permanent parking spaces in the center and neighboring.

As described by Perner (2002), in the frame of parking control, residents are allowed to park in streets within a reasonable distance from their department; short term parking is only available for shoppers and visitors in car parks at a rate of fee; and regular long stay parkers must switch to other forms of transport. (Thomas and Taylor, 2002).

According to the data of EAUE (2002), as a consequence of combination of comprehensive strategies, between the years of 1976 and 1997, the percentage of car trips of all non-pedestrian trips has declined from 60 percent to 43 percent.

Figure 4.7 Trams and cyclists share the street in the centre of Freiburg
(Thomas and Taylor, 2002, 8)

Figure 4.8 Light Rail in Central Freiburg
(Kirkheim, 2001, 4)

4.3 Strasbourg

Similar to Zürich and Freiburg, Strasbourg was also declining in its center due to traffic congestion in 1970's. The city has reversed this trend by making the inner city so attractive for people to easily get there by public transport (Thomas and Taylor, 2002). Strasbourg began its program in the late 1980's to reduce the traffic problems deteriorating the inner city. Thomas and Taylor (2002) describe this program with redesigning and reorientating urban space to establish a balance between the different modes of transit, with a preference to non-motorized modes and public transport.

The policy implemented in Strasburg focused on mainly reducing the number of cars in its centre through a program of light rail introduction. In this scope, public transport efforts began with the restructuring of the system in 1990. A tram system was constructed in 1994 in order to facilitate people to drive into the city center by public transport. The tram system was also used as part of a comprehensive public transport network that encourages the integration of all modes of transport such as walking and cycling. This system enables service to be more attractive and it allows for more pedestrian and bicycle infrastructure within the city center.

As to Thomas and Taylor (2002), the city has achieved the aim to reduce the amount of traffic by not only providing a different means of transport into the city, but also rerouting car traffic to a ring road at the periphery of the city, and pedestrianizing the inner core (Figure 4.10). As a part of this, there is now a ring road around the city center to direct traffic out of the center and thus most of streets have been closed to most traffic. As a result of this new traffic approach, the city achieves a decrease of 20% in private car traffic in the city centre (Kirkham, 2001, 14).

After closing streets to traffic, roads have been transformed into pedestrian malls in order to allocate public space to the exclusive use of pedestrians and trams in the inner city. As the words of Thomas and Taylor (2002), the pedestrianization has resulted in a significant increase in the number of trips made on foot, which gives pedestrians more freedom of movement.

Parking regulation was also an important part of policy of limiting the invasion of cars in the city. It included decreasing the number of parking areas and providing necessary parking spaces especially under the reclaimed public space (Thomas and Taylor, 2002).

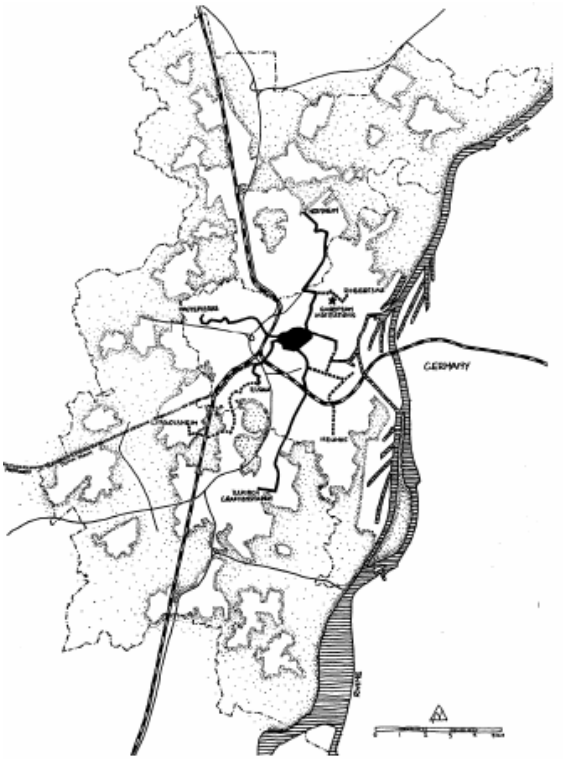


Figure 4.9 Urban region of Strasbourg. (Thomas and Taylor, 2002, 11)

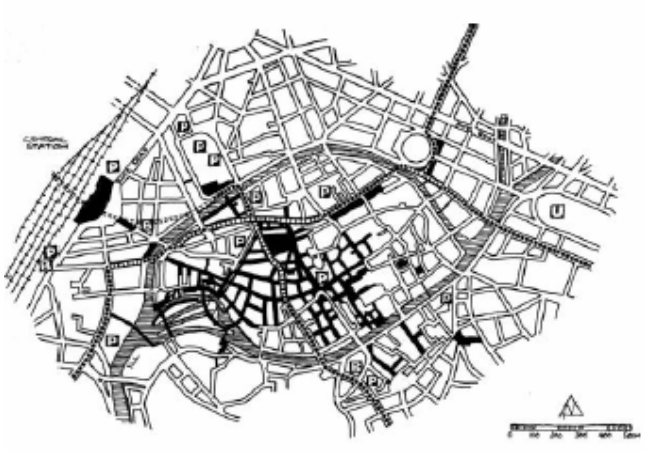


Figure 4.10 Central city of Strasbourg, showing pedestrianised areas (black), tram lines (dashed), public parking facilities. (Thomas and Taylor, 2002, 12)

Figure 4.11 Before (left) and after (right) improvements to urban design and traffic control accompanied with the introduction of light rail in Strasbourg. (Kirkheim, 2001, 16)

4.4 Copenhagen

Copenhagen is considered as one of the world's great pedestrian cities as a result of transport policy that has been implemented for 40 years. The problem in Copenhagen is the growing numbers of cars driving and parking in the city center and environs that have urged more and more space to be turned for the sue of vehicular traffic. According to Gehl and Gemzoe (2001) this problem has resulted not only in congestion, pollution, and fear of accidents but also to the deterioration of the quality of public spaces for people.

The transportation concept of Copenhagen can be summarized with the efforts of reducing the access to the city center by car and of increasing the use of public spaces in the Inner City and thus creating a new "traffic culture" depending on pedestrian.

The city of Copenhagen has been developed like a finger so its development plan is considered as the Finger plan. This plan (Figure 4.12) has played a crucial role in the overall planning of the city of Copenhagen. In accordance with this plan, residential and commercial developments were concentrated along three corridors. In addition, the Ring Road (Figure 4.13) was proposed to distribute traffic throughout the city and to facilitate entry and exit to the city center and to strength the connection between these three corridors. The implementation of ring road was important in the process of pedestrianization of the city center.

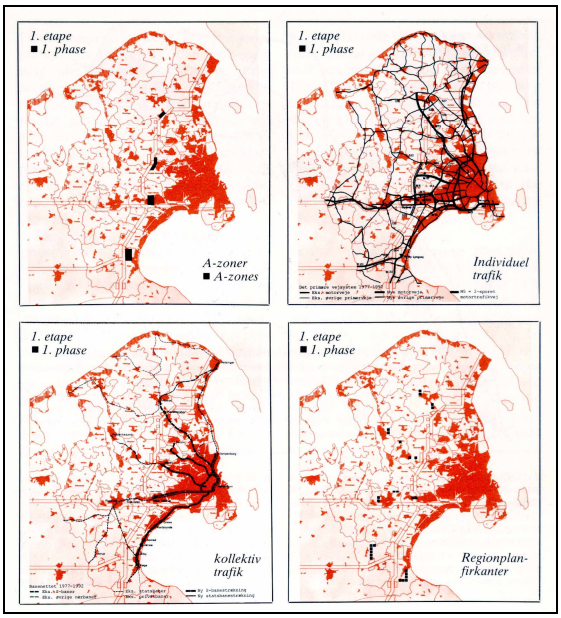


Figure 4.12 The development of Copenhagen's Finger Plan / Evaluation of the city center (Günay's Personal Archive)

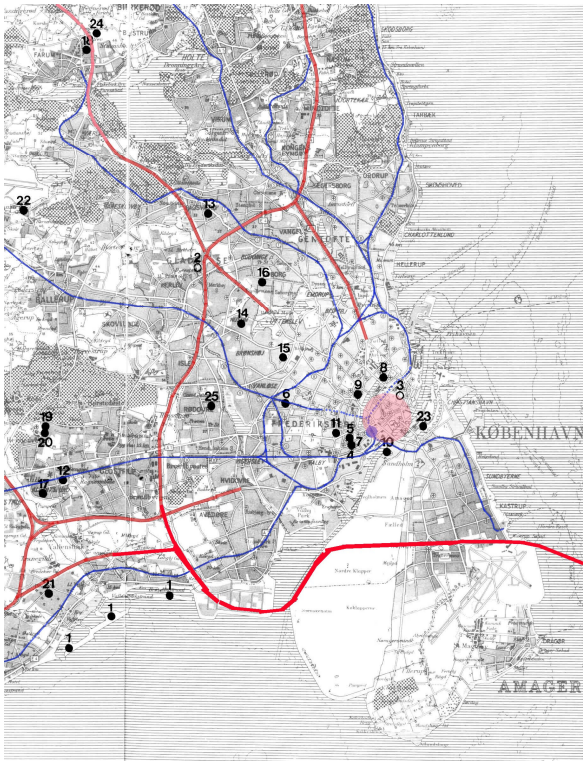


Figure 4.13 Reorientating of traffic flow by the Ring Road. (Günay's Personal Archive)

The pedestrianization application of Copenhagen goes back to 1960's when Copenhagen's main street was turned into a pedestrian thoroughfare. Since then, several small steps have been taken to transform the city. As stated by Gehl and Gemzoe (2001) during the last 40 years, the inner city of Copenhagen has changed its character step-by-step from car-dominated to a pedestrian oriented environment.

In the frame of pedestrianization, Stroget, the old main street through the Inner City, was turned from a street with vehicle traffic to pedestrianized street in 1962. As seen in Figure 4.15, the city gradually also added more pedestrianized streets, and pedestrian-priority streets, where pedestrians and cyclists have "right-of-way", and cars are allowed at only low speeds.

The city reduced the number of cars in the city center by eliminating parking spaces. To change public spaces to people places, the city has used parking control measures. Thus, parking spaces have been reduced at a rate of 2-3 percent per year and between 1986 and 1996 the city eliminated about 600 spaces. Then, these spaces were turn into public spaces enabling the city to easily transform them into public squares (Gehl and Gemzoe, 2001).

Unlike most of cities, in Copenhagen, cycling is a socially acceptable means of transport and cycle planning is considered as an integral part of traffic planning. Therefore, the city established new bike lanes and extended existing ones. Bicycles have priority in many crossings with traffic lights and driving through the central city districts. Also in this way the Inner city has become better for walking.

Gehl and Gemzoe (2001) determine that as a consequence of these policies, the number of people staying in the pedestrianized spaces in the Inner City had multiplied 3-4 times since 1960's. Although the number of people walking through the streets had been rather constant, the number of people staying in the spaces had been growing proportionally. Today the inner city as a whole is dominated by pedestrian traffic as 80% of all traffic is on foot (see transformation in Figure 4.15).

Figure 4.14 Integration of bicycle traffic with other modes / Bicycle use as a transport mode in Copenhagen (Günay's Personal Archive)

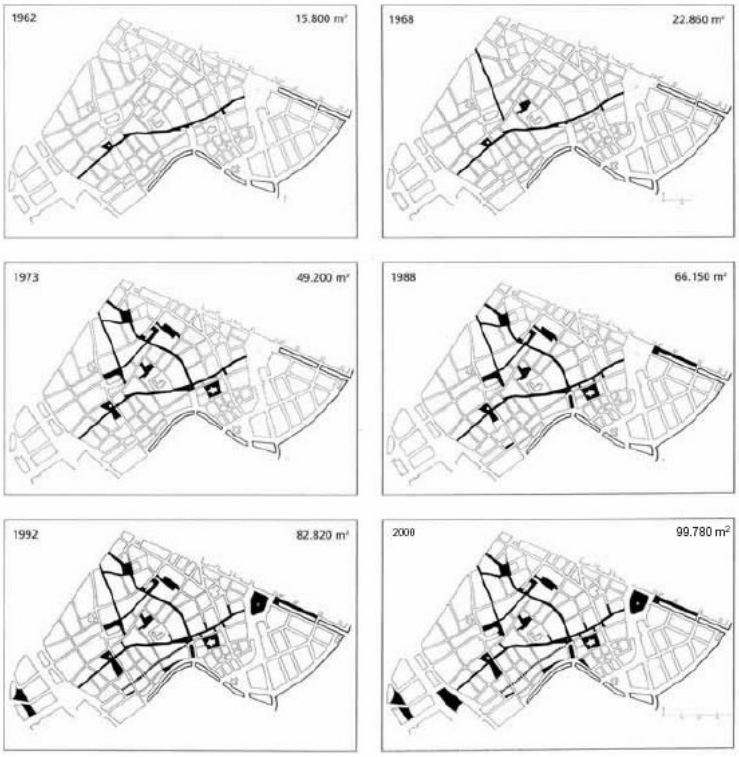


Figure 4.15 The gradual development of pedestrian areas in the city centre of Copenhagen 1962 - 2000. (Gehl and Gemzoe, 2001, 33)

4.5 Evaluation of Examples

All these examples mentioned before clearly show that all cities faced with the problem of congestion and pollution at different levels. Automobile dependence has negatively affected the quality of city life especially in the inner city with a big cultural value. After the decision to solve the declining social and environmental conditions of the city, all cities took into account the new concerns for the social and ecological impact of traffic on the environment. In accordance with the experiences, sustainable transport planning is a key issue in creating a livable environment.

In response to these problems, cities determined some policies integrated several levels of concerns, from regional level to street design level. The aim was mainly to reduce automobile traffic and to achieve a balance in the use of transportation modes. The aim of this part of the study is to understand how Zürich, Freiburg, Strasbourg and Copenhagen were able to success the implementation of transportation program. Important inferences from these experiences are that;

On the observation of the experiences shows that the success to solve such problems needs an implementation of a series of complementary transportation and city planning efforts. This includes improving public transit, re-orientating vehicle traffic by ring road, pedestrianization of inner core, parking restrictions and traffic calming techniques. The design of sustainable transport network is a result of such coordinated and complementary efforts.

The aim of all examples is not only to increase the livability of city by declining the car uses but also to change completely the car-orientated transportation system in order to establish a modern, balanced transportation system. The starting point of transport policy is a limiting of the invasion of cars by providing better public transport. Therefore in all examples, the cities have focused on encouraging public transportation including light rail transport, bus, tram rather than the private cars.

The integration of all modes of public transport is one of the main features of the transport policy of all examples. All cities have tried to achieve a balance in its

transport system, by reversing the trend of increasing car usage through actively favouring alternative modes. With the programs they try to integrate different transportation modes by physical and other measures.

As seen in Table 4.1, in all examples, non-motorized modes such as walking and cycling are considered as a fundamental means of transport in the process of achieving a balanced and sustainable and pedestrian oriented transportation system.

Table 4.1 Diagram showing implemented measures by example cities.

	ZÜRICH	FREIBURG	STRASBOURG	COPENHAGEN
Improvement of transit	***X*** (tram)	***X*** (LRT)	***X*** (tram)	***X*** (bus)
Transit priority measures	***X*** (signalization)	***X***		
Traffic calming	***X***	***X***	***X***	
Pedestrianization	***X***	***X***	***X***	***X***
Regulation on car traffic	***X*** (parking)	***X*** (parking)	***X*** (parking)	***X*** (parking)
Bicycle system	***X***	***X***	***X***	***X***
Reorganization of traffic flow			***X*** (ring road)	***X*** (ring road)

After developing the transport policies, the most important aspect of urban transport planning is its implementation. A satisfactory result needs each measure to be comprehensively implemented. It should be noted that implementation such a comprehensive policies is not so easy that it takes so many times in their implementing period. According to Nash and Sylvia (2001) implementing such a long-period programs require a detailed understanding of traffic movement and increasing public support.

One of the most important requirements to implement transport program is obtaining public support. In the light of experiences, it can be said that in both decision and implementation phases of such programs, public support is required for the success of them. Public support is particularly necessary because the transport measures can not be easily accepted by people. As mentioned by Nash and Sylvia (2001), such programs create both winners and losers. Therefore, public should take an active role in forcing the city administration to comprehensively implement each transport policy.

Transport improvements consist of several interrelated projects. Implementation of high-impact projects in a small period is so crucial that public is able to see immediate changes and positive changes. This helps to minimize criticism to transit priority improvements and other related measures.

It is considered that managing travel demand by transportation measures alone is not enough for a sustainable system. In this scope, the four cities examined before having implemented complementary programs in order to support and improve the city's transit system. Nash and Sylvia (2001) explain that as a part of this complementary program, these cities tried to encourage land use in order to support transit system by increasing density with zoning and developments agreements and by creating attractive places to live, work and visit. This effort mostly focused on improving the condition of city center by the creation of pedestrian areas and reallocation space for public events.

An important inference from experiences is regional improvements. A regional transit system is critical to transport system's success. The city developed a regional rail system to provide regional mobility and to enable citizen to use transit system rather than to drive their cars into or out of the city.

Table 4.2 Interrelated measures for achieving pedestrian oriented transportation system according to measures implemented by example cities.

FAVOURING ALTERNATIVE MODES	PUBLIC TRANSPORTATION	**1. Improvements Of Transit** • Bus • Tram • LRT **2. Transit Priority Measures** • Roadway Improvements / Traffic Regulations • Traffic Signal Priority • Separate Right of Way
	NON-MOTORIZED MODES	**1. Pedestrianization** • Extensively pedestrianized city center **2. Cycling** • Strong commitment to bicycle infrastructure **3. Traffic calming** • Enforcement of car restraint
REGULATION ON CAR TRAFFIC	PHYSICAL REGULATION	**1. Reorganization of traffic flow** • Ring roads
	REGULATORY RECTRICTIONS	**2. Road pricing** **3. Car sharing** **4. Parking regulation**
LAND-USE	LAND-USE MEASURES	**1. Integrated transport and land-use planning** • Transit oriented growth • Mixed use in centers

As conclusion, measures implemented for sustainable and pedestrian oriented transportation system can be summarized as above in Table 4.2. It indicates that this kind of transportation system is result of several set of interrelated measures.

CHAPTER 5

DEFINITION OF THE STUDY AREA AND ITS HISTORICAL EVALUATION

5.1 Definition of the Study Area

Kızılay study area of this thesis is one of two centers of Ankara. It has developed at the south part of the city. It is the administrative center as well as commercial center. The area is surrounded by Sıhhıye at north, by Bakanlıklar at south, by Kolej at east, and by Demirtepe at west. Kızılay Square is divided into four parts by Atatürk Boulevard at the north-south axe and by Gazi Mustafa Kemal Boulevard and Ziya Gökalp Avenue at west-east axe (Figure5.1).

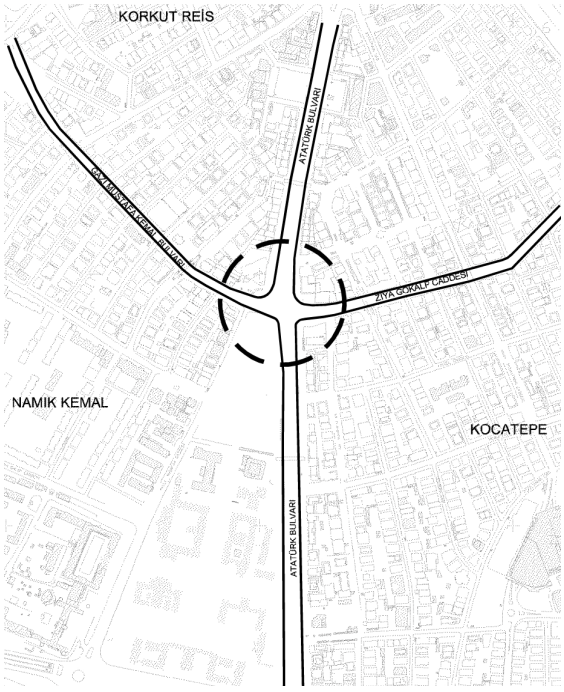


Figure 5.1 Kızılay Square, as a traffic intersection. (Personal drawing)

5.2 Historical Evaluation of the Study Area

5.2.1 The Lörcher Plan Period (1924-1925)

In 1920s, Ankara was a small and compact Middle Anatolian city with a population of 20.000 – 25.000. In this period of time, the primary mode of travel was walking. Between the periods of 1920-1926, the government gave primary importance on problems of economy and population in the war environment, and as secondary, interested in the restructure of main public needs and in the needs of physical spaces for the population growth (Altındağ Belediyesi, 1987).

After War of Independence, following its declaration as the capital of Turkey on 13th of October, 1923, Ankara has entered a stage of planned growth and development. After that time, the planning efforts focused mostly on converting this small Anatolian city into a capital city, and on changing its urban infrastructure for the future development of the city (Altındağ Belediyesi, 1987). Increasing housing needs with rapid population growth created by service sector and insufficient old housing pattern of the old city were the main reason behind the need of 1924-1925 Lörcher Plan. The city also had a necessity of public buildings as a capital city (Cengizkan, 2004).

Due to these needs, on 30 May 1924, the first plan of Ankara (Cengizkan, 2004) was prepared by Lörcher and contributed to the formation of new city till the year of 1929 when an international competition was concluded.

The Lörcher Plan, the first one for the development of the Old City in 1924, and the second one for the New City in 1925, determined the development of new settlements of Ankara throughout the following five years and according to Cengizkan (2004), it was the reason orientating the Jansen Plan. In truly, the first plan of Ankara is the Lörcher Plan and it has been very effective on the urban development of the city and on the Jansen Plan.

The second Lörcher Plan proposed a new settlement at the south part of Ankara so a field of 400 ha was nationalized by the state. From this point of view, The Lörcher Plan is also considered as a plan for orienting this movement.

In the 1925 Lörcher Plan, Kızılay Square as Cumhuriyet or Kurtuluş Square (Figure 5.2) was taken a shape of traffic intersection and was defined as a square on which theatres and qualified buildings of the city were concentrated. It established the foundation of pattern in which new central functions to be created in both Kızılay and Ulus.

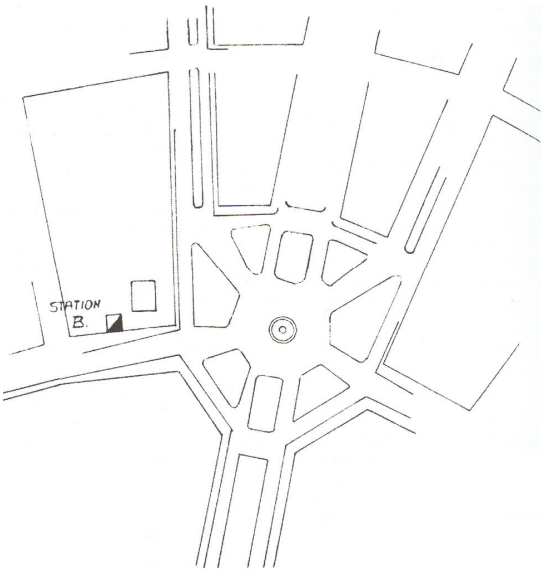


Figure 5.2 Kızılay Square proposed as a traffic intersection in the 1925 Lörcher Plan of "Yenişehir". (Cengizkan, 2004, 74)

Sıhhıye and Zafer Squares through Atatürk Boulevard as well as Necatibey and Mithatpaşa Roads were realized as proposed in Lörcher Plan. According to Lörcher Plan, the city was realized on the direction of north-south direction through Atatürk Boulevard (Figure 5.3). İstasyon Street and Talatpaşa Boulevard planned between İstasyon and Cebeci were also realized in this period.

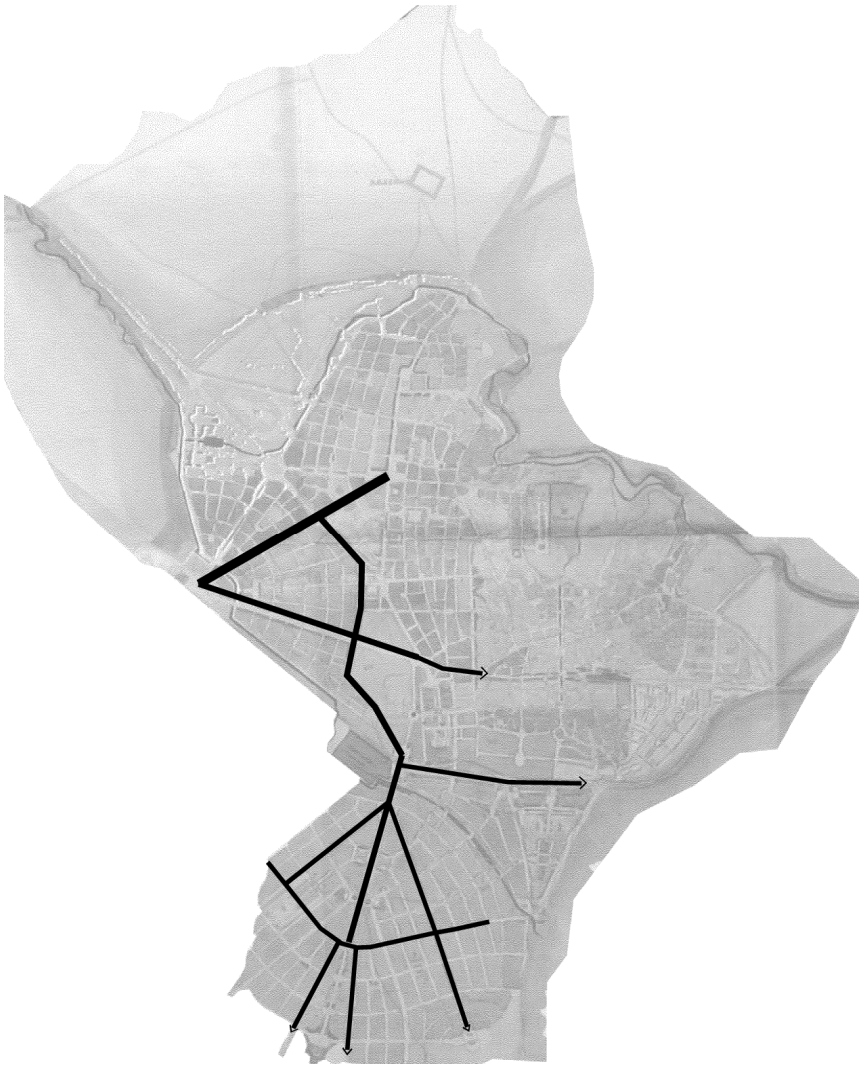


Figure 5.3 The road network around Kızılay Zone proposed in the Lörcher Plan. (Adopted and redrawn from the Lörcher Plan)

5.2.2 The Jansen Plan Period (1932-1957)

Planning of a new capital, as a Model Modern City, was the main purpose of the state in order to represent the identity of the Modern Republic. After the declaration as a capital city of Turkey, the city gained importance and started to attract migration from all Anatolia. Thus, in 1927 only four years after declaration, its population had reached to 74.000.

The rapid urban developments, the housing shortage and the land speculation as a result of the exceptional population growth of Ankara resulted in the requirements of an urban plan. In this respect, in 1927, a competition to obtain a city plan was announced and in 1928, "Directorate of Urban Development of Ankara" (Ankara İmar Müdürlüğü) was established. In early 1930's, an urban development plan was prepared by Prof. Herman Jansen, as the winner of an international competition concluded in 1929.

In this plan, Jansen proposed that the city should reflect its appearance of a capital city with large administrative areas, large boulevards and squares (Tankut, 1993). According to Cengizkan (2000), Jansen designed his plan in respect of the concept of the Garden City Movement. The main plan decisions were functional zoning, separation of the pedestrian and automobile traffic, protection of the castle and the old city and construction of new sections through the southern parts of the city, as well (Tankut, 1993).

As to Jansen, in 1978, the population of the city would be 300.000 people, however, the city reached to this number in the early 1950's. This unpredicted rapid growth in the population as well as the need to public buildings resulted in that the plan was not sufficient in order to supply the demand of urban development. After the year of 1950, therefore, the city started to face with the unplanned urban developments in order to meet the excess demand of housing.

As Jansen Plan, although Ulus was approved as a commercial center of Ankara, Yenişehir was choosed as an administrative center and opened for new residential development. This caused the development of Ankara to jump to the south part of the city (to the south of railway) (EGO, 1995). The plan also did not offer any approach about how the city develop. In this period, the priority was given to choose the locations of public institutions and residential units.

Ankara has developed at the south part of railway, where residential areas for new bureaucrats, shopping and recreation areas started to settle after the early 1930's.ıt should be noted that in this period, Kurtuluş and Kızılay Squares, Havuzbaşı (Figure

5.4), Güvenpark and Atatürk Boulevard became the most active recreation centers of the city (Gültekin and Onsekiz, 2005). The development of Ankara continued until 1950s according to the general planning decisions of the Jansen Plan (Tankut, 1993).

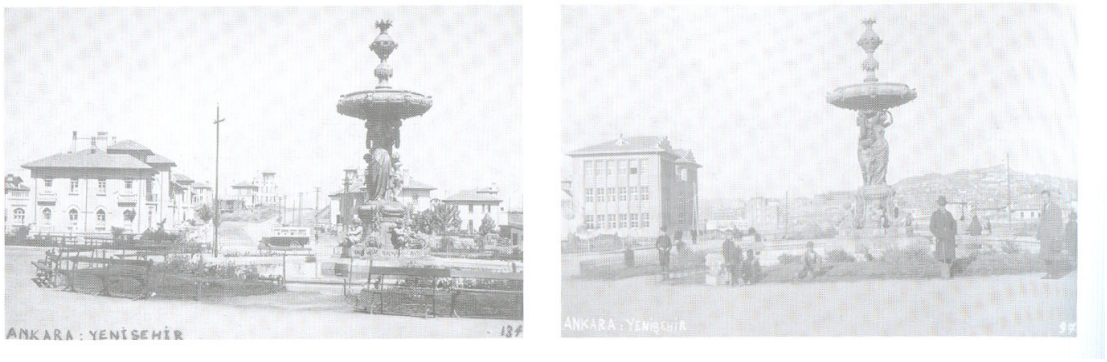


Figure 5.4 In the 1930's, Havuzbaşı the symbol of Ankara located in Kızılay Square. (Cengizkan, 2004, 72)

However, in the 1940's, the Jansen plan became insufficient to supply the intended needs, as a consequences of the extensive population growth and the intensive pressure of the land speculation. According to Tankut (1993), the Jansen Plan failed due to its inflexibility to adopt the changing urban conditions.

It can be seen in Figure 5.5, as for road network, Atatürk Boulevard was still the main connection between Ulus and Kızılay and had no alternative. Except the north-south axe, the east-west backbone of the city between Bahçelievler and Cebeci was realized as proposed by Jansen. Thus, the city was developed in the north-south direction between Çankaya and Keçiören along and around Atatürk Boulevard and in the east-west direction between Bahçelievler and Cebeci. In this structure, these two main backbones crossed at Kızılay Zone. In addition, the arrangement of grid system at both western and eastern part of the Boulevard could not offer an alternative for the Boulevard.

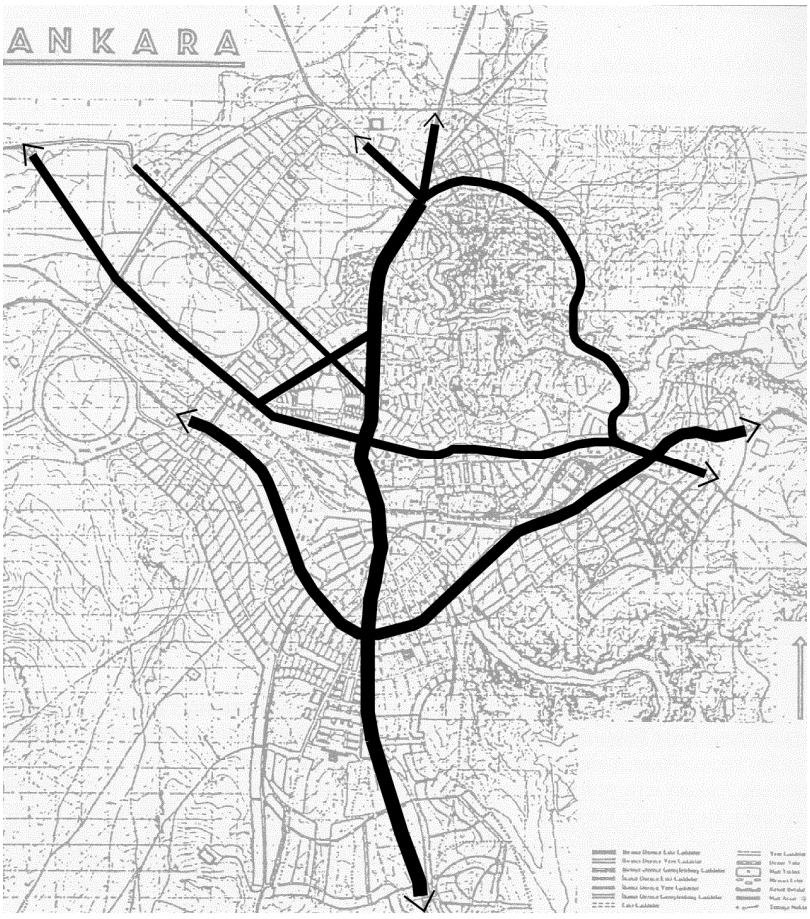


Figure 5.5 The road network around Kızılay Zone realized as the Jansen Plan (1932-1957) (Adopted and redrawn from the Jansen Plan)

5.2.3 The Uybadin-Yücel Plan Period (1957-1969)

In this context, in 1954, Directorate of Ankara Urban Planning announced an international contest for obtaining a city plan. Raşit Uybadin and Nihat Yücel, who won the plan competition in 1957, prepared a plan based on the assumption that the population of the city would reach 750.000 by the year 2000. However, as the Jansen Plan, the city reached to the proposed population before the assumption year and was exceeded before 1965.

Furthermore, in this plan, Ankara was proposed as a city concentrated within the existing boundaries of municipality with one center and no unlicensed construction

rather than proposing new urban development areas. It is clear that this plan had a restricted point of view and directed by the past and current developments rather than to direct the future developments (EGO, 1995). In addition, unplanned developments and the process of centralization in Kızılay did not sufficiently be evaluated in this plan (EGO, 1995).

Since the early 1960's, 60 percent of the city has developed out of the boundaries of the planned area (Altındağ Belediyesi, 1987). In 1969, Greater Ankara Metropolitan Area Planning Bureau (AMANPB) was founded in the structure of Ministry of Development and Housing to achieve the required coordination between Directorate of Ankara Urban Planning and the Municipality and to direct this development out of the boundaries of planned area.

From the view of road network, this plan could not propose a different approach from the Jansen plan. Similar with the previous plans, Atatürk Boulevard still was the only connection between two centers (Figure 5.6). This point of view, this plan could also not develop a new concept as a response to the need of alternatives for the Boulevard. The north-south and east-west axes still continued to form the main backbones of the city. In addition, the most important contribution of this plan for road network was the realization of Eskişehir Road, as shown below in Figure 5.6. This plan proposed Eskişehir Road for the western part of the city. This road enabled the city to develop at this route. As will be mentioned later, however, this road has increased the traffic pressure on Atatürk Boulevard.

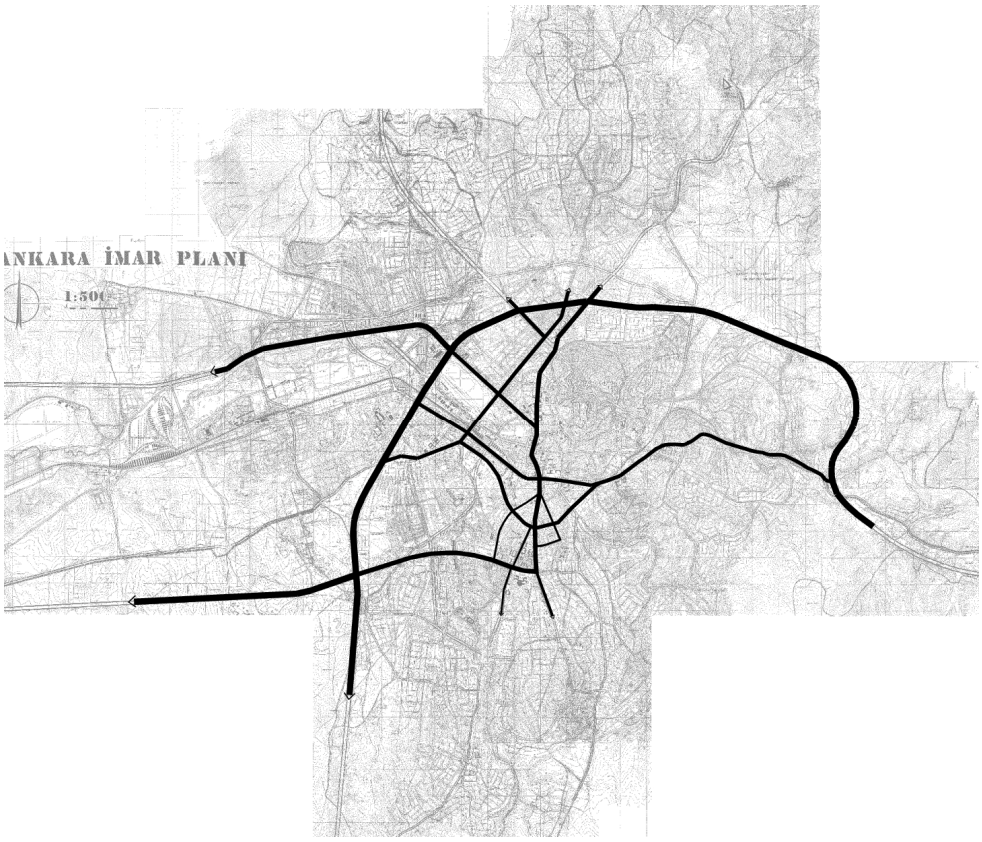


Figure 5.6 The development on road network in the Uybadin-Yücel Plan. (Adopted and redrawn from the Uybadin-Yücel Plan)

5.2.4 Period of AMANPB (1969-1984)

AMANPB developed a city plan scheme for the period of following 20 years according to results of detailed researches made between the years of 1970-1975. In 1982, the scheme came into force with the name of Greater Ankara Metropolitan Area Plan.

On the contrary of previous experiences, this plan period was able to direct the development of the city, due to the consistent estimation made by AMANPB and realistic proposals for problems (EGO, 1995). Besides directing the city macroform, it was aimed to direct the development on the west side of the city. Although it could not propose a new structure as an alternative for Atatürk Boulevard (Figure 5.7),

AMANPB has also crucial effects on the projects on pedestrians and urban public transportation. Segregated bus lanes between Dikimevi and Beşevler, and Kızılay Pedestrians Region (EGO, 1995) were realized as proposed in AMANPB. Despite all these efforts, AMANPB, like previous efforts, could not prevent unauthorized development.

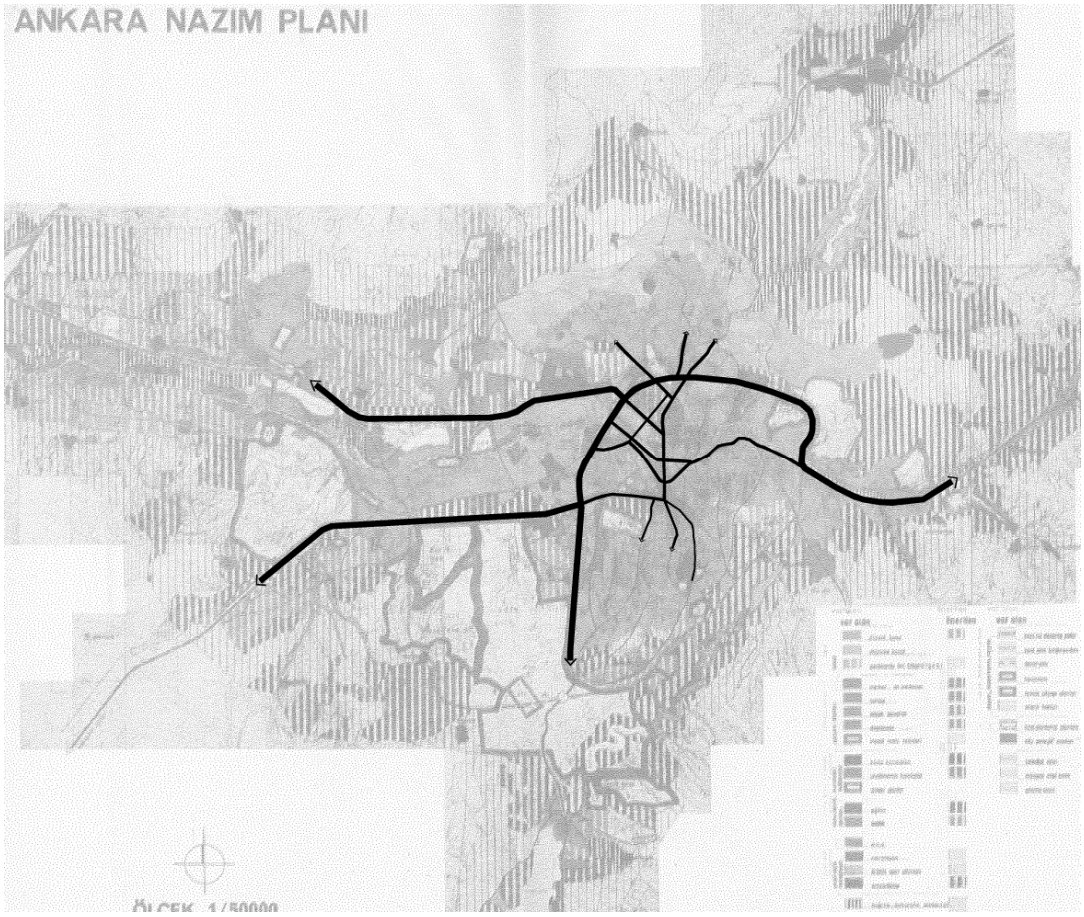


Figure 5.7 The road network in the plan of AMANPB (Adopted and redrawn from the plan of AMANPB)

5.2.5 2015 Structure Plan (1986)

The 2015 Structure Plan was prepared in 1986 by METU City and Regional Planning Department and The Municipality of Greater Ankara Bureau City Plan. It aimed to define macroform proposals for 2015 that formed the basis for the Ankara Urban Transportation Study prepared by EGO. Therefore, it can be said that this plan is one

of most integrated plan with transportation system. As for the transportation system, it proposed decentralization depending on public transportation.

5.3 Transportation efforts related to pedestrians in Kızılay

After the CBD functions concentrated at Kızılay Zone, Kızılay dealt with many urban transportation problems. To overcome traffic problems, the city, however, has mainly used physical arrangements that changed entirely existing urban pattern. The date of actions regarding widening vehicle roads, restricting pedestrian roads, and diminishing the green segment in the middle of Boulevard goes back to earlier 1950's (Figure 5.8). Likewise, Atatürk and Gazi Mustafa Kemal Boulevards were widened for vehicle traffic.

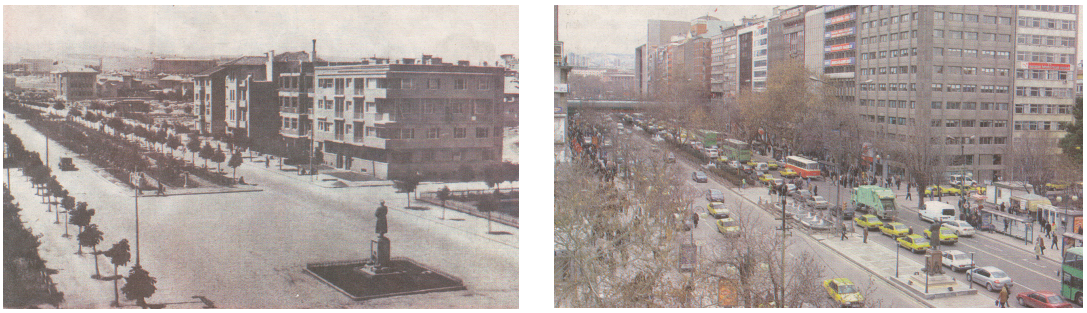


Figure 5.8 General view of Atatürk Boulevard in the 1940's (left), and today (right) (Ankara Büyükşehir Yayınları, 2005, 19)

Contemporary approaches to the conflict between vehicle and pedestrian movement began in the middle of 1970's. In this period, as a part of the encouraging public transport, Gazi Mustafa Kemal and Ziya Gökalp Boulevards were limited for the use of public transport. Separated bus lanes were formed through the line of 5,3 km between Dikimevi and Beşevler. In this way, it was aimed to achieve a continuity and comfort in public transport system through preventing buses from existing traffic and time lost in their trips. In addition, it is worth noticing that these separated lanes for use of buses could be used by emergency vehicles as a service way at the urgent

time. After the establishment of underground light rail system, known as Ankaray, through the line of Dikimevi-Beşevler, these separated lanes were removed and Boulevards were widened for vehicle traffic.

Furthermore, in 1978, as a response to the conflict between vehicle and pedestrian, a pedestrianization project for Sakarya Street and its environs as a part of "Pedestrian Region Projects" was realized. However then, Sakarya Street was opened for vehicle traffic due to the demands of trades. After certain time, it was pedestrianized again in accordance with the project.

In the scope of pedestrianization, "New Pedestrianized Region Projects" was prepared by General Directorate of EGO in 1982. Except for Sakarya Street and its environs, İzmir Street and its environs (Fevzi Çakmak I and II, Sümer I and II, Menekşe I and II , and Şehit Adem Yavuz Streets) with Yüksel Street and its environs (Konur I and Karanfil Streets) were proposed to be pedestrianized. Although most of them were approved (Figure 5.9), only few of them could be implemented. Today, İzmir and Yüksel Streets pedestrianized in that period are considered an important part in the urban transport and pedestrian system of the city (Kızılay Kent Merkezi Çalışma Grubu, 2004).

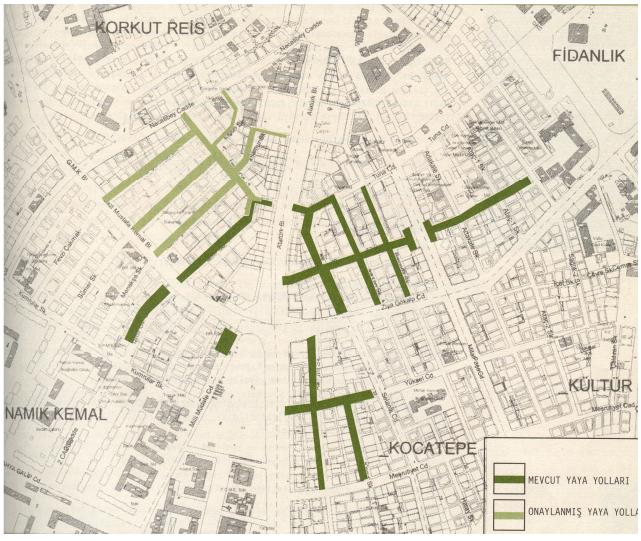


Figure 5.9 Existing and approved pedestrianized areas in Kızılay (Kızılay Kent Merkezi Çalişma Grubu, 2004, 13)

As stated by EGO (1995), with the New Pedestrianized Region Projects, pedestrian priority over automobiles in Kızılay was to be achieved both by encouraging public transport and by creating car restricted spaces to support development of social interactions. This transportation plan included contemporary transportation policies such as arrangement of pedestrian spaces integrated with public transport, encouraging of public transport, parking restriction measures. It also stressed on subjects of pedestrian safety in the stage of project for new investments (EGO, 1995).

As a requirement for solving increasing traffic problems in city center, proposals for urban transportation were developed with the name of "Ankara Transportation and Traffic Improvement Study" in 1998. In this study, under the heading of "Improvement Program of Pedestrian Transport", the following policies related to pedestrian and pedestrian spaces were determined, which are;

- Improvement for implementation of existing legal structures regarding pedestrian spaces and transportation.
- Improvement for pedestrian network in CBD (Central Business District).
- Preparing pedestrian plans for pedestrian areas out of CBD.
- Developing public transportation and encouraging non-motorized modes (cycling).
- Integration of pedestrian plans with planning of land use and transportation criteria.

This study also stated that the CBD (between Dışkapı and Kavaklıdere) should be rearranged in accordance with giving priority for public transport and pedestrian. The measures included limiting of private car uses, parking restriction, segregated roads for buses, road arrangement for pedestrian and public transport, and signalization system. To take vehicle traffic in center under control, there is a need of preparing special plan for pedestrian spaces in CBD (between Ulus and Kızılay). The study also stressed on traffic calming techniques for residential areas.

Despite all these proposals and planning efforts, it is seen that these proposals for city center could not be implemented, except for some pedestrianization implementation in Kızılay. In the frame of pedestrianization projects, in 2003, space quality in İzmir Avenue tried to be improved by urban design arrangements such as removing car parking and new landscape objects (Figure 5.10).

Figure 5.10 General view from İzmir Pedestrian Street after its reorganization. (Personal Archive, 2005)

In addition, to keep traffic away from Kızılay Square, the Greater Municipality has orientated vehicle traffic into Meşrutiyet and Necatibey Roads. However, it is seen that this application is not enough to achieve satisfactory results. Reorientation alone could not reduce traffic vehicle in center without being supported by managerial and physical restriction.

Parallel to the measures to accelerate vehicle traffic, the Municipality of Greater Ankara, took a decision on 3 October 2003 to restrict the pedestrian cross through Atatürk Boulevard by means of barriers on the boulevard. In this scope, traffic lights for pedestrian were removed and finally pedestrians were forced to use metro underground passes (Figure 5.11). However, this was canceled by the decision on 19 November 2003.

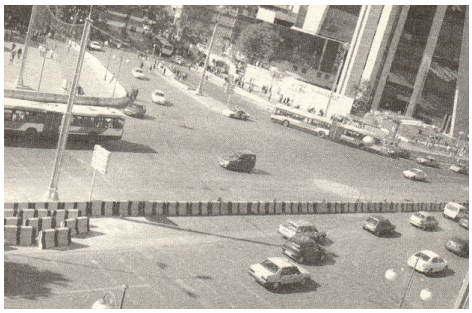


Figure 5.11 Traffic reorganization efforts on Atatürk Boulevard on the basis of priority given to vehicle traffic. (Kızılay Kent Merkezi Çalişma Grubu, 2004, 72)

5.4 Processes that have shaped urban macroform of Ankara

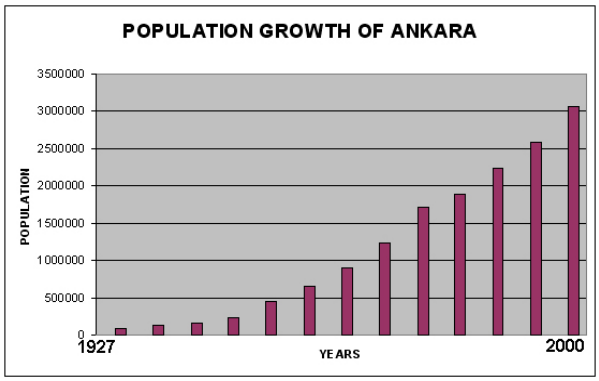
It is clear to say that Ankara has been experiencing urban transport problems due to the extensive use of cars, land-use decisions and urban public transport policies. Before proposing a transport scheme for Ankara it is useful to analyze the main determinants of city form which is considered in this study as a main cause of transport problem. Urban macroform will be analyzed with reference to planning decisions, geomorphologic, economic and social processes.

As stated by Günay (2005, 65), one of the most important determinants in shaping urban macroform of Ankara is its geomorphologic structure. The city of Ankara is located between Çubuk and Mogan valleys. The heights around the city form "a horse shoe" (EGO, 1982) opening to Mürted Plain at the western part of the city that shapes "the Ankara basin". The citadel and historical city are located at the end of Mürted Plain lying from west to east. Instead of the fact that geological settings are suitable for settlement, Ankara is concentrated at the topographical basin. As Altaban (1982) states that the form of Ankara is also shaped largely by social and economic factors such as land ownership, land price, unexpected population growth and unplanned urban development.

As seen in Table 5.1, Ankara has experienced a rapid population growth between the years of 1927-1975. Although this tended to slow down by the late 1970's, the city could not solve this problem and its results including social and economic needs for

increasing demand. It could be said that population growth together with planning decisions is one of major determinants of urban growth in Ankara.

Table 5.1 Population growth in Ankara between 1927-2000 (DİE, 2003)



Günay (2005, 61) mentions about the approach of urban ecology developed by Chicago School in 1920's. As to this approach, there are four stages in the process of urbanization from centralization to decentralization. Ankara has experienced these stages in accordance with the assignment of Lörcher, Jansen and Uybadin-Yücel Development Plans.

It is certain that planning processes and their implementations are the main determinants in shaping urban macroform of Ankara. In evaluating of planning processes, it is seen that the assumptions of Lörcher and Jansen forced the city to concentrate at the topographical basin surrounding the citadel through developing the city at the north-south direction. Thus, they could not create opportunities for urban growth and caused the current transportation and pollution problems to occur (Günay, 2005, 6).

In parallel to population growth, Ankara dealt with rapid urban development from 1923 till 1970s. Jansen proposed the city to be developed at two backbones; in the north-south direction between Çankaya and Keçiören and in the east-west direction between Bahçelievler and Cebeci. In this context, Atatürk Boulevard lying from north-south direction was realized as the main and unique backbone between the two centers. The aim of north-south direction was to increase accessibility between these two commercial centers.

Due to rapid urbanization, these two axes could not work efficiently and they became insufficient. In addition, the city could not develop alternatives to these axes. It is likely that the lack of alternatives makes it difficult to solve transportation problems. It should also be noted that, streets around Kızılay Zone were not designed as complementary and supportive to Atatürk Boulevard (Figure 5.12). Planning experiences on road network are summarized below. In Figure 5.13, it is easily seen that these plans from 1920's till nowadays could not solve the dependence of transport system on two backbones crossed at Kızılay Zone.

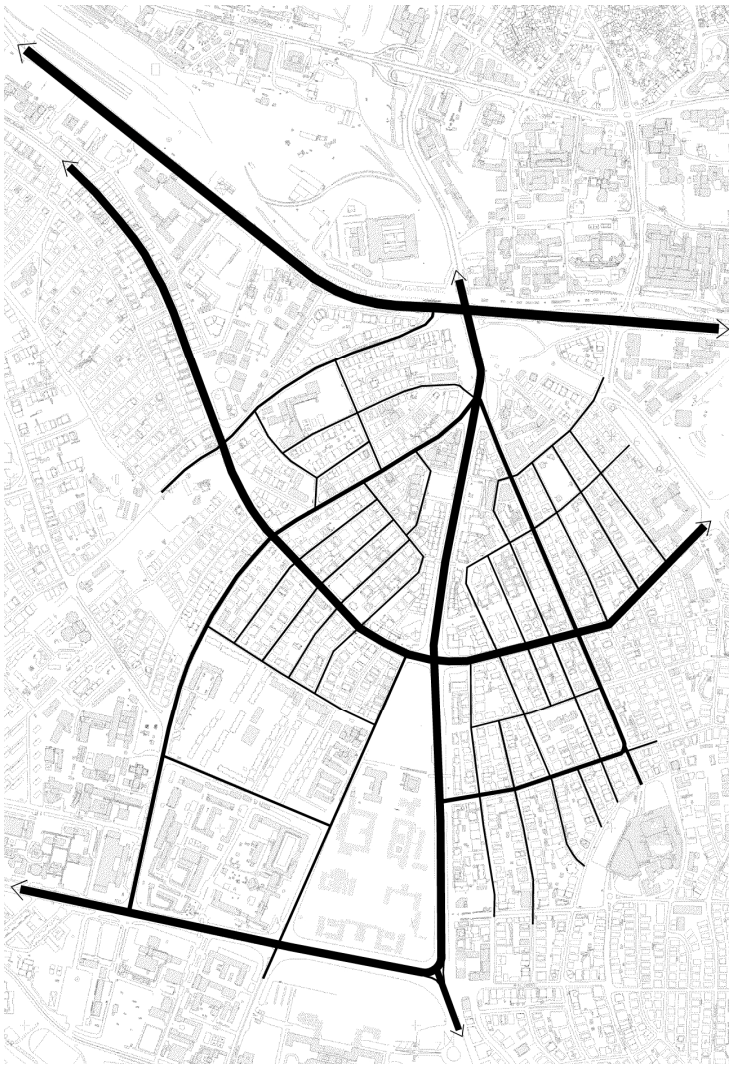


Figure 5.12 Relation between Atatürk Boulevard and streets around it. (Personal drawing)

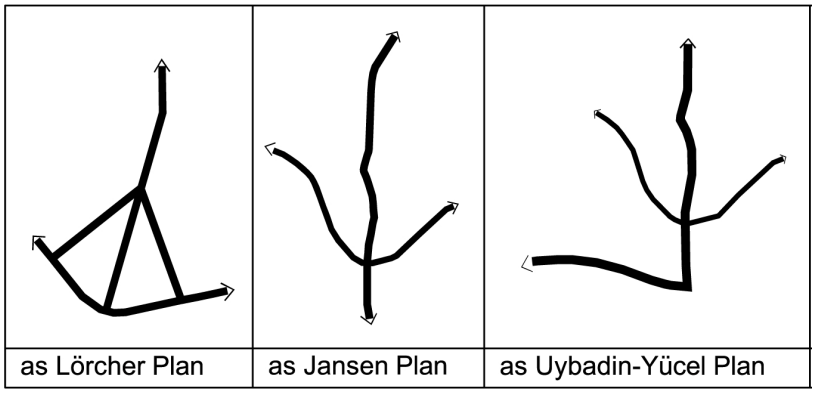


Figure 5.13 Transformation of road network in Kızılay Zone. (Personal drawing)

As a capital city, the selection process of administrative units is also considered one of basic determinants on urban growth. Administrative functions were concentrated in a complex of ministries in Yenişehir. The selection of the location had impact on the direction of urban growth and that of the CBD. In addition, after 1950's, the new administration center and military units tended to settle along the Eskişehir Roads. This has enabled the city to develop at west corridor and satellite settlement to take shape.

As for the CBD functions, they were firstly located in Ulus. Then, as the CBD started to expand, the CBD functions at Kızılay developed very rapidly and the old center Ulus started to lose its commercial importance including major banks and financial institutions to Kızılay. High accessibility with the construction of Eskişehir Road proposed in Uybadin-Yücel Plan also increased the attractiveness of Kızılay as a new center. Thus, the center of Kızılay has rapidly developed at the intersections of north-south and east-west axes and gained a feature of shopping center serving mostly for upper classes.

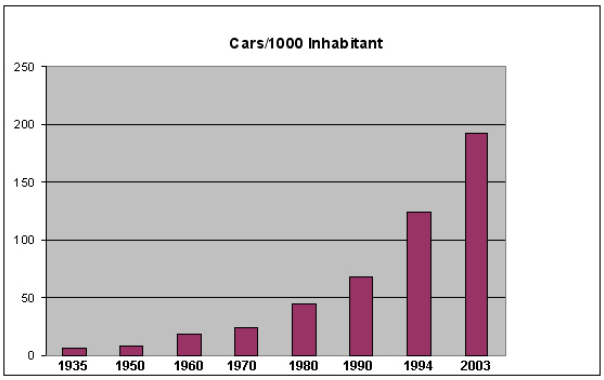
As a consequence of concentration of CBD functions at Kızılay Zone, existing settlement pattern changed completely. The lack of spaces caused a need to develop at the constructed region. Due to the increase in land value, Kızılay faced with high pressure to increase the number of floors. Thus, the law of "Flat Ownership", came into to force in 1965, legalized all these demands (Altaban, 1986).

As a response to the rapid centralization, the residential units around Kızılay began to replace with central functions and then transformed into prestige offices due to high land value (AMANPB: 71). Between the years of 1960 and 1970, most of the houses with 2-3 stores were demolished and, instead, high rise apartments were constructed.

It should be stated that, planning decisions affected the future development of Ankara; the Jansen Plan approved in 1932, and the Yücel-Uybadin Plan approved in 1957, could not take under control the unexpected urban development. In briefly, wrong population expectation and the intensive pressure of the land speculation and inadequate solution approaches caused the city to face with some crucial urban problems.

Beside main planning decisions, rapid increase in the level of car ownership in Ankara and insufficiency in transportation infrastructure as a response for this development have important role in the stage of the transportation problem. Car ownership levels in Turkish countries are low compared to those of European countries. However, the rate of growth in car ownership and car use levels in Turkey is far above those of European countries. Table 5.2 (Babalık, 1996, 73) indicates that after 1950's, there has been a sharp increase in the car ownership level in Ankara. In addition, Ankara has the highest level of car ownership among other metropolitan cities of Turkey.

Table 5.2 Car Ownership Levels in Ankara from 1935 till 2003. (DİE, 2003)



5.4.1 Problem Definition in Kızılay

While Kızılay and Atatürk Boulevard was one of the most important spaces for social interactions, today they are considered as an expressway due to high population and intensive traffic. In the light of observation on Kızılay Zone, it is easily said that Kızılay is now in a chaos due to the overlapping of vehicle traffic, pedestrian movement, and public transport systems. This causes a decrease in both the service quality of public transport and pedestrian safety.

Nowadays, one of the most important problems with which the local management has been dealing is surely on urban transportation issue. To address the increasing traffic problems, municipality has focused mainly on increasing the supply of road infrastructure by expanding road systems capacity and developing rapid transit systems like light rail and metro. In general, the measures can be arranged in new metro lines, underground tunnel projects, and thus, pedestrian underpasses and overpasses.

In centralization period of Kızılay, the city could not take necessary measures to manage traffic problems. The lack of approach to reorganization of central formation has increased the pressure on Kızılay. The city has managed decentralization process by improving existing road network rather than creating a new transport system. The city has not developed a new road system except current one proposed in Yücel-Uybadin Plan. The main form of transportation is private car. As a response to the need of automobiles, the city has chosen to improve the conditions of existing system rather than to create rail network system. This tendency has caused new developments to concentrate along main arterials and increased the pressure on them.

It is clear that all these measures are only to accelerate traffic speed in the inner city. Likewise, underground tunnel projects on İnönü Bulvarı and İstanbul Road have accelerated vehicle traffic towards center. At this point, it should be mentioned about Akay underground tunnel project (Figure 5.14) which was made as a response to the traffic congestion in 1998. However, although this application achieves a decrease in

the congestion at Akay, it also increases volume of traffic flows through Atatürk Boulevard and thus on Kızılay Square (Babalık-Sutcliffe, 2005, 302).

Figure 5.14 General views from Akay underground tunnel project after its reorganization. (Ankara Büyükşehir Yayınları, 2006, 19 (left) and Personal Archive, 2006 (right))

To meet transportation need, the city has increased roadway capacity of this road. Given the fact that there is not much space available to expand Eskişehir Road, accessibility can only be met by increasing the capacity of the existing road network. This needs an efficient management of road space which can only be achieved by encouraging public transport like railway system.

It is also important to stress on intersections around Kızılay. In point of fact, they have crucial role in reducing both traffic speed and its amount. They should be evaluated as a buffer points for reducing vehicle traffic towards city center. However, it is not perceived that underground tunnels enable vehicles to drive more rapidly and more continuously towards center without losing any time. Transportation policies based on engineering solutions, i.e. underground tunnel projects, enable vehicles to reach easily center without stopping at any intersections. In this manner, Kızılay has gained a feature of "expressway". Teber (2004) evaluates this as an accelerator force behind the process of suburbanization of city center.

Expressway may encourage higher speeds, greater use of private vehicles. Higher speeds could result in an increase in the incidence. From the urban design of view, expressway also divides the urban landscape into separate zones. Thus, it becomes very difficult for people to cross Atatürk Boulevard on foot. Elevated roads also reduce the attractiveness of business and entertainment in Kızılay.

The road network in Ankara is based on hierarchy of roads, ranging from arterial roads designed to carry fast through traffic to collector and residential roads. Eskişehir and Konya-Samsun Roads are the most important arterial roads. The outer ring road is serving to the metropolitan region. It is seen in Figure 5.15 below that all main roads cross at the city center.

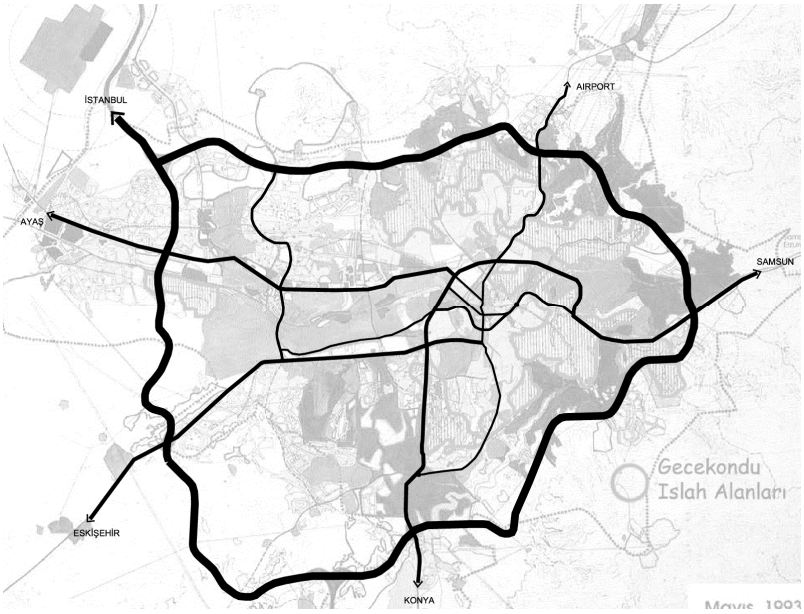
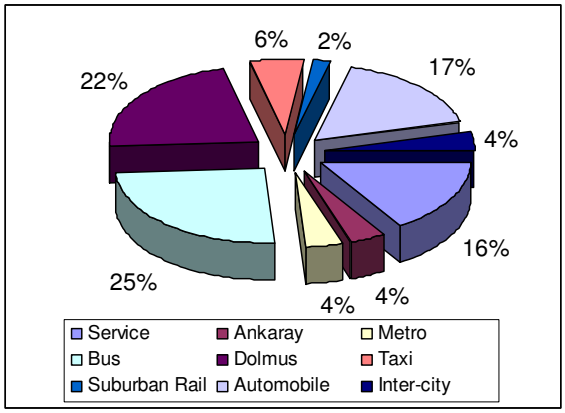


Figure 5.15 Road network system of the city of Ankara (Personal drawing)

Given its inner trips character, public transport vehicles are the major mode of transport in Ankara. Table 5.3 indicates that approximately 75 percentages of all trips is made by public transport vehicles. Although the road design, traffic signals, and traffic management policies are not specifically designed for bus transport system, buses carry approximately 1.315.000 commuters everyday (Çubuk and Türkmen, 2003, 131). However, the dependence of public transportation on road transport like in Ankara is not right approach for sustainable transportation. It increases, on the one hand, petrol dependency and, on the other hand, air pollution in the city.

Table 5.3 The proportion of trips made by motorized modes in Ankara (Çubuk and Türkmen, 2003, 132)



Contrary to bus system, only 10 percentages of all trips is made by rail system including suburban train, metro and Ankaray. The ratio of rail system compared to those of developed countries is too low. Ankara has a light rail system with a total length of 22 km. While Ankaray is serving in the east-west direction between AŞTİ and Dikimevi, Metro system is operated between Kızılay and Batıkent, one of suburbs at western part of Ankara. It is easily seen in Figure 5.16 that the metro and light rail system of Ankara with its total length is not enough for serving to whole city region. It is perhaps useful to mention on the suburban rail network system of 400 km in Zürich. From this point of view, it is clear the insufficiency of rail system of Ankara. This difference shows us the fact that the sustainable, balanced transport system requires an extended railway system. The most needed tool in the aim of controlling car use is certainly rail transport system.

As will be discussed later, for satisfactory results, the ratio of rail transport system in all trips should be increased by extending its network to whole city. According to data by EGO (1998), except its insufficient rail network system, the use of existing rail system is also not enough to decrease the private car use.

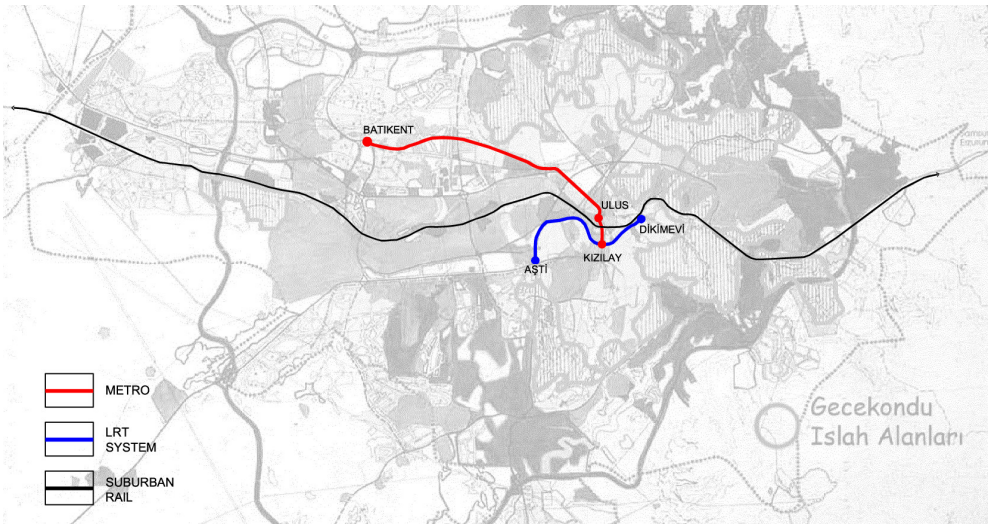


Figure 5.16 Existing rail transport network of Ankara. (EGO, http://www.ego.gov.tr/uprs/ortak.htm, March, 2006)

As for the arrangements for pedestrian safety, underground tunnel projects, as mentioned before, cause traffic acceleration in Kızılay, and thus a conflict between pedestrian and vehicles. This causes a need of measure for pedestrian in Kızılay. Therefore, the city uses over and underpasses for pedestrian to keep them away from vehicle traffic. Although it is seen as a solution, it only restricts the pedestrian movement. In this context, pedestrian is seen as just an obstacle for vehicle traffic.

As mentioned by Babalık-Sutcliffe (2005, 296), today, in Kızılay Zone, there are 17 overpasses which are concentrated along Atatürk Boulevard, Meşrutiyet and Mithatpaşa Streets, as seen in Figure 5.17. By these passes, pedestrian are segregated from vehicle traffic. The aim of this is to increase pedestrian safety and speed of vehicle flow and thus to decrease traffic congestion by segregating the vehicle traffic and pedestrian flow.

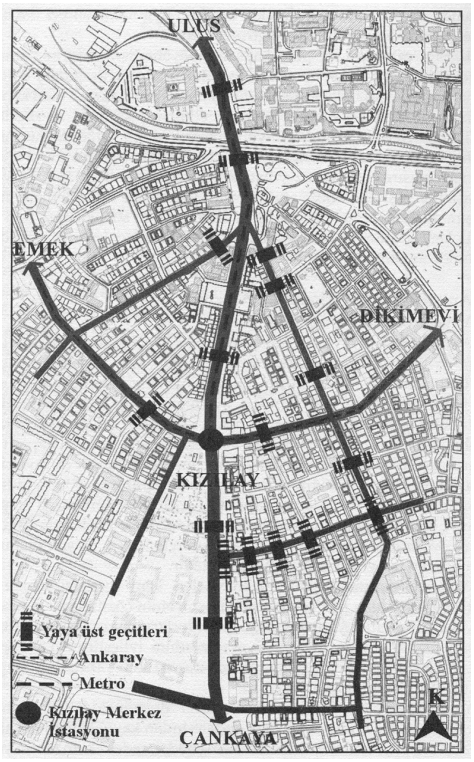


Figure 5.17 Pedestrian overpasses at Kızılay Zone. (Babalık-Sutcliffe, 2005, 296)

However, the expected solutions could not be achieved. Instead of the fact that pedestrian are forced to use overpasses along Meşrutiyet Street, they still cross the street from the same level due to the difficulty of using overpasses. As seen in Figure 5.18, it is obvious that now there is "a mix way of living between vehicles and pedestrians" (Çimen, 2001, 64). This shows us that this arrangement devoted to pedestrian passes could not increase pedestrian safety as well as not improve the condition of traffic flow.

It should also be noted that, the use of over passes is not so easy that pedestrian has to climb up to 8-10 meter high in order to continue his journey in the city center. In general, over and under passes make pedestrian movement more difficult especially of weak road users such as children, disabled, elderly. In addition, overpasses, on the one hand, make difficult pedestrian movement in city center, on the other hand, aesthetically have negative effects on vision of the city (Kızılay Kent Merkezi Çalışma Grubu, 2004).

Figure 5.18 Mix way of living between vehicles and pedestrians. (Personal Archive, 2005)

A wide variety of vehicle types including buses, private cars and taxis share the same road space in Kızılay. All these vehicles, which have varied dynamic and static characteristics, share the same road. There is also no segregation between private cars and public transport vehicles except rail system vehicles. This often leads to unsafe conditions for buses and congested conditions for motorized vehicles. Although bus commuters and pedestrians together form the largest group of roads users in Ankara, the system could not provide them special offers.

There are no specific facilities for buses except bus shelters. Bus stops are concentrated on Meşrutiyet and Mithatpaşa Streets as well as on the Atatürk Boulevard. Public transport vehicles are affected by existing traffic at bus stops (Figure 5.19) and in their trips. The main reasons behind this problem can be classified with absence of special lane or separated roads for public transport, and using of bus stops by more than one lane, such as taxis, private cars, and public buses.

Figure 5.19 General views from Meşrutiyet Street and Ziya Gökalp Boulevard (Personal Archive, 2005)

One of the most important space problems that should be stressed in Kızılay is the need of parking space in response to the invasion of vehicles. Encouraging vehicle traffic needs more space. As seen in Figure 5.20, the existing parking spaces around Kızılay Zone are not enough and can not provide the need of parking. In the process of location selection, they are dispersed to the region and they have no relation between the transport system. Due to the lack of space, vehicles are forced to use sidewalks, streets, and even school gardens for the need of parking. The invasion of sidewalks by vehicles thus narrowed sidewalks are main obstacles for pedestrian movement.

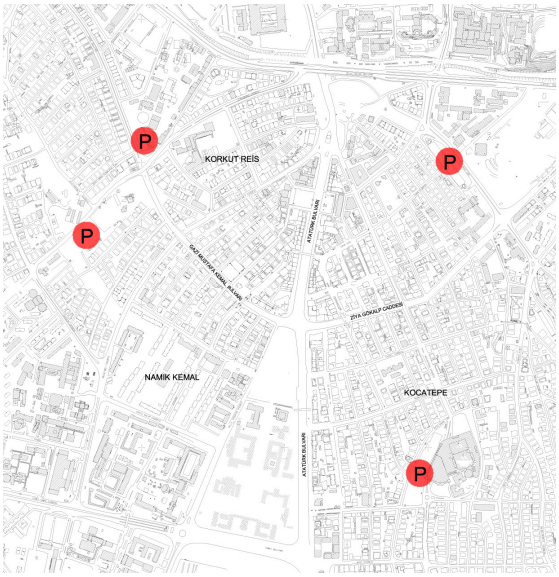


Figure 5.20 Distribution of parking spaces around Kızılay Zone. (Personal drawing)

The other arrangement for pedestrian safety is pedestrianization. As mentioned before, some streets around Kızılay Zone were closed to vehicle traffic and pedestrianized such as Sakarya, Yüksel and İzmir Pedestrian Regions. Given problems of these regions, the majority pedestrian spaces are invaded by sideboards and advertisement boards (Figure 5.21). These obstacles reduce space quality and restrict the pedestrian movement. This fact shows that closing some streets to vehicle traffic is not enough to achieve a full pedestrian environment. In Ankara, sufficient measures for pedestrian safety have not developed yet. From this point of view, there is a need of the management of pedestrianized streets. Streets should be pedestrianized in accordance of some criteria regarding to economic and social quality. Pedestrianization is a crucial issue so it required a detailed pedestrian master plan. It is needed to establish a framework for improvements that will enhance the pedestrian environment and increase opportunities to choose walking as a mode of transport.

Figure 5.21Trade invasion in pedestrian spaces. (Personal Archive, 2005)

5.5 Proposals on the Urban Transportation System of Ankara

Most of the existing transport problems are result of giving priority to private car in central areas while restricting public transport and pedestrian movement. As mentioned before, rapid urbanization and incapability of controlling this development by planning decisions are the main causes of these types of problems. In Ankara, the local management could not sufficiently control urban development.

It is clear that the increase in personal income has also resulted in rapid increase in the number of private cars. Although it is accepted as a big problem for urban transport, it is likely that with correct transport policies and appropriate land use strategies, high car ownership levels would not negatively affect pedestrian movement and urban quality of city center.

Parallel to rapid urbanization, commercial functions and shopping centers has jumped to the periphery of center. It should be noted that this would accelerate the process of decentralization. Therefore, the city center could lose its economic importance. On the observation of the experiences shows that sustainable urban transport system is so effective on the reorganization of central area in terms of social and economic issues.

Transportation concept, which has become one of the main elements in development process of city, has resulted in crucial problems in city due to wrong identification of problems and wrong applications. Therefore, before developing a proposed scheme for Ankara, it is crucial to define the causes and reasons of transport problems. Till nowadays, transportation problem in Kızılay have been evaluated only as traffic congestion, thus, transportation efforts have focused on only increasing capacity of existing road system rather than creating a system regarding managing travel demand. Indeed, as stated before, the most effective way to obtain sustainability in transport system is dependent on managing the travel demand of commuters.

In the light of experiences, it is clear that the aim to decrease the number of private cars and to create a sustainable transport system encouraging pedestrian movement can be only achieved by implementing a series of complementary transportation and city planning efforts from regional planning to street design. For example; investments in public transport alone could not stop the increase in vehicle traffic. It needs an integrated transport plan including land-use planning, parking policies and other measures. Success depends on a combination of political commitment and operational efficiency. In this respect, it is seen that any proposal alone creates a restricted solution like applications seen in Ankara experience.

Instead of looking problems with a restricted point of view, it should be accepted that a balanced and sustainable transport system can be achieved through implementing a transportation master plan. This approach would have positive impacts on not only city center but also residential areas.

At this point, it should be noted that the city could not overcome traffic problem by the approaches of building more roads and increasing roadway capacity through engineering applications. This application could not achieve permanent results. It results in only accelerating of traffic towards city center and increasing demand on those roads by drivers. Looking to case of Ankara, it is certain that the efforts for solving problems with underground tunnel projects and increasing roadway capacity rather than promotion of public transport have increased traffic pressure on Kızılay Square.

The need to change the mode share for travel is clearly achieved by a set of measures on the basis of comprehensive urban transport system. It is clear that traditional policy is not enough to tackle traffic problems on city so contemporary policies should be developed according to city's physical conditions, and demand management policies should be implemented. An integrated approach to pedestrian and vehicle issues require not only traditional measures such as pedestrianization and road crossings, but also more radical approaches, such as rerouting traffic and reallocation of road space for pedestrians. It is certain that this could be achieved not only by such physical regulations but also by demand management policies.

Problems that stem from assignment of priority to private cars cause a need to establish a sustainable transport system managing travel demand of people in their trips. To obtain a sustainable transport system for Ankara, this study proposes a transport scheme including management of car traffic, encouraging public transport, and pedestrianizing the inner core.

5.5.1 A Proposal for the Management of Transportation System of Ankara

In accordance to its urban macroform, the city of Ankara consists of three parts which are the centers, the nuclei and the suburbs (Figure 5.22). In this scope, a proposed scheme should cover all of them and take into consideration the relations between these three parts of the city. This study proposes a transport system including relation between city center and suburbs and inner city residential areas, and in the scope of Kızılay Zone, as follows:

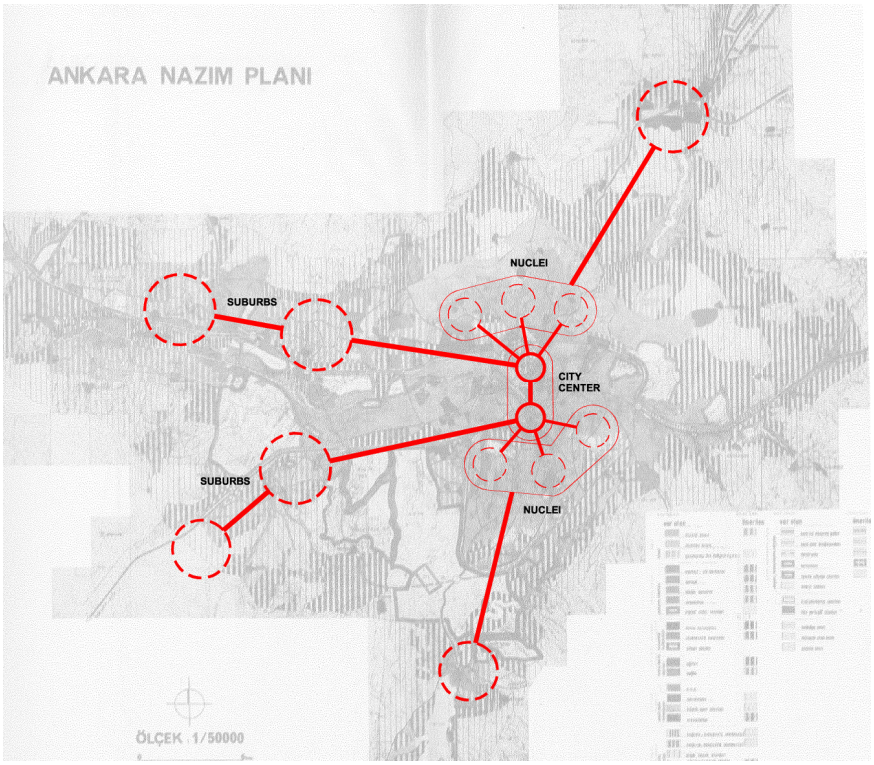


Figure 5.22 Components of the city of Ankara. (Personal drawing)

5.5.1.1 For Suburbs

On the observation of the experiences show that in a sustainable city, transport system is mostly depended on rail transport vehicles such as metro, light rail. It is likely to say that rail transportation is one of most important parts in sustainable transport system. As mentioned before, the existing rail network of Ankara is not sufficient to meet the travel demand of people so it should be extended to whole city, particularly on to suburbs. Metro system is needed to meet increasing travel demand and to improve the quality of public transport. It is clear that giving priority to public transport enable the city to decrease the ratio of private cars in all trips and pedestrians to move more freely and more safety in city. Therefore, public transportation should be taken into account in any urban planning decisions.

As for the relation between suburbs and city center, in proposed scheme, these relations are provided by metro network. Thus, at first phase of proposed scheme, the existing metro system should be extended to whole city. In this scope, metro system forms the backbone of inner city trips (Figure 5.23). Rail transport system is the main way to reach from suburbs to center and thus, other modes of transport system are designed to support it where they could not be provided. In addition, a modern, balanced transportation system requires easy and pleasant transfer from metro system to foot and connection between major parking facilities, bus stops and pedestrian areas. While preparing projects of railway system, metro stations and connection with bus system, pedestrian system, and car parks should also be considered. The metro stations are so important for sustainability of the system that they work as exchange points and enable people to easily transfer to other modes.

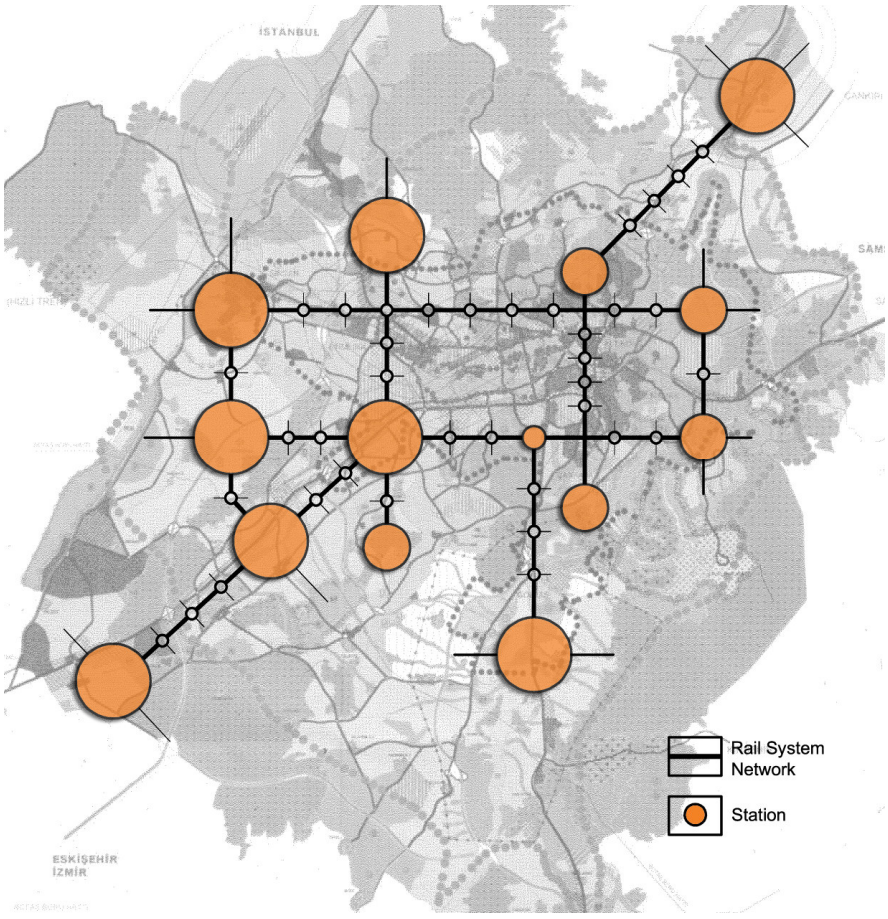


Figure 5.23 Proposed rail transport network for Ankara (Personal drawing)

It is also important to design bus systems in the city as a complementary of the metro network. The bus priority implementations should be developed on the routes where access by the urban rail system cannot be provided. In proposed scheme, bus system is integrated the whole system (rail system) with exchange points. They are serving on the direction between exchange points and residential areas in suburbs.

In the frame of proposed scheme for suburbs, car parks are sensitively located in respect of conveniently integration with pedestrian areas and public transport system. In this scheme, car parks are distributed around metro stations. This would provide people to avoid the need of use their private cars to reach the city center.

Except bus system and private cars, the relation between the metro stations should be also provided by non-motorized modes such as walking and cycling. The use of non-motorized modes is important for sustainability. One of the important components of

pedestrian friendly settlement is using of cycling. Thus, the necessary measures should be taken to promote use of cycling by reserving special lane for bicycles. Traffic calming techniques could also be used for the safety of pedestrian movement. The proposed travel pattern and integration of all modes are summarized in Figure 5.24 below.

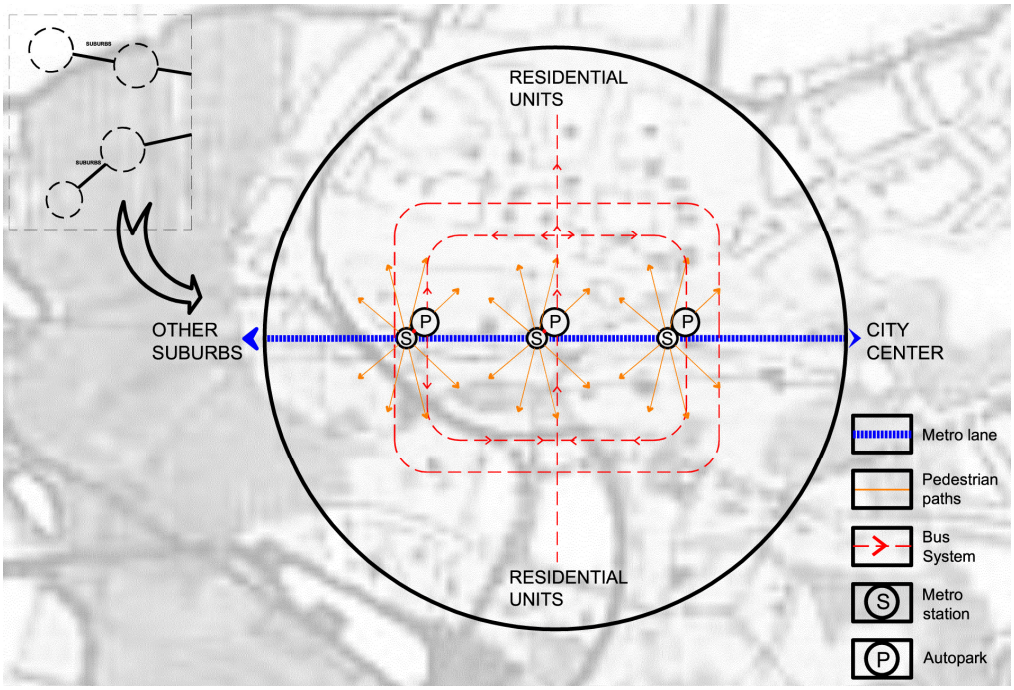


Figure 5.24 Diagram showing the integration of different transport modes and traffic flows in suburbs. (Personal drawing)

5.5.1.2 For Residential areas at inner city

The condition of pedestrians at inner city should also be evaluated in the frame of sustainable transport system. As those of suburbs, rail transport vehicles form the backbone of trips around the city center. Pedestrian ways, car parks and bus stops are concentrated around metro stations in order to enable commuters to easily change modes (Figure 5.25). The tendency of changing the share of modes causes a need to extend rail transport system to whole city as well as to suburbs. Except the direction of its network, the location selection of their stations should also be determined with respect to walking distance. This is important for accepting walking as a transport

mode because increasing walking distance creates difficulties for pedestrians and decreases availability to metro stations by foot.

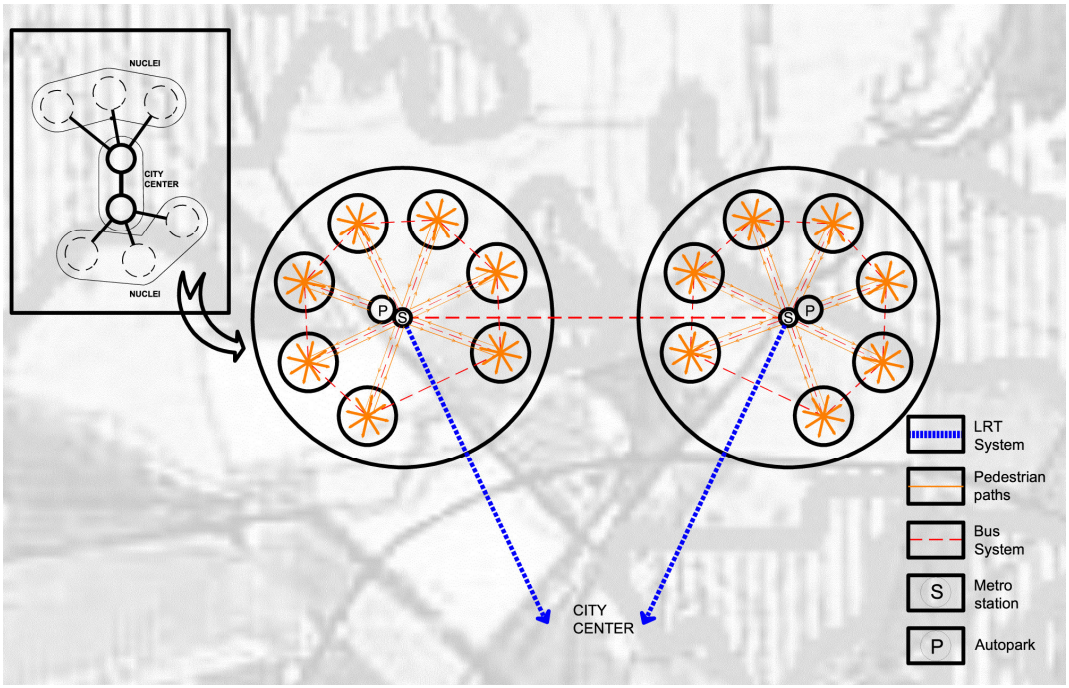


Figure 5.25 Diagram showing the integration of different transport modes and relations between the city centers and inner city residential units. (Personal drawing)

In proposed scheme, stations of light rail system are located with the distance of 500 meter which is considered appropriate distance for walking. The distance of 500 meter creates a zone in which pedestrian accessibility is high, as seen in Figure 5.26. It is thought that bus system will integrate with rail transport vehicles at stations and provide accessibility where light rail system cannot provide. This feature of system provides opportunity to pedestrian in the process of easily integration to whole system.

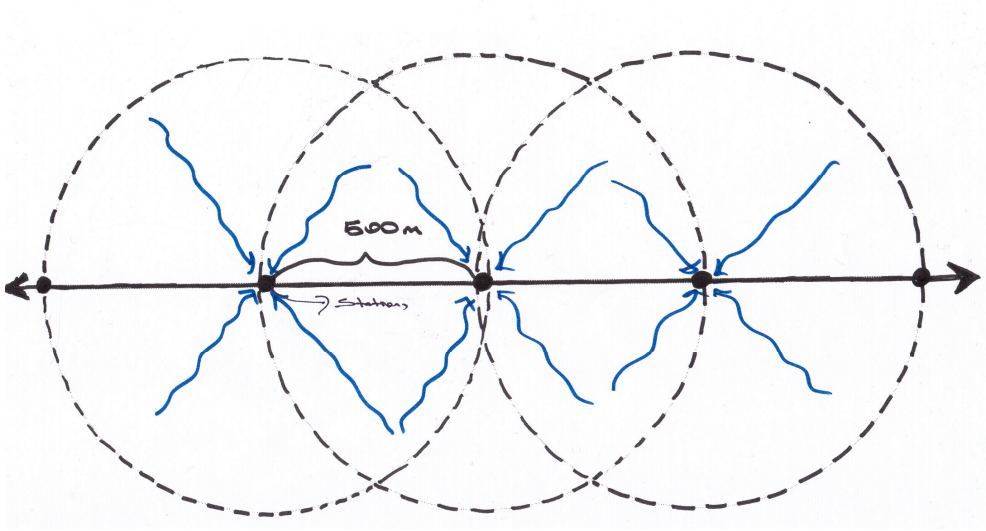


Figure 5.26 Proposed rail transport network between the city centers and suburb and location selection of rail transport stations. (Personal drawing)

In addition, traffic calming techniques including physical measures should be applied in residential area in order to reduce speed of motor vehicles and thus to improve conditions for non-motorized street users such as pedestrians and cyclists. This causes a need to reorganize streets. It includes reallocating road space in favor of pedestrians, widening of sidewalks, and physical restriction for cutting vehicle speed. It is essential that reorganization of streets as to traffic calming techniques enables the concept of pedestrianization to shift from the city center to the residential areas.

5.5.1.3. For Kızılay Zone

The main measure to be implemented in Kızılay Zone is about decreasing the access of private cars to center. Proposed scheme for Kızılay Zone involves a system of three parts. The general aim is to decrease access of vehicle traffic and then to create a pedestrian friendly environment at Kızılay Zone.

The first part is related with the regional scale about changing the transportation patterns from car dominance to more sustainable system. As stated before, to achieve sustainability, it is required of promotion of rail transport system in daily trips rather

than using private cars. The proposed scheme firstly focuses on decreasing the tendency of using private cars to the city center through providing metro lanes.

As mentioned before, due to its physical development, traffic in Kızılay depends on two main axes. It is evident that much of the action must be taken to tackle the dependency on this structure. In proposed scheme, it is aimed that inner city trips would be made as much as possible by rail transport vehicles. Thus, the promotion of public transport could decrease access to the city center with private cars.

It is certain that the amount of traffic passing through the center can be reduced by not only providing a different means of transport for private cars into the city but also managing traffic flow by shifting of car traffic to other streets around center and pedestrianizing the inner core.

The second part is interested in the scale of Kızılay Zone. Instead of the fact that local management has orientated vehicle traffic into Meşrutiyet and Necatibey Streets, they are not able to keep traffic away from Kızılay. Instead, orientation of traffic supported by public transport system could obtain satisfactory results. After guiding traffic out of the city center, the city could entirely close access to Kızılay Square for both private cars and buses.

In this frame, vehicles that have to pass toward Kızılay are orientated to Meşrutiyet and Necatibey Streets. These streets are sensitively proposed to get a pedestrian oriented zone around the Square. This forms the first stage of pedestrian oriented zone in Kızılay. In generally, the aim of this orientation is to overcome requirement of passing through center and finally to make this change possible.

It is seen in Figure 5.27, the orientation of vehicle traffic to streets surrounding Atatürk Boulevard creates a pedestrian oriented zone covering Kızılay Square. It is aimed by this zone to achieve a full integration between pedestrian and other modes by increasing the space quality through pedestrian and public transport priority measures. It should be noted that zoning of Kızılay Zone in accordance with

pedestrian's aspect enables Ankara to evaluate pedestrian problems in the frame of a system rather than local solutions such as closing streets to vehicles.

The measures to be implemented in this zone focus also on reorganization of traffic system to create pedestrian areas entirely segregated from car traffic. This car restricted areas offer people a pedestrian-friendly environment with high aesthetic and green features providing social interactions between people throughout the day. In these areas, access for private cars into streets, except for emergency vehicles and garbage trucks, as well as for delivery vehicles, will be fully restricted.

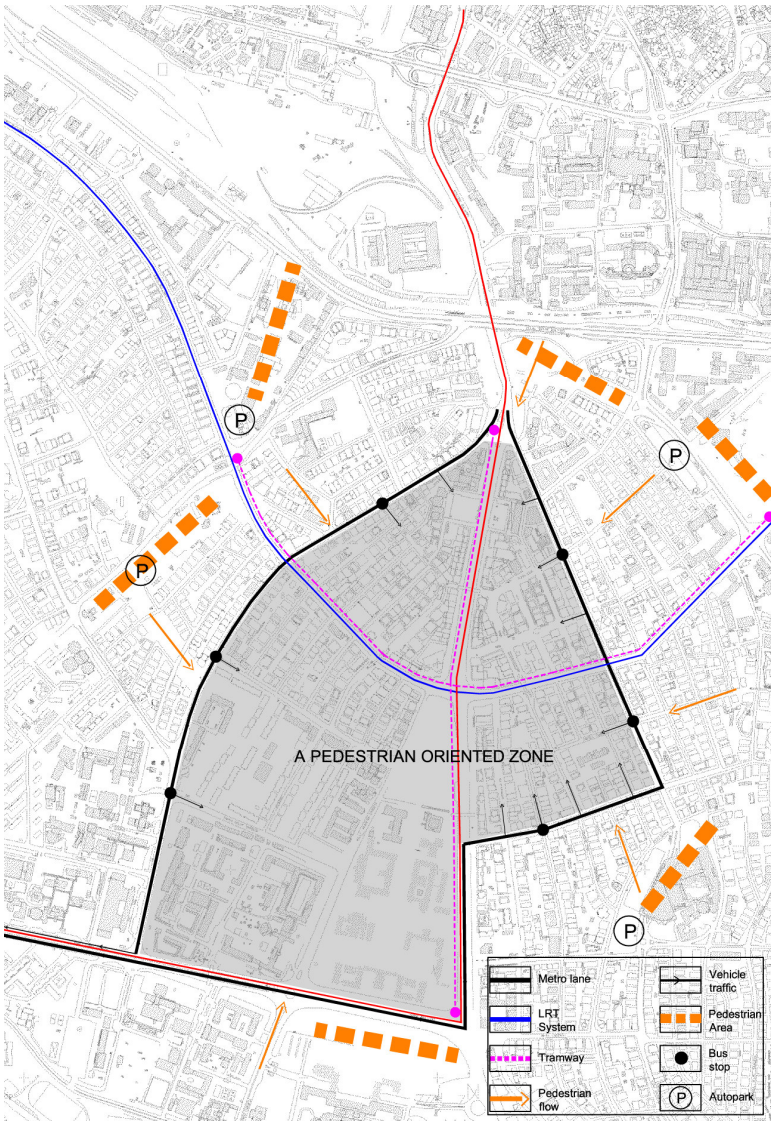


Figure 5.27 Proposed car-restricted zone in Kızılay Zone. (Personal drawing)

In the pedestrian oriented zone, walking forms the main mode of transport. The intended aim in this zone is to create “streets for people” in which it would be expected to give more road space and priority to walking. It needs a range of measures, including reallocating road space to pedestrians, providing direct and convenient walking routes, improving footpath maintenance and cleanliness.

As stated in the previous chapters, one of the most important push-measure for reducing unnecessary car traffic is parking management. Parking in the city center should be legally or physically kept low to limit car flows to the city center. According to proposed scheme, parking management involves a set of measures of the restriction and control of parking spaces in order to obtain fewer parking spaces in the city center.

As for the location selection of car parks, they should be sensitively located in respect of discourage of car uses and conveniently integration with pedestrian areas. In the scheme, car parks are distributed out of the core in order to reduce parking capacities in the city center. Direct access from streets to high capacity car parks would provide to avoid the need for wider streets within core of central area for parking. In addition, on-road parking by private cars except public transport and taxis should be allowed at only certain points on Necatibey and Mithatpaşa Roads. The parking of service and delivery vehicles for varying periods should be provided with the premises.

The relation between these car parks and CBD functions should be provided through designing pedestrian ways in car-restricted zones. In this way, pedestrians could radiate to center from car parks, bus stops and railway stations. The integration of car and public transport users with pedestrian system through using pedestrian ways is critical point for reorganization of Kızılay. This would increase interaction between different transport modes and the different land-use types.

Most important issue in the reorganization of Kızılay Zone is creating pedestrian ways. They aim to provide opportunities for greater safety, security, and social contact for pedestrians as well as to continue their trips by foot in the city center. In

this respect, some car-restricted zones should be converted into “pedestrian street”, which will attract the customer, who because on foot already, may more easily stop and buy. As in experiences mentioned before, it is likely that this remarkable redesign movement will gain an important economic value to the city center by creating a new shopping center as an alternative for those out of city center. Experiences show that converting streets into pedestrian areas, with attractive public transport access, has increased turnover for local commerce.

No doubt, integration of public vehicles and pedestrian is important for pedestrian in moving more freely and more safety. Therefore, priority to public transport should be achieved by integration of measures, including separated bus lines, signalization priority over private cars. Segregated bus lanes are necessary to meet increasing travel demand and to improve public transport. In many cities around the world the special lane is reserved for buses. Bus lanes system should be developed along congested roads. However, this measure is not enough to overcome private car uses so it should be supported by restrictive management policies on car use.

In Kızılay Zone, access to pedestrian areas is provided only by public services such as tram in order to overcome the difficulties of increasing walking distances and availability to public stations. In that sense, it could be proposed free public services through Atatürk and Ziya Gökalp Boulevards in order to enable people to easily change transport mode by using car parks in Maltepe, Sıhhıye. It is worth noticing that, Güvenpark, Kurtuluş Parkı, Zafer Meydanı and Old Gas stations which have a potential of pedestrian so they should be considered as a part of pedestrian system in the process of pedestrianization. It is possible to redesign these areas in respect of concept of sustainability to meet the needs of pedestrian.

CHAPTER 6

CONCLUSION

The observations on the cities that have experienced the transport problem have shown that there is a clear relationship between traffic problem and automobile use. In this scope, this study evaluates the place and the level of automobile in traffic problem in the extent of cities that have faced with urban transportation problem. On the other hand, it evaluates the changes in the transport planning process, its needed applications and impacts on the urban pattern. These impacts can be seen not only on the physical structure of the city but also on the person's decision and behavior in their daily trips. In the light of research on its planning process with its historical and physical evaluation, this study also shows the place of Ankara in the urban transport policy process.

The planning efforts in Ankara can be summarized in four periods after its declaration as a capital city. Although Ankara has a long history, the city planning process started after 1920's and emphasized on building a new city in order to represent the identity of the Modern republic. The ultimate aim of this study is to set the framework for the transport system of Ankara in the light of experiences which have succeed in both decision and implementing transport policies.

From the observation on traffic problem, after the Second World War, the increase in automobile supply and the lack of road network caused traffic problem in the city. This increase also caused a new term called "automobile dependence" to invade the city region. First of all, automobile dependence changed the balance between the uses of the city which had been in balance for centuries. The development in transportation changed the transport pattern of cities and automobile became a dominant factor in the city. Automobile dependence is so crucial that the physical form of cities is shaped entirely by transport technologies. In other words, unlike the

traditional city, that had been shape in response to human needs and behavior, in automobile dependent city all efforts focus on meeting the special needs of automobile. Thus, automobile gives the city opportunity to expand 40 to 50 km in the region.

However, after automobile dependence reached to high level, the city faced with erosion by automobile. At this point, automobile become the main determinant and all of policies are to meet its needs by supplying new infrastructure such as building more and more roads. From this point of view, it is seen that automobile is the main cause of traffic problem. However, automobile should not be considered as an enemy but an important development facilitating our lives. Actually, the problem is entirely related not only to automobile use but also to the transportation approach regarding to the dependence of automobile.

From the research of historical development of the city, it is taken that traffic problem is usual for developed city. The large increase in motor vehicle traffic inside the city center has lead to unsustainable conditions for the environment, and people. Traffic congestion and thus pedestrian-vehicle conflict are the results of increasing car use and the applications for supporting private car use. It is inevitable that car ownership is increasing in parallel to increase in income level. However, according to the experiences, the cause of problem should not be associated only with automobile use. In reality, the problem is result of being insufficient in managing the travel demand of people. The name of problem is actually the efforts of achieving sustainability in the transport system. The issue of traffic congestion as well as of pedestrianization of the inner core is only a part of this aim. It is crucial to note that the first phase for a sustainable transport system is surely clear definition of problem and its causes.

As a response to increasing transport problem, the concept of urban transport planning has gained importance. In the beginning most of efforts focused only on improving accessibility through increasing capacity of the system. As mentioned before, this gives planning process a mechanistic character due to the dominance of traffic engineers. In this context, this type of planning has a restricted point of view

to the problem so traditional policies are not enough to tackle the transport problem. This caused a need to leave the traditional policies and instead, to develop contemporary ones. This tendency continued to the new approach that occurred as a reflection of automobile dependence. This has been developed in order to give pedestrians more opportunities in the city center and to achieve a balance between all modes and thus create a sustainable transport system.

In 1980's there was a turning point for transport planning approach. A new term called "sustainability" emerged. This term is a contemporary approach dealing with meeting today's need without adversely affecting the ability of future generation to meet their needs. It has many dimensions like ecological, economic and social. Thus, cities should develop some strategies considering not only improving accessibility but also its ecological, economic, and social aspects.

These strategies are dependent on the concept of travel demand management. It is clear that travel demand management is considered as one of important keys feature assisting the city to move toward more sustainable urban transport system. The most important task of travel demand management is to decrease the attractiveness of private car use and to change person's decision. This can be reached only by combining all transport modes. As seen in Table 6.1 below, it needs a system where all modes support to each other and do not compete among themselves. Managing the demand for transport is needed several of the policies and actions in order to reduce reliance on the private motor vehicle, to achieve a balance between all modes and finally to improve the livability of cities. These are achieved by the improvement of alternative transport options such as public transport and non-motorized modes, physical regulatory restrictions on car use.

In reference to the research on the global experiences, it can be said that cities need complementary transportation programs integrated several levels of concerns to obtain a sustainable transport system. It consists of several interrelated policies which are not competitive but complementary. It is clear that in many ways the role of each measure is interlinked and each represents an important contributor necessary to provide satisfactory results. It is certain that this approach enables a greater

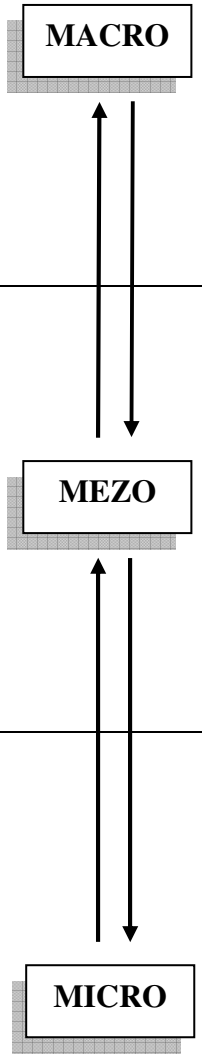
participation between all modes. In other words, it provides a combination of all modes that will make the system more attractive for people.

Table 6.1 Contemporary Transport Planning for overcoming automobile dependence and achieving a sustainable and pedestrian oriented transportation system.

MACRO	• **Promotion of Public Transportation**
	  • Regional Transit System
	  (Suburban Rail System – Metro System)
	  • Transit System Operations
	• **Reorganization of traffic flows**
	  (Ring Road System)
	• **Transit Oriented Growth**

MEZO	• **Promotion of Public Transportation**
	  • Improvements of Transit
	  (bus, tram, LRT)
	  • Transit Priority Measures
	  o Roadway Improvements
	  o Traffic Signal Priority
	  o Separate Right of Way
	• **Regional Traffic Calming**

MICRO	• **Favouring Non-Motorized Modes**
	  • Pedestrianization
	  (creating car-free areas)
	  • Cycling
	  o Reallocating road space
	  o Traffic Calming
	  o Priority for pedestrians
	• **Regulatory Restrictions**
	  o Parking management
	  o Road pricing
	  o Car sharing



This study has also concentrated on examples of the more successful stories of transport planning process. In this scope, Zürich, Freiburg, Strasbourg and Copenhagen are evaluated as examples with their viewpoints to the transport problem and implementation of transport programs. Given the fact that these cities have successfully managed the travel demand through regularly implementing complementary programs, they could achieve sustainability and thus a pedestrian oriented transportation system. This depends on encouraging all modes of transport rather than only one mode especially automobile. These cities tried to associate declining social and environmental conditions by changing their transportation character. One of the most important outcomes of the literature reviews is the fact that urban transportation planning is considered as an important tool in the process of creating a pleasant environment in the city.

At this point, it should be noted that these efforts focus not only on increasing the livability of the city by declining the car uses but also on changing completely the transport system from car-oriented to pedestrian-oriented through taking care of all modes especially public transport and non-motorized modes.

Observations on the planning periods of Ankara have shown that planning decision have an important part to play in relation to traffic problem concentrated in Kızılay Zone. Land use decision and transportation network are important causes of transport problem. Kızılay and Ulus are two center of the city. As proposed in the Jansen Plan, the unique connection between these two zones is provided by Atatürk Boulevard. As proposed by Jansen, the city was developed in the north-south direction between Çankaya and Keçiören along and around Atatürk Boulevard and in the east-west direction between Bahçelievler and Cebeci. Till nowadays, Ankara has not been able to offer any alternative to this development structure depending on these two backbones.

In addition, unexpected population growth and insufficiency in providing social, and economic infrastructure to this growth increased the pressure on the existing infrastructure. As a response, the city could not take control under the rapid urbanization by planning decisions. Thus, after 1950's, the city faced with the

unplanned development surrounding the city center. Consequently, Ankara is now suffering from the lack of adequate road network to provide alternatives for the Boulevard.

Like in many metropolitans of Turkey, most of efforts in Ankara emphasize on improving urban transport system. In spite of the fact that the recent urban transport projects are presented as solutions for the traffic congestion problems, all of them cannot provide any solution except accelerating car traffic towards the city center. Problem that stems form dependence on only Atatürk Boulevard and car priority measures cause a conflict between car and pedestrians in Kızılay Zone. Pedestrian are forced to use narrowed sidewalks due to the lack of spaces for them. To meet the increase in vehicle traffic the city allocated the spaces for parking needs of vehicle.

Since 1980's, many new residential areas have developed especially at the western part of the city. The insufficiency of public transportation services between the city centers and these new settlements results in high level of car use and thus traffic congestion. The existing modes of transportation are adequate and cannot provide a satisfactory service level for those directions. The city could not offer effective solutions for this except buses.

A rapid transit line has been constructed on the western route. It is clear that this system provide access those settlements at the periphery of the city by public transport and a decrease in the use of private car. However, it is certain that rail transit system alone is not adequate for a significant decrease so it is needed to be provided by managerial measures such as promotion of non-motorized modes, parking restrictions and reorganization of traffic flows.

As for the transportation pattern of Ankara, today, its existing public services network is not enough for the effective service level. However, it is clear that more effective use of the existing network can result in the reduction of urban transport problem related to increasing car use. This reduction could not be achieved by increasing capacity of existing road network, however, only by encouraging modes of transport which are more efficient in terms of space utilization. This statement

indicates the rail transit system to be formed the backbone of whole transport system. Indeed, rail transit system and non-motorized modes (walking and cycling) form the backbone in the sustainable transport system. In this scope, the city should promote walking as the mode of choice for short trips by giving them priority.

In the frame of the concept of travel demand management, this study proposes a transport system for Ankara. Proposed scheme for Ankara is developed on the base of rail transport system as in sustainable transport system. The assumption is that rail transport vehicles like metro and light rail system form the backbone of the whole transport. This is crucial in the process of decreasing private car use. In this system, bus system and private cars are not competitive but complementary to rail transport system. They offer access to people where rail transport cannot be provided.

The city of Ankara is formed by three parts so proposed system should be developed with the assumption that transport system has to evaluate all relations between these parts. Therefore, proposed scheme consists of three kinds of parts. First one is about regional measures and interested in the connection between the city centers and suburbs. Second one is dealing with residential areas around the city centers and finally third part includes creating a pedestrian oriented zone in Kızılay.

The assumption behind this system is that a sufficient transport infrastructure must fulfill the requirements of all road users. Therefore, this system must also take care of pedestrians and other non-motorized modes by meeting their special needs. This issue is important for the efficiency of the system. In addition, proposals includes other related programs addressing personal choice such as integration of all modes, parking regulations, car restricted zones.

In that contextual framework, in the process of sustainability, the most important issue is developing a set of complementary programs including all scales from regional to street design. The only way to overcome the transport problems is management of travel demand of people. In addition, the measures restricting vehicle traffic requires strong public support. Therefore, public should take an active role in forcing the city administration in order to implement transit priority programs more

comprehensively. In the scope of the case of Ankara, this study puts forward the need of comprehensively implementing travel demand management in order to achieve a significant decrease in car use and thus sustainability in transport pattern of the city.

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